

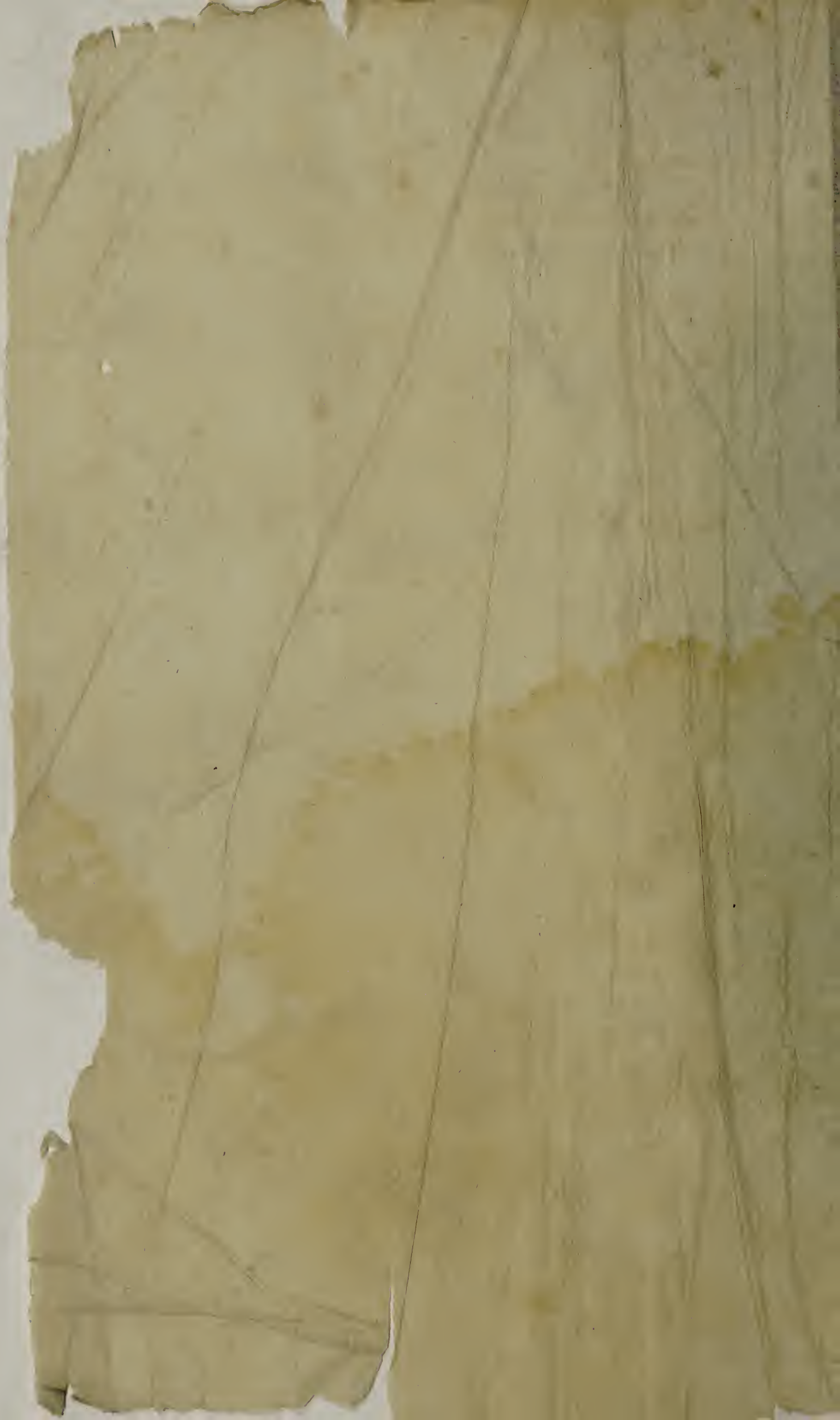


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The above General FRONTISPIECE elegantly Engraved by MR TAYLOR, Represents to the Public that the following New and Complete Body or System of Natural History is not confined to the Natural History of any particular Country or place, but that it pursues the pleasing Subject throughout the WHOLE WORLD at large, and traces the History of all Animals, Vegetables, Minerals, the Theory of the Earth, &c. from the Creation to the present Time.



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NATURAL HISTORY;

Being a Grand, Accurate, and Extensive

Display of Animated Nature.

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Accurate Descriptions and faithful Histories of all the several Classes of ANIMALS, which inhabit
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Including an authentic Account of all the infinite Variety of

BEASTS, BIRDS, FISHES, REPTILES, INSECTS, and AMPHIBIOUS CREATURES, such as FROGS, LIZARDS, SERPENTS, &c.
And other ANIMALS, too numerous to mention in a TITLE PAGE.

Comprehending also, a General and very particular Account and Description of all Kinds of

VEGETABLES, FOSSILS, SHELLS, MINERALS, &c.—and a Theory of the EARTH in general.

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New Discoveries in NATURAL HISTORY, acquired by those celebrated Circumnavigators of the present Reign, viz. BYRON, WALLIS,
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In this Work will likewise be given, a particular Account of the Properties, Virtues, and various Uses of all the different Subjects of NATURAL
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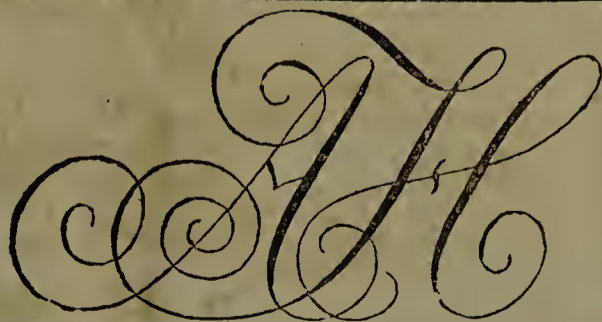
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P R E F A C E.

NATURAL HISTORY, whether we consider the amazing variety with which it abounds, or that order and uniformity which it points out in the works of the Great Creator, may be considered as a spacious field, over which the eye of curiosity ranges with incessant delight, the attentive examiner expatiates with progressive improvements, and where taste, while she gathers the choicest flowers of Literature, is entertained with the most pleasing ideas. This captivating science includes every object which the whole universe presents to our view; nor, on this extensive, fertile, and enchanting ground, does the assiduous enquirer, in his researches, ever labour in vain. We reason here, from what we know, and discoveries, equally useful to individuals, and the public, are the result of a diligent enquiry. Many other sciences terminate frequently in doubt, or rest in bare speculation; but here, every step is marked with certainty. Upon a transient view of the works of nature, our admiration is excited; her numerous productions fill us with astonishment; her art, her mechanism, her infinite resources, nay even her irregularities, afford an amusement not less rational than it is pleasing. The various wonders alone of the animal, the vegetable, or the mineral world, exceed all powers of computation. The hand of the Almighty seems to have formed, not one determined number, one settled chain of species, but, with a diffusive power, to have spread at once a world of beings, a perpetual alternative of destruction and renovation. And, in the contemplation of the objects of Natural History, besides the benefits resulting to human society, our veneration by degrees is exalted towards the first prime agent, or great cause of such wonderful effects, who did not bestow so much workmanship upon his creatures, to be looked upon with a careless, incurious eye, especially to have them slighted, or contemned: and since the works of creation are so many demonstrations of infinite wisdom and power, they ought to be admired by the rational part of Nature's Works, as manifestations of divine glory; while, at the same time, they should serve us as so many arguments, exciting us to a constant fear of God, and a steady obedience to all his laws.

The Study of Natural History, and the improvements made in this science, have been the laborious employment both of the past and present ages: Natural History has always been recommended by the learned, and admired by all mankind, as the hand-maid, or rather mistress of the arts. But though, from the earliest times, this noble subject has employed the pens of eminent writers, both in our own and foreign countries, yet it is but lately that it began to dawn in these kingdoms; and then a contracted commerce could not furnish the lights or materials we now enjoy; nor have the genius of earlier investigators, nor the industry of modern authors, understood or copied nature in a clear and comprehensive manner; nor have they ranged their indigested matter in that form, as to render the whole of their systems distinct and perspicuous. In these works, which have escaped the wreck of time, a vast design, and extensive knowledge, are apparent; nevertheless, things are considered only in general lights, and the subject is left when it becomes too minute, or remote from their confined point of view. Many excellent writers have also failed in the exactness of their descriptions. There are creatures described by the naturalists of antiquity, which are so imperfectly characterized, that it seems difficult to determine to what animals now subsisting we can refer the description. As to the laborious and voluminous productions of some modern writers, they are insupportably tedious and disgusting, being filled with uncouth terms of art, unnecessary Latin quotations, and unimportant digressions. They abound with a studied display of learning, as if the patience of readers could never tire, or as if the precious moments of time were to be spent only in reading the laboured compositions of pedantic writers, without the least regard to profit or delight. Are these to be expected from dry unentertaining theories? And of what use are classical arrangements without the necessary brevity and perspicuity? By a minute attention to characteristic peculiarities, and nominal distinctions of things, without regard to their instincts, habits, properties, and uses, they omit those circumstances that constitute the most interesting and instructive parts of natural knowledge: on the other hand, by multiplying technical terms, Latin distichs, and unnecessary divisions, instead of impressing the mind with distinct ideas, some only confound it, and, instead of order, introduce confusion: thus making the language and study of the science more difficult than the science itself. With respect to the less exceptionable treatises on this subject, we may with strict truth observe, that they are either mere abstracts from original writers, with all their defects, or too voluminous to be read, or too expensive to be purchased: and after all their indefatigable researches in the lumber-room of antiquity, many particulars, though of the greatest utility, have been totally neglected, or very superficially considered. Indeed, the universe is so spacious a field, and contains so extensive a plan, that after a revolution of successive enquiries, a part of it will be found still to remain uncultivated, and a part unnoticed in its native wildness, without having recourse to New Discoveries, which, in different periods of time, if we may be allowed the expression, enlarge the boundaries of the natural world, and mark out a new employ for the powers of investigation. In the course of these remarks, we have not even glanced at some recent compilations before us, which have been puffed off in a very pompous manner by certain adventurers, in order to take the advantage of credulity. They are, indeed, too contemptible to come under the eye of criticism, being void of excellencies, and replete with errors, though offered to the public on very extravagant terms. To correct the errors, and fill up the deficiencies of former plans, are sufficient reasons for a New and Complete BODY or SYSTEM of NATURAL HISTORY, especially such a one as the present, which will unite Elegance and Cheapness; which will be very extensive, and calculated at once to entertain and improve. And as all the former productions, in this delightful science, are too credulous, too prolix, or too incomplete, we are persuaded that this New and Extensive Work, which will be written in a manner different from all that have appeared on the subject, properly executed throughout in every respect, enriched with all the modern discoveries, and sold on so moderate terms as only sixty sixpenny numbers (each containing more than is usually sold at one shilling) will meet with encouragement from the public at large, and the approbation of our very numerous friends and correspondents, who have prevailed upon us to undertake this great, this important, this useful, this valuable Work. From having exerted our abilities with unremitting assiduity in prior performances, and from having fulfilled, with a scrupulous integrity, prior engagements, we shall enter, with some degree of confidence, This Garden, tempting with delicious fruit; this wild, where flowers and weeds promiscuous shoot; this grand survey of the earth, the sea, the firmament, and animated nature, as far as human conception and labour have penetrated, and capacious as the globe itself. Here, our Readers, companions in delight, but not in the toil, will see displayed the beauties of the Vegetable World, without the fatigue attending travelling, or the dangers inseparable from navigation.—They will have a view of the Four-Footed part of the creation, without a single alarm from savage animals, voracious fishes, or noxious insects.—They will be led, by short and pleasant excursions, to the extent of Terrestrial Continents; and in their way contemplate, without one painful idea—the height of Mountains—the variation of Winds—the causes of Earthquakes—the changes in Volcanoes—the formation of Caverns—the nature and qualities of different Soils, Marshes,

Marshes, Lakes, Running Waters, Perpendicular Heights, &c. And to make every moment of time replete with increasing pleasure, we shall, for their amusement, bring from its interior parts all kinds of Minerals and Fossils—Petri-fied Shells—Subterraneous wood, coal, water, and the various materials of which the globe is composed.—With the same view, the expanse of ocean, even to the limits of the South-Sea, and all its numerous natural productions, will be diligently explored—Fishes—Plants—Water-spouts—Currents—Salt Lakes, &c.—will be described with precision, and in a pleasing and satisfactory stile adapted to the nature of the subject.—And while we thus range in the delightful walks of nature, we shall be induced, when the evening shades prevail, to look up to the spangled canopy, and take a view of those bright orbs, which, as they roll on, proclaim to us the divine hand that made them——

“ Soon as the evening shades prevail,
The moon takes up her wondrous tale,
And, nightly, to the list’ning earth,
Repeats the story of her birth,
While all the planets round her roll,
And spread the truth from pole to pole;
For ever singing, as they shine,
The hand that made them is divine.”——ADDISON.

What an awful sense of the adoration due to the Great Creator must a prospect of this part of the universe inspire! The heavens declare the glory of God. It is the duty of man, made after his image, to proclaim it; nor is it our ambition to be ranked among some of the greatest philosophers, of whom it may be said, while they are describing the wonderful works of God—“ God is not in their thoughts.”

This is but a short sketch, or mere outline of a work, intended to be copious, without being expensive. To enumerate particulars in due order, in this prefatory address, would be tedious, and exceed the limits of a preface. The number of beings endued with life seem, at a cursory view, to be infinite: the forest, the water, the air, teem with animals of different kinds; almost every vegetable, and every leaf, have millions of minute inhabitants, each of which is destined to perform his allotted task. But the active and inquisitive mind is not intimidated with the immense variety; it engages in the laborious employ of numbering, grouping, and classing all the various kinds of beings, animate or inanimate, that fall within its notice; continually discovers new relations between the several parts of the creation; acquires a method of considering them at a time under one point of view; and, at length, perceives that the variety, though great, is not so inscrutable, as might at first be imagined. But one difficulty a faithful Naturalist, or Zoographer, must labour under is, that of separating the imperfections of other writers from their merit, and, particularly, supplying their deficiencies. We have scarcely an author who has made a tolerable attempt toward distributing the Fossils into method, and forming the study of them into a science; not even the arrangements of Dr. Woodward, in his catalogues, by any means approach toward a perfect system. What has been written on the subject of Minerals, serves only to shew how little the authors were acquainted with them, a great part of which, even at this time, lie unnoticed, and unnamed. The same may be said of the histories of Plants, or what is termed Botany, a large portion of which, particularly what relates to the lesser class, commonly called imperfect plants, has either been untouched, or not disposed in any degree of order. As in regard to these, so with the Animals, the lesser and invisible ones, without the assistance of glasses, called Animalcules, and Insects, have been almost totally disregarded: but certainly their want of magnitude is not a sufficient reason for excluding them from their rank among animated beings; yet authors of NATURAL HISTORY in general, even of the latest period of time, either from indolence, or from not having glasses, or from a careless neglect, have passed them over in silence. Indeed, it requires a series of experiments to discover the characters of the minute part of the creation, to which the writers of the following System of NATURAL HISTORY have paid a strict attention. We have a good foundation in our hands, and hope to convince the world that we want not application in raising and finishing the superstructure.

In saying thus much, and by the above observations, we cannot magnify our subject, or render its importance to society greater than it really is: nor is it our intention to raise expectations in our readers, which it may not be in our power to satisfy; for our design is not to amuse the ear with well turned periods, or the imagination with borrowed ornaments; but, as faithful guides, it is our duty to let them know, we are well acquainted with the road, and the several parts of the country, through which they intend to travel. We have not neglected any resources, whereby we might obtain materials for making this Body of NATURAL HISTORY Extensive and Complete. To this end, the discoveries of our late circumnavigators have been carefully attended to, every author has been consulted for authentic information, heaps of lumber have been turned over to detect falshood, travellers, whose judgment and veracity we could rely on, have been consulted; so that it may reasonably be supposed, many parts of this New System of NATURAL HISTORY have exhausted much labour in the execution; that we have been less liable, than superficial observers, to be imposed on by the hear-say relations of credulity; and we are fully persuaded, the descriptions of every object which has come under our consideration, will be found as clear and satisfactory as possible: yet, after all, Public Judgment alone can stamp a value on our endeavours to instruct and entertain; but whatever that decision may be, we shall still have the pleasing satisfaction, at the close of our labours, to know, and without vanity to say, we have discharged, with fidelity, our duty, and left the Science of NATURAL HISTORY, in a better state than we found it. Our work will be illustrated and embellished with a great variety of SUPERB COPPER-PLATES, representing several thousand objects in NATURAL HISTORY, such as Birds, Beasts, Reptiles, Fishes, Insects, Amphibious Creatures, and other Animals, Vegetables, Shells, Minerals, Plants, Fossils, &c. &c. &c. all most accurately drawn from nature, and elegantly engraved by the very best artists of LONDON and PARIS.

It is necessary to observe that several *vain attempts* have been made to deliver *coloured prints* with some Works of this kind, but the absurdity and impracticability of this is now sufficiently obvious; for upon examination, not even two impressions of the same plate, and these coloured by the same hand, can be found alike, nor one of them strictly according to nature. However, to remedy all former defects, and to furnish all ranks of people with an opportunity of perusing, at a cheap and easy rate, so desirable a subject, we beg leave humbly to offer this New, Complete, and Universal Body or System of NATURAL HISTORY, as the very best, and most perfect work of the kind, and at so reasonable a price, as cannot fail to surprise every purchaser. Indeed Mr. Hogg, (to whom we have intrusted the publication) has engaged in the present instance (as he has hitherto performed with regard to his other valuable works) to be content with a moderate profit, and deliver to the public more for Sixpence than others do for a Shilling.

GEORGE HENRY MILLAR.

A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature:

A Work far Superior to every other Publication of the Kind hitherto Published, or now Publishing, as it is calculated on a Plan in which Cheapness and Elegance will be united.

B O O K I.

A New and Complete History and Description of
QUADRUPEDS, or FOUR-FOOTED ANIMALS.

I N T R O D U C T I O N.

NATURAL HISTORY requires method, arrangement, or classing its several parts, without which little progress can be made in the science. It is this alone which fixes the attention to one point, and, by slow degrees, causes it to leave not a single object in the universe unexplored. All former writers, of any acknowledged ability on this subject, have adopted some manner of grouping the several parts of nature; and each one, in this particular, has followed his own ideas, adopted such classical divisions, and placed that class of particulars first, which he conceived to be most interesting, or most entertaining. Some have begun with the history of fossils; others with theoretical dissertations, general systems, and different particulars in the works of creation. For our parts, we think the Animal World, in point of importance, deserves the lead; and of all four-footed animals, we have given the pre-eminence, in this New and Extensive Work, to the HORSE, being a noble animal, admired for his beauties, and whose use is acknowledged in every country. If we take a comparative view of the various animals of the globe, we shall be convinced, that, next to man, quadrupeds demand the foremost place; and therefore we have made them the first objects of our consideration. The similitude between the structure of their bodies and our own, those instincts which they seem to enjoy in a superior degree to the other classes that inhabit and live in air, earth, or water, their constant services to man, or the unceasing enmity they bear him, all render them the most interesting parts of animated nature, and entitle them to our first attention. It is probable, that, in the early ages of the world, all animals were nearer an equality with us than at present. Man, when almost a savage himself, was but ill qualified to civilize the forest. While he continued naked, unsheltered, and unarmed, every wild beast was a formidable rival, and the destruction of such was the first employment of heroes. But when he began to multiply, and arts to accumulate, he soon cleared the plains of his most noxious

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rivals; in time an empire was established by him over all orders; a part was taken under his protection and care, while the rest found a precarious refuge in the solitary wilderness or howling desert. But now, quadrupeds, instead of rivals, are become the assistants of man; to them he allots laborious employments, and finds them content with the smallest retribution.

One obvious and simple division of quadrupeds, is into the domestic and savage; by the former we mean, such as man has taken into friendship, or reduced to obedience; by the latter, those who still preserve their natural independency and ferocity. The savage animal retains at once his liberty and instinct; but man seems to have changed the very nature of domestic animals by cultivation. They have few desires but those which man is willing to grant them. And not only native liberty, their very figure is changed. What an immense variety in the ordinary race of dogs, or horses; yet the whole has been effected by climate and food, seconded by the arts and industry of man. Thus, in some measure, we see nature continually under restraint, in those creatures we have taught to live about us; but it is otherwise when we come to examine the savage tenants of the forest, or the wilderness; there every species preserves its characteristic form, and is strongly impressed with the instincts and appetites of nature. The more remote from mankind, the greater seems to be their sagacity; but as soon as man intrudes upon their society, their spirit of wisdom and industry ceases; and not only this, their courage also is repressed by the vicinity of man. Wherever he approaches, the savage beasts retire; and it is thought, that many species of animals had once birth, which are now totally extinct. The Elk, for instance, which we are certain was once a native of Europe, is now no longer, except in Canada. It is in the forest, therefore, and remote from man, that we must look for those varieties, instincts, and amazing instances of courage, and cunning, which quadrupeds exert in a very high degree. Their various methods of procuring subsistence, may well attract

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our admiration. The rapacious animal is, in every respect, formed for war; yet the various kinds make their incursions in very different ways. The lion and tyger pursue their prey by the view alone, and for this purpose they have a piercing sight. Others hunt by scent; while some lie in wait, and seize whatever comes near them, or they are able to overpower.

In all animals their heads differ from each other, and are generally adapted to their manner of living. In some the head is sharp, the better to facilitate the turning up the earth, in which their food is hid. It is long in others, as in dogs, who find out their prey, and pursue it by the scent. In some, as in the lion, it is short and thick, to give strength to the jaw, and the better to qualify it for combat. Those which feed on grass, are enabled to hold down their heads to the ground by a strong tendon, which extends from the head to the middle of the back. The teeth of carnivorous animals differ, in every respect, from those which feed on vegetables. In the latter, they seem entirely calculated for gathering and bruising their simple food, being edged before, and fitted for cutting, but made broad, for pounding towards the end of the jaw: whereas, the teeth of carnivorous animals are sharp before, and appear formed rather for holding than dividing. They serve as grindstones in the one; and in the other as weapons of defence. In both, however, the surfaces of the grinding teeth are unequal, with cavities and risings which tally with each other, when the jaws are brought into contact. These inequalities better serve for grinding the food; but they grow smoother with age, which is the reason why old animals take a longer time to chew their food than those in the prime and vigour of life. The legs and feet of quadrupeds are exactly suited to the motion and exercise of each animal. In some they are made for strength only, in order to support a vast unweildy frame, and are neither flexible, nor beautifully formed. The elephant, the rhinoceros, and the sea-horse, have legs resembling pillars: whereas deers, hares, and other animals, whose safety depends upon their flight, have slender and nervous legs. The means of safety are indeed superior to those of offence, and it is only by patience, perseverance, and industry, that the pursuing animal can succeed; and were it not for this advantage, they would soon become the prey of every carnivorous animal. The feet of some, that feed upon fish alone, are fitted for swimming: the toes of these animals are joined together with membranes like those of geese and ducks, by which they swim with great rapidity. Animals that lead a life of hostility, and devour others, have their feet armed with sharp claws, which some of them can sheath, and unsheath, at pleasure: on the contrary, peaceful animals have generally hoofs, which serve some of them as weapons of defence, and are more convenient to all for traversing extensive tracts of country, than the claw-feet of their hostile pursuers. The stomach is generally proportioned to the quality of the animal's food, or the ease, or difficulty of obtaining it. In those who live upon flesh, and such nourishing substances, it is small and glandular, affording such juices as are best adapted to digest and macerate its contents. On the contrary, such animals as feed entirely upon vegetables, have a capacious stomach; and ruminating animals, or such as chew the cud, have four stomachs; all which serve to prepare and turn their gross food into proper nutriment.

Nature seems to have fitted all creatures for procuring food, though never without a proper exertion of their strength, or industry. Large animals of the forest, such as the elephant and lion, want swiftness, and a distinguishing scent for catching their prey, but have strength to overcome it: others, who want strength, such as the wolf and the fox, make it up by their cunning; and those, to whom nature has denied both strength and speed, follow by the smell, and, at last, overtake their prey by perseverance. Few wild animals seek their prey in the day-time; but about night

the forest echoes with a variety of different howlings. That of the lion resembles distant thunder; the tiger and leopard's notes are somewhat more shrill, but more hideous; while the jackall, pursuing by his scent, barks somewhat like a dog, and hunts in a pack in the same manner. But it is the most usual way with larger animals, to hide and crouch near some path frequented by their prey, or some water where cattle come to drink, and, with a bound, seize them instantly. When this is effected they devour it in a most voracious manner, often bones and all, and then retire to their retreats, continuing inactive till the calls of hunger again excite their courage and industry. But as all their methods of pursuit are counteracted by their prey, with all the arts of evasion, in this manner they often continue to range without success, supporting a life of famine, and fatigue, for eight or ten days successively. Beasts of prey seldom devour each other, nor can any thing, but the greatest degree of hunger, induce them to it. What they chiefly seek after is the deer, or the ox; which, when caught, they first suck the blood, and then devour the carcass; yet there are antipathies among the rapacious kinds, which render them enemies to each other, even though no ways instigated to it by hunger. The elephant and the tyger, the dog and the wolf, are mortal foes, and never meet without certain death.

Such are the beasts of the forest, possessed of various methods to seize, conquer, and destroy; nor are their destined prey less sagacious to escape destruction. Some find protection in holes, wherein nature has directed them to bury themselves; some owe their safety to their swiftness; and those who possess neither of these advantages generally herd together, and endeavour to repel invasion by united force. Some animals, that feed upon fruits, which are to be obtained only at one time of the year, fill their holes with variety of plants, and lie concealed during the hard frosts of the winter, contented with their prison, which affords them plenty and protection. These holes are so artfully constructed, that there seems the design of an architect in the formation. In general, there are two apertures, by one of which the little inhabitant can always escape, when any enemy is in possession of the other. Such are the contrivances of the badger, the hedge-hog, and the mole. Many creatures avoid their enemies, by placing a sentinel to warn them of the approach of danger: this duty they perform generally by turns, and they have modes of punishment for such as have neglected their post, or been unmindful of the common safety. These are some of the efforts exerted by the weaker quadrupeds to avoid their pursuers, and they are attended generally with success. These are the efforts of instinct for safety, which are, in general, sufficient to repel the hostility of instinct only. Man is the only creature against whom their little arts can scarce prevail. Such as he has chosen to protect, have calmly submitted to his dominion; such as he has thought proper to destroy, engage in an unequal war, and their numbers are daily decreasing.

In all countries where the men are most barbarous, the animals are more cruel and fierce. Africa has ever been remarked for the barbarity of its men, and the ferocity of its beasts; its crocodiles and its serpents are as much to be dreaded, as its lions and leopards; their dispositions seem entirely marked with the climate, and bred in an extreme of heat, they shew a peculiar savageness, invincible to the force or cunning of mankind. The largest and fiercest animals are found in Africa, where the plants are extremely nourishing; and, perhaps for a contrary reason, America does not produce such large animals as are found in the antient continent. It is however certain, whatever be the reason, that although America exceeds Europe in the size of all kinds of reptiles, it is far inferior in its quadruped productions. Its beasts of prey have also less strength and courage than those in other parts of the world. The lion, tyger, and leopard of America,

are

are neither so fierce nor so valiant as those of Africa and Asia. But although the quadrupeds of America be smaller than those of the antient continent, they are much more numerous; for it is a rule that obtains through nature, that the smallest animals multiply the most. The wisdom of providence in making formidable animals unprolific is obvious; for had the elephant, the rhinoceros, and the lion, the same degree of fecundity with the rabbit, or the rat, all the arts of man would be unequal to the contest, and we should soon perceive them become the tyrants of those to whom the Great Creator gave power and dominion over the beasts of the field. He has therefore wisely made it an established order of nature, that the larger creatures which bring forth a few at a time should seldom produce their species till they have nearly acquired their full growth: on the other hand, those which bring forth many, engender before they have arrived at half their natural size. In proportion to this also most animals continue the time of their pregnancy. The mare goes eleven months with foal; the cow nine; the wolf five; and the bitch nine weeks. The intermediate litters are generally the most fruitful in all; the first and last producing the worst of the kind, and fewest in number. Whatever may be the natural disposition of animals at other times, they all acquire new courage and fierceness in defence of their young: no dangers can drive them from the post of duty; even the mildest begin to exert their little force, and threaten the invader. Where there are no hopes from resistance, they incur every danger, in order to rescue their young by flight, and retard their own expedition by providing for their little ones. At such times, they who have force, and subsist by rapine, are terrible indeed! No obstacles can stop their ravage, no threats can terrify them. The lioness then appears more daring than even the lion himself: men and beasts she attacks indiscriminately, and carries all she can subdue reaking to her cubs, whom she thus early inures to slaughter. But the first aliment of all quadrupeds, is milk, which is at once a liquor both nourishing, and easily digested; this being, in carnivorous animals, in much less quantity than others, the female often carries home her prey alive, that its blood may supply the deficiencies of nature in herself.

The courage of animals in the protection of their young, is not greater than their sagacity in chusing such months for bringing them forth, as afford the greatest quantity of provision, suitable to the age, and appetite, of each peculiar kind. They, in general, couple at such times, as that the female shall produce in the mildest seasons, such as the latter end of spring, or the beginning of autumn; the wolf, for instance, brings forth her young in April; and the mare foals about the beginning of May. But those animals which treasure up provisions for winter, as the beaver and marmotte bring forth in January; for which severe season they have provided the necessary supplies. However, among some of the domestic kinds, we may make them breed whenever we please, by feeding, and keeping them from the rigour of the climate, and season. By this contrivance, lambs are produced all the year round. Their choice of situations in bringing forth is not less worthy of our admiration. Among the most rapacious kinds, the female takes the utmost precautions to conceal from the male the place of her retreat, which, when pressed with hunger, would otherwise devour her cubs. She therefore seldom strays far from the den, and never returns while the male appears in view. Animals of tender constitutions are particularly careful to provide a place of warmth as well as safety for their young: the rapacious kinds bring forth in the thickest woods; the ruminant, with the various species of lesser creatures, chuse some hiding place in the neighbourhood of man; some a hollow tree; others dig holes in the ground; and all the amphibious kinds rear their young near the water, and accustom them early to either element. But, there is one class of animals which leave their brood to chance

alone, and their own early instinct, without a parent either to protect or teach them the arts of subsistence. These are of the oviparous kind, or such as are produced from the egg, as the lizard, the tortoise, and the crocodile. Of all animals, these are the most prolific, bringing forth often more than two hundred at a time; but as the offspring is more numerous, the parental care is less exerted; for they bury their eggs in the sand, and the heat of the sun alone brings them to perfection. As soon as hatched, they immediately make to the water; but the young brood, in their passage thither, have innumerable enemies to fear. Birds of prey that haunt the shore, beasts, and even the parent animal, by a strange rapacity, are said to reduce their numbers. It may be observed, that the more imperfect each animal is, the sooner it arrives at its greatest state of perfection. The lizard is capable of providing for itself as soon as hatched; the otter swims in quest of food at one day old; but the dog takes a longer time; and the horse and the lion are still slower in their advances.

But of all the self-moving beings endued with life, *Man* superior walks amidst the glad creation: yet we have not placed him foremost in our catalogue, because he may be considered as different from all kinds of animated beings, having as it were two natures, the animal and the rational, both composed of different principles, and contrary in their action. The one, called the Soul, is a pure light, accompanied with serenity and peace; a salutary source, whence flow science, reason, and wisdom; the other, called the Body, is purely material, a false light, that never shines but in the midst of darkness and hurricane; an impetuous torrent fraught with error and passion. There is a striking resemblance between quadrupeds and man in many respects; and by comparing their internal structure with our own, we shall perceive they enjoy several advantages in common with us, above the lower tribes of nature. They are, like us, placed above the class of birds, by bringing forth their young alive; like us, they are also placed above the class of fishes, by breathing through the lungs; like us, they are placed above the class of insects, by having red blood circulating through their veins; and, like us, they are different from all the other classes of nature, being either wholly or partly covered with hair. They are likewise less liable to be changed by the influence of climate and food. The figure of animals may be considered as a kind of drapery, which human assiduity may put on or off: in man, indeed, the drapery is almost invariable; in quadrupeds it admits of some variation; and, if we descend to the inferior classes of animal existence, the variety may be made still greater. Though quadrupeds are, in general, divided from the various kinds around them, yet some are so equivocal, that it is difficult to determine whether they deserve to be ranked in the quadruped class, or placed with those below them. The bat, for instance, approaches the aerial tribe, and might by some be ranked among the birds. The armadilla, being covered with a shell, might be referred to the tribe of snails or insects; the seal and the morse, being furnished with fins, and residing almost constantly in the water, might be ranked among the fishes. But notwithstanding there is such infinite variety in quadrupeds, they all seem well adapted to their respective stations, and probably enjoy a state of pleasurable sensations adapted to their nature. We may suppose the sloth, that is two months employed in climbing up a single tree; or a mole, who cannot distinctly see on account of the smallness of its eyes, are miserable and helpless creatures; but their life is perhaps a life of luxury: the most pleasing food is easily obtained, and, as they are abridged in one pleasure, in those that remain their enjoyment may be doubled. At worst, the inferior kinds of animals have only the torments of immediate evil to encounter, which is transient and accidental; but man has two sources of calamity, that which he suffers, and that which he foresees or dreads; he would therefore

therefore be the most miserable of all beings, if his hope, his happiness, and his rewards, were to be only in this life. Here, in imitation of Count de Buffon, and other philosophers, members of royal societies, we might entertain ourselves with many curious speculations, such as whether brutes have souls? whether they have reason? whether they have memory? These, and propositions of the like nature, are topics that may employ the speculative, but can never recompence the enquiry. They are questions concerning which we may form doubts, but can never have them resolved, till brutes themselves find language to inform us, and farther enlighten our philosophy. A mind, willing to employ itself in vain conjectures, can never want subjects upon which to expatiate: but it is sufficient for us, that every thing we see is good, and that all

those good things have been granted for our enjoyment. All theories are embarrassed with insurmountable objections, and only serve to shew, that an immoderate pursuit of subjects hidden from us only leads to the maze of uncertainty; in such investigations, every last opinion serves to overturn the preceding, while itself only waits to be overturned by some succeeding speculation, more pleasing, because new. Happy is it for mankind, that, in modest nature, the great I AM has concealed her secret operations from the eye of rash presumption; and that the most intricate enquiries are generally the most useless: let it suffice us, therefore, to examine the form, qualities, use, and not the cause of things; and to know that the God of providence, in his numerous productions, acts with uniformity and success.

C H A P. I.

Containing a descriptive Account of FOUR-FOOTED ANIMALS, with an undivided Hoof, such as the HORSE, the ZEBRA, the ASS, the MULE, the ONAGER, and the UNICORN.

NATURAL HISTORY of the HORSE.

THIS spirited and haughty animal is the noblest conquest made by man; for he shares with him the fatigues of war, and the glory of the combat. Equally intrepid as his master, the horse sees the danger and braves it: inspired at the clash of arms, he is animated with the same ardour. He feels pleasure also in the chase: in tournaments, and in the course, he is all fire; but equally tractable as courageous; does not give way to his impetuosity, and knows how to check his inclinations: he not only submits to the arm that guides him, but even seems to consult the will of his rider; and, always obedient to the impressions which he receives from him, presses on, moves gently, or stops, and only acts as he pleases. This majestic animal is in strength and fierceness equal to any quadrupeds, yet is easily tamed, and made fit for our purposes, either of draught or carriage; scarcely any creature excels him in swiftness, nor hardly any in beauty. His head is long; his eyes large and prominent; his ears erect; his neck thick, elegantly formed, and decorated with a mane of long hair, like that of the lion; his body is rounded and finely turned; his legs are strong, without being bulky; his tail is long and hairy all the way; his fore teeth are six; the upper ones incurvated, and the inferior prominent; the canine teeth are on each side separated from the other by a space; the teats are two, situated in the groin. Such is the horse, which from the earliest ages has been improved, exercised, and broke to the service of man. His education commences with the loss of his liberty, and by constraint it is finished. To have a perfect idea of this noble animal, in his native simplicity, we must not look for him in the pastures or the stables, but in those wild and extensive plains where he has been originally produced, where he ranges without controul. In this happy state of independence, and, rioting in all the variety of luxurious nature, he disdains the assistance of man, which tends only to servitude. In those boundless tracts, whether of Africa or New Spain, he is not incommoded with the inconveniences to which he is subject in Europe. His wants are supplied with the continual verdure of the field, and the climate, which is a stranger to winter, and suits his constitution, adapted naturally to heat. His enemies are few; for none but the larger animals will venture to attack him, any one of which he is singly able to overcome; but he secures his safety in society; for in those countries

the wild horses always herd together, and are often seen feeding in assemblies of five or six hundred. As they are harmless animals, they are satisfied to remain entirely upon the defensive. The pastures supply them abundantly with food, and all other precautions are purely for their security in case of a surprize. Whenever they sleep in the forests, one among their number performs the office of sentinel, to give notice of any approaching danger; and this office they execute by turns. If, while they are feeding by day, a man approaches them, their sentinel walks boldly towards him, as if he meant to examine his strength, or to intimidate him from proceeding. If the man advances within pistol shot, the sentinel alarms his fellows by a loud kind of snorting, upon which they all take the signal, and fly off with the rapidity of the wind, their faithful sentinel always bringing up the rear. All this may be observed in young horses brought up together, and which are led together in droves. They live in peace, because their appetites are simple and moderate; their manners are gentle, and their qualities social; they seldom show their ardour and strength by any other sign than emulation; they endeavour to be foremost in the course, are animated by danger, and will defy one another to cross a river, or leap a ditch, and those, which in these natural exercises set the example, are often the most docile and gentle, when once broke.

Although the horse is found in almost all countries, it is evident that the colder climates do not agree with his constitution; his form is altered there, and he is found not only diminutive, but ill-shaped. We have the testimony of antient writers, that there were wild horses once in Europe; at present, however, they are totally brought under subjection, and even those in America are of a Spanish breed, which were sent thither upon its first discovery, and, becoming wild, have spread over all the south of that vast continent, almost to the streights of Magellan. These are, in general, a small breed of about fourteen hands high, and indifferently shaped; they are easily tamed, and if they recover by any means their native liberty, they never become wild again, but know their masters, and obey their call. But American horses cannot properly be ranked among the wild races, being originally bred from such as are tame. We must look into the old world for this animal, if we would see him in a true state

state of nature; in the extensive deserts of Africa, in Arabia, and in those vast countries that separate Tartary from the more southern nations. Heroditus says, that on the Banks of Hypanes in Scythia, there were wild horses which were white. Leon, the African, assures us, that in the remotest parts of Numidia, he saw a colt with a curled mane, the hair of which was white. Marmel confirms this fact, asserting, that some horses are found in the deserts of Arabia and Libia of an ash colour, others white, and neither dogs nor tame horses can equal them in swiftness. Large assemblies of these animals are seen wild among the Tartars. To the north of China are also great numbers of them, but they are weak and of a timid breed. At the Cape of Good Hope they are vicious and untameable. In Africa, the wretched inhabitants are either ignorant of their uses, or know not how to tame them. They seem to consider the horse rather as dainty food, than a useful creature, capable of assisting them either in war or labour; for whenever the natives of Angola or Caffraria catch one of these creatures, they butcher him for food. But of all the wild horses, Arabia produces a breed the most beautiful, generous, swift, and persevering. Their colour is brown, their mane and tail very short, their hair black and tufted. Their swiftness is incredible. The method of taking them is by traps concealed in the sand, which entangling their feet, the hunter approaches them, and either kills or carries them home alive. The inhabitants in the island of St. Domingo, make use of nooses to catch the wild horses; but by this method they are strangled, unless the hunter comes time enough to their assistance, who instantly secures them by the body and legs, and fastens them to trees, where they are left for two days without either food or drink. This experiment is sufficient to begin to make them tractable, and in time they become as much so as if they had never been wild. At present, however, the horses thus caught are very few: the value of Arabian horses, in every part of the world, has thinned the deserts of the wild breed; and there are not many to be found in those countries, except such as are tame.

We are informed by historians, that the Arabians first began the management of horses in the time of Sheque Ismael. Before that period they wandered wild along the face of the country, useless and neglected; the natives first began then to tame their fierceness, and to improve their beauty: they now possess a race of the most beautiful horses in the world, with which they drive a considerable trade, and adorn the studs of princes at immoderate prices. Almost the poorest person, among those people, is provided with a horse. In their ordinary excursions, they generally make use of mares; experience having taught them, that they endure hunger, thirst, and fatigue, better than the horses: they are also less vicious, of a gentler nature, and more harmless among themselves; not being so apt to kick or hurt each other. The Arabians having no other house but a tent to live in, that also serves them for a stable, wherein the husband, the wife, the children, the mare, and the foal, lie indiscriminately together. They never beat their horses; but treat them gently, considering them as friends. The Arabian horses are the handsomest in the known world. They are larger and more plump than those of Barbary, equally well shaped, and easy in their motions. Every morning and evening they are dressed with the greatest care. They have not any food during the whole day, and are permitted to drink only once or twice. At sun-set a bag is hung to their heads, containing about half a bushel of clean barley. They continue eating, at times, the whole night, and the bag is removed early in the morning. In the beginning of March, when the grass is pretty high, they are turned out to pasture, from whence they are taken when the spring is past, and they eat neither grass nor hay during the rest of the year: barley is their only food, except now and then a little straw. Sensible of the great advantage their horses are to the country, the Arabians

have made a law, prohibiting the exportation of the mares; and those stallions that are brought into England, are generally purchased on the eastern shores of Africa, and come round to us by the Cape of Good Hope. They are in general about fourteen hands, or fourteen hands and a half high. Their motions are more graceful, and they are swifter than our own horses; but their speed is irregular, nor can they endure so much fatigue: nevertheless, they are considered as the first and finest breed known, and that from which all others have derived their principal qualifications. It is probable that Arabia is the original country of horses; for there, instead of crossing the breed, they are careful to preserve it entire. In other countries they change continually their races, or their horses would soon degenerate; but, in Arabia, the same blood has passed down through a long succession, without any diminution either of strength or beauty. This race of horses has spread itself into Barbary, among the Moors, and even extended across that vast continent to the western shores of Africa. It has also been diffused into Egypt, and even into Persia. In these countries, the horses generally receive the same treatment as in Arabia, except that they are littered upon a bag of their own dung, dried in the sun, and then reduced to powder.

The horses of Barbary are very proper to breed from: it were only to be wished, that they were of larger stature, they seldom exceeding four feet, eight inches in height. Those in the kingdom of Morocco are the best; next, those of the mountains; the rest of the horses of Mauritania, are of a far inferior quality, as well as those of Turkey, Persia, Armenia; and all the horses of warm countries have the hair shorter than others. In Numidia, however, the race of horses is much degenerated, the Turks having discouraged the natives from keeping their breed up, by seizing upon all the good horses without bestowing upon the owners the smallest gratuity. The Turkish horses are not so well proportioned as those of Barbary: they have commonly the chest slender, the body long, and the legs too thin; they will, however, travel a great way, and are long winded: this is not surprizing, if we do but consider, that in warm countries, the bones of animals are harder than in cold climates; and it is for this reason, that they have more strength in the legs.

The Spanish Genettes hold the second rank after the Barbs. They are low of stature, but plump, well coated, and extremely swift. Their most usual colour is black, or a dark bay. They are all branded on the thigh, or buttock, with the name of the owner, or mark of the stud where they were bred. Those of Upper Andelusia are esteemed the best, though they are apt to have the head too long; but this defect is excused in favour of their excellent qualities: they are courageous, obedient, graceful, haughty, and more supple than those of Barbary, for which advantages they have been preferred as war horses, to those of any other country.

The horses of Italy are not so beautiful now as they were formerly, for the Italians have greatly neglected the breed; nevertheless, the Neapolitans are possessed of some beautiful horses, which they use principally for draught: but, in general, the Italian horses have large heads, and the chest thick; they are restive, and, consequently, not easily managed; which defects are compensated by a noble form, stateliness, spirit, and an easy, graceful motion. They are very fond of prancing, shewy, and excellent for the harness.

The Danish horses are of a large strong make, beautiful in their coats, and preferred to all others for putting into carriages. However the number is but small that are perfectly moulded; for most of them have a thick chest, large shoulders, long and low loins, and a narrow croup. But they are all graceful in their motions, and excellent for either war or state. They are of all kinds of colours; some very whimsical ones; being pied, mottled, like the leopard, or, which are found no where but in Denmark, streaked like the tiger. The horses of Holland are very good for draw-

ing in coaches. The best come from Friezland: there are also some good ones in the provinces of Berges and Juliers. The Flemish horses are greatly inferior to those of the Dutch breed; having almost all large heads, flat feet, and are subject to humours in the eyes: these two last defects are essential ones in their coach horses.

In Germany, the horses, though originally from Arabian and Barbary stocks, are generally heavy, and short-breathed, therefore not swift enough for hunters, whereas the Hungarian, Transilvanian, &c. are, on the contrary, light and good courfers. The Hussars, who use them for war, split their nostrils, for what purpose we know not, although some assert it is to prevent their neighing in time of battle. It is remarked, that Hungarian, Croatian, and Polish horses have the mark in their mouths during life.

In France are horses of all kinds, but few good ones: the best come from Limousin; they resemble much those of Barbary; and, like them, are excellent for the chace; but they are slow in their growth, require great care while young, and must not be ridden till they are eight years old. Normandy furnishes handsome horses; but they are better for war than for hunting; they have thick coats, and soon arrive to perfection. Many coach horses are brought from Lower Normandy to the continent; they are lighter than those of Holland. Franche Compte, and the country round Boulogne, furnish very good draught horses. Those in France are, in general, defective, in having their shoulders too thick, instead of which the Barbary horses are commonly too narrow.

In Great Britain, the breed of horses is as mixed as that of its inhabitants. From the frequent introduction of foreign horses, we can boast of a greater variety than any other country: few other kingdoms produce more than one kind; but ours, by a judicious mixture of the several species, by the variety of our soils, and by the superior skill in management, may triumph over the rest of Europe, in having brought this noble animal to the highest degree of perfection. An English horse is known to excel the Arabian in size and swiftness; to be more durable than the Barb; and more hardy than the Persian. The famous horse Childers was an amazing instance of rapidity; he has ran eighty two feet and a half in a second, or almost a mile in a minute: the same horse has run round the course at New-Market, which is only four hundred yards less than four miles, in six minutes and forty seconds. It is, however, remarkable, no other horse has since been able to equal him; and those of his breed has been remarkably deficient. This kind of horses derive their origin from Arabia, the seat of the purest and most generous breed. The hunter is a happy combination of the former with others of superior strength, but inferior in swiftness and lineage: this is a necessary union; for the fatigues of the chace require the spirit of the one, as well as the vigour of the other to support it. No other country can produce a breed of horses, equal in strength and size to ours, which are destined for the draught, or to the united strength and activity of those that form our cavalry. In London, we have had instances of a single horse that has been able to draw, for a small space, the weight of three tons; but could easily draw half that weight for a continuance. It has been usual for the pack-horses of Yorkshire to carry a burden of four hundred and twenty pounds; and that over the highest hills of the north, as well as the most level roads. Some of our mill-horses will carry at one load thirteen measures, which, at a moderate computation of seventy pounds each, will amount to nine hundred and ten. When it is considered that these horses are accustomed to the weight by degrees, it will appear the less surprizing: it must also be remembered, that they travel only to and from the adjaent hamlets. The increase of our inhabitants, and the extent of our manufactures, together with the neglect of internal navigation, occasioned the number of our horses to be multiplied: an excess of wealth in-

creased the luxury of carriages, and added to the necessity of an extraordinary culture of these animals: the reputation they have acquired abroad, has also made them a branch of commerce, and proved an additional cause of great increase. When foreigners, particularly the French, describe our breed, they mention as a defect, the aukward motion of our horses; they admit them to be good: but will not allow them an easy or elegant carriage. But they do not consider, that this seeming want of grace is entirely the result of our manner of breaking them. Speed is what we consult in this animal's motions; whereas the French, and other nations, pay more attention to parade and spirit. We always throw our horses forward, while they put them upon their haunches; we teach them an easy, swift method of going, that covers a great deal of ground: on the contrary, they throw them back, which certainly gives them a more showy appearance, but makes them infinitely less useful. From our manner of breaking, it must be acknowledged, that the horse is sometimes apt to fall forward; whereas the French-managed horse generally falls on one side, never before. It would certainly be no difficult task to give our horses all that grace which foreigners are so fond of; but it would render them less swift and durable. But foreigners, in general, have now perceived their error, and our English hunters are considered as the most useful animals in the world. Numbers of geldings are sent over to the continent, and sell at very high prices. We have, indeed, a law prohibiting the exportation of our mares and stallions; and even so early as the times of Athelstan, their exportation was prohibited, except they were intended as presents.

Travellers report, that there are very good horses in the islands of the Archipelago. Those of Crete were much esteemed among the ancients, for their strength and swiftness; at present, however, they are little used even there, the country being uneven, rocky, and mountainous. The natives of the kingdom of Morocco are much smaller than the Arabian breed, but very fleet and vigorous. Horses of almost every race may be found in Turkey; Arabians, Tartars, Hungarians, and those natural to the place. The latter are extremely beautiful and elegant; they have a great deal of fire and swiftness, and yet are very obedient; but they cannot support fatigue. The Persian horses are, in general, the most beautiful and most valuable of any in the East. Great numbers of them are annually transported into Turkey, but more frequently into the East Indies: all travellers agree, that they are not to be compared with the Arabian horses, either for courage, strength or beauty. A writer on this subject says, that the breed of Egypt and Tingitania are preferable to all those of the neighbouring countries; though a century ago there were good horses all over Barbary. It is said that the excellency of these Barbary horses consisted in their never being tired, and in their standing still whilst the rider dismounts, or lets fall his bridle: they walk fast, and gallop swiftly; but are never suffered to trot or amble, the inhabitants of the country looking upon these paces as rude and ignoble. According to Leon, the African, the Arabian horses are descended from the wild horses of the deserts, of which, in antient times, large studs were formed, which have multiplied so much, that all Asia and Africa are full of them; they are so nimble, that some will outstrip the very ostriches in their course. The Arabians of the desert, and the people of Libia breed a great number of these horses for hunting. They send them to pasture while there is grass for them, and when that fails, they feed them only with dates and camel's milk, which makes them nervous, lean, and nimble. They lay snares for the wild horses, and eat the flesh of young ones, which they affirm is very delicate food. These wild horses are smaller than the tame ones, and are commonly ash-coloured, though there are also some white ones, the hair of whose manes and tails are commonly short and frizzled.

The horses of India are of a very indifferent kind. Those used by the grandees of the country, are brought from Arabia and Persia: they are fed sparingly with hay in the day-time, and at night with boiled peas, mixed with sugar and butter; this nourishment strengthens and supports them; otherwise they would soon degenerate, the heat of the climate being against them. The native horses of the country are very small. Tavernier says, some of them are so little, that a young prince of the Great Mogul, when but seven years old, rode one that scarce exceeded a greyhound in size; and one of these has been brought over into this country, as a present to our queen, that did not exceed nine hands high, and very little larger than a common mastiff. Those of the Gold Coast, as well as those of Judea, Guinea, &c. are, like those of the Indies, very bad: they carry their heads low; their walk is so tottering, that one would imagine they were always ready to fall; they would never stir, if not beat continually; and the greatest part of them are so low, that the feet of the rider almost touch the ground; in short, they are most untractable creatures, and fit only for food for the Negroes, Arabians, Tartars, and Chinese.

The horses of China are not superior to those of India: they are small, weak, ill-shaped, and spiritless: those of the Corea are not above three feet high, and so timorous that they cannot be rendered serviceable in war; it may, therefore, with propriety be said, that the Tartarian horses conquered China. These are, indeed, extremely serviceable in war; and although they are but of a middle size, they are surprizingly patient, vigorous, bold, and swift. The Tartars live with their horses nearly in the same manner as the Arabians do. When they are about seven or eight months old, the young children mount them, and make them walk and gallop, by turns, a little way: thus they break them by degrees, and oblige them to undergo long fastings, but they are never mounted for racing or hunting, till they are six or seven years old, and then they make them support incredible fatigue, such as travelling two or three days together without stopping, passing four or five, without any other food than a handful of grass every eight hours, and to remain twenty-four hours without drinking. These horses which appear, and are, in reality, so robust in their own country, become enfeebled, and are soon good for nothing when transported to China or the Indies; but they succeed better in Persia and Turkey. The lesser Tartars have also a breed of small horses which they set such great store by, that they are not allowed to sell them to foreigners. There are also in Circassia, and in Mingrelia, many horses which are even handsomer than those of Tartary; and some much esteemed in the Ukraine, Wallachia, and Poland, but we have no account of their qualities and defects. Upon the whole, it is certain, that every country that boasts of a fine race of horses, is indebted to Arabia, their primæval seat.

Different nations are not agreed, as to the particular shapes that constitute the beauties of a horse. It may not therefore be amiss, to explain the terms, whereby dealers in horses among ourselves, denominate the particular parts of this noble animal; we shall likewise add some remarks, which may enable our readers to form a judgment of the perfections or imperfections of a horse, and direct him how to chuse a good one. The denominations of the external parts of a horse are these. The hair is, in general, called his coat; but it has different names in several parts of the body: the hairs on the under lip are the beard; and those which grow along the upper part of the neck are called the mane. That part of the neck which is most arched has the name of the crest, and when it sinks, a horse is said to be crest fallen. The tuft of hair which grows on the lower part of the hind-leg above the heel, is termed the feet-lock, or fetlock. The hair that grows round over the top of the hoof is the crown, or coronet, and the hair on the eye-lids, the eye-lashes. The body is called the carcass. The two

hollows above the eyes, most remarkable in old horses, the eye-pits. The mark, if any, that runs down the face, if pointed, is termed blaze, if broad, bald; and where there is a white spot in the forehead, it is the star. The back part of the head that joins to the neck, is the poll. The lips, with the tip of the nose, forms the muzzle. The fleshy rows that run across the roof of the mouth, are called the bars, and these are very remarkable in young horses.

The top of the shoulder blades, and highest part of the spine, at the setting on of the neck, are the withers; and from the top of this a horse is measured to know its size. From the withers, to the end of the false ribs, are the reins; and next these are the loins. The extremity of the reins above the hip to the tail, is called the croup; the part where the crupper lies, is the channel; the tail is the dock; and the sinking of the back, if any, has the name of the sway, or hollow, or low-backed. The hinder part of the belly, next the genitals, is called the flank, and this reaches from the small ribs to the haunches. The loose skin that covers the yard, is the sheath, and the belly reaches from this to the brisket. The point from the withers to the top joint of the thigh, enclosing the whole breast on both sides, is called the shoulder, at which the fore-legs begin; and the hind part pointing towards the brisket is the elbow. In the middle part is the knee, to which the fore-leg reaches. The extent from the knee to the pastern, is called the shank; and the strong tendon behind the shank inserted in the heel, is the back sinew. The place where the shank joins the pastern, is distinguished by the pastern or fetlock joint; and the pastern reaches from the lower part of the joint to the foot, and has a joint in the middle to facilitate the motion of the foot, which it distinguishes into two parts, namely, the great pastern next the shank, and the less next the foot. The joining of this last with the foot, is called the coffin-joint. The hoof is generally denominated the horn, or coffin, because it incloses the whole foot. The tender part of the hoof next the heel, is the frush, and the ball of the foot, the frog; though they should be considered as one. This reaches from the middle part of the foot to the heel; and the sole is the horny part which covers the rest of the bottom of the foot, and adheres to the verge of the hoof, where the nails are driven in, when a horse is shod. The sides meeting on the heel, are called the quarters. The haunches begin at the two bones of the back part of a horse, which enclose the loins, and descend to the ham, or hock. The stifle is seated in the middle joint of the thigh; and is outwardly that part which jets out from the thigh towards the belly. The thigh, or gascoin, begins at the stifle, and reaches to the bending of the ham or hock: the hock is the bending of the hind leg; and the round knob behind is the heel of the hock, in which the great master leader, or *tendo Achillis*, is inserted. The pasterns and feet are distinguished in the same manner as in the fore-legs; and that side of a horse which we usually approach, is called the near side, and the other the off side. Hence come the terms of near-foot, and off-foot, near-eye, and off-eye, and so of the rest. These are the common terms made use of by dealers in horses; but the true shape and form of each can only be distinguished by long experience: however, there are some obvious properties, in which the generality of dealers are agreed; marks which direct to their choice; and first, the marks of the teeth lead to the knowledge of the age.

One of the most important things to be known, is the age of the horse, and the most certain knowledge of this is obtained from the teeth. The first of these that appear are four, two above and two below, which are called foal teeth, and may easily be distinguished from others by their whiteness: the rest come out afterwards till they are twelve in number, six above and six below. When a colt is between two years and a half and three years old, he casts four of these teeth, two above and two below. These are called nippers

or gatherers, and are much longer and larger than the fore teeth; with these he nips off the grafs, and pulls the hay from the rack. When these are complete, the horse will be three years old, or somewhat more. When about four, he casts again two above and two below, one on each side the nippers; so that now there are no fore teeth remaining but the corner teeth; and hence it may be concluded, that he is about four years old. The tusks appear next after these, and are a little crooked. Those below come out before those on the upper jaw, and at four years old they are very small. When all the colt-teeth are cast, and the corner teeth begin to show themselves, then the horse comes five. From this age to five and a half the corner teeth remain hollow within, and are not quite filled up till the horse is six. At five and a half they are about a quarter of an inch high, and when he is full six, near half an inch. At six years old we are to examine principally the corner teeth and the tusks. That part of the corner teeth that had flesh within, first turns to a brownish spot, like the eye of a garden bean. At seven this mark becomes faint, and the tooth more even. At eight it quite disappears, though it possibly may remain in a very small degree for two or three more years, which has deceived many. The longer the corner teeth are; the older is the horse, and they are apt to grow more foul, and turn yellow. When this mark is gone, if you touch the tusks on the upper jaw with your finger, and find them worn away, and equal with the palate, you may certainly judge the horse is ten years old at least: the teeth from continual rubbing each other, grow smooth in all animals through age. Lastly, when the flanks of a horse are much sunk, the feet broken or spoiled, the pace bad, and the eye-pits hollow, you may certainly conclude the horse is considerably advanced in years.

We may judge of the natural and actual state of this animal by the motion of his ears; when he walks, he should project forwards the points of his ears; a jaded horse carries them low: those which are spirited and vicious, carry alternately one of their ears forwards and one backwards; all direct them to that side from whence they hear any noise; and if any one should strike them on the back or the rump, they turn their ears back. Horses who have their eyes deep sunk in the head, or one smaller than the other, have usually a bad sight: those whose mouths are dry are not of so healthy a temperament as those which have the mouth moist, and make the bridle covered with foam. A saddle horse ought to have the shoulders flat, moveable, and not very fleshy; the draft horse, on the contrary, should have them flat, round, and brawny: if, however, the shoulders of a saddle horse are too thin, and the bones show themselves through the skin, it is a defect which shews the shoulders are not free, and consequently the horse cannot bear fatigue. Another fault of a saddle horse is, to have the chest projected too forward, and the fore legs drawn too much back, because he is apt to rest on the hand in galloping, and even to stumble and fall: the length of the legs should be proportionable to the height of the horse; when the fore legs are too long, he is not sure-footed; if they are too short, he is too heavy in the hand. It is remarked, that mares are more liable than horses to be short legged; and that horses, in general, have the legs thicker than mares or geldings.

Were it possible to have an assemblage of perfections in one horse, the head should be lean and small, without being too long; the ears at a moderate distance, small, straight, narrow, thin, and well placed on the top of the head; the forehead narrow, and a little convex; the hollows filled up; the eye-lids thin; the eyes clear, lively, full of fire, rather large, and projecting in the head; the pupil large; the nether jaw thin; the mouth of a moderate width; the withers raised and sloping; the shoulders flat, and rather confined; the back equal, even, and insensibly arched lengthways, and raised on each side the spine, which should appear indented; the flank full and short; the

rump round and fleshy; the haunches well covered with hair; the stump of the tail thick and firm; the fore legs and thighs thin but fleshy; the knee round before; the houghs large and rounded; the sinews loose; the joint next the foot small; the fetlock not thickly covered with hair; the pastern not large, and of a middling length; the coronet raised; the hoof black, smooth, shining, and high; the quarters round; the heels wide and moderately raised; the frog small and thin; and the sole thick and hollow. The eyes are subject to many complaints, sometimes difficult to be known. In a healthy eye we ought to see through the cornea two or three spots of the colour of soot above the pupil; for to see these spots, the cornea must be clear, clean, and transparent; if it appears double, the eye is not good: a small, long, and strait pupil, encompassed with a white circle, is also a bad sign; and when of a bluish green colour, the eye is certainly bad, and the sight dull. On this useful part of our subject, we think it necessary to be a little more particular. When a horse is without blemish, the legs and thighs clean, the knees strait, the skin and shank thin, and the back sinews strong and well braced, he increases in value. The sinews and the bones should be so distinct, as to make the legs appear thin and lathy, not full and round; nor must there be any swelling near the coronet. The hocks should look lean and dry, not puffed up, as with wind.

With regard to the hoof, the coronet should be equally thick, and the horn shining and greyish. A white horn is a sign of a bad foot, for it will wear out in a short time; and likewise when the horn is thin, it is liable to be spoiled in shoeing, and by travelling hard on stony grounds. This is best known when the shoe is taken off, for then the verge all round the sole will appear thin, and the horse will wince at the least touch of the pincers. A strong foot has the fibres of the hoof very distinct, running in a direct line from the coronet to the toe, like the grain of wood. In this case, care must be taken to keep the foot moist and pliable. The greatest inconvenience attending a strong hard foot, is its being subject to rifts and fissures, which sometimes cleave the hoof quite through, from the coronet down to the bottom. A narrow heel is likewise a defect; and when it is not above two fingers in breadth the foot is bad: a high heel causes a horse to trip; and one too low, with long yielding pasterns, is very apt to be worn quite away on a journey. Too large a foot in proportion to the rest of the body, renders a horse weak and heavy.

The fore-head of a horse should be neither too broad nor too flat. The nose should rise a little, and the nostrils be wide that he may breathe more freely. The muzzle should be small, and the mouth neither too deep nor too shallow. The jaws should be thin, and not approach too near together at the throat, nor too high upwards towards the onset, that the horse may have sufficient room to carry his head in an easy graceful posture; and the tongue should be rather small, that it may not be too much pressed by the bit. The neck should be arched towards the middle; the hair of the mane long, small, and fine; and if a little frizzled, so much the better. A horse of a middle size should have the distance of five or six inches between his fore thighs, and less distance between his feet, near his shoulders when he stands upright.

The carcass should be of a middle size, and home-ribbed; but the short ribs should not approach too near the haunches, and then he will have room to fetch his breath: When a horse's back is short in proportion to his bulk, and yet otherwise well limbed, he will hold out a journey though he travels slow. When he is tall, at the same time, with very long legs, he is of little value.

The wind should never be overlooked in the choice of a horse; and it may be easily known by his flanks, if he is broken winded, when he stands quiet in the stable; because he always pinches them in with a very slow motion, and drops them suddenly. A thick winded

horse fetches his breath often; sometimes rattles or wheezes. This may be always discovered when he is put to brisk exercises. The temper of this noble animal should also be observed. A vicious horse generally lays his ears close to his pole, shews the whites of his eyes, and looks dogged. An angry one may be known by his scowling looks, and he seems frequently to stand in a posture of defence: when very vicious, he pays no regard to the groom that feeds him: however, some horses that are ticklish will lay back their ears, and yet be of a good disposition. A fearful horse is apt to start, and never leaves it off till he is old and useless. With regard to colour, the bright bay, and, indeed, all kinds of bays, are accounted a good colour. The chestnut is generally preferable to the sorrel, unless the former happens to be bald, or party-coloured, with white legs. Brown horses have frequently black manes and tails, and their joints are of a rusty black. Those of this colour that are dappled are much handsomer than the rest. Horses of a shining black, and well marked, without too much white, are in high esteem for their beauty. A star, or blaze, or white muzzle, or one or more feet tipped with white, are thought by some to be rather better than those that are quite black. Of the greys, the dappled are accounted best; though the silver greys make a more beautiful appearance, and often prove good. The iron grey, with white manes and tails, are thought not to be so hardy; and, what is remarkable, are very apt to turn blind. Greys of every kind will turn white sooner or later; but the nutmeg grey, when the dappled parts incline to bay, or chestnut, are reckoned good hardy horses. Roan horses have a diversity of colours mixed together, but the white is more predominant than the rest. Most of them are hardy, and fit for the road; and some are exceeding good. Those of a strawberry colour nearest resemble the sorrel, and they are often marked with white on the face and legs: when the bay is blended with it, he seems to be tintured with claret; and some of these prove to be very good. Dun horses are seldom chosen by gentlemen: the fallow and cream-coloured are better esteemed, both for beauty and use. Those that are finely spotted with gay colours, like leopards, are great rarities.

Walking is the slowest of all paces belonging to a horse. In this he should step quick, and neither take too long, or too short steps: his carriage should be with ease, and this depends much on the liberty of his shoulders, and is known by the manner in which he carries his head in walking; in which he should raise his shoulders, and lower his haunches: he should also support his leg, and raise it high enough; but if he keeps it up too long, or lets it fall too slowly, he loses all the advantage of his suppleness, becomes heavy, and fit only to match with another, or for shew. It is not sufficient that his walk be easy, his steps must be also equal and uniform both behind and before. When the horse extends his hind leg too much, and rests it almost in the same place in which he rested his fore foot, the rider is much jolted. Horses with short bodies are subject to this fault. Such as cross their legs, or strike them against each other, are not sure footed; but on those whose bodies are longer, the rider sits most at his ease, because he is at a greater distance from the two centres of motion, the shoulders and haunches. In the walk there are four times in the movement; if the right fore-leg moves first, the left hind-leg follows the moment after; then the left fore-leg moves forward in turn, to be followed the instant after by the right hind-leg: thus the right fore-foot rests on the ground first, the left hind-foot next, then the left fore-foot rests; and, lastly, the right hind-foot, which makes a movement of four times, at three intervals of which the first and last are shorter than the middle one.

In the trot there are but two times in the movement: if the right fore-leg goes off first, the left hind-leg moves at the same time, and without any interval between the motion of the one, and the motion of the

other; also, the left fore-leg moves at the same time with the right hind-one, in such a manner, that there are in this movement of trotting only two times, and one interval: the right fore-foot and the left hind-foot rest on the ground at the same time; and then the left fore-foot and the right hind-one rest at the same time also.

In the gallop, which is a kind of leaping, there are three times and two intervals; and in the first of these intervals, when the movement is made with haste, there is an instant when the four legs are in the air at the same time, and when the four shoes of the horse may be seen at once. When the horse has the haunches and the houghs supple, and moves them with agility, the gallop is more perfect, and the cadence is made in four times: he then rests the left hind-foot, which shews the first time; then the right hind-foot falls to the ground, and shews the second time; the left fore-foot falls a moment after, shewing the third time; and at length the right fore-foot, which rests last, shews the fourth time. Horses usually gallop on the right foot, in the same manner as they carry the fore right leg in walking and trotting: they also throw up the dirt in galloping with the right fore-leg. In walking, the legs of the horse are lifted up only a small height; in trotting, they are raised higher; and in galloping, the feet seem to rebound from the earth. The walk, to be good, should be quick, light, and sure; the trot firm, quick, and equally sustained; the hind-foot ought to follow well the fore-foot: the horse, in this pace, should carry his head high, and his back strait; for if he rocks himself, he trots ill through weakness; if he throws out wildly his fore-legs, it is another fault; the fore-legs should tread in a line with the hind-ones, and always efface their tracks. When one of the hind-legs is thrown forwards, if the fore-leg of the same side remains in its place too long, the motion becomes more uneasy and difficult from this resistance; and it is for this reason that the interval between the two times of the trot should be short; but be it ever so short, this resistance is sufficient to make this pace more uneasy than walking and galloping. Horses who lift up their fore-legs very high, are not those which gallop the best; they make the least dispatch, and are the most fatigued; and this usually happens from their not having their shoulders sufficiently free.

Walking, trotting, and galloping, are the most usual natural paces; but some horses have another natural pace, called the amble, very different from the other three, and extremely fatiguing to the animal, notwithstanding, in this pace, the quickness of motion is not so great as in galloping, or trotting hard. In this pace, the foot of the horse grazes the ground still more than in walking, and each step is much longer. But the most remarkable circumstance is, that the two legs on the same side, for example, the fore and hind-leg on the right side, set off at the same time to make a step; and afterwards the two left legs move also, at the same time, to make another; so that each side of the body is without support alternately, and no equilibrium is maintained between the one or the other: there is, therefore, in the amble, as well as in the trot, but two times in the movement; and all the difference is, that in the trot the two legs which go together are opposite, in a diagonal line; instead of which, in the amble, the two legs on the same side go together: this pace is extremely fatiguing to the horse, and which he should never be suffered to use; but, on even ground, it is very easy to the rider. We are told that horses which naturally amble never trot, and that they are much weaker than others. It is certain colts often get this pace, more especially when they are forced to go fast, and have not as yet sufficient strength to trot or gallop. We may therefore look upon this pace as a defective one, and natural only to a number of horses weaker than others. Even those that are strongest among these, are worn out in less time than such as only trot and gallop: but, there are still two other paces, one between the amble and gallop, and the broken amble,

which weak or abused horses take of themselves, both which are more defective than the amble. The pace between the amble and the trot is somewhat of the trot and gallop, and both proceed from long fatigue, or great weakness of the loins. Pack-horses who have been overloaded, begin to make use of this pace, in proportion as they are ill used; and post-horses, when broken down and spoilt, and forced upon an attempt to gallop, make use of this pace instead of the latter.

Such are the beauties and imperfections, the improved qualities and defects of those useful animals, which, though endued with vast strength, and great powers, seldom exert either to the prejudice of their masters; on the contrary, they will endure the greatest fatigues for our benefit. Horses have a benevolent disposition, and a fear of the human race, together with a certain consciousness of the services we can render them. The hoofed quadrupeds are, in general, domestic, necessity compelling them to seek our protection: wild animals are furnished with feet and claws, adapted to the forming retreats from the inclemency of the weather; but the former are obliged to run to us for artificial shelter, as nature, in scarcely any climate, can supply them with necessary food throughout the year. Providence hath admirably adapted the several services of domestic animals towards the human race, and hath even ordered that the parts of such which have been most useful during their lives, should contribute to our wants after death. The principal uses the skin of the horse are applied to are, for collars, traces, and other parts of the harness: thus, even after death, he preserves some analogy to his state of servitude when alive. The mane is also used in making perukes, and the hair of the tail for bottoms of chairs, floor-cloths, cords, and lines for anglers.

In ancient history we find the Egyptians made animals symbols representing divinity, and honoured them with public worship, authorized by the laws of the country. Whoever killed one of those consecrated animals was punished with death. In other heathen countries, every deity had his favourite animal dedicated to him: thus, the eagle was dedicated to Jupiter, the lamb to Juno, the bull to Neptune, and the horse to Mars, as the god of battle. The Persians sacrificed horses to the sun. The Suevi, an ancient people of Germany, says Tacitus, supported white horses in the sacred woods, at the public charge, from which they drew omens: no one was permitted even to touch them; the prince and priest alone fastened them to a consecrated chariot, accompanied them, and observed their neighings and tremblings. We cannot, perhaps, better sum up our account of the horse, than by reminding our readers of that sublime description of this noble and generous animal, contained in the sacred writings. Here God is represented as speaking after the manner of men, and says to Job, "Hast thou given the horse strength? Hast thou clothed his neck with thunder, or given him courage? Canst thou make him afraid as a grass-hopper? The glory of his nostrils is full of terrors. His feet dig; he beateth with his hoof; he paweth in the valley, and rejoiceth in his strength. He goeth on to meet the armed men. He mocketh at fear, and is not affrighted; neither turneth he back from the sword. The quiver rattleth against him, the glittering spear, and the shield. He swalloweth the ground with fierceness and rage, so that it seemeth nothing under him: neither believeth he, that it is the sound of the trumpet. He saith among the trumpets, ha, ha; and he smelleth the battle afar off, the thunder of the captains, and the shouting."

NATURAL HISTORY of the ZEBRA.

THIS animal has been mistaken by many authors for the wild Ass. Our translators of the bible, in the book of Job, have given the name of the wild ass to a beast which has little resemblance, in the description of the inspired pen-man, to that animal.

"Who hath sent out the wild Ass free? or who hath loosed his bands? whose house I have made the wilderness, and the barren land his dwellings. He scorneth the multitude of the city, neither regardeth he the crying of the driver. The range of the mountains is his pasture, and he searcheth after every green thing." This description will be seen to agree best with the Zebra, the most beautiful, and, at the same time, the wildest animal in nature. It is a native of many parts of the East, particularly of the southern country of Africa; and whole herds of them are frequently seen feeding on those extensive plains that lie towards the Cape of Good Hope. But they are so vigilant, that they will suffer nothing to approach them, and so swift, that they easily leave every pursuer behind.

The male Zebra rather resembles the mule than the horse, or ass, being less than the former, and yet larger than the latter, but of a much more elegant figure. Its head is small and short; the ears longer than those of the horse, but shorter than those of the ass. The eyes are full and bright; and the mouth is considerably large. The neck is long and slender, yet elegantly turned; the back is straight; the body rounded and small; the mane is short, not hanging down like that of the horse, but erect. The legs are finely placed, long, slender, but very strong; they seem all bone, only just covered with the skin. The tail is long, and tufted at the end.

The whole of this beautiful animal is parti-coloured, being striped in a transverse direction with streaks, which in the male are white and brown, or black; and in the female white and black. These colours are so exactly disposed in alternate stripes over the whole body, that one would imagine a rule and compass had been employed in painting them. The stripes, resembling so many ribbons laid over its body, are parallel, and curiously separated from each other; every stripe is perfectly distinct. The head, the body, the thighs, the legs, the tail, and even the ears, are thus beautifully streaked. The stripes of the body have their origin from the ridge of the back, and are carried down to the belly. The head is streaked with fine stripes of black and white, which in a manner center in the forehead. The ears are also variegated with a white and dusky brown; and the neck has broad stripes of the same dark-brown running round it, which takes in the mane, leaving narrower spaces of white between them. The belly is white, except a black line, formed like a comb, reaching from between the fore-legs along the middle of the belly; two thirds of its length. There is a line of separation between the trunk of the body and the hinder quarters on each side, behind which, on the rump, is a plat of narrow stripes joined together by a stripe down the middle of the rump to the end of the tail, forming the figure of a fish bone. The feet are brown a little way above the hoofs; the tuft of the tail is of the same colour, as is also the muzzle; and on the outsides of each thigh are drawn obliquely three bars of brown, ending roundish at both ends. The legs are all encompassed with rings of white and brown, alternately, in an irregular and broken manner. All the marks are of a dark, blackish brown, and all the spaces between them are white.

A female Zebra was in the possession of the late Prince of Wales. This animal was brought alive, together with the male, from the Cape of Good Hope, and her general colour, exclusive of the stripes, which were all black, was of a bright bay on the head, neck, upper part of the body and thighs; but the belly, legs, and the end of the tail, were white. On the joints of the legs, it had such corns as we see in horses, and the hoofs were blackish. The head was striped a little different from that of the male, and the mane was black and white. The ears were of a bay colour, and there was a little white on the forehead, with several broad stripes round the neck, which became narrow on its under side. It had a black list running along the ridge of the back, and part of the tail, and

another

another along the middle of the belly: the stripes on the body proceeded from the list on the back, and some of them ended in forks on the sides of the belly, others in single points, and these had some longish spots between them. The upper part of the body was spotted in a more irregular, confused manner; but the two sides were marked very uniformly. The noise it made was very different from that of an ass, resembling more the confused barking of a mastiff dog. It seemed to be of a savage and fierce nature; for no one could venture to approach it, but a gardener in the Prince's service, who was used to feed it, and could mount on its back. It would eat flesh, or any kind of food offered to it; and although it feeds naturally on vegetables, as horses and asses do, yet this animal, like them, was taught to live upon different food: and it is remarkable, that horses may easily be taught to drink milk, eat eggs, and such like substances.

The Zebra is the native of countries, where the human inhabitants are but little superior to the quadrupeds. Those of Angola and Caffraria consider horses only as being good for food: neither the stateliness of the Arabian courser, nor the beautiful colours of the Zebra, have any allurements to a people, who only consider the quantity of flesh, and not the fine disposition of the parts. It is therefore imagined; that the Zebra may have continued wild, because a native of a country, where no successive efforts have been made to reclaim it. However, hitherto, the Zebra appears to have disdained servitude, and neither force nor servitude have been able to wean it from its native ferocity and independence. Yet, it is probable, that in time this wildness might be surmounted: perhaps, the horse and the ass were equally obstinate and unmanageable, when they were first taken from the forest. The Count de Buffon says, that the Zebra, from which he took his description, could never be mastered, notwithstanding the utmost pains were taken to tame it. Whenever it was mounted, two persons were obliged to hold the reins, while a third ventured upon its back; and, upon perceiving any one to approach, it always attempted to kick. That at our present Queen's Menagerie, near Buckingham Gate, was also extremely vicious; and the keeper found it absolutely necessary to inform the spectators of its ungovernable temper. It appeared as wild as if just caught, and would endeavour to kick any one who came near it, though it was taken very young, and treated with the utmost indulgence. But as the Zebra resembles the horse in form, it has doubtless a similitude of nature, and by art and industry might be numbered among our useful domestics; and, as a civilized people are now placed at the Cape of Good Hope, where this animal is principally found, it is likely that we may have them tamed, and rendered serviceable. We do not know that any one Zebra has ever been brought into Europe, that was caught sufficiently young, so as to be untinged by its original state of wildness; and we are inclined to believe, that were it taken very young, and properly managed, it might be rendered as tame as any other trained animal. It is not merely on account of the extraordinary beauty of this animal, that we wish it among the number of our dependents; its swiftness is said to surpass all others; it stands better on its legs than the horse, and is consequently stronger in proportion. When we consider this, and numerous other creatures, intended, by their formation, for the service of man, we cannot but acknowledge the goodness of God; and with the devout psalmist say, How wonderful are his works! In wisdom hath he made them all!

NATURAL HISTORY of the ASS.

THIS animal resembles the horse in many respects; but it is only a faint, a mean copy of that noble quadruped; for it is smaller, and wants the symmetry, as well as the dignity of appearance so conspicuous in

the generous horse; yet, from the great resemblance there is between them, we might, at first sight, be induced to suppose, that the ass was only a horse degenerated in the breed, but they are certainly distinct; an inseparable line is drawn between them, for the mule they produce is barren, which appears to be a barrier between every species of animals. Providence has stopped the fruitfulness of these ill-formed productions, to preserve uncontaminated the form of every animal: without this regulation, the races would, in a short time, be mixed with each other; every creature would lose its original perfection, and degenerate. Although we cannot demonstrate, that the production of a species by degeneration is a thing impossible in nature, yet the number of probabilities to the contrary is so great, that we can no longer doubt of it; for if some species have been produced by the degeneration of others, if the species of the ass came from that of the horse, this can only have happened successively; and then, by degrees, there would have been between the horse and the ass, a great number of intermediate animals, the first of which would have differed but slightly, in its nature, from the horse, and the latter would have approached, by degrees, to that of the ass: and why do we not see the representatives, the descendants, of those intermediate species? Why do only the two extremes remain? The ass then is not a horse degenerated; he is neither a stranger, an intruder, nor a bastard; he has, like all other animals, his family, his species, and his rank: his blood is pure, and although his nobility is less illustrious, yet it is equally good; equally antient, with that of the horse. Why then have we so much contempt for this humble, this useful creature? Do men carry their contempt even to animals; those too which serve them so well, and at so small an expence? We bestow education on the horse, take care of him, instruct him, and exercise him; but the ass is abandoned to the care of the lowest servant, or the tricks of children; and if there were not a fund of good qualities in him, he would certainly lose them, by the manner in which he is treated. He is the may-game or drudge of vagabonds, who beat him cruelly with sticks, overload him, and make him work beyond his strength. We do not consider, that the ass would be in himself, and with respect to us, the most beautiful, the best formed, and the most distinguished of animals, if there were no horse in the world: he is the second; instead of being the first, and it is from that circumstance only that he appears to be of no estimation: the comparison degrades him; we look at him, and give our opinions, not from himself, but comparatively; we forget that he is an ass; that he has all the qualities of his nature; all the gifts attached to his species; and, at the same time, we only think of the figure and qualities of the horse, which are wanting in him, and which he ought not to have.

They are easily distinguished from each other with the glance of an eye, for the head of the ass is larger in proportion to its body; the ears much longer, and narrow; without an elegant effect in their appearance; the fore-head and temples are furnished with longer hair; the eyes are large, but not so prominent, nor are they bright or striking in their appearance; the lower eye-lid is more flat; the upper lip more pointed and hanging; the neck is moderately long, but it is lank, and not finely turned; the body is rounded, and the back not much depressed; the legs are long and slender; the tail is very long, not hairy all the way, as in the horse, but only at the end. The ass is covered with a short and coarse fur, of a pale dun colour, and has a streak of black running lengthways down its back, and another across the shoulders; its neck does not wholly want a mane; but it is shorter and less regular than in the horse: besides, the withers are not so high as those of the horse; the back-bone generally stands more out, and the hindmost parts are higher than the withers. However, the fore-legs are like those of the horse; but in the hind legs there is some difference, for they are generally more crooked. The large

large head, the eyes sunk into it, and at a great distance from each other, these with the muzzle prominent towards the end, give an air of stupidity to this inoffensive animal that never appears in the horse; nor is the shape, when taken altogether, by any means so beautiful. His pace corresponds with his figure, and he is much more sluggish than the horse.

But though, in a comparative view, the ass appears to disadvantage, yet, with all his imperfections, he is not without some good qualities. He is naturally as humble, patient and quiet, as the horse is proud, ardent, and impetuous; he suffers with constancy, perhaps with courage, chastisement, and blows; he is moderate both as to the quantity and quality of his food; he is contented with the hardest and most disagreeable herbs, which the horse, and other animals, will leave with disdain; he is very delicate with respect to his water, for he will drink none but the clearest, and from rivulets he is acquainted with: he drinks as moderately as he eats; but does not put his nose in the water through fear, as some say, of the shadow of his ears. As care is not taken to curry-comb him, he frequently rolls himself on the grass, thistles, and in the dust; and without regarding his load, he lays himself down to roll about as often as he can, by this reproaching his master of the little care he takes of him; for he does not paddle about in the mud and in the water; he even fears to wet his feet, and will turn out of the road to avoid the mud: his legs are also drier and cleaner than those of the horse. In the early time of their youth asses are sprightly, and even handsome; they are light and genteel; but they soon lose these recommendations, either from age, or bad treatment, and become slow, indocile, and head-strong. The ass is ardent in nothing but pleasure, or rather he is so furious in that respect, that nothing can detain him; and, as he loves with a kind of madness, he has also the strongest attachment to his progeny. Pliny assures us, that when the mother is separated from her young one, she will go through fire to recover it. Nor is the ass less attached to his master, notwithstanding he is usually ill-treated by him: he will smell him afar off, and can distinguish him from other men: he also knows the places where he has lived, and the ways which he has frequented: his eyes are good, and smell acute. When he is overloaded, he shews it by lowering his head, and bending down his ears: when he is greatly abused, he opens his mouth, and draws back his lips in a disagreeable manner: if his eyes are covered over, he seems motionless, and when laid down on his side, and his head is fixed in such a manner, that one eye rests on the ground, and the other is covered with a piece of wood, he will remain in this situation without any motion, or endeavour to get up: he walks, trots, and gallops, like the horse, but all his motions are smaller, and much slower; notwithstanding, he can run with tolerable swiftness; however, he can gallop but a little way, and only for a small space of time, and whatever paces he uses, if he is hard pressed, he is soon fatigued. The ass, like the horse, is three or four years in growing, and will live till twenty-five or thirty. He sleeps much less, and never lies down for that purpose, unless very much jaded.

In general, this animal has much better health than a horse, and is subject to fewer diseases; and of all animals covered with hair, the ass is less troubled with vermin: he has no lice, which perhaps may proceed from the hardness and dryness of his skin, far beyond the generality of most quadrupeds; for the same reason he is less sensible of the strokes of the whip, and the stinging of flies. His teeth fall, and grow at the same age, and in the same manner as in the horse, and he has the same marks in his mouth.

Asses breed generally in the months of May and June: in the tenth month the milk appears in the female; but she does not bring forth till the twelfth month: seven days after she is ready for the male again, and always brings forth one at a time. The horse neighs; but the ass brays, which he does by a

long discordant cry, from a sharp key to a flat, and the contrary. He seldom makes his disagreeable cry, but when pressed by love or appetite. The noise of the she-ass is shrill, and clearer. The ass is perhaps, with respect to himself, an animal which can carry the greatest weight; and as it costs but little to feed him, and he requires little attendance, he is of great use in the country, at the mill, &c. He also serves to ride on, as all his paces are gentle, and he stumbles less than the horse. He is frequently put to the plough in countries where the earth is light, and his dung is an excellent manure to enrich some kinds of grounds.

As the skin of the ass is extremely hard and elastic, it is used for different purposes, such as to make drums, shoes, &c. and thick parchment for pocket-books, which is slightly varnished over. It is also with the ass's skin that the Orientals make the *Sagri*, which we call shagreen: it is also probable, that the bones of this animal, as well as the skin, are harder than the bones of other animals; since the ancients made flutes of them, and they were found to have shriller tones than those produced from other bones. Notwithstanding it is in so many respects useful, yet the ass is suffered to dwindle every generation, and were it not for the medicinal qualities of its milk, the whole species might have been long since extinguished. Indeed, this animal, now so common in all parts of England, was entirely lost among us during the reign of Queen Elizabeth. Hollingshed informs us, that in his time, "Our lande did yelde no asses." However, there are accounts of their being common in England before that time, for mention is made of them in the time of king Ethelred, when the price of a young ass was twelve shillings: they are also mentioned in the reign of Henry III. It must therefore have been owing to some accident that the race was extinct in the days of Elizabeth. It is probable, that it was again introduced in the succeeding reign, when our intercourse with Spain was renewed, in which country this animal was greatly used. There are among asses different races, as among horses, but they are much less known, because they have not been taken the same care of, or followed with the same attention; but we cannot doubt that they came all originally from warm climates. Aristotle assures us, that there were none in his time in Scythia, nor in its neighbourhood, nor even in Gaul, which he says is a cold climate; and he adds, that a cold climate either prevents them from procreating their species, or causes them to degenerate; and that this last circumstance is the reason why they are small and weak in Illyria, Thrace, and Epirus. They are still the same in France, where they have been, for many ages, naturalized, and where the coldness of the climate is much lessened since two thousand years, by the number of forests destroyed, and marshes dried up: but it is still more certain that they have been newly introduced into Sweden, and are rarities in the other northern countries. They appear to have come originally from Arabia, and to have passed from thence into Egypt; from Egypt into Greece; from Greece into Italy; from Italy into France; and afterwards into Germany and England; and, lastly, into Sweden, &c. This migration seems to be well proved by the account of travellers.

Chardin says, that there are two kinds of asses in Persia, those of the country, which are slow and heavy, and used only to carry burdens, and a race of Arabian asses, exceeding beautiful: the skin is polished, the head high, the feet light, which they raise with grace, walk well, and are made to ride on. The saddles which they use with them are like a bat, round on one side, flat on the other: they are made of linen or tapestry, have harness and stirrups, and are placed nearer the rump than the neck. Some of these asses cost eighteen pounds sterling; none are sold under twenty-five pistoles, or sixteen pounds. They are broke like horses, but are taught no other pace than the amble: their nostrils are slit in order to give them more breath, and they go so fast that a horseman must gallop

gallop in order to overtake them. In Egypt they are handsome, and high in stature; they are the same in climates excessively hot, as in the Indies, and in Guinea, where they are larger, stronger, and better than the horses of the country; a great number of them are in the Madeiras, where one of the most considerable tribes of Indians pay homage to them; for they believe, that the souls of all their chiefs pass into the bodies of these animals: in short, asses are found in great numbers in all parts of the East, from Senegal to China, and wild asses are more commonly found than wild horses.

NATURAL HISTORY of the MULE.

IN creating animals, the Supreme Being has followed but one idea, and varied it, at the same time, in every possible method, that man may equally admire the magnificence, execution, and simplicity of the design. In this point of view, not only the horse and ass, but even man, and all animals, may be looked upon as making but one family; but we ought not to conclude, that in this great and numerous family, which God hath created from nothing, there are other small families projected by nature, and produced by time. If these families existed, in fact, they could only be formed by the mixture, the successive variation, and the degenerations of the original species; and if we admit for once, that there are families in plants and animals, that the ass is of the family of the horse, and that he only differs because he has degenerated, we may say, with as much propriety, that the monkey is of the same family with man, and that he is a man degenerated. But it is certain by revelation, that all creatures have equally participated of the grace of infinite wisdom, which has fixed immutable bounds to the laws of nature, and said unto her, Hitherto thou shalt go, and no farther. Whence we may conclude, that the two first of each species originally came immediately out of the hands of the Creator; and we ought to believe, that they were nearly such from the beginning as they appear at present in their descendents. Since nature has been observed, to the present time, we have not seen any new species, notwithstanding the rapid motion drags on, or dissipates the parts of matter; notwithstanding the infinite number of combination, which must have been in the space of twenty ages; notwithstanding the fortuitous couplings of animals allied nearly in their species, or others bearing no resemblance, and from which nothing has ever resulted but individuals, as the mule, vitiate and steril, and such as have not been able to become a stock for new generations. We must also consider, that although nature makes its progress through clouds, and by degrees frequently imperceptible, the intervals of these degrees or clouds are not always the same; that the more exalted the species the fewer they are in number, and the greater the intervals of the shades are that separate them; that the smaller species, on the contrary, are very numerous, and, at the same time, have more affinity to each other, so that we are the more tempted to confound them together in one family, as they fatigue and embarrass us the more by their numbers and small differences, with which we are obliged to charge our memories: but we must not forget that these families are our own works, that we have made for the ease of our minds; that, if we cannot comprehend the order of succession, it is ourselves, not nature, that we ought to blame, who knows not these pretended families, and in fact contains only individuals. It is then in the characteristic diversity of the species, that the shades of nature are the most sensible, and best marked; we may even say, that these shades between the species are the most equal and least variable of all, since we may always draw a line of separation between two species; that is to say, between two successions of individuals, which would re-produce in mixing. This is the most fixed point that we have

No. 2.

in natural history, and all the other differences that we can make in the comparison of beings, would be neither so constant, so real, nor so certain. If there is any truth in these sentiments, on the degeneration of beings, are they not highly culpable who introduce into the perfect works of creation unnatural mixtures, or a species of beings, produced contrary to the established laws of nature, and the declared intention of the all-wise Creator? In the beginning, the Lord God said, Let the earth bring forth the living creature (that is, animals having a self-moving principle, or soul of life) after his kind; cattle, and creeping thing; and beast of the earth, after his kind; and it was so. In the second law which God gave in mount Sinai, to prevent confusion, he says to the Israelites, Thou shalt not sow thy vineyard with divers seeds, lest the fulness of the seed which thou hast sown, and the fruit of thy vineyard be defiled. Thou shalt not (even) plough with an ox and an ass together. The tenor of this law is to walk in simplicity, and that we ought not to be curious of new inventions, especially such as counteract, or may be contrary, to the settled laws of nature, appointed and established by an over-ruling Providence. Neither mules, nor the spurious offspring of any other animal, generate any farther: all these productions, therefore, may be considered as monsters; therefore nature wisely stops, in the first instance, the powers of propagation, in order to preserve the original species of animals pure and entire.

The mule is an animal engendered between a horse and a she ass, or between an ass and a mare; consequently is a creature of a middle nature, between its parents. Those produced by the two last are esteemed the best, being larger, stronger, and better shaped: as they partake more of the female than the male parent, they generally inherit, in a great degree, the obstinacy of the former; though their viciousness, it must be acknowledged, may be heightened by their being injudiciously broke. The common mule is very healthy, and will live above thirty years. They are extremely fit to carry great burdens, as they seldom stumble. In Spain coaches are all drawn by mules; and they are of great service in the mountainous parts, on account of their climbing and passing safely upon the very edge of a precipice. They are also employed in carrying the litters of sick persons, the baggage of an army, and the equipage of princes and officers: in short, they serve for all the purposes of horses, and are much more patient and laborious. Fifty or sixty guineas is no uncommon price for one of them.

NATURAL HISTORY of the ONAGER, or ANGRA.

IN the warmer climates the ass is wild; and authors, who are fond of multiplying species, suppose it different in this wild state from the tame ass, and call it Onager. But in their descriptions they give no specific mark of distinction. Some have confounded this animal with the zebra, of which we have given a separate account: but the angra, or wild ass, is neither striped like the zebra, nor is near so elegant in figure. Wild asses are found in some of the islands of the Archipelago, particularly in that of Cerigo: there are also many in the deserts of Lybia and Numidia: they are grey, and run so fast, that the horses of Barbary can only beat them in hunting. When they see a man, they give a loud cry, turn themselves about, stop, and do not attempt to fly till he comes near them: they are taken in snares, made with ropes, and go in troops both to pasturage and to drink. There were also wild asses in the island of Sardinia, but less than those of Africa; and a Spanish writer says, he saw a wild ass at Bassora, whose figure differed in no respect from a domestic one; he was only of a lighter colour, and had, from the head to the tail, a stripe of white: he was also much livelier and lighter in hunting than asses usually are. Neither horses nor asses are natives of America, although the climate,

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especially in North America, is as good for them as any other.

They were imported originally into America by the Spaniards, and afterwards by other nations, where they have run wild, and multiplied in such numbers, that in several places they are become a nuisance. Ulloa informs us, that, in the kingdom of Quito, the owners of the grounds where they are bred, permit any persons to take away as many as they can, on paying a small consideration, in proportion to the number of days their sport continues. Their manner of catching them is remarkable. A number of persons go on horseback, attended by Indians on foot. At proper places they form a circle, in order to drive them into some valley, where, at full speed, they throw the noose, and endeavour to halter them: the animals, finding themselves enclosed, make furious efforts to escape, and if only one happens to make his way through, they all follow with an impetuosity irresistible: but when they are noosed, the hunters throw them down, secure them with fetters, and leave them till the chase is over. These animals will not suffer a horse to live among them; and should any one happen to stray into the place where they graze, they immediately fall upon him, and without permitting him to escape, they bite and kick him till they leave him dead. When they are attacked, they defend themselves with their heels and mouth with such activity, that, without slackening their pace, they often maim their pursuers: they have all the swiftness of horses, and neither declivities nor precipices can retard their career. It is, however, extremely remarkable, that, after carrying their first load, their celerity and ferocity leaves them, and they soon contract the stupidity and dulness peculiar to tame asses.

As wild asses are unknown in these climates, we cannot say whether the flesh is good to eat; but it is certain that the flesh of the domestic ass is extremely bad, and harder than that of the horse. Galen says, that it is a pernicious aliment, and occasions several diseases. But the Persians set so great a value on the flesh of these animals, that they have a proverb expressive of it. However this be, asses milk is a specific remedy, and by no means to be ranked in the class of useless medicines: it is well known to be of great use in many complaints, being clearer, lighter, and easier of digestion, than the milk of any other animal that we are acquainted with: it curdles less upon the stomach than any other; and, therefore, when the tone of the stomach is so weak as to digest nothing else that is

nourishing, asses milk will fit easy upon it: for this reason it is used in curing diseases of the lungs, and may be of service in all internal ulcers. Some affirm it helps the gout and the rheumatism, by abating the acrimony of the fluids. That it may be good in its kind, we should chuse a young healthy she-ass, full of flesh, that has lately foaled, and which has not since been with the male: the young one which she suckles must be taken from her, after which she is to be fed well with hay, wheat, and grafs, whose qualities may have influence on the disease, with particular care not to let the milk cool, nor even expose it to the air, which will spoil it in a little time.

NATURAL HISTORY of the UNICORN.

WHETHER this animal ever existed or not, we are now scarce able to tell, since there is no living testimony of its existence, nor has been for several ages. There are, it is true, many horns kept in the cabinets of the curious, that have been said to be horns of a unicorn; but these, we know, do not belong to a quadruped, but to a fish distinguished by that name; it is possible, however, that such an animal might once have existed, but, like the European elk, has long since disappeared. In holy writ, the Divine Being is represented as thus speaking to Job; "Will the unicorn be willing to serve thee, or abide by thy crib? Canst thou bind him with his band in the furrow? Or will he harrow the valleys after thee? Wilt thou trust him because his strength is great? Or wilt thou leave thy labour to him? Wilt thou believe him that he will bring home thy seed, and gather it into thy barn?" But in this description of the unicorn there are no particular marks of distinction, nor any characteristics, except such as are equally applicable to every beast, remarkable for his vigour, spirit, and fortitude. This animal has been described by some authors as having the body of a horse, with one horn growing out of his forehead. The certainty of his existence as represented by them, has induced many travellers to search after him with greater care: but, after the most diligent enquiry, made in all parts of the world, there is no such creature now to be found. We know of no quadruped that has a single horn, but the rhinoceros; nor is that in the middle of the forehead, but on the nose: whether this has given rise to the fable of the unicorn, or not, we will not take upon us to determine.

C H A P. II.

The NATURAL HISTORY of RUMINATING ANIMALS, and those of the Beeve kind, namely, the BULL, OX, COW; the URUS, BISON, BONASUS, ZEBU; the BEEVE HOG; BUFFALO, and SIBERIAN COW.

TO preserve a succession of beings, it is necessary they should destroy among themselves; and that animals may subsist and be nourished, they must destroy vegetables, or other animals; yet nature, like a prudent mother, in the midst of abundance, has fixed bounds to her liberality, and prevented an apparent waste, in giving but a few species of animals the instinct of feeding on flesh, and she has even reduced to a small number those species which are voracious. Such as feed on plants or vegetables, she has more abundantly multiplied: she seems to have been prodigal to the vegetable, and to have bestowed on each great profusion and fecundity, perhaps, to second her views in maintaining and even establishing this order on the earth. Animals that chew the cud are the most inoffensive, and the most easily tamed. Living en-

tirely upon vegetables, they have neither pleasure nor interest in making war upon other creatures. The fiercest of the carnivorous kind seek their food in gloomy solitude; but these range together in herds, and the very meanest of them unite in each others defence. The food of ruminant animals being easily procured, they seem naturally more indolent, and less artful, than those of the carnivorous kinds. The fox and the wolf are habituated to want, and long habit furnishes them with a degree of sharpness and cunning; their life is a continued series of stratagem and escape, but the bull and ox enjoy the repast which nature has abundantly provided them with, certain of subsistence, and satisfied with security.

Before grafs can be transmuted into flesh, it requires a long and tedious process, therefore nature has generally

rally furnished such animals as feed upon grafs with four stomachs. The first is called the paunch, which receives the food after it has been lightly chewed; the second, a continuation of the former, is called the honey-comb; these two, which are very capacious, the animal fills with as much expedition as it can, and then lies down to ruminate. When these two stomachs are filled, and the grafs, that was slightly chewed, begins to swell with the heat of the situation, the stomachs dilate, and afterwards contract upon their contents. The aliment, thus squeezed, has two passages to escape at; one in the third stomach, which is very narrow; and the other back, by the gullet, into the mouth, which is wider. The greatest quantity is driven back through the largest aperture into the mouth, to be chewed a second time; and a small part, the most liquid, is driven into the third stomach, through the small aperture. The food which is chewed a second time, is by that means rendered more soft and moist, and at length passes into the conduit that leads to the third stomach, where it still suffers comminution. The third stomach is called the manifold, from the number of its leaves, which all tend to promote digestion. It requires the operation of the fourth stomach to make a part of the animal's nourishment, where it undergoes a compleat maceration, and is separated to be turned into chyle. Thus all quadrupeds that ruminate are furnished with four stomachs for the macerating of their food. These only are properly called the ruminant kinds, though many others have this quality in a less observable degree. The rhinoceros, the camel, the horse, the rabbit, the squirrel, and the marmotte, all chew the cud occasionally, but they are not furnished with stomachs like the ox and cow. There are many other animals that appear to ruminate, as birds, fishes, and insects. Among birds that have a power of disgorging their food to feed their young, are the pelican, the stork, the heron, the pigeon, and the turtle; all which have the stomach composed of muscular fibres, in the same manner as those which are particularly distinguished in this chapter by the appellation of ruminants. Men themselves have been known to ruminate. An account of a ruminating family is given us in the Philosophical Transactions; but, as the particulars cannot possibly be agreeable to our readers, we shall purposely omit them. Instances of this kind, however, are accidental and uncommon; and it is fortunate for mankind that they are so. Of all other animals, we spend the least time in eating: this is a principal distinction between us and the brute creation; and eating is a pleasure of so inferior a kind, that only such as are allied to the quadruped, desire its prolongation.

All animals with horns, if of the ruminating kind especially, have suet, others have only fat, which is softer, and melts more readily before the fire. Cloven-footed animals have each toe covered with a kind of hoof, the upper part of which is of a horny substance; and the lower, which composes the sole of the foot, is callous. In the deer, goat, and sheep kind, it is softer, and these animals have two small hoofs or nails behind, which are useful to keep the feet from sliding.

The climate of England is above all others productive of the greatest variety and abundance of wholesome vegetables, almost equally diffused over all its parts. For this general fertility we are indebted to those clouded skies, which mistaken foreigners mention as a reproach to our country: but let us cheerfully endure a temporary gloom, whereby our hills and meadows are clothed with the richest verdure. To this we owe the number, variety, and excellence of our cattle, the luxurious plenty of our dairies, and innumerable other advantages. After man, animals that live on flesh only, are the greatest destroyers, enemies of nature, and our rivals; but the bull, ox, and cow, of which we are now about to treat, and other animals which subsist on grafs, are the best, the most useful, and the most precious for man; since they not only nourish him, but consume and cost him

least: they likewise give as much to the earth as they take from it, and enrich the ground whereon they live. We have no general name for these kind of animals, except the beeve, which is now almost out of use, though very proper to be retained. It answers to the Latin word *bos*, which comprehends the bull, ox, and cow, and may be extended to all of this kind. Of all ruminating animals, these deserve the first rank, with respect to their size, their beauty, and their services: we therefore shall proceed to give a descriptive account of them; and point out their utility in due order.

NATURAL HISTORY of the BULL, OX, and COW.

THE bull is a very heavy, yet a fierce, stately looking animal. The head is large, oblong, and very broad: the nose is obtuse: the nostrils are wide; the eyes large, and have a very fierce aspect; the ears are long and patulous; the horns short, hollow, turned forward, smooth on the surface, and sharp at the point; their figure is lunulated, or like the moon when crescent. The forehead is decorated with short curled hair; the skin hangs loose under his throat; the neck is very thick and robust; the body very large; the legs strong, and of a moderate length; the tail long, and the colour is generally a deep reddish brown, but it varies greatly. The fore-teeth are eight in number, but there are no canine teeth.

Among the ancients, the bull was the most usual victim in sacrifices, and was chiefly offered to Jupiter, Mars, Apollo, Minerva, Ceres, Venus, and the Lares. Black bulls were selected for Neptune, Pluto, and the infernal deities: before they were sacrificed, they were variously adorned. Over the middle of the body was placed a large piece of cloth, which hung down on both sides, and was ornamented with flowers; their horns were decorated with festoons. The bull that was sacrificed to Apollo, had usually great horns. The blood of a bull was looked upon by them as a poison; this opinion is found to be false, for some of the moderns have given a drachm of it, mixed with white wine vinegar, against all internal hæmorrhages, though with what success it is hard to say. Formerly, the flesh of this animal, after he had been baited, was much used in England, especially by the poor; but it is now seldom bought for food; and, if we are not mistaken, when butchers expose bull beef in their shops, they are obliged, by a penal law, to burn a candle during the time of sale. However, this is certain, bull beef contains a great deal of volatile salt and oil; it is also hard, tough, and dry; for which reasons it cannot be either pleasant or wholesome food. At present the bull is kept chiefly for the propagation of his species; and we must be on our guard against the use he makes of his strength, for nature has made this animal indocile and haughty; and, at certain times, he is very furious. The bull that is to be turned among cows, should always be the most beautiful that can be found, large, well made, and fleshy; of a middle age, between three and nine years old; he ought not to have above fifteen cows, though this rule is never observed near London. In all quadrupeds, the voice of the male is stronger and deeper than that of the female, and we believe there is no exception to this rule. The ancients say, that the cow, the ox, and even the calf, have the voice deeper than the bull; but, it is certain, this animal has a stronger voice; since he can be heard much farther. What has afforded grounds to think that his voice is less deep is, that his bellowing is not a simple sound, but one composed of two or three octaves, the highest of which strikes the ear most; and, if we give attention thereto, we hear a grave sound, and at the same time one much deeper than the voice of the cow, the ox, or the calf, whose lowings are much shorter. The bull bellows only when he is enamoured; the cow more frequently lows through fear and dread than love, and the calf bellows from pain, want of food, and a desire of being with its mother.

The Ox is cloven-footed, and well known to be a castrated bull. His general colour is fallow, though there are many others: some are entirely black, others white, red, bay, brown, and some still variegated with different colours. Like all other ruminating animals, he has no fore-teeth in the upper jaw; but in their stead a thick hard membrane formed of the inward skin of the mouth, which serves for the same purposes. The fore part of the lower jaw, is furnished with eight incisive, or cutting teeth, of different lengths, and so disposed, that those in the middle are longer and broader than the rest, which grow less gradually. There are no dog teeth between the incisors; infomuch, that there is a large space without any teeth at all. In each jaw are twelve grinders, six on each side; and there are several pointed protuberances on the top, between which there are little cavities, so placed, that when the upper and lower meet, the points of those above fall into the cavities of those below, they allow the under jaw a motion sideways, which is not above half as broad as the upper; for which reason the teeth in the upper jaw are much broader, which consequently supplies their want of motion: The age of a beeve is known by the teeth and horns. The first fore-teeth fall out at the age of six months, and are replaced by others that are not so white but broader. At the end of sixteen months, the next milk teeth likewise fall out, and others grow in their room; at the end of three years, all the inciding or cutting teeth are renewed, and then they are long, white, and equal. In proportion as the animal advances in years they become unequal and black, as well in the ox, as the bull and cow; for castration makes no change in the teeth. Their horns, however, have a difference, for they become longer in an ox after castration. At the age of three years they fall off, and new ones arise in their places, and these continue as long as they live. At four years of age the ox has small pointed, neat, smooth horns, that are much thicker near the head; the next year they rise to a greater distance, and are thrust forwards by a horny cylinder; thus are they protruded one after another annually; for as long as this animal lives, the horns continue to grow, and by these swellings the age can be certainly known; but then the point, or upper part of the horn to the first ring must be reckoned for three years, and one year for each of the rest.

An Ox is not so proper as the horse to carry burdens, though made use of for riding in some eastern countries: however, he is of great use in ploughing, and harrowing land, and very fit to bear the yoke. In some parts of Europe they do not yoke them together by the necks, but by the horns. His large size, slow motion, stout legs, and great patience, render him very proper for labour, and seem to have fitted him for turning the soil on which he feeds. The time of inuring him to labour is at the age of two years and a half, or three years at farthest; for when he is older, he becomes untractable, and sometimes will never be thoroughly broke in. When strong and fit for labour, his skin is usually sleek, and his hair soft and shining; when otherwise, it is a sign the animal is not in health, or that at least he is weakly. At ten years of age he is usually taken from labour, and fed for slaughter. He generally becomes fat in five months; for he is very quick in feeding, and fills himself very soon; after which he lies down and ruminates, or chews the cud. The two first stomachs are nothing but a continuation of the same bag, and are very capacious. After the grass has been chewed over again, it is reduced to a sort of paste; not unlike minced spinage; and it is under this form, that it is retained in the fold of the third stomach; but the digestion is not perfectly effected till it comes into the fourth, where it is reduced into a perfect mucilage or pulp. When the Ox has thus fed to satiety, he lies down, generally on the left side; for which reason the kidney on that side is always the largest, and sur-

rounded with more fat than the right. While awake, he continues to ruminate, but he sleeps little, and awakes at the least perceptible noise.

The flesh of this animal, or ox beef, contains a great deal of oil and earth, and is in great esteem. It is very nourishing, and yields a strong aliment; we seldom perceive any bad effects from it; on the contrary, those who live chiefly upon this diet are strong, vigorous, and healthy: it ought, however, to be young, fat, tender, and well fed, for, otherwise, it is hard of digestion, tough, breeds gross humours, and causes obstructions. But such as are weak, and lead sedentary lives, together with infants, and very old people, should use it with moderation. As to its medicinal qualities, and use, these are various. Beef-suet is emollient and resolvent. It may be used in clysters to an ounce, to abate sharp humours in the intestines. It is exceeding good to heal chapped lips. The common people frequently apply the tallow of a candle by way of lip-salve, and it is the best we have. Beef marrow is said to be good against weakness of the nerves, as well as for rickets and the scurvy; for which purpose it is made into a liniment mixed with wine. The gall of an ox or cow is preferred before that of any other animal, because it is more acrid, volatile, and penetrating. Some have given a drachm of it in laxative clysters, to render them more sharp when the body is bound. A plaister composed of this gall, aloes, myrrh, and oil of coloquintida, laid upon the navel, produces the same effect, as well as kills worms: it is very proper for those who cannot take medicines inwardly. For children, a little of this gall, mixed with aloes, and applied to the belly, has been often found beneficial on the same account. A bit of cotton steeped in this gall, and introduced into the ear, will cure hardness of hearing, if continued some time; water distilled from it is said to be good against spots in the eye, and dimness of sight from the opacity of the cornea: the best way to lay it on is with a pencil, and then it will work a cure in a short time. The tincture of ox-gall is an excellent cosmetic when rubbed all over the face; but it must not be wiped off, nor exposed in the open air, for three or four days, in which time it will give a charming whiteness to the skin. This tincture is made by drying gall in the sun, and infusing it in spirits of wine. It is well known that the dyers make use of this gall to cleanse their stuffs; for it is of a soapy nature, and will take spots out of cloths: it is also used by painters to give a brighter tinge to their colours. Some have applied the dung of an ox or cow, in the form of a poultice, to appease the pain of inflammations, especially those of the gout. In the German Ephemerides we are told, that several obstinate intermitting fevers have been cured by taking an infusion of the fresh dung in ale: it must be taken warm before the fit, and repeated two or three times when the first dose will not do: it causes a plentiful sweat. But these, as may be seen from what has already been said on this subject, are not the only advantages that this animal procures to man; he is a faithful, and most useful domestic. In former times he, together with the sheep, constituted the only riches of mankind, and still he is the basis of the wealth of states, which only flourish, and are supported by, the opulence of the earth, and the number of the cattle: these are the only real property we possess, all others, even gold and silver, being only arbitrary representations, monies of credit, which are of worth no longer than the produce of the earth gives it them. The truth of this remark will be still more obvious in our account of that no less useful animal the cow.

The Cow is to be found, in some one of its varieties, in almost every part of the world: the few kine which subsist in Iceland; are without horns, though they were originally of the same race with ours. The Dutch bring frequently large quantities of lean cattle from Denmark, which they fatten on their own grounds; these are generally larger than their own natural breed,

and

and soon become fat. The cattle of the Ukraine have excellent pasture, and are considered as the largest breed of all Europe. On the rich mountains of Switzerland these animals grow to a very great size. In France, where they are permitted to have no grass but what is thought unfit for horses, they dwindle and grow lean. In Barbary, and the provinces of Africa, where the pasturage is short, and the ground dry, the cows are small, and give but little milk. In Ethiopia they are exceeding large. In some parts of Persia and Tartary they are of a prodigious stature, and in others exceeding small. There are greater plenty of Beeves in Europe than in any other parts of the world, especially in the northern regions; for, in general, they can bear cold better than heat, for which reason they are not numerous in the southern countries. As for America, there were none before they were carried thither by the Europeans. But of all countries, India and England produce the largest Oxen. Our breed of horned cattle has been so greatly improved by a foreign mixture, that we cannot, with any degree of certainty, point out the original kind of these islands. Those which may be supposed to have been purely British, are much smaller than those on the northern part of the European continent. On the Highlands of Scotland the cattle are extremely small, and many of them, males as well as females, are hornless: the Welch runts are considerably larger; and the Cornish cattle are of the same size with the latter. The large species, now cultivated through most parts of England, are either entirely of foreign extraction, or our own improved by a cross breed with that kind; and the large hornless cattle, bred in some parts of our country, came originally from Poland. Of all quadrupeds, this animal seems most liable to alteration from its pasture, or according to the richness or poverty of the soil. In some they grow to a great bulk, in others they appear as diminutive: in almost every part of the world they are to be found large or small, in proportion to the richness or poverty of their food. The differences, however, in the size of this animal, are less remarkable than those of its form, its hair, and its horns. In many of them the variation is so very extraordinary, that they have been considered as a different kind of species, when they are, in reality, the same. It is evident, therefore, that the differences between the Cow, the Urus, and the Bison, are merely accidental. Nature, which has given horns to some cows, and not to others, may also have given a hump to the Bison, or enlarged the Urus.

In those species of animals, which man has formed into flocks, and where the multiplication is the principal object, the female is more necessary, more useful, than the male: the produce of the Cow is a benefit which grows, and which is renewed every instant: the flesh of the calf is a delicious dainty for the table; the milk makes, in a variety of particulars, part of our food, and for our children; butter relishes the greatest part of our victuals, and cheese is acceptable both to the rich and poor. Many of our English peasants have (we should say had) no other possession than a Cow, and they are little more than nominal possessors of its advantages. If they pretend to taste its flesh, their whole stock of riches is at once destroyed: veal is a delicacy they cannot make any pretensions to, therefore they are obliged to fatten its calf for sale; even its milk is wrought into butter and cheese for the tables of their masters, a very small share being appropriated to their own use. In Germany, Poland, and Switzerland, every peasant keeps two or three Cows for his own benefit. The meanest of them annually kills, at least, one for his own table, which is hung up, after having been salted, and is thus preserved all the year round. But in this country, where the opulent riot in luxury, the poor, in these iron times, are not able to purchase meat, and even butter is considered by them as an article of extravagance.

The flesh of the Cow is not so good as that of the Ox; though when well fatted, especially if young, it is not much inferior; and this is commonly called heifer-beef. Veal contains a great deal of oil, and a fixed salt,

which is found in this meat that supplies the London markets, the young animal being permitted to lick salts and chalk, which he does greedily, to correct the acridities of his stomach. This the fatteners of veal suppose brings on the calf more speedily in his flesh, and also whitens the veal; but, however this may be, it does not certainly improve its flavour. Veal is nourishing, well tasted, easy of digestion, and rather keeps the body open than otherwise. It agrees very well with weakly constitutions, and persons who do not use much exercise. The lungs of a calf are pectoral; and proper to abate acrimonious humours in the breast. Calves feet are the same, from which is made the jelly, prescribed often in consumptive habits. Broth made of the knuckle of veal is a good restorative. Veal marrow and suet, being emollients, are applied outwardly to soften hard swellings, and to supple contracted tendons. Runnet is nothing else but the curdled and acid matter that is found at the bottom of the stomach of young calves; the use of it is universally known, for the curdling of milk in order to make cheese. Some say the black cows, some that the red, give the best milk, but that the white yield most: however, when a Cow is chosen, she ought to be young, fleshy, and have a brisk eye. She goes with young nine months, and brings forth at the beginning of the tenth: but, by human industry, her time may be altered; for, by a particular management, we have veal in London at all seasons of the year.

Cow's milk is of universal use, and is preferred for food before that of any other animal where it can be had. It is very balsamic, and good in many diseases, especially when attended with a falling away of the flesh. Good milk is neither too thick nor too thin; its consistence should be such, that when we take a drop, it should preserve its roundness without running, and in colour it should be a beautiful white: that which is inclinable to blue or yellow is worth nothing: its taste should be sweet, without any bitterness or sourness: it is best during the month of May, and during the summer, than in winter; and it is never perfectly good but when the cow is of a proper age, and in good health. The milk of young heifers is too thick, that of old cows too dry, and during the winter it is too thick. The milk of cows which are hot is not wholesome, any more than that of one near her time, or that has lately calved. Whey, having an opening quality, is an excellent remedy in many disorders, particularly those of the malignant sort, either alone, or with the juice of oranges and lemons. It may be given safely to women with child, and is very serviceable when the viscera are obstructed. In most cases it should be taken twice a day with a little sugar, or the syrup of violets, for a month's time. However, it will be best, in most distempers, to mix it with the juice of those herbs that are recommended against the peculiar disorder. Some, of late, have been very profuse in the praise of sugar milk. This is made by boiling four or five quarts of milk with an ounce of cream of tartar very finely powdered. As soon as the milk is curdled, the clear part must be filtered, and clarified with the white of an egg; then it must be evaporated to a pellicle, or thin skin, and the vessel must stand in a cool place for a day or two; after which you will find crystals at the bottom, and on the sides of the vessel: these are called sugar, on account of their sweetness, and they are good in all cases where milk is useful.

Butter, as almost every one knows, is extracted from cream, and they have both the same virtues. Cheese is made of the grossest part of the milk with runnet. It is hard of digestion, if eaten to excess; but the contrary in a small quantity, and when made of new milk. In Ireland the greatest part of their cheese is made of sheep's milk, and coloured with saffron. Dr. Boerhaave affirms, that very old strong cheese has sometimes inflamed the gums and throats of those who have eaten of it; from whence he concludes, that it must be bad for the stomach and intestines: but many of our most eminent physicians, than whom there are none better in the world, are of a contrary opinion, and old Cheshire-

cheese, by many experiments, has been proved to be a powerful resolvent. Butter is of great use in all the northern countries of Europe, except France, where they have no great opinion of it, because they say it weakens the stomach, takes away the appetite, and creates sickness; but in England the consumption of it is very great.

In short, there are scarce any parts of these animals, which we have described, without their uses in commerce, manufactures, and medicine. The hide serves for boots, shoes, and many other conveniences of life. Vellum is made of calves-skin; and gold-beater's skin is made either of a thin vellum, or the finer part of the guts of the ox. The hair, mixed with lime, is a necessary article in building. Combs, handles for knives, buttons, drinking vessels, &c. are made of the horns. Carpenters glue is made of the chips of the hoofs, and the parings of the raw hides. The bones are used by mechanics, as a substitute for ivory, by which many neat conveniences may be purchased at an easy rate. From the feet is procured an oil much used in the harness and trappings belonging to a coach, and the bones calcined afford a fit matter for tests, used by the refiner in the smelting trade. The blood is said to be an excellent manure for fruit trees, and it is the basis of the colour called Prussian blue. To their suet and fat we owe, in some manner, our artificial light. Thus we see man changes the natural state of animals, by forcing them to obey him, and rendering them useful to him. When God created the first human pair, in his own image, male and female, "he blessed them, and said unto them, be fruitful, and multiply, and replenish the earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth." But we must distinguish the empire of God from the domain of man. The Creator of all beings is the only master of nature; man has no command over the productions of the creation; he can have none over the heavenly bodies, over the revolutions of the globe which he inhabits: nevertheless, the divine ray, with which man is animated, ennobles and raises him above all other material beings. This spiritual substance, far from being subject to matter, has the power of making it obey, and though it cannot command all nature, it presides over particular beings. God, the source of all light and intelligence, rules the whole universe with infinite power; man has only power limited to small portions of matter, and is master of individuals only. Yet, this empire which man has over animals, is an empire revolution cannot overthrow; it is an empire of the spirit over matter; it is not only a right of nature, a power founded on unalterable laws, but a gift of God, by which man may learn every moment the excellence of his being; for he does not rule them because he is the most perfect, the strongest, or the most artful of animals. Was he only the first of the same order, the second in rank would unite together to dispute the empire with him; but it is from the superiority of his nature, and the divine fiat, or will, that man reigns and commands: he is master over all animals, because, like them, he not only has sensation and motion, but is a partaker also of the divine image: he possesses the light of reason; is capable of governing his actions, concerting his operations, and of overcoming force by swiftness, by cunning, and by the employment of his time. Nevertheless, among animals, some appear more or less familiar, more or less savage, more or less gentle, more or less ferocious than others. Let us compare the docility and submission of the dog, with the cruelty and ferocity of the tiger; one will appear to be the friend of man, the other his enemy. His empire then over animals is not absolute. How many species can escape his power by the rapidity of their swiftness, by the obscurity of their retreats, by the distance which the element they inhabit places between them and mankind? How many other kinds escape him from their minuteness? And, in short, how many others are there, who, far from respecting their sovereign, openly attack him, without mentioning those insects that insult him with their

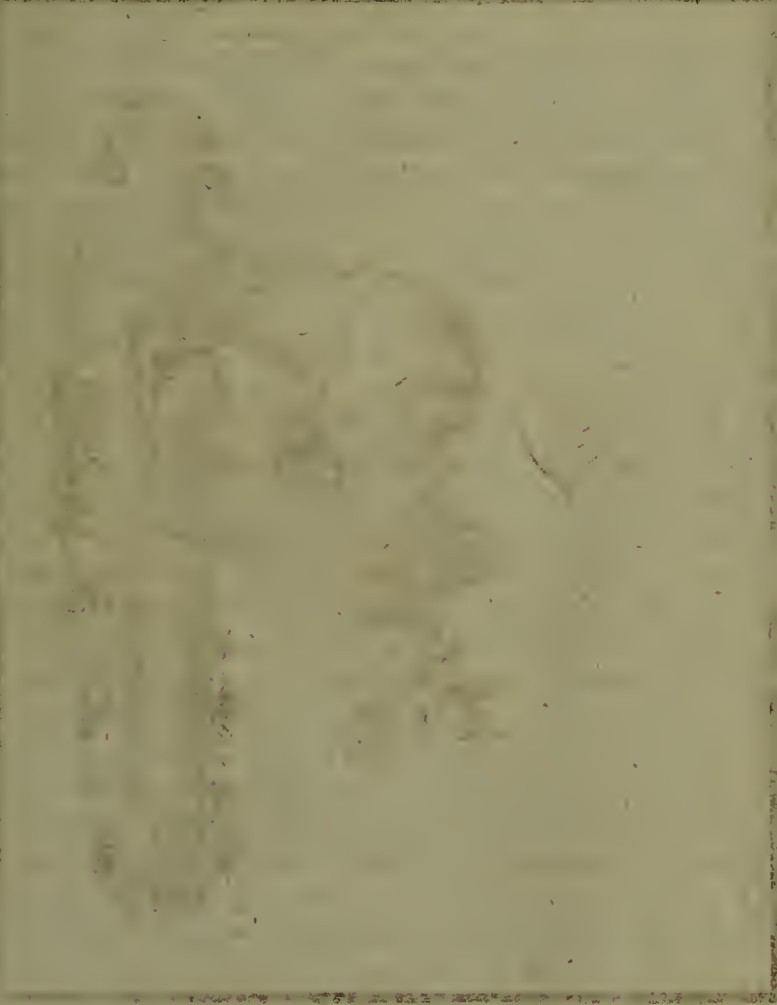
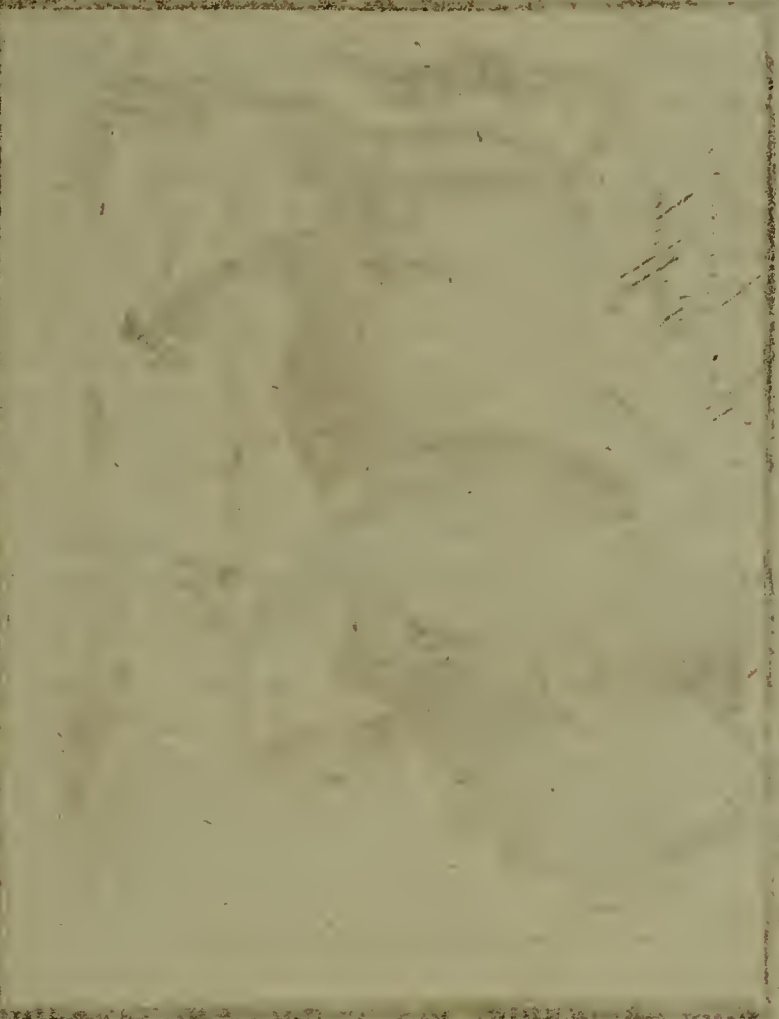
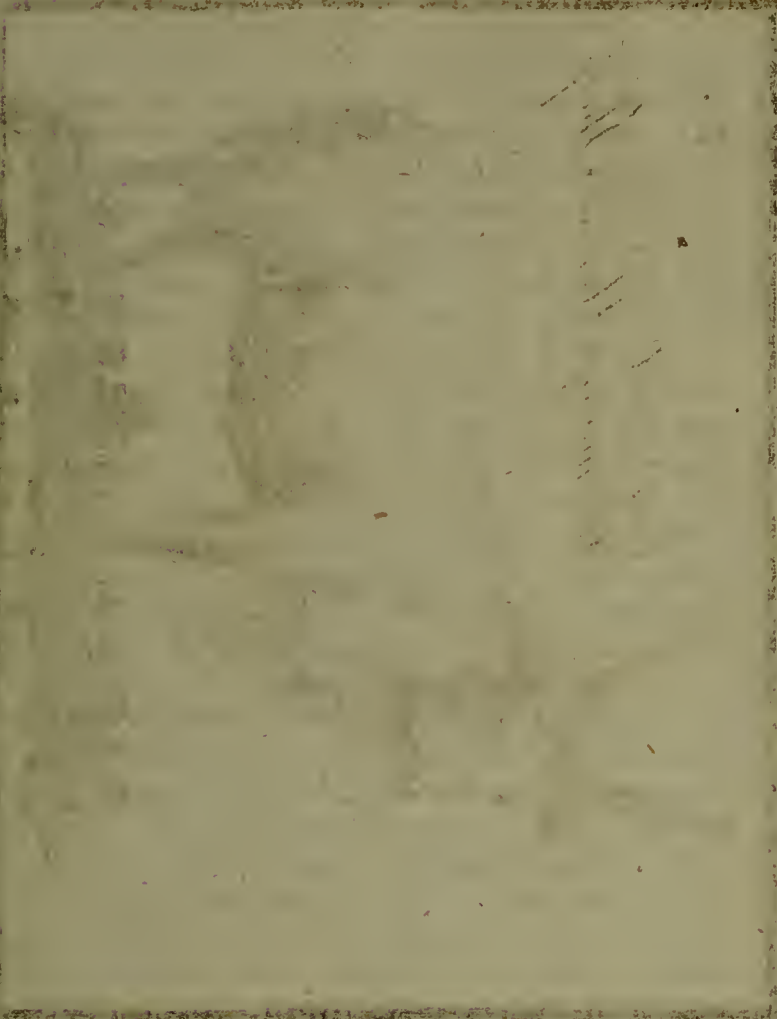
stings, those serpents that carry poison and death in their bites, and many other troublesome creatures, that seem to exist only to form a shade between good and evil, and to make man to comprehend how little respectable his fall has made him? On the other hand, as in time the human race multiplied, and spread over the face of the earth; and as, by the aid of arts and of society, man has been able to conquer the universe, he has, by degrees, destroyed, or reduced to a small number of individuals, every hurtful and voracious species of wild beasts; he has opposed animals to animals, and conquered some by fraud, others by force, till, by frightening them away, and attacking them by every rational method, he has arrived at the means of safety, and established an empire, bounded only by inaccessible places, hidden solitudes, frozen mountains, and obscure caverns. These reflections, and the whole of our observations on the present subject, naturally direct our thoughts to the spring of divine benevolence, the great cause and source of all our comforts in this life. The ox knoweth his owner, the ass his master's crib; and shall the intelligent spirit of a man be ungrateful? No; let us omit no proper opportunity to acknowledge and adore the never-failing goodness of our Creator, who satisfieth the desires, wants, and appetites of every living creature, and diffuseth throughout the whole creation his varied bounties with a liberal hand.

NATURAL HISTORY of the URUS.

THERE are some parts of Europe where the Urus, in its wild state, is the largest of all the beeve kind. Julius Cæsar, in his commentaries on the Gallic war, affirms that, in size, it is little less than the elephant, though of the colour and shape of a bull, and that he is exceeding strong and swift. Other authors affirm the same, and say this animal grows to an amazing size, and is very fierce. The Urus is chiefly to be met with in the province of Lithuania. He is quite black, except a stripe mixed white on the top of the back, which extends from the neck to the tail; the eyes are fierce; the horns short, thick, and strong; the forehead is generally decorated with a large quantity of black, curled hair, and many of them have beards of the same; the neck is short and thick, and the skin has a strong odour resembling musk. The female, though much smaller than the male, is superior in size to the largest of our oxen; but her udder and teats are so extremely small as hardly to be perceived. Upon the whole, however, this animal differs but little from the tame bull: there are, indeed, some trifling varieties, which have probably been produced by his wildness, or the richness of the pastures where he is found. There is a smaller race of the Urus in some parts of Spain. But whether they are of the large enormous breed of Lithuania, or the smaller Spanish race; whether with short or long horns; whether with or without long hair on the forehead; they are every way the same with what our common breed was, when in the forest, and before they were reduced to a state of servitude. The flesh of the Urus is much inferior to that of the Ox, and the most valuable part of him is the hide, which serves for various purposes.

NATURAL HISTORY of the BISON.

THIS animal is called by the Lithuanians Suber, and by the Germans Wifent; but the Bison differs from others of the beeve kind, in the neck and shoulders; for he has the appearance of a lion before, with a horrid mane, and has a very long beard under his chin. His head is large, broad, and short; his nose obtuse; his nostrils very open; his eyes full, and of a fierce aspect; his neck robust and thick; his forehead large; his horns point forward, but, are surprizingly big, and far asunder; his body is bulky and unweildly; his legs short, and thick; his tail reaches to the ground; and on the middle of his back is a bunch hairy and high



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QUADRUPEDS



Thomson sculp.

high like that of the camel. Those who hunt him are very dextrous and careful, for he is a cruel animal and afraid of nothing. The inhabitants of Lithuania usually make pits, and cover them over with boughs and earth; then they get on that side of it which is opposite to the Bison, who immediately makes at them, and tumbles into the pit-fall, where he is killed. There is no hunting him unless in forests, where there are trees large enough to hide the hunters. His tongue is said to be so rough, that if he touches a part of a man's garment, he seldom or never fails of getting him in his power, and tearing him to pieces. He is much offended with a red colour; for which reason they sometimes throw down a red cap, or some such thing, and he will never leave it till he has trod it all to bits. Linnæus calls the Bison a Beeve with horns turned upwards, a bunched back, and a very long mane and beard. The body is covered with long hair as far as the shoulders.

The Bison is found in all the southern parts of the world; throughout the vast continent of India; and throughout Africa, from mount Atlas to the Cape of Good Hope. This animal seems chiefly to prevail in all these countries, where they are found to have smooth soft hair, travel a great pace, and supply in some degree the want of horses. They are very expert and docile: many of them bend their knees to take up and set down the burthens with which they are loaded; and they are treated by the natives of those countries with a tenderness proportioned to their utility. Among the Hottentots, Bisons are highly esteemed: they are considered, as their protectors and servants, companions of their pleasures and fatigues, and assistants in attending their flocks. The animal lives in the same cottage with his master, conceives an affection for him; and in proportion as the man approaches to the brute, so the brute seems to acquire human sagacity. The Bisons, or Cows with a hump, differ greatly from each other in the several parts of the world. The wild ones are larger than the tame. Some have horns, others have none; some are extremely large, and others very small: but when tame, they are all equally docile and gentle. The Bisons of Malabar, Abyssinia, and Madagascar, are large; those of Arabia, Petræa, and most parts of Africa are small. The American Bison is rather less than that of the antient continent; its hair is longer and thicker, and its hide softer.

NATURAL HISTORY of the BONASUS.

THIS is a very bulky and unweildy animal; larger than our bull, and furnished with a mane like a horse. The horns are so short as not to exceed a span in length, and turned in such a manner as to be quite unfit for wounding: the head is short and broad; the forehead flat; the nose obtuse; the nostrils wide; the ears long and broad; the legs thick; and the tail long. The colour is a deep tawny, except the forehead, and breast, which are white. The mane is of a darker colour than the body, and hangs down quite to the breast. He has no teeth in the upper jaw before, like others of this kind. His legs are covered with hair, and he bellows like an ox. When pursued he does not attempt to defend himself with his horns, but kicks, and discharges his dung to a great distance against his pursuers; but this is only when he is disturbed and enraged, for, at other times, he has no such power. This animal is found in Lydia, Phrygia, and in many of the warm climates.

NATURAL HISTORY of the ZEBU.

IN Africa is an animal called the Zebu, or Barbary Cow, which, for shape, approaches nearer that of a stag, than an English Cow. The hair is reddish, and of the same thickness near the points as at the roots, which is very unusual. The horns likewise are not exactly like those of common cows, for they rise very near each other, because the head is extremely narrow

in that part: they are a foot long, very thick, and bend a little backwards; of a black colour, and twisted almost like a skrew, except near the ends, where the channels are almost obliterated. The tail is thirteen inches long, including the tuft of hair at the end, which is about three inches. The ears are like those of an Antelope, and without hair, except on the side which is partly white. The eyes are so high, and so near the horns, that the head seems to be almost without a brow. Their teats are two in number, very slender, short, and quite different from those of our cows. There is also a swelling nearly like that of the camel. This is probably the same animal mentioned by voyagers to be found in the Gomera islands, near Madagascar, which some call a buffalo, and others a cow. They are very extravagant in praise of the bunch, or large hump, as they call it, upon the back, affirming that it is very delicious eating. Belon is also of opinion, that it is the buffalo of the ancients; but this is a circumstance of no great consequence, and his conjecture is but feebly supported. We have already observed, that naturalists have given various names to animals, which are, in reality, the same, and differ only in a few accidental circumstances. The wild and tame cow, that belong to Europe; and that of Asia, Africa, and America; the Bonafus, and the Urus, the Bison, and the Zebu, in our opinion, are all one and the same: they all propagate among each other, and, in a few generations, the hump wears away, and few vestiges of savage fierceness remain. Of all animals, except man, the cow seems most extensively propagated. It is equally an inhabitant of the frozen fields of Iceland, and in the scorching deserts of Lybia. It is domestic and tame in civilized countries, savage and wild in those thinly inhabited, but is capable of being made useful in all.

NATURAL HISTORY of the BEEVE-HOG.

THERE is an animal of the beeve kind, that appears to be of a middle nature between a beeve and a hog, and is indiscriminately called a Beeve-Hog, or a Hog-Cow. The female of this species was shewn a few years ago in England. It is of the height of an ass, but broader and thicker; and the colour is of a whitish dun, or a cream colour. The hair on the body is very thin, and more like that of a hog than a cow. From the neck to the tail is a row of bristles down the spine of the back, not quite so strong as those of the hog. The tail has stiff bristles at the end, and appeareth much like that of an ass. The head is very long, and the snout, though pretty much like that of a cow, is a little inclining to that of the hog kind. On the top of the head are two black flattish horns, that bend inwards like a bow, and lie pretty close to the neck. There is no udder like that of a cow, but there are two teats between the hind legs, which are not visible unless you stoop down to view them, for they are close to the body, without any appearance of an udder. In short, it is a very uncommon animal, and seems not to have been described hitherto by any author. Those who exhibited this creature in England, called it a Bonafus, and said it was brought from the East Indies; but it is the business of such people, to impose upon the ignorant, and therefore they seldom give the right name to those animals that are not well known: one in his bills mentions two beavers among his collection, which were no other than racoons.

NATURAL HISTORY of the BUFFALO.

BY comparing the tame Buffalo with our cow, we perceive a striking likeness between them, both in their form and nature: they are equally submissive to the yoke, both live frequently under the same roof, and are employed in the same domestic services: their figures in some particulars are not unlike; yet, no two animals

animals can be more distinct, or appear to have a stronger antipathy to each other. The Buffalo is less beautiful than an ox; his figure is more clumsy, and he carries his head nearer the ground; his limbs are not so fleshy, nor his tail so well covered with hair; his body is shorter and thicker; his legs higher; his head smaller; his horns not so round, but compressed; one side being sharp with a tuft of hair hanging down between them; his skin is also harder, thicker, and blacker, with less hair; his flesh is disagreeable to the taste and smell; the colour is usually a dark grey, but a great variation is to be observed in this particular; but there is commonly some white under the belly, and about the forehead. Under his throat the flesh hangs very loose. This animal is a native of the East, but has been introduced into Italy, and some other parts of Europe, where it is employed in agriculture, and carrying burthens, being guided by a ring, thrust through its nose. It is said that two buffaloes, yoked in a waggon, will draw more than four strong horses: their heads and necks being naturally bent downward, they are the better fitted for the draught. But though they may be pretty well tamed, they always retain something of their natural fierceness. It is certain that our cow refuses to breed with a Buffalo, which it so nearly resembles, though she will propagate with the bison, to which, in point of form, it has but a distant similitude. The milk of the female, though produced in great abundance, is not so good as that of our cow; yet, in the kingdom of Naples she is kept chiefly for the sake of her milk, and of this in warm climates, the greatest part of their cheese and butter is made. But the Buffalo, being apt to be mischievous, is less fit to be trusted loose in the fields where people walk. The veal of this animal is not better eating than our beef; but the hide is well known for its softness, thickness, and impenetrability. The horns are greatly used in the pope's territories for making of combs. Dellon, who saw a great many Buffaloes on the coast of Malabar, in the East Indies, informs us, that he is larger than an ox, but much of the same shape, only his head is somewhat longer and flatter; his eyes, which are almost white, a great deal larger; and the horns in some are ten feet long. It must be confessed, the Buffalo, upon the whole, is an ugly animal; he has scarce any hair on his body; his pace is very slow; but, as we have before observed, he will carry or draw a very heavy burthen when tamed.

The wild Buffaloes are very dangerous animals, and frequently tear and crush travellers to death. They are least to be feared in the woods, because, in the pursuit, they often get entangled in the branches of the trees, which affords time to escape. There is hardly any other method to avoid them, for they are extremely swift, and such excellent swimmers, as to cross large rivers without any difficulty. All large animals of the torrid zone are very fond of the water, and in the midst of the pursuit, frequently plunge in to cool themselves. The Negroes of Guinea, and the Indians of Malabar, delight much in hunting and destroying them; but they never attempt to face the Buffalo openly; their usual method is to climb up a tree, and from thence shoot at him; nor do they venture to come down till they have effectually dispatched him. The Buffalo is found wild in many parts of Africa, and India; from India they were brought into Lombardy, so early as in the reign of king Agilulf, in 616. They are said to be found wild in Apuglia; and to be common in hot weather on the sea shore between Manfredonia and Barletta. They grow to an enormous size, some say, twice the bulk of our largest oxen. There is a pair of horns in the British Museum, probably from one of these animals: one of them is six feet six inches and an half in length; it weighed twenty-one pounds, and the hollow contained five quarts of water. The female produces but one at a time; but they are very different in the times of gestation; for the cow goes but nine months, the Buffalo twelve.

The small Indian Buffalo is the size of a calf six months old, and resembles an English bull in shape, but has very short horns, and a hump between the shoulders. They are used in the East Indies for drawing coaches instead of horses: the nose is broad, flat, and without hair: on the muzzle are some straggling hairs; and those on the sides of the nose are whitish: the horns which are small, and of a dark colour, appear but a little above the rough hair on the top of the head: the ears are much longer and larger than the horns, being of a flesh colour, and without hair on the inside: the hair is sleek all over the body, and the head, neck, back, tail, are of a bluish colour. The loose skin on the neck is white, and the belly is covered with so small a quantity of lightish hair, that it shews the flesh colour. The legs are of a light colour, spotted and marked with black, and become gradually whiter towards the feet. The tuft of hair at the end of the tail is black, and the hoofs of a dark brown, shaped like those of our cattle.

In the northern parts of America is another animal of the beeve kind, which differs from the rest in some particulars. He is larger than the ox, and has short black horns, and a large beard under his chin: his head is so full of hair, that it hangs down over his eyes, and gives him a terrible appearance. He has a bunch on his back, extending from the shoulders to the haunches. The hump is covered with reddish long hair, and the rest of the body with a kind of black wool, which is in great esteem. He has a large breast, a short tail, and hardly any neck; but his head is larger than that of a bull. At the sight of a man, he will run away, and a whole herd of them will make a precipitate flight, if they see but a single dog. He has so quick a smell that he is not to be approached but on the leeward side: however, when he is wounded, he becomes very furious, and will turn back upon the hunters. The flesh of the female is good, and the hide excellent for many purposes. The savages make bucklers of it, which, though extremely light, are hardly to be penetrated by a musket ball. In the western parts of New France, on this side the Mississippi, they are famous for hunting this animal. The hunters range themselves into four lines, and form a very large square; afterwards they set fire to the grass, which at that time is very long and dry: the animals draw closer together, as the fire runs along the lines, and, as they are much afraid of fire, they naturally fly from it, and at length make one body. The hunters then attack them briskly, and seldom suffer many to escape.

In South Carolina is also a species of wild Cow, or Buffalo, called by some writers the American Bison. They are of low stature, but weigh more than our largest oxen, and the hide is too heavy for the strongest man to lift from the ground. They range in droves, feeding in open savannahs morning and evening, and in the heat of the day retire to shaded streams of water, gliding through thickets of tall canes; which, though a hidden retreat, yet, as their heavy bodies cause them to make a deep impression with their feet in moist sand, they are often traced and shot by the Americans. Their hoofs, more than their horns, are their offensive weapons, and whoever opposes them is in no small danger of being trampled into the earth. Their flesh is very good, and of a high flavour, differing only from common beef, as venison does from mutton. The bunch on their shoulders is thought, by the Americans, to be the most delicate part.

The Siberian Cow, is another animal of the above kind, though extremely different from any of the beeves already mentioned. The male has neither horns nor mane; but he has curled hair on the top of his forehead, and his tail resembles that of a horse. His whole body, except the legs and face, is covered with long straight hair, but he has not a hump on his back. He is found near the lake Baykal, in Siberia, and probably in the neighbouring countries.

C H A P. III.

The NATURAL HISTORY of ANIMALS, of the SHEEP and GOAT Kind.

Containing a descriptive Account of the SHEEP, and the GOAT; the many HORNED SHEEP, the BROAD TAILED; the STREPSICHEROS; the GUINEA SHEEP; the MOUFFLON; the GOAT; and its Numerous Varieties.

WE cannot expect, that any two races of animals should exactly correspond in every particular, because no two animals are found entirely the same. The goat and the sheep are apparently different in the form of their bodies, in their covering, and in their horns. They may from hence be considered as two different kinds, with regard to all common and domestic purposes. But if we come to examine them closely, and observe their internal conformation, no two animals can be more alike: their feet, their four stomachs, their suet, their appetites, all are entirely the same, and shew the similitude between them: but what makes a stronger connection is, that they propagate with each other. The buck goat is found to produce with the ewe an animal that, in two or three generations, returns to the sheep, and seems to retain no mark of its antient progenitor. The sheep and the goat, therefore, may be considered as belonging to one family; and were the whole races reduced to one of each, they would quickly replenish the earth with their kind.

The conformation of the sheep and goat internally, as we have just observed, is entirely the same; nor is their structure very remote from that of the cow kind, which they resemble in their hoofs, and in their chewing the cud. Indeed, all ruminating animals are internally very much alike. The goat, the sheep, or the deer, exhibit to the eye of the anatomist, the same parts in miniature, which the cow and the bison exhibit in the great. But, the differences between these animals are, nevertheless, sufficiently apparent. Nature has obviously marked the distinctions between the cow and the sheep kind, by their form and size; and they are also distinguished from those of the deer kind, by never shedding their horns. Indeed, the form and figure of these animals, if there were nothing else, would seldom fail of guiding us to the kind; and we might almost, upon sight, tell which belongs to the deer kind, and are to be ranked with that of the goat. However, the shedding the horns of the deer annually, and the permanence in the sheep, draws a pretty exact line between the kinds; so that we may hold to this distinction only, and define the sheep and goat kind as ruminants of a smaller size, that never shed their horns. If we consider these harmless and useful animals in one point of view, we shall find that both have been long brought into a state of domestic servitude. Both seem to require protection from man; and are, in some measure, pleased with his society. The sheep, indeed, is more serviceable of the two; but the goat has more sensibility and attachment. The attending upon both, was once the employment of the wisest and best of men; and those have been supposed the happiest times, in which these animals were considered as the chief object of human attention. In the patriarchal age, the goat was a great favourite, and it continues such in Ireland, and in other countries, to this day. But, in England, the sheep has been principally regarded. We shall, therefore, make this the first object of our attention; and the goat with all its varieties, will then follow in proper order.

NATURAL HISTORY of the SHEEP.

FROM the defenceless structure of this quadruped, which disqualifies it for combat, and the slowness of its motions, which renders it incapable of flight, it

should seem as if providence intended, that it should find safety under the protection of man. In its servile state, the Sheep appears to be the most stupid of all animals, and to be divested of all inclinations of its own. Every animal has a peculiar turn of countenance, which generally marks its nature. The Sheep seems to have none of those traits which betoken either cunning or courage. It appears a large mass of flesh, supported upon four small straight legs, ill suited for carrying such a burthen. It is easily fatigued, and frequently sinks under the weight of its corpulency. Those which feed upon a more fertile pasture, and grow fat, become entirely feeble; those without horns are duller and heavier than the rest; and those that have the longest and finest fleeces are subject to the greatest number of disorders. The ram has but feeble arms; his courage is nothing but a petulance, useless to himself, inconvenient to others. The Weather Sheep are still more fearful than Ewes: it is through fear that they gather so often in troops: the smallest noise to which they are unaccustomed is sufficient to make them fly and get close together; yet, they know not, at times, how to fly from danger; nor do they even seem to feel the inconvenience of particular situations: they continue wherever they are, either in rain or snow; and to oblige them to stir, they must have a chief to walk before them: but this guide will remain with the rest of the flock, without motion, if not driven from it by the shepherd, or the dog which guards them, who, in fact, watches for their safety, defends, directs, and separates them, assembles them together, and communicates to them motions not their own. The sheep is equally insensible and absurd, when bred up tame in the house, or familiarized with its keepers; it then becomes mischievous, butts with its head, and evidently shews that it is more fitted for the necessities than the amusement of mankind. We know of one instance only, in which this animal testifies any attachment to its keeper. In many parts of the Alps, and even in some provinces of France, the shepherd and his pipe are still continued. The flock is penned up every evening in order to preserve them from the wolves; and, at sun set, returns homeward, with his Sheep following him, seemingly pleased with the sound of the pipe. The Arcadian life is thus preserved, in all its antient purity, in countries uncultivated by the fine arts; but where an inequality prevails by nominal distinctions, or in civilized countries, the shepherd is generally some indigent wretch, who, for a paltry pittance, only guards those luxuries, of which he is not permitted to participate.

The Ram, or male, is cloven footed, horned, and ruminating. When perfect in his kind, he has a broad well-covered forehead, hazel eyes, large ears, horns twisted and turned backwards, a wide breast and shoulders. He sometimes lives to the age of fifteen years. Some Rams as well as the Ewes, have no horns. When two of them meet together, they sometimes engage very fiercely. When castrated, they are called Weathers, and they then grow larger, become fatter, and their flesh is much sweeter. The Ewe, or female, is not remarkable for its beauty, though, when perfectly clean, it has its share of comeliness. The head is small, oblong, and narrow at the mouth; the horns flat, and annulated on the surface; the eyes large, and prominent; the ears patulous. It is clothed with a deep, substantial, and frequently curled wool, obscuring the shape of the body, and making it seem much clumsier than it really is. The tail is short in comparison of that

extent to which it grows in some parts of Arabia, where it spreads into a vast breadth as well as length, and trails after the animal. Like all other ruminants, Sheep want the upper fore teeth, but they have eight in the lower jaw: two of these teeth drop, and are replaced at two years old; four of them are replaced at three years old; and all at the age of four years. There are some breeds in England, called leather-mouthed, that never change their teeth. The Ewes are said to live about ten years; however, they seldom reach that age, but they will propagate their species during the whole of that time. They have generally but one lamb at a time, though some will produce two, three, and even four. The first is generally less valuable than those of a second or third production; the third being always supposed to be the best. They bear their young five months; and, if housed, will bring forth at any time of the year. In a flock of four hundred sheep, every Ewe will know its own lamb. They yield generally great plenty of milk for five or six months. This is tolerable food for poor people in the country, but not equal to goat's milk, which is less glutinous. When mixed with cow's milk, butter, and good cheese are made of it in Ireland, and some parts of Great Britain. In Wales the goat has the pre-eminence, being better suited to the nature of that country. The flesh of the Ram is always ill-tasted, that of the Weather rather insipid, whilst that of the Ewe is the most succulent, the sweetest, and best, of all common mutton. In dry soils, and in high grounds, where wild thyme, and other odoriferous herbs abound, the flesh of the Sheep is of a much better quality, than when fed in low plains and humid valleys, unless these plains are near the sea; for then all the herbs imbibe a saltness, and the flesh of mutton is no where better than in salt meadows. The milk is also of a finer flavour and more abundant; and as nothing is more pleasing to the taste of these animals than salt, so not any thing is more salutary, when given to them in moderation. The age of the Ram may be known by his horns, which shew themselves in the first year, and frequently from the birth: they grow every year a ring, which is a mark round, and continues growing till death. The Sheep commonly have no horns; but they have boney prominences on their heads, in the same parts where the horns of the Rams grow: there are, notwithstanding, some sheep which have two, and even four horns. These are five or six inches long, but less turned than those of the Ram; and when there are four horns, the two exterior ones are shorter than the two others.

Sheep will thrive upon almost any ground, and for that reason are preferred by many before the larger cattle. The farmer should always buy his Sheep from a worse land than his own, and they should be large boned, and have a strong greasy wool, curling close and well. These Sheep always breed the finest wool, and are the most approved of by the butcher for sale in the market. The feeding Sheep with turnips is one great advantage to the farmers, from the crops they raise them: they soon fatten, but there is some difficulty in getting the sheep to feed on them: the old ones always refuse them at first, but the lambs fall to at once. The common way, in some places, of turning a flock of Sheep at large into a field of turnips, is very disadvantageous. There are three other ways of feeding them on this food, all of which have their several advantages. The first is, to divide the land by hurdles, and allow the Sheep to come upon such a portion only at a time, as they can eat in one day, and so advance the hurdles farther into the ground, daily, until the whole crop be eaten. This is infinitely better than the former random method, though they never eat them clean even this way, but leave the bottom and outides scooped in the ground: the people pull up these with iron crooks, and lay them before the Sheep, but, by reason of their foulness, they eat but little of them, and what they eat does not nourish them like the fresh roots. The second way is by inclosing the Sheep in hurdles, as in the former; but in this they pull up all the turnips they suppose the sheep can eat in one day, by which method there is less expence, and less

waste. The third way is to pull up the turnips, and remove them in a cart or waggon to some other place, spreading them on a fresh place every day: by this means the Sheep will eat them up clean, both roots and leaves. Many advantages, besides saving the expence of hurdles, and the trouble of moving them, will result from this method. There are in this kingdom tracts of ground, known by the name of downs, whereon are chiefly fed large flocks of sheep. Experience has abundantly evinced, that though the grass there is naturally short, it is excellent food for Sheep: and as the welfare of these creatures is of the utmost consequence to one of the most essential branches of the commerce of England, very great caution should be used in making any alteration in their diet, until it be well proved, by fair experiments, that a richer pasture does not injure their fleeces. We would therefore recommend, in the strongest manner, to gentlemen who have estates bordering on such downs, particularly on that extensive tract, called Salisbury-Plain, which reaches from the westward of Marlborough to the sea, to bring some of their sheep into natural, or artificial, rich pastures, and to keep them there for some generations. The word generations will not imply a long space of time for such experiments, if we consider in how few years his succession may take place. A lamb reared from its birth on burnet, for instance, will, in two years, bring a lamb, which, in two years more, brings forth young, and the sixth year may see the third generation: so that by the end of seven or eight years the fact may be ascertained.

Every year the flock should be examined, in order to find out such as begin to grow old, and are intended for fattening; for as they require a different management from the others, so they should also be formed into a separate flock. They should be turned out in summer before sun rising, in order to feed on the grass while moistened with the dew. The fattening of Weathers is greatly forwarded by a quantity of moisture, and nothing more obstructs it than the heat of the sun; so that about eight or nine in the morning they should be brought back, before the great heat begins, and salt given them to excite thirst. About four in the afternoon they should be led a second time into cool and moist places; and after two or three months, they will have the appearance of being full of flesh; indeed, they are generally fattened as much as they can be; but this fat proceeding only from the great quantity of water they have drank, may be said to be little more than a bloated humour, which would, in a short time, turn to the rot, and can be prevented only by killing them while they are in this state of fatness: besides, their flesh, far from being firm and juicy, is extremely insipid and flabby: in order, therefore, to make good flesh, besides letting them feed on the dew, and giving them plenty of water, they should have at the same time more nourishing food than grass. They may be fattened in every season, by only keeping them apart in a sheep-house, and feeding them with the meal of barley, oats, wheat, beans, &c. mixed with a moderate quantity of salt: but in whatever season they are fattened, or in whatever manner, they must be disposed of without delay; for they cannot be fattened twice, and they will die by diseases of the liver.

Every year the whole flock, weathers, ewes, and lambs, are sheared. In hot countries, where the creature may be laid bare without danger, the wool is not sheared, but plucked off, and often they yield two fleeces in the year. In France, and the colder climates, it is cut only once a year with large shears, but the sheep have part of their fleece left, as some defence against the severity of the climate. The season for this operation is in the month of May, after having thoroughly washed them, that the wool may be as clean as possible. In the month of April it is too cold, and if delayed until June or July, the wool would not grow sufficiently during the remainder of the summer, to secure them from the inclemency of the winter. The weathers have generally more wool than the ewes, and it is also better. That of the neck, and the top of the back, is the prime; that

that of the thighs, tail, belly, throat, &c. is not so good. White wool is also preferred to the brown and black, as it may be died of any colour. A considerable advantage may also be drawn from sheep by folding them; that is, by leaving them for a proper time on lands intended for improvement. In order to this, ground must be inclosed, and the flock shut up in it during the summer: by this means the dung, urine, and heat of the body of these creatures, will, in a short time, bring the ground into heat, whether exhausted, or naturally cold and barren. A hundred sheep will, in one summer, meliorate eight acres of ground, which will continue its fertility six years. There is hardly any part of these animals, setting aside the fleece, that is not useful to mankind; they defend us principally from the cold, and adorn our tables with numerous and agreeable repasts: the flesh is delicate and wholesome food; gloves, and different articles of our apparel, are made from the skin: it is also used for covers to books; parchment is likewise made from it: of the entrails are formed strings of various musical instruments: the milk, being thicker than that of cows, yields a greater quantity of butter and cheese; and the dung is a very rich manure. The sheep and lamb are the hieroglyphics of innocence; therefore St. Cyprian, in his Book of Envy, says, "Let us remember by what name Jesus Christ calls his people; by what appellation he distinguishes his flock. He calls them sheep, that Christians may equal lambs in innocence. He calls them lambs, that, by simplicity of spirit, they may imitate the harmless disposition of those animals. Opulence, felicity, and plenty, are represented by the sheep, and a mild, open-hearted, unblemished person, by a lamb."

In Ireland, of all the quadrupeds, the sheep is the animal best adapted to pay the rent. It is true, sheep require great attention, but at the same time little bodily trouble. The chief care should consist in their cantonment for food, in which the Irish farmers are extremely negligent; for they station them promiscuously over the land, inclosing only the fattening grounds, which is done but badly, and other cattle suffered to mix with them; whereas sheep, in their rearing and fattening state, should be by no means suffered to perambulate a variety of pasture. But countries and circumstances differ; for though we do not approve of extensive uninclosed pastures in Ireland, it seems in Spain they do well enough; the flocks there are small, as in France; but they have a right of commonage in that country, perhaps, not in any other civilized one that we know of. There, it is a constant practice with the shepherds, soon after shearing-time, to set out with their flocks, generally consisting of one hundred each, and to pass from one province to another, feeding them both on pasture and corn-lands: the meadows, and some other particular enclosed lands, as parks belonging to the nobility, and clergy especially, only excepted. These itinerant shepherds often travel three or four hundred miles from their habitations with their small flock. They sometimes take part of their family, provisions, a tent, some well-trained dogs; and are never stopped, if they keep the sheep on the open lands; and do not often return home till after lambing time. They have generally one third, or half the profit of the flock, for their hire.

In England, as we have observed, the work of shearing sheep is done about the middle of May; but some will defer it till at or after Midsummer; but this should be avoided, as very bad consequences often ensue; for by this late shearing, the maggot has an opportunity of breeding in their skins, which frets them in such a manner, that they will pine away, and lose all their flesh. We cannot but in general approve of the early shearing of sheep, beginning with the fattest; but no certain day can, with reason, be fixed for doing this work; for our seasons differ so much in various years, that next year, in the beginning of May, the weather may be so warm, as to be very proper for the work; and, in the year following, the middle of the same month may, on account of the cold, be too soon to begin. The best regulator for their work, as well as

many others, would be the state of vegetation, from repeated observations of some particular tree or plant, on a particular soil and exposure; for to bring plants to a certain state, requires always a certain degree of heat, and this is sooner or later, according to the season. Every work of husbandry, in spring at least, might be regulated in the same manner, and that to great advantage, for nature is an unerring guide.

The taste of the flesh, the fineness of the wool, the quantity of the suet, and even the size of these animals, vary very much in different countries. In France they chiefly abound in the dutchy of Berry: those in the neighbourhood of Beauvais, and some other parts of Normandy, are the largest and fullest of suet. In Burgundy they are very good; but the best are those that feed on the sandy coasts of maritime provinces. The wool of Italy, and that of Spain and England are finer than that of France. In Poictou, Provence, the neighbourhood of Bayonne, and some other parts of France, are sheep which seem to be of a foreign breed: they are stronger, larger, and have a great deal more wool, than those of the common breed. Those sheep are also more prolific than the ordinary sort, it being usual with them to have two lambs at a time, and to yeave twice in the year. The rams of this breed, when mixed with the common breed of the country, produce an intermediate race, partaking of the two from whom they proceed. In Italy and Spain, the number and variety in the breeds of sheep is still greater; but all must be considered as forming one and the same species with our sheep; though this so numerous, and diversified species, scarcely extends beyond Europe. Those long and broad-tailed creatures, common in Africa and Asia, and by travellers called Barbary sheep, seem to be of a species different from ours, as well as the American, Vigonia, and Lama.

From our antient writers it doth not appear, that the breed of this animal was cultivated among the Britons. The inhabitants of the interior parts of this island went entirely naked, or were covered only with skins: those who lived on the sea coasts, and were the most civilized, affected the manners of the Gauls, as in the histories of those times there are not the least traces of manufactures among the Britons. This negligence does not appear wonderful, when it is considered, that they were uncivilized, their wants few, and those easily satisfied; but it is surprizing, that when we had long cultivated a breed of sheep, whose fleeces were superior to those of other countries, we still neglected to promote a woollen manufacture at home. That valuable branch of business lay for a considerable time in foreign hands, and we were obliged to import the cloth manufactured from our own materials. After many unavailing efforts among our kings, to introduce and preserve the manufacture at home, Henry the Second granted a patent to the weavers in London, wherein he directed, that if any cloth was found made with a mixture of Spanish wool, it should be burned by the mayor. Notwithstanding this, the weaving business advanced so slowly, that Edward the Third was obliged to permit the importation of foreign cloth in the beginning of his reign: but shortly after, by encouraging foreign artificers to settle in England, and instruct the natives in their trade, the manufacture so far increased, as to enable him to prohibit the wear of foreign cloth. Many salutary edicts operated, by degrees, towards the establishing this trade among us; but the grand rise of all its prosperity is to be dated from the reign of Queen Elizabeth, when the tyranny of the duke of Alva, in the Netherlands, drove numbers of artificers into this country for refuge, who were the founders of that immense manufacture we carry on at present: it is, however, supposed by many, that the woollen manufacture is upon the decline among us, and that the cloth now made is neither so firm, so fine, nor so serviceable, as it has been. No country in the world is better supplied with materials than Great Britain, and those adapted to every species of the cloathing business; and though the sheep of this island afford fleeces of different qualities, yet they may all be used in some branches of it. Herefordshire,

fordshire, Devonshire, and Cotswold downs, are celebrated for producing sheep with exceeding fine fleeces. The Lincolnshire and Warwickshire kind are very large, and exceed any for the quantity and quality of their wool. Lincolnshire yields the largest sheep in Great Britain, and, in that county, it is no uncommon thing to give fifty guineas for a ram. Suffolk breeds a very valuable kind. In the northern parts of this kingdom, the fleeces are inferior in fineness to those of the south. The Yorkshire hills furnish the looms of that country with great quantities of wool; and that which is taken from the neck and shoulders they mix with Spanish wool, and use in some of their finest cloths. The wool which Wales produces is coarse, though it is more extensively useful than the finest Spanish fleeces; for every one must acknowledge the universal benefit of the flannel manufacture. In Ireland the sheep are found to vary like those of Great Britain. In the South and East they are large, but their flesh is rank: those of the North, and the mountainous parts, are small, and their flesh is sweet. Their fleeces also differ in proportion. Scotland breeds a small kind, and their fleeces are coarse. No country, however, produces such sheep as England, either with larger fleeces, or better adapted for the business of cloathing. The woolly sheep, such as we have among us, are found only in Europe, and some of the temperate provinces of Asia. When transported into warmer countries, either into Florida or Guinea, their wool degenerates into hair, and their flesh has a different flavour: in extreme cold countries, they seem equally strangers and helpless; and though they subsist both in Guinea and Greenland, yet they do not appear like natural inhabitants of either. Sheep also differ greatly in different countries, of which the following account may entertain our numerous readers.

The MANY HORNED SHEEP.

The first variety of the domestic kind, after our own, is to be seen in Iceland, Muscovy, and the coldest climates of the North. This, which may be called the Many Horned, or Iceland sheep, resembles that of our own breed, in the form of the body and the tail, but differs considerably in the number of horns: they have generally four, and sometimes they are known to have eight, growing from different parts of the forehead. This animal is large and formidable in appearance, and nature seems to have fitted it for a state of war; it is, nevertheless, like the rest of its kind, gentle, mild, and timid. Its wool is long, smooth, and hairy; very different from that of the common sheep; it is of a dark brown colour, and, under its outward coat of hair, it has an internal covering, fine, short, and soft, and which rather resembles fur than wool. There is a kind from Spain, with two upright, and two lateral horns, the body covered with wool, with yellowish hairs in the fore part of the neck, fourteen inches in length: such a sheep was shewn alive in London a few years ago.

The BROAD TAILED SHEEP.

This animal is very common in Tartary, Arabia, Persia, Barbary, Syria, and Egypt. It is principally remarkable for its large and heavy tail, which often weighs from twenty to thirty pounds. It is sometimes a foot broad, and is usually supported by a small board, that goes upon wheels; whence arose the common report of their having carts to carry their tails. The upper part of the tail is covered with wool; but it is bare underneath; and the natives, who reckon it a great delicacy, are careful to preserve it from injury; these tails are of a substance between fat and marrow, and are eaten with the lean of the mutton. In the temperate climates their fleeces are, as in our breed, soft and woolly, but they are hairy in the warmer latitudes; yet the enormous size of their tails they preserve in both. In Aleppo and Syria, these sheep are usually kept in yards, to preserve their tails from injury.

The STREPSICHEROS.

This is a native of Crete, and the other islands of the Archipelago, and differs from the English sheep in

having erect and spiral horns: It is of the size of the common sheep, and resembles it in form. The head is oblong, broad at the top, and very small at the nose; the eyes are large and prominent; the ears patulous: the horns are not at all like those of our sheep; they are short, straight, very sharp at the point, and elegantly marked with a spiral twist all the way up; the neck is short and thick; the legs are very long in comparison of those of our sheep; they, and the face, are covered with short and rigid greyish fur; the body with a soft white curling wool. In other respects they are like the English sheep.

The ANGOLAN or GUINEA SHEEP.

This is a very singular species from the common sheep, and their form is so different, that they might be considered as animals of another kind, if they were not known to breed with them. It is somewhat larger than the common sheep: the head is shorter and more obtuse, and, on the hinder part, swells out in a very singular manner: the ears are very long and broad; not carried erect, but hang down: the horns are formed like those of our ram, and turn round till their points approach near the eyes: the neck is short, having the flesh of the under part of it loose, like a dewlap, and it is ornamented with a kind of mane of long hairs. The body is not covered with wool, but with rough hair, like that of the goat-kind. This animal is a native of Guinea, but generally found in all the tropical climates both of Africa and the East Indies. Of all the domestic kinds, the Guinea sheep seem to come nearest to a state of nature: they are stronger, larger, and fleet, than the common breed, and therefore better adapted to a precarious forest-life. Like the rest, however, they seem to rely on man for support, being of a domestic nature, and subsisting only in the warmer climates.

The MOUFFLON.

The varieties of the sheep kind, which have been subdued, and brought into a state of servitude, are capable of producing among each other; the peculiarities of their figure have been the result of climate and human cultivation; but not any of them appear to be sufficiently independent to live in a state of savage nature. They may, therefore, be considered as a degenerate race, formed by the hand of man, and propagated solely for his benefit. While man thus cultivates the domestic kinds, he drives away and destroys the savage race, which are more headstrong, and less beneficial. These are to be found only in a very small number, in the most uncultivated countries, where they live in solitude, and subsist by their native swiftness and strength.

The Moufflon, that preserves all the marks of being the primitive race of sheep, is to be found only in the more uncultivated parts of Greece, Sardinia, Corsica, and the deserts of Tartary; however, it has been actually known to breed with the domestic animal. Though covered with hair, the Moufflon nearly resembles a ram; it has the eyes placed near the horns; and its ears are not so long as those of the goat; in its horns it also resembles the ram, and in all the particular contours of its figure; they are of a yellow colour; they have three sides as in the ram, and bend backwards behind the ears in the same manner: the muzzle, and the inside of the ears, are whitish, tinged with yellow. But, upon the whole, the form of this animal seems more calculated for strength and agility than the common sheep; for the Moufflon can live in a savage state, and maintain itself amidst all the beasts that live by rapine. Many, on account of its speed, have been inclined to rank it rather among the deer kind than the sheep; but they are certainly mistaken, as the Moufflon has a mark that entirely distinguishes it from that species, being never known to shed its horns. There is a strong resemblance between the male and female of this species; but the female is less, and her horns never grow to that prodigious size they are of in the wild ram. Such is the sheep in its savage state; a noble, bold, and beautiful animal; but the most beautiful creatures are not always

QUADRUPEDS

Broad-tailed Sheep.



Sprain Goat.

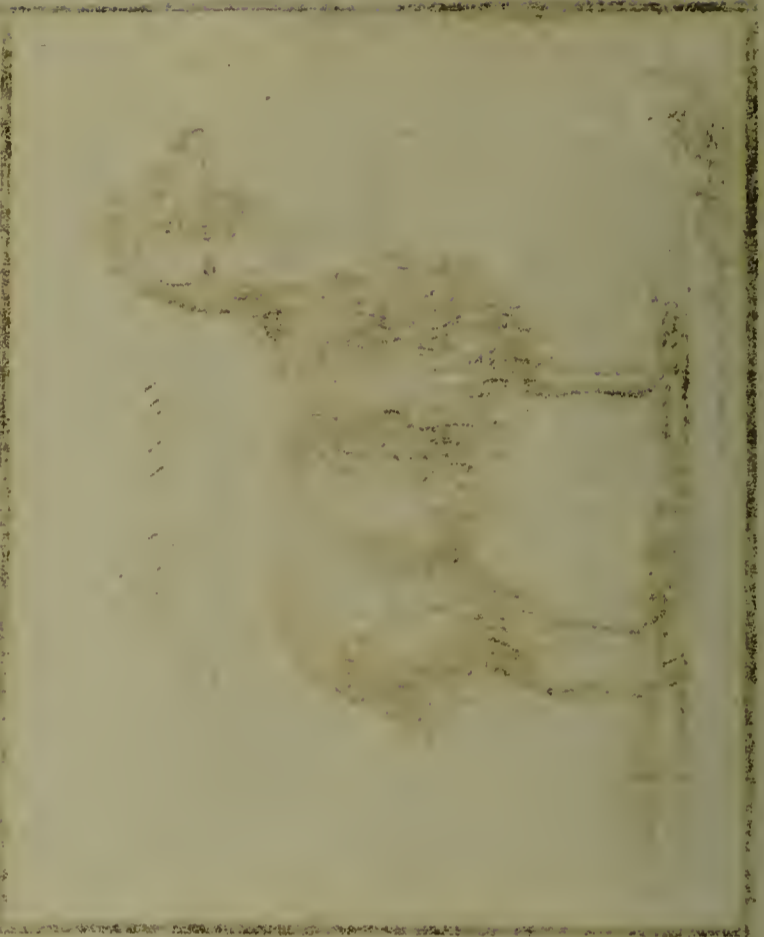


Mountain.



Alpine Sheep.





always the most useful. Human industry, to improve its utility has destroyed its grace. Some years ago a moufflon was kept in the French king's menagerie.

NATURAL HISTORY of the GOAT, and its numerous VARIETIES.

THIS animal, in every respect, is more adapted to a life of savage liberty than the sheep; it is naturally more lively; yet readily attaches itself to man, and seems sensible of his caresses. It is not easily confined to its flock, but chuses its own pastures, and loves to stray remote from the rest. It delights in climbing precipices; is often seen suspended upon an eminence hanging over the sea, upon a very small base, and even sleeps there in security. Nature has, in some measure, fitted it for traversing these declivities with ease, the hoof being hollow underneath, with sharp edges. It chuses the healthy mountain, or the shrubby rock; its favourite food is the tops of boughs, or the tender bark of young trees: it seems less afraid of immoderate heat, and bears the warm climates better than the sheep: it sleeps exposed to the sun; and seems to enjoy its warmest fervours: neither is it terrified at the storm, or incommoded by the rain: immoderate cold alone seems to affect this animal, and is said to produce a vertigo, with which it is sometimes affected.

The common Goat is nearly the size of the sheep: the head is oblong, considerably broad at the top, and thence gradually taper to the extremity of the nose, where it is small and sharp: the eyes are large and bright; the nostrils wide; and the mouth large: the neck is short and thick; the body bulky; the legs short, robust, and very stiff: the hoof is divided and brown: the fur is deep; the hairs rigid, waved, but without the least appearance of wool: the beard is long, and hangs down from the chin: the horns are but little contorted, and of a deep brown hue. The general colour of the Goat, in its wild state, is a pale dun; but in those that are kept tame, the varieties, in this respect are endless. The he Goat is accounted best that has an ample body, soft, long, thick, shining hair: a full short neck, hanging, heavy ears, and fleshy thighs. He is a salacious animal, very strong, and sometimes runs with such force against a man with his head, that he will almost beat him down. The common goats have a rank smell. They are of the ruminating kind, have no fore teeth in the upper jaw, and are cloven footed.

The flesh of this animal, if old, has a disagreeable smell, and bad taste; therefore is seldom or never used for food; but the milk of the female is sweet, nourishing, and medicinal: not so apt to curdle upon the stomach as that of the cow; and therefore preferable to those whose digestion is weak. The peculiarity of this animal's living, which feeds upon grass, hay, and on the fruits, leaves, and barks of shrubs, gives the milk an agreeable flavour, different from that of the cow and the sheep. It is remarkable, that Goats are not only proud in their gait, but exceeding delicate feeders; for if you only breath upon any thing, which otherwise they would eat from your hand, they will turn away and refuse it. In several parts of Ireland, and the highlands of Scotland, the Goat makes the chief possession of the inhabitants. On those mountains, where no other useful animal could find subsistence, the goat continues to glean a sufficient living, and supplies the hardy natives with what they consider as varied luxury. They lie upon beds made of their skins, which are soft, clean, and wholesome; they live upon their milk, with oat bread: the flesh, indeed, they seldom taste of, as it is a delicacy which they find very expensive; however, the kid is considered, even by the city epicure, as a great rarity; and the flesh of the female goat, when about two years old and properly prepared, is reckoned by some as no ways inferior to venison. Most of our modern compilers, who are exceeding careful to tread steadily, without the least deviation, in each other's steps, tell us, that the poor of different countries convert part of the milk into butter, and some into cheese, but an instance

of this never came within our knowledge, either in England, Scotland, or Ireland; and, however this may be, it is certain, Goat's milk being thin, produces little or no cream; at no times a sufficient quantity for the purposes of raising a stock of either butter or cheese. In this manner, even in the wildest solitudes, the poor find comforts of which the rich do not think it worth their while to dispossess them. In those mountainous retreats, where the landscape is composed only of a dreary scene of rocks, heaths, and shrubs, that speak the wretchedness of the soil, these simple people, attended by their faithful flocks to awful solitudes, there find all the necessaries of life, and are not without even their feasts and pleasures.

The she Goat brings forth two at a time, or three at the most: but in warmer climates, although she degenerates and grows less, yet she becomes more fruitful, being found frequently to produce three, four, and five at a single delivery. Their best breeding time is generally delayed till the age of two years, or eighteen months at least. One buck is sufficient for an hundred and fifty goats; for his libidinous appetite is excessive; but this ardour brings on a speedy decay, so that he is enervated in four years at most, and even becomes old before he reaches his seventh year. The female, like that of the sheep, continues five months with young; and, in some places, bears twice a year. As these animals are apt to stray from the flock, no man can attend above fifty of them at a time. They are fattened in the same manner as sheep; but, after having used every precaution, their flesh is never so sweet, in our climate, as that of mutton. Between the tropics it is otherwise. The mutton there becomes lean and flabby, and the flesh of the goat is much superior to it: in some places the latter is cultivated in preference to the former. We therefore find this animal in almost every part of the world, as it seems fitted for the necessities of man in both extremes. Towards the north, where the pasture is coarse and thin, the Goat is fitted to find a scanty subsistence; between the tropics, where the heat is excessive, the Goat is fitted to bear the climate, and its flesh is found to improve. From the hair of this useful animal, the white perukes are made; for which purpose that of the he Goat is most esteemed; that which grows on the haunches is generally the longest, the whitest and the thickest. The skin, in proportion to its good or bad colour, will sell from a guinea to about two shillings. The Welch Goats are larger, and have longer and finer hair than those of other mountainous countries; besides they are generally white, and those of France have short reddish hair, and little horns. Of these, the country people make handles for their tucks and knives. The suet of this animal is in great esteem for making candles, which are far superior in whiteness and goodness to those made from that of the sheep or the ox, and consequently bears a better price. The skin is much used in the glove manufactory, especially that of the kid. In the army it covers the horseman's arms, and a kind of bag is made of it for carrying the foot soldiers provisions. In some books of husbandry, Goats are recommended to lie among horses; their smell, as supposed, preventing many distempers. We shall now give an account of the most remarkable varieties to be found in this species of domestic animals. Of these are, first, the Goat of Angora, called by others,

The GOAT of NATOLIA.

This animal has ears longer than ours, and broader in proportion. The male has horns of about the same length with the goat of Europe, but black, and turned very differently, going out very horizontally on each side of the head, and twisted round in the manner of a cork-skew. The horns of the female are shorter, and encircle the ear somewhat like those of the ram. They are of a dazzling white colour, and all the hair is very long, thick, fine, and glossy, which, indeed, is the case with almost all the animals of Syria. But those we are speaking of are found only near Angora, Beibazar, and Congua, in Asiatic Turkey. In the last place they are brown and black; and in the two first of a silky fineness, and

silver-whiteness, in curled locks of eight or nine inches in length, which is the basis of our fine camblets. The hair is imported here in the form of thread; for the Turks will not suffer it to be exported raw, as the spinning gives employment to multitudes of poor. This variety is confined to a district of two or three days journey in extent; if they change climate, the hair grows coarser. The goatherds are very attentive to them, and are perpetually combing and washing them. Nothing can exceed the beauty of the stuffs which are made from the hair of almost all the animals about Angora.

The LONG-EARED SYRIAN GOAT.

An animal this greatly resembling the common goat in its form, but very remarkable for having ears which almost hang down to the ground. These are sometimes so troublesome, that the owners cut off one, to enable the animal to feed with more ease. The horns do not exceed two inches and a half in length; are black, and bend a little backwards. The colour of the hair is like that of the fox, and there are two excrescences under the throat, like the gills of a cock. These animals are chiefly kept round Aleppo, to supply the people with milk, which is sweet, and well tasted. They are driven through the streets from April to September, in the same manner that the asses are in London, and their milk is sold to the inhabitants as they pass along.

The SMALL GOAT of AMERICA.

This is of the size of a kid, but the hair is as long as that of the ordinary breed. The horns which do not exceed the length of a man's finger, are thick, and bend downwards so close to the head, that they almost penetrate the skin.

The BLUE GOAT.

At the Cape of Good Hope is an animal, called by this name. In shape it resembles the domestic, but is considerably larger, being nearly of the size of a stag. Its hair is very short, and of a delightful blue; but it loses a great deal of its beauty when the animal is dead. It has a very long beard; but the horns are not so long in proportion as in other goats, being turned spirally, in the manner of a cork-screw. It has very long legs, yet well proportioned; and the flesh is well tasted, but lean. For this reason, in that plentiful country, it is chiefly killed, on account of its skin. It is a very shy animal, and seldom comes near the Dutch settlements; but they are found in great abundance in the more uncultivated parts of the country. Besides these, they are found, in this extensive region, of various colours, many of them being spotted, beautifully, with red, white, and brown.

The JUDA GOAT.

This is called by some the Whidaw Goat. It is found in Africa, and resembles ours, except in size, it being much smaller. The Juda Goat is common in Guinea, Angola, and all along the coasts of Africa. It is not much larger than a hare, very fat, and its flesh has a delicious taste. In that country it is universally preferred to mutton.

Such are the varieties of the species of goats, which we thought it incumbent on us to particularize; yet, in our opinion, these animals seem all of one kind, with very trifling distinctions between them. It is true, they differ in some respects, such, as having neither the same colour, hair, ears, or horns; but it ought to be laid down as a rule in natural history, that neither the horns, the colour, the fineness, or the length of the hair, or the position of the ears, are to be considered as making an actual distinction in the kinds. These are accidental varieties, produced by climate and food, which are known to change even in the same animal, and give it a seeming difference of form: but, when we see the shapes, the inclinations, and the internal conformation of seemingly different creatures nearly the same; above all, when we see them producing among each other; we then have no hesitation in pronouncing the species, and

asserting that these are of the goat kind, with which they are so materially connected.

But there are others nearly resembling the Goat, of whose kindred we cannot equally ascertain. These are such as, being found in a state of nature, have not as yet been subjected sufficiently to human observation. Hence, it is impossible to determine, with precision, to which class they belong; whether animals of a particular kind, or merely the goat in its state of savage freedom. There are two kinds that have almost equal pretensions to this claim, namely, the Ibex and Shammoy.

The IBEX.

Both this animal and the Shammoy-bear very near approaches to the goat in figure: they both have horns that never shed; and, at the same time, are more different from each other, than from the animal in question. From which of these two sources our domestic goat may be derived, is not easy to determine. We are of opinion, with a celebrated French naturalist, that the Ibex is the principal source; that our domestic goat is the immediate descendent; and that the Shammoy is but a variety from that stock, a sort of collateral branch of the same family. We give the preference to the Ibex, because it has a more masculine figure, large horns, and a large beard; whereas the Shammoy wants these marks of primitive strength and wildness: we think, therefore, that in their original state, our goat has taken after the male of the parent stock, and the Shammoy after the female; and that this has produced a variety in these animals, even before they underwent human cultivation.

Both these animals, however, seem well fitted for their precarious life: they are both extremely swift, and capable of running, without fear or danger, along the ledges of the precipices; where the wolf and the fox, though driven by hunger, dare not venture to pursue them. They are both natives of the Alps, the Pyrenees, and the mountains of Greece and Crete: there they propagate abundantly, and continue to exist in spite of the hunter, and their other natural enemies.

The Ibex, in the shape of its body, resembles the goat; but his horns are much larger. They are bent backward, full of knots, and, it is said, a knot is added every year. He has a large black beard, and a thick warm coat of hair: his colour is brown: a streak of black runs along the top of the back; the belly, the thighs, and the back, are of a fawn colour: the sides are of a dark dusky colour: the body is not so large in proportion to the height of the common goat, but more resembles the deer kind: the legs are also like that animal, straight, slender, and elegant: but what is most singular in this animal is the surprizing length of his horns, which often extend considerably beyond the rump, being more than equal to the neck and body in length: yet notwithstanding this incumbrance, it runs and leaps with an amazing force and rapidity, in those mountainous parts of Europe, where it is to be found.

The SHAMMOY.

The Shammoy is a wild inhabitant of the mountains of Dauphiny, of Piedmont, Savoy, Switzerland, Germany, Greece, and Crete; particularly of the country of the Grifons, where the horns may be seen fixed up in most of the inns. Though a wild animal, it is easily tamed. The large males feed at a distance from the rest, except at that season when they approach the females. They couple from the beginning of October to the latter end of November; and bring forth their young in March and April. The young ones keep with the dam about five months; if they are not separated by the hunters, or the wolves. They live between twenty and thirty years. They generally produce two, and seldom more than three at a time.

This animal is about the size of a goat, but in the shape of his body nearly resembles a stag: the belly, forehead, throat, and the inside of the ears are white; but over the eyes, on both sides there is a yellowish streak: the rest of the body is of a dirty blackish colour, and the tail

tail is black all over, and not white underneath, as that of the deer. Both male and female have horns above four inches long, the upper parts of which are turned back into a sort of hooks, black, and not very smooth; there being furrows running along, according to the length: the inside of them is filled with a solid bone, proceeding from the scull, and they rise from the fore-part of the head over the eyes. The hair for the most part is short like that of the doe. Some writers say, it is of an ash colour in spring; a dun colour, inclining to black, in autumn; and of a blackish brown in winter. The flesh of the Shammoy is good food, and he will yield about ten or twelve pounds of suet, far surpassing that of the goat in firmness and goodness.

Most animals are known to have some cry; the Shammoy has scarce any. He has a kind of feeble bleat, by which the parent calls its young; but when danger threatens, and he is to alarm the flock, he makes a hissing noise, which is heard at a considerable distance. This animal is extremely vigilant, having a piercing eye, and a very distinguishing smell. It is said, by this last sense, it can discover a man, if we suppose to the windward, at half a league distance, and gives the earliest notice. Upon apprehensions of danger, it begins its hissing note. Having reposed a moment after this alarm, the animal again looks round, and, perceiving the cause of his fears, continues to hiss by intervals, till it has spread the alarm to a vast distance. During this time, it seems violently agitated; strikes the ground with one of its fore-feet, and sometimes with both; bounds from rock to rock; turns frequently, and looks about; runs to the edge of the precipice; and, if it has still the enemy in view, flies with the utmost speed. The hissing of the male is much sharper and louder than that of the female.

These animals, like those of the goat kind, feed upon the best herbage, and select the most delicate parts of the plants, flowers, and buds. While they feed upon the succulent herbs, they drink but little, and chew the cud in the intervals of feeding. Heat is so offensive to them, that in summer they are found only in the caverns of rocks, amidst fragments of unmelted ice, under the shade of high spreading trees, or of hanging precipices that face the North, and keep off the rays of the sun. Throughout the rigours of winter, they sleep in the thicker parts of the forest, feeding upon the shrubs and buds of the pine tree: they turn up the snow to seek for herbage; and, where they find it green, make a delicious repast. The more craggy and uneven the ground, the more they are pleased with their abode. They always ascend or descend in an oblique direction, and will throw themselves down a rock of thirty feet, fixing safely upon some protuberance, or fragment, on the side of the precipice, though it should be but just large enough to place their feet upon: in their descent, however, they strike the rock with their feet, to check the velocity of their motion. They are hunted, during the winter, partly for their flesh, and partly for their skins; the latter of which have been celebrated for their softness and warmth: but, at present, the leather, called shammy, is made from those of the tame goat, the sheep, and the deer. The chase of the Shammoy is a laborious employ; for they must be got at by surprize, and are shot with rifle-barrelled guns. In their stomach is often found a hairy ball, with a hard crust, and of an oblong form.

We are told by a person of veracity, that there are two sorts of Shammoy Goats in Switzerland, one of which is smaller and redder than the other, and never descends into the valleys, but continues on the most inaccessible mountains, during the whole winter. The other sort, which is larger and browner, sometimes comes down to the foot of the mountains, where it lives in winter on the ends of fir-tree branches. Many medicinal virtues are ascribed to several parts of this animal. The fat, mixed with milk, is said to be good in ulcers of the lungs; and the gall to strengthen, to cleanse ulcers of the cornea, and to take away spots. A stone is sometimes found in the stomach, which is now known to be little more than an absorbent. It is the size of a walnut,

of a blackish colour, and, when broken, has a fine smell. In the present enlightened age of physic, all these medicines are quite out of repute; and, although we have the names of several medicines procurable from quadrupeds, yet, except the musk, or harts-horn alone, we know of none in any degree of reputation. It is true, the fat, the urine, and even the dung of various animals, may be found efficacious, where better medicines are not to be had, and on this account we notice them in this work; but they are far surpassed by others, now used by our skilful practitioners, whose virtues we know have been confirmed, and whose operations have been fully ascertained by successive experiments.

These are the quadrupeds that more peculiarly belong to the Goat-kind. Each of them, in all probability, can breed with the other; and were the whole race extinct, except any two, they would be sufficient to replenish the world, and continue the kind. Nature, however, proceeds in her variations by slow and insensible degrees, and scarce draws a firm distinguished line between any two neighbouring races of animals whatever. Thus it is difficult to discover where the sheep ends, and the goat begins; and we shall find it a still harder task, to fix precisely the boundaries between the goat-kind, and the deer. In all transitions from one kind to the other, there are to be found a middle race of animals that seem to have somewhat of the nature of both, and that can precisely be referred to neither. The race of quadrupeds, called the gazelles, are of this kind: they are, properly, neither goat nor deer, and yet they have many of the marks of both: they make the shade between these two kinds, and fill up the chasm in nature.

The gazelles partake of both natures. Like the goat, they have hollow horns that never fall, which is otherwise in the deer; but, like the latter animal, they feed rather upon shrubs than grafs. They resemble the roebuck in size, in delicacy of form, in the nature and colour of their hair, in the bunches upon their legs, which differ only in being upon the fore-legs in one, and on the hind-legs in the other. They seem, therefore, to be of a middle nature between these two kinds, or, to speak with more precision, they form a distinct kind by themselves. We shall endeavour to give a clear description of the animals of this class, whereby our readers will be able to discern their peculiar characters, and may judge for themselves concerning the genus, or tribe, to which they belong.

NATURAL HISTORY of the GAZELLE, OF ANTELOPE.

THE Gazelle, for the most part, is more delicately turned than even the roebuck; his hair as short, but finer, and more glossy. The hinder legs are larger than those before, as in the hare, which affords it greater security in ascending or descending steep places. Their swiftness is equal, if not superior, to that of the roe; but as the latter bounds forward, so these run along in an even uninterrupted course. Most of them are brown upon the back, white under the belly, with a black stripe, separating those colours between. Their tail is of various lengths, but in all covered with pretty long hair; and their ears are beautiful, well placed, and terminating in a point. They all have a cloven hoof, like the sheep; they all have permanent horns, and the female has them smaller than the male. Of all animals in the world, Antelopes have the most beautiful eyes, extremely brilliant, and yet so meek, that all the eastern poets compare the eyes of their mistresses to those of this animal. "You have the eyes of a Gazelle," is considered as the highest compliment a lover can pay. The feet of this animal are more cloven than those of most others, and are covered with hoofs of a horny substance, forming the two points of the toes, that are tied together by a skin which will stretch greatly. The female Gazelle has but two udders and two teats, and on each side of the udders, in the groin, are deep cavities, common

common to several other animals; where the skin is without hair, the same as the teats, and from whence an unctuous matter is discharged. Under the hair of the Antelope the skin is black and shining; though in some greyish. The ears are large and bald within, where the skin is black, like polished ebony. The horns are likewise black, striped crossways: they are fifteen inches long, and near an inch in diameter at the bottom. At the points they are sharp. They turn a little outwards in some places, and in others inwards. Those of the male are bent a little more than those of the female, which are very round, but the former are flattish. At the root of them is a skin very hard, very thick, and full of blood vessels. The nose of the Gazelle is somewhat flat, like that of the goat, but more in the male than the female. The palate is covered with a hard skin in the form of long scales, and there are no fore-teeth in the upper jaw, the Antelope being a ruminating animal. The fore-legs, about the part called the knee, is furnished with pretty long coarse hair, and here likewise the skin is thicker than in other parts, and seems to serve instead of a cushion to kneel down upon, like the callosity in the knee of the camel. The Gazelle is about the size of a roe-buck.

Of these quadrupeds, herds are to be met with of two or three thousand; but some of the different species assemble in small parties of five and six. They generally inhabit hilly countries: they browse and feed on the tender shoots of trees, like the goat, which renders their flesh delicious. Most of them are natives of those parts of the temperate zone, which lie so near the tropics as to form a doubtful climate. It is remarkable, that notwithstanding the warmth of North America appears suited to their nature, yet not a single species of them has ever been discovered in any part of the new world: but they are very numerous in Asia and Africa. The chase of these animals is a favourite diversion with the Eastern nations. Bernier informs us, that the greyhound, which is the fleetest of all dogs, is unequal in the course; and the sportsman requires the aid of the falcon, trained for the sport, to pounce the Gazelle, whereby his motions are impeded, and the dogs have an opportunity of overtaking him. In India and Persia, a kind of Leopard is made use of in the chase. It is not by swiftness that this animal takes his prey, but by the greatness of his springs; motions similar to that of the Antelope; but if in the first attempt the leopard should fail, the game escapes. There is another way of taking the Antelope, but which is neither so certain, nor so entertaining as either of the former. A Gazelle being bred up tame, is taught to join its own kind the moment it sees them: when, therefore, the hunter discovers a herd of them, he fixes a noose round the horns of the domestic animal, and, thus prepared, sends it among them. The tame animal no sooner approaches the wild ones, than the males fall forth to oppose him, and, butting with their horns, are caught in the noose. In this condition they frequently struggle till both of them fall to the ground, when the wild animal becomes an easy prey to the hunter, who either secures or kills him.

Under this head of the Gazelles, some naturalists have enumerated more than forty species, though M. Buffon makes them only twelve, but we shall confine ourselves to such, in which may be traced the distinguishing characters of this tribe; and yet, even in some of these, trifling distinctions only exist; but almost all have certain general agreements: they are all of an active and elegant make; of restless and timid dispositions; extremely vigilant; of great vivacity, and remarkable swift and nimble.

The COMMON ANTELOPE.

This is smaller than the fallow deer or buck, yet resembles it in all the proportions of its body. It has upright horns, twisted spirally, and surrounded almost to the top with prominent rings: they are about sixteen inches long, and twelve inches distant from point to point. The colour of this animal is brown, mixed with red, and dusky: its belly, and the inside of its thighs,

are white: the tail is short, black above, and white beneath. The female is without horns. This animal is a native of Barbary. Its horns, when on the skull, are not much unlike the lyre of the ancients; and it appears, from many antique gems, that the sides of that instrument were frequently made of the horns of animals.

The BLUE ANTELOPE.

While this animal ranges in its native woods, the colour of it is a fine azure blue; but, when dead, this changes to a bluish grey, with a mixture of white. The horns are twenty inches long, sharp-pointed, taper, and bending in an arch backwards: they are marked with twenty prominent rings, but are smooth towards their points. This kind of Gazelle, somewhat longer than the common buck, has long hair, a white belly, a tail seven inches in length, and a large white mark beneath each eye. It inhabits the interior parts of Africa; and is called by the Dutch, at the Cape of Good Hope, the Blawme Bock, or the Blue Goat. And this species of the Gazelles seems to connect, with great propriety, the genus of the goat with that of the deer.

The GUIBA.

It resembles the Gazelles in every particular, except in the colour of the belly, which, as we have seen, is white in them, but in this is tawny, or of a deep brown. Its horns also are not marked with annular prominences, but are smooth and polished. It is also remarkable for white lists, on a brown ground, that are disposed along this animal's body, as if it were harnessed. Three of these point downwards, on each side of the rump. This kind of animals is a native of Africa, and may be seen in large herds feeding on the plains and woods of Senegal.

The ALGAZEL.

Of this species of the Antelope, there are two kinds. One has straight, slender, annulated horns, having a black triangular spot at the base, bounded on each side with white. In the centre of the face is a similar spot, besides two others that fall from the eyes to the throat, forming a junction with that in the face, by a lateral band of the same colour. A black line extends from the neck to the loins, composed of hairs longer than the rest: the neck, back, and sides, are of a dark grey, and the breast and belly are of a lively white. The tail, which is about two feet long, is terminated with black hair. This animal resides chiefly in the plains, and inhabits Egypt, the Cape of Good Hope, Persia, Syria, Arabia, and India.

The other kind of Gazelle is of a red colour, having the breast and hinder parts white. The horns are long, slender, and upright, bending internally towards the top; and sometimes they are extremely full of undulations, though in others of the same species there are very few. Some Naturalists have supposed this to be the Leucorix of Oppian, of which two drawings are preserved in the British Museum; but there are certainly some material variations, though probably not sufficient to constitute a distinct species. This beautiful Antelope inhabits Egypt, Africa, Bengal, and some other tropical countries.

The INDOSTAN ANTELOPE.

This animal is a native of the most distant parts in the Great Mogul's dominions. It chews the cud, rises, and lies down like the camel; and makes a kind of croaking noise, somewhat like the rattling of deer, at a certain time. This Gazelle is about four feet in height, and has a large lump on the shoulders, resembling that of the Indian ox. The horns are seven inches long, projecting forward: the neck, which is strong, has also a bend, like that of the camel, on the top of which is a short mane: the hinder parts resemble those of an ass: the tail, which is twenty-two inches long, is terminated with long hairs: the legs are slender: on the lower part of the breast the skin hangs loose, like that of a cow; the hair is short and smooth, in general of a light ash colour, though dusky in some places: under the

the tail, and beneath the breast, it is white; and on the forehead is a black spot, in the form of a diamond. Among all the writers on the subject of Natural History, two only, of our own country, have described this animal.

The WHITE-FOOTED ANTELOPE.

The height of this Gazelle, to the top of the shoulders, is about four feet; and it measures nearly the same in length, from the bottom of the neck to the insertion of the tail. It has short horns, bending a little forward; ears large, and marked with two black stripes: a small black mane, extending half way down the back: a tuft of long black hairs on the fore part of the neck; above which is a large spot of white; another on the chest between the fore-legs; one white spot on each fore-foot; and two on each hind-foot. The tail, of a moderate length, is tufted with black hairs. The female Gazelle is without horns, is of a pale colour, has a mane, and striped ears, like the male. Some of these animals have been imported into England, where, notwithstanding the difference of climate, they have been known to breed and thrive most surprizingly. A few years ago, a pair of them was living, and to be seen at Claremont, once the seat of the good old Duke of Newcastle, who was indefatigable in his exertions, and spent a great part of his fortune, to subdue the rebellious spirit of the Tories, and to secure, in spite of all their machinations, the succession in the illustrious line of Brunswick. The white-footed Antelope inhabits the interior parts of Indostan, in India, and is sometimes brought down to the British settlements by the natives, as a great curiosity.

The SWIFT ANTELOPE.

The length of this animal is nearly three feet ten inches, and the height two feet eight inches. The horns are round, eight inches long, and reverting at their extremities. This Gazelle varies in colour, but in general is tawny: the lower part of the sides, the belly, the thighs are white; and there is also a white spot on the fore part of the neck. It is a native of Senegal; the swiftest of this race of animals, as its name imports; but it is easily tamed. Ælian compares its amazing speed to the rapidity of a whirlwind.

The STRIPED ANTELOPE.

This Gazelle is nine feet long, and four feet high. The body is slender, as are also the legs: on the upper part of the neck is a short mane, and some long hairs hanging down from the throat to the breast: the horns are smooth, twisted spirally, and compressed sideways, with a ridge on one side following the wreaths; they consist of three bends, are three feet nine inches in length, and of a pale brown colour: they are close at the base, and two feet seven inches distant at the points, which are round and sharp. In the upper jaw is a hard, horny substance, disposed in ridges. The tail, which measures two feet, is brown above, white beneath, and black at the end. The colour of this animal is of a reddish cast, mixed with grey: it has a white stripe along the top of the back, extending from the shoulders to the tail; from this seven others branch out, four pointing towards the thighs, and three towards the belly; this and the breast are grey. The face, which is brown, is marked with two white lines, proceeding from the corner of each eye, and uniting above the nose. It is a native of Caffraria; said, at the Cape, to possess uncommon agility, and the height of its leaps is really beyond conception.

The CHINESE ANTELOPE.

The size of this animal is nearly that of the roe-buck: it is of the same colour, and imitates its actions. Its length is about four feet and a half. The horns are nine inches long, bending a little in the middle, and reverting towards the end: they are annulated almost to their extremities, at which they are black and smooth; but the lower parts are of an opaque yellow colour. The head is rather clumsy; the nose obtuse; the ears small and sharp pointed; and, on the middle of the neck,

grows a considerable protuberance. On the approach of winter, the hair of this Gazelle grows long, rough, and hoary, so that at a distance it appears almost white; but, towards the beginning of May, it exchanges its coat for another, which is short, thick, and of a tawny hue. These Antelopes are very numerous in Chinese Tartary, on the frontiers of China and Thibet: they also inhabit the borders of India; and thousands of them herd together on the vast plains beyond the lake Baikal. The flesh supplies the natives with food, and their skins with cloathing. They are naturally shy and timid, frequenting dry and sandy plains, and are so very fearful of water, that even the most imminent danger cannot compel them to enter that element. During the winter, they herd in great numbers, but separate again on the approach of spring. The Tartars hunt them with the utmost eagerness; for their horns form a considerable article of commerce, and are in high estimation among the Chinese.

The SCYTHIAN ANTELOPE.

This Gazelle is about two feet six inches high, and four feet nine in length: the tail is about three inches. The head resembles that of a sheep: the nose is very large, arched, and marked the whole length with a small line: the cutting teeth are placed so loose in their sockets as to move with the least touch. The horns of the male, which are of a pale colour, and the greatest part of them almost transparent, are a foot in length, bending a little in the middle; the points incline inwards, the ends are smooth, and the other parts annulated. The females are without horns, and extremely timid. If they are attacked either by dogs or wolves, the males place them in a circle, stand round, with their heads towards the enemy, and will defend them valiantly. These animals bleat like sheep, and their common pace is a trot: when they go faster it is by leaps and bounds; and they are as fleet as roe-bucks. Their skin, which is delicately soft, is excellent for gloves, and many other purposes. They are seen in flocks from five to ten thousand, between the Tanais and Boristhenes. The wild sheep, or ablavos, mentioned by le Brun, appear to be the same with these. The young are easily tamed; they are covered with a soft fleece, curled and waved, like new-dropped lambs. These animals are emigrants. Late in the autumn they collect in large bodies, and retire into the more southern latitudes. In spring, they again divide into small flocks, and wander northward, continually shifting their residence. Though they outstrip the swiftest coursers, they are often overtaken through timidity, and shortness of breath. While running, they seem to incline to one side, and scarcely to touch the ground; but no sooner does a dog give them the slightest wound, than they instantly tumble down, without the least appearance of resistance. The heat of the sun, reflected from the sandy deserts which they traverse, renders them almost blind in summer, or at least extremely short-sighted, and of course more liable to be caught. The hunters pursue them with guns, dogs, and black eagles, properly trained, and always approach them against the wind, lest, by their smell, they should have notice of impending danger.

The SENEGAL ANTELOPE.

The head and body of this Gazelle are of a light reddish brown, with a narrow black list down the hind part of the neck. The rump is of a dirty white. On each knee, and above the fetlock it has a dusky mark: the hoofs are small; and the tail, which is covered with coarse black hairs, is about a foot long: the horns are close at the base, but bend out greatly a little above, then, towards the extremities, approach again; but recede from each other near the points, which bend backwards: the distance, in the middle, is about six inches; above that four inches, and six at the points: they are seventeen inches in length, and eight in circumference at the bottom, surrounded with fifteen prominent rings; but they are smooth and sharp at the ends: its ears are seven inches long; its head eighteen,

large and clumsy. This animal inhabits Senegal, where the French call it "La grande vache brune;" the great brown cow.

The BUBALUS.

This is called by the moderns, The Cervine Antelope, an animal that seems to partake of the mixed natures of the cow, the goat, and the deer. It resembles the stag in the size and figure of its body, and particularly in the shape of its legs; but it has permanent horns, like the goat, and made entirely like those of the Gazelle kind. It also resembles that animal in its way of living: however, it differs in the make of its head, being exactly like the cow in the length of its muzzle, and in the disposition of the bones of its skull; from which similitude it has taken its name. This animal has a narrow long head; the eyes are placed very high; the forehead short and narrow; the horns about a foot long, black, thick, annulated, and the rings, of the Gazelle kind, remarkably large: the shoulders are very high, having a kind of bunch on them, that terminates at the neck: the tail is about a foot long, and terminated with tufted hair. In all other quadrupeds, except this and the elk, the hair tapers off from the bottom to the point; but in these, each hair seems to swell in the middle like a nine-pin. The Bubalus also resembles the elk in size, and the colour of its skin; but these are the only similitudes between them; for the one has a very large branching head of solid horns that are annually shed; whereas the other has black unbranching hollow horns that never fall. The Bubalus is common enough in Barbary, and has therefore been called the Barbary cow, though so widely different from that animal. It partakes more of the nature of the Antelope; like that, having the hair short, the hide black, and the flesh good for food.

The AFRICAN ANTELOPE.

This Gazelle, which is also called the Wild Goat of Grimmus, is about eighteen inches high. Its form is most elegant. The females have no horns; but those of the male are straight, black, slender, sharp-pointed, about three inches long, and slightly annulated at the base. Between these, in the middle of the head, is a hairy tuft standing upright. On both sides, between the eyes and the nose, are deep cavities, greater than those of the other kinds, which contain a yellow, oily fluid, coagulating into a black substance, that has a smell between musk and civet. This being taken away, the liquid again runs out, and coagulates as before. These cavities have no communication with the eyes, consequently this oozing substance can have nothing of the nature of tears. The colour of the neck and body of this animal is a dark ash colour, its belly white, and the tail, which is short, is black above, and white beneath.

The INDIAN ANTELOPE.

This animal is an inhabitant of the Southern parts of Africa, and appears to delight chiefly in ranging the mountainous districts of that country. Being naturally fat and fleshy, it is slow paced, when compared with many of the Gazelle species; and, consequently, falls an easier prey to the hunters, who greatly esteem its flesh. It is about five feet high, thick bodied, and strongly made; but, with slender legs, in proportion to its magnitude. The horns are thick and straight, marked with two spiral ribs, for a considerable way from the base, but smooth towards the points: the head is of a reddish hue, the forehead broad, and the nose pointed. On the forehead grows a line of long loose hairs, and on the lower part of the dewlap a considerable tuft of dusky hair. The body is of a blueish grey colour, slightly tinged with red. The tail, which is short, is covered with short ash-coloured hair, and terminated by a large tuft of long black hairs. The females, to which the Hottentots give the name of Emphos, have horns like those of the males.

The KEVEL.

Some call this Gazelle the Flat-Horned Antelope, it having very curious horns, flattened on the sides, and containing from twelve to fourteen rings. The Kevel is rather less than the roe-buck, but its eyes seem larger, and the horns are flattened as well in the female as the male. The colour of the upper part of the body is a reddish brown; the under and hinder parts are white: along the sides the two colours are divided from each other, by a strong dusky line, and on each knee is a tuft of hair. This animal is easily tamed, and its flesh is agreeable food.

The WHITE-FACED ANTELOPE.

In size this Gazelle is superior to the fallow-deer. It is upwards of five feet in length, and the height, to the summit of the shoulders, is three feet. The horns, which are similar to those of the flat-horned antelope, are sixteen inches long; five between the two tips: they are annulated in the male, but smooth in the female. The face, and the space between the horns, are both of a pure lively white: the cheeks and neck are of a fine bright bay: the back is ash-coloured, blended with red, having a dark stripe along the middle: the sides, flanks, and shoulders, are of a deep brown, a broad band of a darker colour dividing them from the belly, which is wholly white, as is a small space above the tail. This, which is about seven inches long, is covered with coarse black hairs. The white-footed Antelope is an inhabitant north of Cape of Good Hope; and a beautiful specimen of this Gazelle is preserved in Sir Ashton Lever's Museum.

The ANTELOPE Springing.

This Gazelle is rather less than the roe-buck. The horns are slender, annulated half their length, and twisted spirally; the ears are very long and dusky: the tail depends to the first joint of the leg: the face, cheeks, throat, and part of the under side of the neck, are white, with a dusky line passing from the base of each horn, beyond the eyes to the extremity of the mouth: the upper side of the neck, and part of the lower, as well as the back, the sides, and exterior parts of the limbs, are of a pale yellowish brown: the chest, belly, and inward parts of the same, are white; and both the sides and belly are divided by a broad chestnut band, which also runs down part of the shoulders: the upper part of the tail is white, and the lower black: the hindermost parts are white, and from the tail, half way up the back, is a white stripe, which the animal can contract, or expand, at pleasure. This Gazelle receives its name from the prodigious springs it takes, on the approach of a supposed enemy. It is an inhabitant near the Cape of Good Hope, but migrates annually from the interior countries. Two or three months it takes up its residence in the vicinity of the Cape, and then retires in troops of many thousands, attended by numbers of beasts of prey, which make dreadful havock among them. These migrations are owing probably to a deficiency of pasture, occasioned by the excessive droughts, to which some latitudes are subject, particularly that of Terra del Natal, where sometimes a single drop of rain does not fall during the space of two or three years.

The TRAGELAPHUS.

Some writers of Natural History have named this Gazelle the Siberian Goat. The skin of one, to be seen in the British Museum, is covered with a pale ferruginous hair, short on the sides, but longer on the top of the neck, and a little erect. On the shoulders, and on the lower side of the neck, the hair is fourteen inches long: beneath the hair is a kind of short wool, and on the knees a bare spot, which appears to have been occasioned by kneeling to lie down. The tail of this animal is short, but the horns are twenty inches long, eleven in the girth, in the thickest place, and nineteen inches distant from point to point. This Antelope has no beard; but its mouth, forehead, and ears, resemble those of a ram. The horns do not fall off annually like those

those of the Stag. They are found in the north-east part of Asia, Barbary, Sardinia, and Greece. Those of Corsica are smaller, and of a deepish brown, mixed with a rust colour: the belly, rump, and hind legs, are white; and the horns of the females are much smaller than those of the males. These animals live among the mountains, and run with great rapidity over the rocks. Those of Kamptchatka are so very strong, that ten men can hardly hold one, and their horns are sometimes so large, as to weigh thirty pounds. This Gazelle will grow to the size of a young stag: it propagates in autumn; and brings forth one at a time, sometimes two.

There is, in the mountains of the kingdom of Fez, another species of this Antelope, in size, between a stag and a roe-buck. The body, colour, and hair, resemble that of the stag, but he is deeper fided. The neck, throughout the whole length, is covered with shaggy hair underneath, which hangs down almost to the knees; and above is a bristly mane of a darker colour than the rest of the body. The knees also are covered with long thick hair, turning backwards; and the hoofs fall off every year. The horns are black, and like those of a goat, but the ears are shorter. The eyes and tail resemble those of a stag. It is a subtle, wanton animal, delighting in craggy rocks, and high places.

The CHEVROTIN.

Some writers have named this remarkable Antelope, the little Guinea Deer; others call it the Royal Antelope. It is the least of all cloven-footed quadrupeds, and, perhaps, the most beautiful. Its legs, at the smallest part, are not much thicker than a goose quill; when mounted with silver, they make very curious tobacco-stoppers. This beautiful Gazelle is seven inches high, and about twelve from the point of the nose to the insertion of the tail. It is the most delicately shaped animal in the world, being completely formed like a stag in miniature; except that its horns, when it has any, are more of the Gazelle kind, being hollow, and annulated in the same manner. It has two canine teeth in the upper jaw, in which respect it differs from all other animals of the goat or deer kind, and thus makes a distinct species entirely by itself. This wonderful animal's colour is not less pleasing: the hair, which is short, and glossy, being, in some, of a beautiful yellow, except on the neck and belly, which is white. They are natives of India, Guinea, and the warm climates between the tropics; where they are found in great abundance. But though they are amazingly swift for their size, yet the negroes often overtake them in the pursuit, and knock them down with their sticks. They may be easily tamed, and then they become familiar and pleasing; but they are of such delicate constitutions, that they can bear no climate but the hottest; and they always perish with the rigours of ours, when they are imported. The male in Guinea has horns, the female is without any; as are all the kinds of this Gazelle, to be found either in Java, or Ceylon, where they chiefly abound.

The PAZAN OR BEZOAR ANTELOPE.

In its general figure, this Antelope resembles the Algazel, except a small variation in its horns, and in having several qualities, and dispositions, peculiar to itself. The Algazel feeds upon the plains, but the Pazan is found only in the mountains: however, they are both inhabitants of the same countries and climate; being found in Egypt, Arabia, and Persia. The Bezoar Antelope is covered with short greyish hair, with a reddish cast: he is of the size of a common goat, and bearded in the same manner. The female has scarce any horns; but those of the male are very long, and marked with rings, whose number discovers his age. The body is in shape like a stag, and he is altogether as active and nimble: but he is very timid, and therefore seldom or never descends into the plains.

This is a species of the Gazelle kind famous for that concretion in the stomach, called the oriental bezoar, which was once in high repute all over the world for its medicinal virtues. The word bezoar is supposed to be derived either from pazan, or pazar, the name of the

animal that produces it, or from a word in the Arabic language, which signifies antidote or counter-poison. And here we beg leave to give it as our opinion, that the name algazel imports the gazel, in like manner as the word, which has been translated, alcoran, means, the coran; al, in the Arabian language, answering to our article the, and having the same signification. The Bezoar is a stone found in the intestines of some animal, and brought over to us from the East Indies. But these kind of concretions, are sometimes found in cows, and are occasioned by their practice of licking off their hair, which, in the stomach, gathers in the shape of a ball. Indeed, there is scarce an animal, except of the carnivorous kinds, that does not produce some of these concretions in the stomach, intestines, kidneys, bladder, and even in the heart. Like all others, the bezoar is found to have a nucleus, or hard substance within, upon which the external coatings were formed; for, upon being sawed through, it is seen to have layer over layer, as in an onion. This nucleus is of various kinds; sometimes the buds of a shrub, sometimes a piece of stone, and sometimes a marcasite. The stone is from the size of an acorn to that of a pigeon's egg; the larger the more valuable; its price increasing in proportion to its size, like that of a diamond. There was a time when a bezoar of four ounces sold in Europe for above two hundred pounds; but, at present, the price is greatly fallen, and they are in very little esteem. It is of various colours; sometimes of a blood colour, sometimes of a pale yellow, and of all the shades between these two. It is generally glossy, smooth, and has a fragrant smell, like that of ambergrease, arising probably from the aromatic vegetables upon which this Gazelle feeds. It has been given in vertigoes, epilepsies, palpitations of the heart, colics, jaundice, and in those places where the dearness, and not the value of medicines, is consulted, in almost every disorder incident to man. In all, perhaps, it is equally efficacious, acting only as an absorbent, and possessing virtues not superior to common chalk, or the powder of crabs-eyes. Judicious physicians have therefore discarded it; and this celebrated medicine is now chiefly prescribed in countries, where the knowledge of nature has been but little advanced. When this medicine was in its highest reputation, many arts were used to adulterate it, and many countries endeavoured to find out a bezoar of their own; so that we had occidental bezoar from America, German bezoar, cow bezoar, &c. To these ignorance may impute virtues that they do not possess: experience has found but few cures wrought by their efficacies; but it is well known, that they often prove fatal to the animal that bears them; for, when become too large to pass, they block up the passage of the food, and the animal dies. The substance of these balls, however, is different from the bezoar mentioned above; being rather a concretion of hair than stone. There is a bezoar found in the gall bladder of a boar, and thence called hog bezoar, in very great repute; but, perhaps, with as little justice as any of the former; and it is more than probable, that the bezoar so much in use some years ago, was not the production of the pazan, or any one animal only, but that of the whole Gazelle tribe; who, feeding upon odoriferous plants, gave an admirable fragrance to the accidental concretions which they were found to produce; however, as this medicine is but little used at present, our curiosity is much abated, as to the cause of its formation.

We here close our catalogue of the Gazelles; all which nearly resemble the deer in form, and delicacy of shape (as will appear in the following chapter); but have permanent horns like those of the goat. They properly fill up, as we have already observed, the interval between those two kinds of animals; so that it is difficult to tell where the goat ends, and the deer may be said to begin. If we compare the gazelles with each other, we shall find but very slight distinctions between them: the turn, or the magnitude of the horns, the different spots in the skin, or a variation in size, are chiefly the marks by which their varieties are to be known; but their nature, way of living, and peculiar swiftness, all come under one description.

C H A P. IV.

The NATURAL HISTORY of QUADRUPEDS of the DEER Kind.

Containing a descriptive Account of the STAG; the FALLOW DEER; the ROE BUCK; the ELK, or MOOSE DEER; the REIN DEER; the VIRGINIAN; the SPOTTED AXIS; the GREAT AXIS; the PORCUPINE; the RIB-FACED; the TAILLESS; the MEXICAN; the GREY; the CARIBOU; the HIPPELAPHUS; &c.

THESE animals, like those of the goat kind, chew the cud; but they differ in this, that they shed their horns, which are internally solid, every year. If we consider their structure, and compare them with the goat, or the ox, we shall find, what will at first appear strange, that they more resemble the latter than the former. The ox and the stag, differ rather in their grossness and slenderness, rather than in any other anatomical distinction: the skeleton of either is nearly alike: the internal conformation is nearly the same; except, that the deer kind want the gall-bladder; their kidneys are also formed differently; and their spleen is proportionably larger. Such are the slight internal discriminations between two animals, one of which is among the swiftest, and the other among the heaviest of the brute creation.

The Stag is one of those innocent and peaceful animals, that seems made to embellish the park, and animate the solitudes of nature. The easy elegance of his form, the lightness of his motions, those large branches that seem made rather for the ornament of his head than his defence, the size, the strength of this beautiful creature, all, sufficiently rank him among the first class of quadrupeds, and therefore naturally present him to us, as the first noted object of our curiosity and attention.

NATURAL HISTORY of the STAG, or HART.

THIS animal, the first of the Deer kind, differs in size and horns from the fallow-deer. He is much larger; and his horns are round; whereas in the fallow-deer they are broad and palmated. The female of the Stag is called a Hind, and her young one a Calf. The first year the Hart has no horns, but only a hard excrescence, which is short, rough, and covered with a thin hairy skin: the second year, the horns are single and straight; the third, they have two antlers; the fourth, three; the fifth, four; and the sixth, five. The animal's age, however, cannot always be known, with certainty, by these indications, for sometimes they are more, and frequently less. When arrived at the sixth year, the antlers do not always increase, and though the number may amount to six or seven on each side, the Stag's age is then estimated rather from their magnitude, and the thickness of the branch which supports them, than from their variety or number. These horns, large as they appear, are shed annually, and new ones come in their place. The old horns are of a firm, solid texture; and handles of knives, and other domestic utensils, are usually made of them: but while young, nothing can be more soft and tender; and the animal, as if conscious of his imbecility, after having shed his horns, instantly retires from the rest of the herd, and, hiding himself in solitudes and thickets, never ventures out for pasture but by night. During this interval, which commonly happens in the beginning of spring, the new horns are very painful, and have a quick sensibility of any external impression. The flies also, at this time, are extremely troublesome to him, who, on that account, appears dejected and disconsolate. When the old horns fall off, the new ones do not immediately begin to appear; but the bones of the skull are seen covered only with a transparent periosteum, or skin, which, according to anatomists, covers the bones of all animals. After a short time, however, this skin begins to swell, and to form a soft tumour, containing

a considerable quantity of blood, which gradually is covered with a downy substance, apparently, soft as velvet, and is nearly of the same colour with the rest of the animal's hair. This tumour protudes daily from the point like the graft of a tree; and, rising, by degrees, from the head, shoots out the antlers on each side; so that in a few days, according to the condition of the animal, the whole herd is completed. For sometime, however, the horns are very soft, and covered with a sort of bark, which is merely a continuation of the integument of the skull. This bark is velvety, downy, and every where furnished with blood vessels, that supply the growing horns with nourishment. As they creep along the sides of the branches, their prints are marked over the whole surface; and the larger the blood-vessels, the deeper those prints appear. Hence arise the inequalities on the surfaces of the horns of the Deer kind, which are furrowed all along the sides, the impressions diminishing towards the points, where the parts are as smooth and solid as ivory. But it is to be observed, that the substance, of which the horns are composed, begins to harden at the bottom, while the upper part remains soft, and continues to grow; from whence we may conclude, that the horns of the Deer grow differently from those of sheep or cows, which are invariably seen to increase from their bottoms. But when the whole herd has attained its full growth, the extremities begin to acquire their solidity; the velvet covering, or bark, together with the blood vessels, dry up, and then begin to fall; which process the animal itself hastens, by rubbing its antlers against every tree that it approaches; and, in this manner, the whole external surface being stripped off, the head at length acquires its complete expansion, solidity, and comeliness.

It is an observation worthy of notice, that if a Stag be castrated when his horns are shed, they will never grow again; and, on the contrary, if the same operation be performed, while the horns are in perfection, they will never fall off. The quantity of his provisions will also tend to facilitate the growth and expansion of his horns. It may be even possible to stop their growth entirely by a considerable retrenchment of food; and, as a confirmation of this assertion, nothing can be more obvious than the difference between a Stag bred in a fertile pasture, and undisturbed by the hunter, and one ill-fed, and liable to perpetual alarms. The head of the former is expanded, his antlers are numerous, and the branches thick; whereas the latter has but few ramifications, the traces of the blood vessels are but slight, and their spread is inconsiderable. The beauty and size of their horns, therefore, mark the strength and vigour of the animals; for such of them as are sickly, or have been wounded, never shoot out that magnificent profusion so much admired in the Stag. Thus the horns may be resembled to a vegetable substance grafted on the head of this animal. Like a vegetable they grow from the extremities; like a vegetable they are for a while covered with a bark that nourishes them; like a vegetable they have their annual production and decay.

A short time after these animals are furnished with new horns, they begin to feel the natural impulse of propagating their species. The old ones are most forward; and, about the end of August, they leave the thickets, and return to the plains, in order to seek the Hinds, to whom they call with a loud tremulous note. At this time their necks become turgid; they appear

bold and furious; fly from one place to another; strike with their horns against the trees; and every other opposing object; and continue restless and fierce till they have found the females, who at first avoid them, but, at last, are overtaken and compelled. When two Stags are competitors for the same Hind, how timid soever they may appear at other times, they now seem agitated with an unusual degree of ardour: they pay up the earth, menace each other with their horns, bellow loud, and desperately engage, seemingly determined either to conquer or die. Such a combat continues usually till one of the parties is either worsted, or put to flight; and it often happens that the victor is obliged to fight several such battles before he remains the undisputed master of the field. On these occasions, the old ones are generally the most successful, as they possess a much greater degree of strength and courage: and these also are by the Hinds preferred to the younger ones, the latter being more feeble and less ardent. However, they are all equally inconstant, confining themselves to one female but a few days, and then seeking out another, who is, perhaps, not to be enjoyed without a repetition of former danger.

In this manner the Hart continues to range from mate to mate for about three weeks, during which period he scarcely either eats, sleeps, or rests. At the termination of this libidinous season, the Stag, which was before very fat, sleek, and glossy, becomes lean, feeble, and timid. Having fully gratified the instinct of nature, he retires from the herd, in order to seek food and repose, he frequents the verge of his bounds; and selects the most nourishing pastures, where he continues till his strength is renovated. Thus is his whole life spent in the alternatives of plenty and want, of corpulence and leanness, of health and sickness, without having his constitution materially affected by the violence of such transitions. As he is above five years coming to perfection, he lives above forty years; and it is a general rule, that every animal lives about seven or eight times the number of years which it continues to grow. What therefore is reported concerning the life of this animal, has arisen from the credulity of ignorance: some say, that a Stag had been taken in France, with a collar, on which was inscribed, "*Cæsar hoc me donavit*," the gift of Cæsar; which has been interpreted of Julius Cæsar; but it should be considered Cæsar is a general name for kings; and that one of the Emperors of Germany, who are always stiled Cæsars, might have ordered the inscription. However, it is certain, that the Stag may differ as to the term of his life, either in respect of the goodness of his pasture; or the repose he may be suffered to enjoy; for these circumstances not only influence his age, but also his strength and vigour. The Stags inhabiting the plains and vallies, which abound in corn and pasture, are much more corpulent, as well as tall, than such as are bred on rocky wastes, or heathy mountains. The latter are low, small, meagre, and incapable of running with the celerity of the former; though they are found to hold out much longer: they are also more artful in evading the hunters; and their horns are usually black and slender, while those of the low land Stags are reddish and flourishing; so that this animal seems to increase in beauty and stature, in proportion to the extent of his security, and the richness of his pasture.

In England, the colour of the Hart is generally red, or a reddish brown, with some black about the face, and a black list down the hinder part of the neck, and between the shoulders: nevertheless, in other countries, the greater number of these animals are brown: a few of them, indeed, are white; but such seem to have obtained this colour by a domestic tameness. The Stag has the most beautiful eye of any animal that is a native of this climate; and his senses of smelling and hearing are in no less perfection. When in the least alarmed, he lifts his head, erects his ears, and stands for a few moments in a listening posture. Whenever he ventures on some unknown ground, or quits his native covert, he makes a pause at the skirt of the plain, in order to examine every object around him; after which he turns

his face against the wind, for the purpose of discovering by his scent the approach of any enemy. Should a person at some distance whistle, or call aloud, the Stag stops short immediately in his slow measured pace, and gazes on the intruder with a kind of awkward admiration; and if he perceives neither dogs, nor any instruments of destruction levelled against him, he then proceeds forward without betraying the smallest emotions of fear. Man, indeed, is not the enemy he is most afraid of; on the contrary, the sound of the shepherd's pipe seems to inspire him with a pleasing delight, and the hunters sometimes make use of that instrument to allure the poor animal to his destruction. The Stag eats slowly, and is very delicate in the choice of his pasture; and, having eaten a sufficiency, he retires to the covert of some thicket to chew the cud in security. But he seems to perform the act of rumination with much greater difficulty, than either the cow or sheep; for the grass is not returned from the first stomach without much straining, and a kind of hiccup, which is easily perceived during the whole time it continues. This defect may probably proceed from the greater length of the neck, and the narrowness of the passage; all those of the cow and sheep kind having it much wider. This animal's voice is stronger, louder, and more tremulous, in proportion as he advances in age; in rutting time it is even terrible: at this season, he seems so transported with passion, that nothing obstructs his fury; and, when at bay, he keeps the dogs off with great intrepidity. Some years ago, William duke of Cumberland, caused a tiger and a stag to be inclosed in the same area; and the stag made so bold a defence, that the tiger was compelled to fly. The Stag seldom drinks in the winter and still less in the spring, while the plants are tender and covered with dew. It is in the heat of summer, and during the time of rut, that he is seen constantly frequenting the sides of rivers and lakes, as well to slake his thirst, as to cool his raging ardour. He swims with great ease and strength, and best at those times when he is fattest, his fat keeping him buoyant, like oil upon the surface of the water. When in pursuit of the Hinds, he will even venture out to sea, and swim from one island to another, although some miles asunder.

The cry of the Hind is not so loud as that of the male, and is never excited, but by apprehension for herself or young. It need scarce be mentioned, that she has no horns, or, that she is more feeble, or unfit for hunting, than the male. When once they have conceived, they separate from the males, and both herd apart. The time of gestation continues between eight and nine months, and one only at a time is generally produced. May, or the beginning of June, is their usual season for bringing forth the Calves; during which time they take great care to hide them in the most secure retreats. Nor is this a needless precaution, since almost every creature is then a formidable enemy: the eagle, the falcon, the osprey, the wolf, the dog, and all the rapacious animals of the cat kind, are at this time in continual motion to find out their retreats: but, what appears extremely unnatural, the Stag himself is also their professed enemy; and the Hind is obliged to employ all her arts to conceal her young from him, and from the most dangerous of their assailants. At this season, therefore, the courage of the male seems to be transferred to the female; for she defends her young against her less formidable opponents by force; and, when pursued by the hunter, she even offers herself to mislead him from the principal object of her concern; with this view, she will fly before the hounds, in a direct course with an amazing fleetness; and if she is so fortunate to escape with her life, she returns to her young, after having eluded her pursuers. The Calf never quits the Hind during the whole summer; but in winter she, with all the males under a year old, assemble together in herds, which are more numerous in proportion as the season is more or less severe. In the spring they separate; the hinds to bring forth; when none but those of one year old remain associated; these animals, however, in general, are fond of herding and grazing in company; danger or necessity alone separates them.

But the dangers they have to fear from other enemies, are nothing when compared to those from the human species; for men of every age and nation have made the chase of the Stag one of their most favourite pursuits; and those who first hunted from necessity, have continued the same for amusement. In our own country, in particular, hunting has ever been esteemed one of the principal diversions of the great; and, in former times, beasts of the chase had the whole island for their range; they knew no particular master, nor any other limits than those of the ocean. The jurisprudence of the Roman empire, which was accommodated to the manners of the first ages, established it as a law, that as the natural right of such things as have no owner belongs to the first possessor, wild beasts, birds, and fishes, are the property of those individuals who can first take them: but the northern barbarians, who overran the Roman Empire, bringing with them a strong relish for this diversion, and being now possessed of more easy means of subsistence, from the lands they had conquered, their chiefs and leaders began to appropriate the right of hunting, and made it a privilege of royalty; and when the Saxon kings had established an heptarchy, the chaces were reserved by each sovereign for his own particular amusement. In those uncivilized ages, war and hunting were the principal employment of the nobles; nevertheless, as the Saxon kings appropriated only those lands to the business of the chase that were unoccupied before, no individuals received the least restraint, nor injury. But it was otherwise when the Norman kings were settled upon the throne: the passion for hunting was then carried to excess, and every civil right was involved in universal ruin: the village communities, nay, even the most sacred edifices, were all turned into one vast waste, to make room for animals, the objects of a lawless tyrant's pleasure: sanguinary laws were made for the preservation of the game; and in the reigns of William Rufus, and Henry I. it was less criminal to destroy one of the human species, than a beast of the chase. But at the restoration of the Saxon line, under Henry II. the rigour of the forest laws were softened; and when property became more equally divided, by the introduction of the arts and industry, extensive hunting grounds became more limited: tillage and husbandry likewise combined, and compelled the beasts of the chase, to give place to others of the domestic kind, more useful to the community; so that in proportion as the useful arts gained ground, they encouraged the labours of the industrious, and repressed the licentiousness of the sportsman.

Hence it is, that, in the present cultivated state of this country, Stags are almost unknown in a wild state of nature; those of them that remain among us are kept under the name of Red Deer, in parks, with the Fallow Deer; but, even these are much less numerous than formerly, owing partly to their excessive viciousness, and the coarseness of their flesh, which have contributed in a great measure to their extermination: however, a few are to be found in their wild state on the moors which border on Cornwall and Devonshire; in the Highlands of Scotland; and on the mountains of Kerry in Ireland, where they add magnificence to the romantic scenery of the celebrated lake of Killarney.

The hunting of the Stag and Buck in England, are performed in a similar manner; the animal being driven from some park, and then pursued through the open country: but those who pursue the wild animal, have a much higher object and greater variety in the chase: besides, the superior strength and swiftness of the mountainous stag, prolongs the amusement: it is possessed of more various arts to escape the hunter, and leads him to precipices, where the danger ennobles the chase. Having spent his whole life in a state of continual apprehension; having frequently been followed, and as frequently escaped, he knows every trick to mislead, to confound, and intimidate his pursuers; to stimulate their ardour, and enhance their success. But here it is impossible for the most lively powers of description to give an adequate idea of the nature of the chase, and the pleasures attending it; and those who are fond of

hunting the Stag, to see, or enjoy it in perfection, should repair to Ireland; where, in that fertile, romantic, and enchanting country, all ranks and degrees of both sexes, on St. Patrick's day, and for several days after Christmas time, are chiefly devoted to the diversion of the chase; when the hunter is rewarded for his toil, and his industry is fully repaid. In England, however, the chase is continued in those parts of the country where the Red Deers are still preserved; and, where the animal is perfectly wild, the amusement, as already observed, is superior. The ambition of the hunter, when he leads out his hounds to the mountain side, is to unharbour the largest and boldest Stag of the whole herd; and for this purpose he examines the track, which, if he finds long and large, he concludes that it must have belonged to a Stag, and not a Hind, the print of whose foot is rounder. Those marks also which he leaves on trees, by the rubbing of his horns, shew his size, and point him out as the proper object of pursuit. In tracing a Stag to his haunt, it is to be observed, that he changes his manner of feeding every month. In November the Harts feed on heaths and broomy places: but in December they herd together, and withdraw into the recesses of the forests, feeding on holm, elder-trees, and brambles. The three following months they no longer herd together, but separate into companies of four or five each, and venture out to the corners of the forest, where they feed on winter pasture, but sometimes make incursions into the adjacent corn-fields, to feed upon the tender shoots just on their appearance above ground. In the months of April and May they resort to thickets, and other shady places, seldom venturing forth unless roused by approaching danger. In September and October, upon the return of their annual ardour, they rush from their shady retirements, boldly facing every danger, without any certainty of food or shelter. When, from a knowledge of the above circumstances, the hunter has found out the residence and quality of his game, his business then is to uncouple, and cast off the hounds for the pursuit; who no sooner perceive the timid animal flying before them, than they open altogether in full cry, pursuing rather by the scent than the view, at the same time encouraging each other to continue the chase, and tracing the flying Deer with the most amazing sagacity. The hunters also are not less ardent in their speed on horseback, cheering up the dogs, and directing them where to pursue. On the other hand, the Stag, when unharboured, seems to fly with the swiftness of the wind, leaving his pursuers far behind; till at length, having gained his former coverts, and no longer hearing the cries either of the hounds or hunters, he stops, gazes around him, and seems to recover his natural tranquillity. But this calm proves only a momentary breathing; for his subtle pursuers continue to trace him; and he again is alarmed with approaching danger. Again he renews his efforts to escape, and again leaves his enemies at their former distance; but this second attempt to fly from destruction rendering him more feeble than before, when they come up, he is unable to out-run them; he tracks more heavily on the ground, which, while it increases the strength of the scent, it redoubles the cries of the hounds, enforcing their speed, and inflaming their ardour in the pursuit: the poor animal is therefore obliged now to practice all his little arts of evasion, which sometimes, though but seldom avail him. He takes refuge, when hard pressed, among the herd, and lies close himself, that the hounds may overshoot him. Sometimes he will send forth a young hart in his stead: at others, he will break into one thicket after another, in search of deer, rousing them, collecting them together, and endeavouring to put them upon the tracks he has made. His old associates, however, with a true spirit of ingratitude now shun him, and leave the wretched animal to his fate; who, thus abandoned, tries other stratagems to secure his personal safety. He doubles and crosses such places, as are least liable to retain the scent: he runs against the wind, not only to cool himself, but that he may the better hear the voice, and judge of the distance of the hounds. It is now very apparent, how sorely the unhappy creature is pressed,

pressed, by his manner of running, which, from a bounding easy pace, is converted into a stiff, short amble: his mouth is black and dry, without foam on it: his tongue hangs out; and, if we may credit common report, the big round tear is ready to start from his eye. At last, when every other method has proved ineffectual, his only refuge is to take to the water, and to attempt an escape by crossing whatever lake or river he happens to approach; and, while swimming, he keeps in the middle of the stream, lest, by touching a bough of a tree, or the herbage on the banks, he may give scent to the hounds; nor does he ever swim against the stream; whence huntsmen have made it into a kind of a proverb, namely, "that he who would his chace find, must up with the river, and down with the wind." In this emergency too, he will cover himself under the surface of the water, shewing only his antlers, and the tip of his nose. Every art, and every resource being exhausted, the poor creature at last collects the feeble remains of his strength, in order to oppose boldly those persevering enemies, from whom he has endeavoured in vain to escape: he therefore now faces dogs and men, and, for some time, stands resolutely at bay. In this situation, being quite desperate, he guards himself, on every side, with his horns: he threatens furiously his opponents: he aims at the first dog or man that approaches; and it often happens, that he does not die unrevenged. At the commencement of the contest, however, the more wary hounds seem inclined to avoid him; but, the whole pack quickly coming up, he is soon surrounded and brought down, upon which those who are fortunately in at the death halloo, and the huntsman winds a treble mort, as it is called, with his horn. Such is the manner of pursuing the stag in England; but every country has a peculiar method of its own, adapted either to the nature of the climate, the face of the soil, or the genius of the people. The antient manner was very different from that practiced at present: they used their dogs only to find out the game, but not to rouse it. Hence they were not curious as to the music of their hounds, or the composition of their packs: and that dog who opened before he had discovered his game, was held in no estimation. They usually endeavoured to find out silently the animal's retreat, which, when discovered, they surrounded with nets and engines, and then, with their united cries, roused and forced him into the toils previously prepared for him. We shall conclude this part of our subject with mentioning a few of the many terms in use among game-keepers and hunters, when they speak of the stag. In the first year, he is called a calf, or hind calf; in his second, a knobber; in his third, a brock; in his fourth, a staggard; in his fifth, a stag; and in his sixth, a hart. The female, in her first year, is called a calf; in her second, a hearse; and in her third a hind. In the place where the stag resides, he is said to harbour; when he cries, he is said to bell; the print of his hoof is called the slot; his tail, the tingle; and the excrement, his fewmet: his horns are called his head. The antlers also have distinct names: the first that branches off is called, the antler; the second the sur-antler; all the rest which grow afterwards to the top, which is the crown, are called royal antlers. When a deer has passed into a thicket, leaving marks whereby his bulk may be guessed, it is called, an entry. When they cast their heads, they are said to mew. When a stag, hard hunted, takes to the water, he is said to go fail. When he turns his head against the hounds, he is said to bay; and when the hounds pursue upon the scent, until they have unharboured the stag, they are said to draw on the slot. Most of these terms are now laid aside, or in use only among game-keepers.

In this country, we have few varieties of the red deer, and they are mostly found of the same size and colour: but it is otherwise in different parts of the world, where they are seen to differ in form, in size, in colour, and in their horns. On the mountains of New Spain are stags extremely swift, and yet they are no bigger than fawns. They are shaped much like European stags, but their horns are as black as pitch, and

round, as if turned in a lathe, ending in a crooked point: they increase every year, with a new spiral turn at the end, which shews the age. Their eyes are lively, their ears long, their teeth large, and their tails are furnished with long hair, while that on the other parts of the body is short, and of a bright chestnut colour. They are often kept tame, and the hinds bring forth their young where they are housed. In the day-time they are let out into the woods to feed, and at night they return to their places of abode. There is a beautiful kind of Stag in Sardinia, about two feet, eight inches high to the top of the back. The neck is about a foot long, and the hind leg, from the knee to the bottom of the foot, is two feet. The hair is of four colours, namely, fallow, white, black, and grey: the white is predominant under the belly, and on the inside of the thighs and legs. Along the back are two rows of spots in a right line: but those on other parts of the body are very irregular. A white line runs along each side, and the neck and head are grey. The tail is black above, and white underneath, and the hair upon it is six inches long. This, by Pliny, is named the Spotted Axis Deer.

In China, the Stags are of a particular kind, being no taller than a common house-dog, and hunting them is a common diversion of the great. Their flesh, while young, is exceeding good; but when they arrive at maturity, it begins to grow hard and tough: however, the tongue, the muzzle, and the ears, are in particular esteem among that luxurious people. Their manner of taking them is very singular: they carry the heads of some of the females stuffed, and imitate exactly their cry: the male, perceiving the heads, does not fail to appear; and, upon their nearer approach, the whole company, who are concealed, rise, surround, and frequently take him alive.

The stags of Corsica are very small, being not above half the size of those common in this country. They are short and thick; their legs are short, and the hair of a brown colour. Those of Mexico have tails as long as mules, are of the same size, and have surprizing strength; two of them, when tamed, were able to draw a carriage. The stags of Canada differ from ours in nothing, except the size of the horns, which is greater; and the direction of the antlers, which rather project forward than turn backward. The Stag of North America is also very large. Their horns are covered over with a very hard hairy skin, of the same colour as that of the body. This skin has a great many veins and arteries full of blood, with which the vessels seem to be swelled, especially on the inside, where there are furrows to receive them. We are informed, that the Americans have brought their stags into the same state of domestic tameness that we have our sheep, and black cattle. They send them forth in the day-time to feed in the forests, and at night they return home with the herdsman who guards them. The inhabitants have no other milk but what the hind produces, and use no other cheese but what is made from thence. Thus we see, that an animal which seems made only for man's amusement, may be easily brought to supply his necessities.

The horns of the Stag are greatly in use, and commonly known by the name of hartshorn. It is calcined for some uses, and made into a jelly for others. Calcined hartshorn is a sort of lime deprived of all its active principles, and is used as an absorbent to destroy acids in the stomach, and to abate the acrimony of the humours, when the body is in a laxative state. The jelly is very nourishing, a good restorative, and some prescribe it against vomiting and spitting of blood. From hartshorn is extracted a water, spirit, salt, and oil, by distillation. Some use the water as a vehicle for remedies that are given in malignant fevers. The spirit and salt are both recommended in the small pox, the apoplexy, epilepsy, palsy, and in hysteric disorders. The oil is by some applied to the nostrils of women in hysteric fits, and as a liniment for paralytic limbs. The marrow of the stag is preferred to that of any other animal to ease pain, and to supple callous parts.

NATURAL HISTORY of the FALLOW DEER.

THE Buck and Doe, called Fallow Deer, are animals very well known in England; where they are found in the greatest perfection; the young of which are called Fawns. They are generally found in parks, and their flesh, called venison, is much better eating than that of a stag or hind. The Fallow Deer and stag resemble each other in several particulars: they are alike in form, alike in disposition, in the superb furniture of their heads, in their swiftness, and in their timidity; and yet no two species of animals avoid each other with a stronger antipathy: they never engender together, nor herd in the same place: they form distinct families, which, though seemingly near, are very remote. The Fallow Deer are smaller, less robust, less savage, and more easily tamed than those of the stag kind: they feed upon many articles which the latter will refuse, on which account the venison is better preserved. The buck browses closer than the stag, and is therefore very prejudicial among young trees, which he often strips too close for recovery. He seeks the female at the second year, and, like the stag, is fond of variety. In three years he comes to perfection, and lives sixteen; but the stag is seven years before he comes to maturity, and will live forty years. The horns of the buck are palmated at their ends, pointing a little forward, and branched on the hinder side, having two sharp brow antlers, and above them two small slender branches. His head, as that of all other animals of this kind, is shed annually, and takes the usual time for a renewal; but this change happens later than in the stag; and, at a certain season, the former animal is not so furious as the latter; nor does the buck so much exhaust himself by the violence of his ardour. He does not quit his natural pastures in quest of the fawn, nor attack other animals with indiscriminate ferocity; but, among Fallow Deer, the males will furiously combat for the female, and it is not without many fierce battles, that one buck is seen to become master of the whole herd; nor is it unusual for a herd to divide into two parties with great obstinacy, both of whom seem desirous of gaining some favourite spot of the park for pasture, and of driving the vanquished party into the coarser and more disagreeable parts. Each of these factions has its particular chief, namely, the two oldest and strongest of the herd. These lead on to an engagement, and the rest follow under their direction. Their combats are singular enough; they attack with order; support the assault with courage; pour in fresh supplies where wanted; retire, rally, and never give up the field upon a single defeat; for the engagement is renewed for several days together; until, at length, the most feeble side is obliged to give way, and to be confined to the less agreeable part of the park, where only they can find safety and protection. The colour of the buck is various, reddish, deep brown, white, and spotted, and its tail is longer than that of the stag. The doe goes about eight months with young, and, in general, brings forth but one at a time. The buck being a beast of chase, like the stag, the hunters have invented a variety of names for him. The first year he is termed a fawn; the second, a pricket; the third a forel; the fourth, a fore; the fifth, a buck of the first head; and the sixth, a great buck: the female is called a doe, the first year a fawn, and the second a tegg.

The manner of hunting the buck is pretty much the same as that of stag hunting, except that less skill is required in the former. The buck is more easily roused; it is sufficient to judge by the view, and mark what grove or covert he enters, as he is not known to wander far from thence, nor, like the stag, to change his layer, or place of repose. When hard hunted, he takes to some strong hold, or covert, with which he is acquainted; not, like the stag, flying far before the hounds, nor using any of the subtleties, which this animal is accustomed to. He will take the water when sorely pressed, but seldom a great river; nor can he swim so long as the former. In short, the strength, the cunning, and the courage of this animal, are inferior to those of the

stag, and consequently, he affords neither so long, so various, nor so obstinate a chase.

In England we have two varieties of Fallow Deer, which are said to be of foreign origin: the beautiful spotted kind, supposed to have been brought from Bengal; and the very deep brown sort, which are now so common in many parts of this kingdom: they were introduced here by James I. from Norway, where he passed some time when he visited his intended bride, Mary of Denmark: the king observed their hardiness, and that they could endure the winter without fodder, even in that severe climate; he therefore brought some into Scotland, and from thence transported them into his chaces of Enfield and Epping, to be near his palace of Theobald's; for that monarch, it is well known, was fond to excess of hunting. Since that time they have greatly multiplied in many parts of this island; and England is now become more famous for its venison than any other country in the world. The flesh of the French Fallow-Deer is much inferior, both in fatness and flavour to that fed on our pasture. Those of Spain have a slenderer neck; are as large as stags, but of a darker colour. According to Labat, in Guiana, a country of South America, there are deer without horns, much less than those of Europe, but resembling them in every other particular. When pursued, they fly into places where no other animal can follow them: The negroes stand to watch for them in narrow paths, which lead to the brook, or the meadow, where they feed. When within reach, they shoot, and are happy if they bring down their game; for the flesh of these kind of deer, though seldom fat, is considered by them as a great delicacy. They are called in that country Cariocon.

NATURAL HISTORY of the ROE-BUCK.

THIS animal is found in most parts of Europe, as far north as Norway. It inhabits Tartary and China, in Asia. It was formerly in the north of England, and in Wales; but, at present, the species no longer exists in any part of Great-Britain, except in the Highlands of Scotland. This is one of the least of the deer kind, being only three feet four inches long, and two feet four inches high. The horns, which are about eight inches long, are upright, round, and divided into only three branches. The body is covered with very long hair, well adapted to the rigour of its mountainous abode. The lower part of the hair is ash-colour, always clean, smooth, and glossy. Near the ends is a narrow bar of black, and the points are yellow. The ears are long, their insides of a pale yellow, and covered with long hair. The spaces bordering on the eyes and mouth are black. The chest, belly, and legs, and the inside of the thighs, are of a yellowish white; the rump is of a pure white, and the tail very short. The make of this animal is very elegant; and its swiftness equals its beauty. It differs from the stag in its smaller size, and the proportionable paucity of its antlers; and it differs from all of the goat-kind, as it annually obtains a new head, which none of that kind are ever seen to do.

Though but a very small animal, yet, when its young is attacked, it will face even the stag, and often comes off victorious. It is also possessed of more cunning, is more difficult to pursue, and, notwithstanding its scent is much stronger, it is more frequently found to make a good retreat. It is also different from the stag in its natural appetites, inclinations, and whole habits of living. Instead of herding, the sire, the dam, and the young ones, associate together in separate families, and never admit a stranger into their little community. The Roe-Buck and his mate, after the first fawning, conceive so strong an attachment to each other, that they never after separate. The female goes with young but five months and a half, which alone serves to distinguish this animal from all others of the deer kind, that continue pregnant more than eight. The Roe-Buck is every year becoming scarcer, and the whole race in many countries is wholly worn out: even in France, where it

QUADRUPEDS

THE ELK



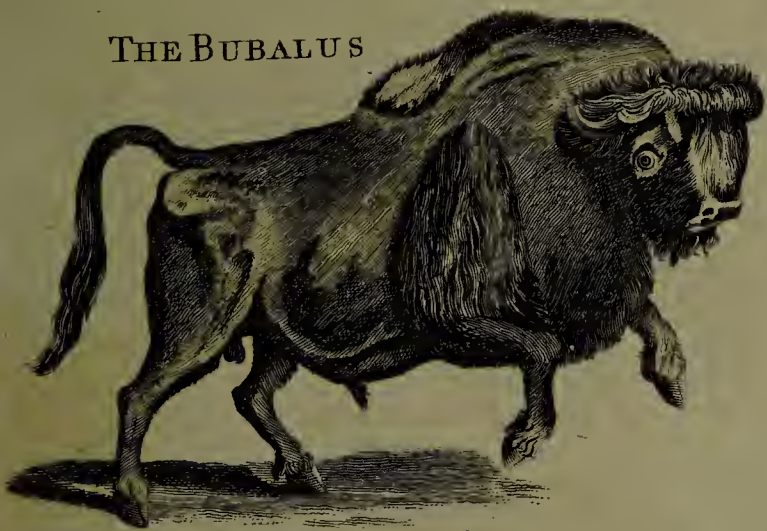
THE FOURMILLIER



THE FIBER



THE BUBALUS



THE GAZELLE



THE GUINEA PIG



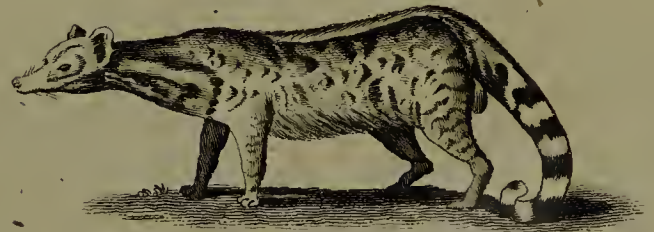
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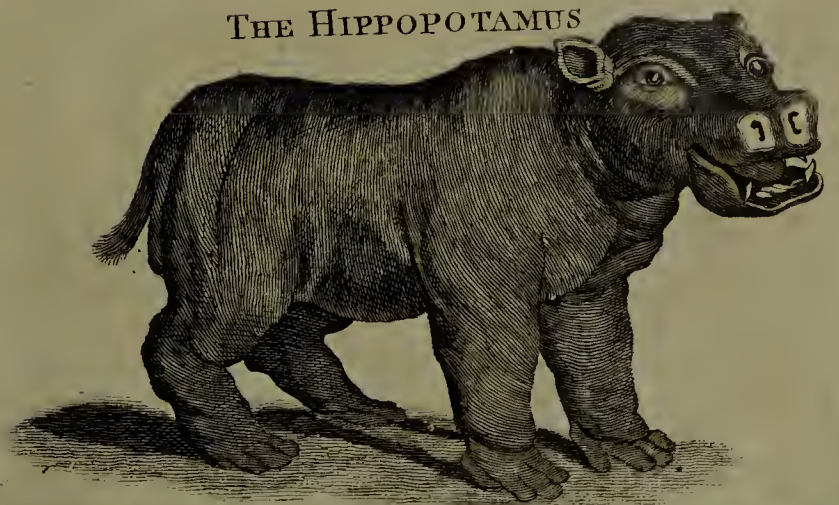
THE CIVET



THE HEDGEHOG



THE HIPPOPOTAMUS



once extremely common, it is now confined to a few provinces; and it is probable, in an age or two, the whole race will be utterly extirpated in Europe. As the growth of the Roe-Buck, and its arrival at maturity, is much speedier than that of the stag, so its life is proportionably shorter. It is seldom found to extend above twelve or fifteen years, and, if kept tame, it does not live above six or seven. The cry of the Roe-Buck is neither so loud nor so frequent as that of the stag. The young ones have a particular manner of calling to the dam, which the hunters imitate, and by this artifice allure the fawns to their destruction.

Fallow-Deer delight chiefly in hilly grounds, preferring the tender branches of trees and their buds to corn, or other vegetables; and it is universally allowed, that the flesh of those between one and two years old, is the greatest delicacy that is known: perhaps, the scarceness of it enhances its flavour. In summer they keep close under covert of the forest, seldom venturing out, except, in violent heats, to a river or fountain; at other times, and indeed, in general, they are contented to slake their thirst with the dew that falls, and seldom risque their safety to gratify their appetites. They may be subdued easily, but can never be thoroughly tamed. No arts can attach them to the feeder; and, while under his management, they still preserve a part of their natural wildness, and are subject to terrors without a cause. In attempting to escape, they strike themselves with such force against their inclosure, that they will break their limbs, and become utterly disabled: in short, whatever care is taken to tame them, they are never to be relied on entirely; for they have capricious fits of fierceness, and sometimes butt at those they dislike with a degree of force not a little dangerous.

These animals are much more common in America than in Europe. With us there are but two known varieties, the red, which is the larger sort, and the brown, with a spot behind, which is less: but, in the new continent, the breed is extremely numerous, and the varieties in equal proportion. In Louisiana, they have the same hair, and are of the same colour as the common sort, but they seem to partake of the nature of a stag and a buck. They are four feet high: their horns are large, having several branches, and bend forward: their flesh is dry, but has the taste of mutton, when well fatted. They are found among the woods, and upon the hills, for they seldom or never visit the open country. When the natives hunt these animals, they put on the dried head, with part of the neck, by which deception, and by counterfeiting their cry, they can get pretty near, and shoot them.

NATURAL HISTORY of the E L K.

IN size, this animal exceeds any one of the deer kind already described; for it grows above the height of a man, and has the bulk of a horse. The colour of the hair is greyish, not unlike that of an ass. The ears are long and broad. The hair is coarse like that of a horse; but it is finer next the skin, for which reason it lies very flat and smooth. The horns are not branched, like those of the stag, but have a short trunk at the beginning, and then immediately grow broad, with teeth on one of the edges: the muzzle is very long; and the upper lip hangs so much over the nether, that, when grazing, he is obliged to go backward. In 1742 a female was exhibited at Paris, that had been caught in the forest of red Russia. Though then young, it was six feet seven inches high. From the tip of the nose to the insertion of the tail it was ten feet; and the circumference of the body was eight feet. The hair, which was long and coarse, resembled that of the boar: the ears were eighteen inches long, and not unlike those of the mule: under the throat she had a beard like that of the goat: in the middle of the forehead, between the horns, projected a bone as large as an egg; and she made use of her fore-feet as a defence from the assaults of her enemies.

These animals delight in cold countries, and in

shady moist places. They shed their horns every year in February and March, and in August the new ones arrive to perfection. In Europe, they inhabit Lapland, Norway, and Russia; in Asia, the north-east parts of Tartary and Siberia: but they inhabit only those parts of the above countries, where cold reigns with the utmost rigour during part of the year. When the whole country is deeply covered with snow, the Elks herd together under the tall pine trees, strip off the bark, and continue in that part of the forest, while it affords them subsistence. While passing through thick woods, they carry their heads horizontally, that their horns may not be entangled in the branches. Though, in general, very inoffensive, yet at one time of the year, or if wounded, they become very furious, and attack with both horns and hoofs. They have a singular gait, their pace being a high shambling trot; but they move swiftly: they were formerly used in Sweden to draw sledges; but as they were often necessary to the escape of criminals, the use of them was prohibited under very severe penalties. It is said the flesh of the Elk has an agreeable taste. The skin of the European breed is so thick, that it has been often known to turn a musquet ball: nevertheless, it is soft, pliable, and, when tanned, is extremely durable, though light. The horns are applied to all the purposes for which harts-horn is beneficial.

In North America there is a species of the Elk, which the natives call a Moose Deer, and the French an Orignal. Of these kind of animals there are two sorts; the common light grey moose, which is not very large; and the black moose, which grows to an enormous height. Mr. Pennant thus describes a young female, which he saw at the Marquis of Rockingham's house, at Parson's Green. It was about a year old, and measured five feet, or fifteen hands to the top of the withers; the head alone was two feet long; the length of the animal, from the nose to the tail, was about seven feet: the neck was much shorter than the head: the mane was thick, short, erect, and of a light brown colour: the eyes were small; the ears were one foot long, very broad, and slouching: the nostrils were very large: the upper lip, which was square, projected considerably over the lower; and in the middle there was a furrow: the nose was broad: under the throat was a small excrescence, from whence depended a long tuft of coarse black hair: the withers were very high: the fore-legs were three feet three inches long; and from the bottom of the hoofs to the end of the tibia two feet four inches: the hind legs were much shorter than the fore ones: the hoofs were very much cloven; and the tail was very short, dusky above, and white beneath: the colour of the body in general was of a hoary black; but about the face there was a greater portion of grey than in any other place. As this animal was only a year old, and a female, we may reasonably conclude that the Elk, especially in America, will grow to an amazing size. It is indeed certain, that the American Elk, having larger forests to range in, and more luxuriant food, grows to a larger size than the European. In all places, however, it is timorous and gentle, content with its pasture, and never, when supplied itself, disturbs any other animal.

When the whole country is covered deeply with snow, the Moose Deer herd together; and at this time the Americans prepare to hunt them; particularly, when the sun begins to melt the snow by day, which is frozen again at night; for then the icy crust which covers the surface of the snow, is too weak to support so great a bulk, and only retards the animal's motion. When the Indians, therefore, perceive an herd of these animals at a distance, they immediately prepare for the pursuit, which is not, as with us, the sport of an hour, but is attended with toil, difficulty, and danger. The timorous animal no sooner perceives its enemies approach, than it immediately endeavours to escape, but sinks at every step it takes. Still, however, it pursues its way through a thousand obstacles. The snow, which is usually four feet deep, yields to its weight, and embarrasses its speed: the sharp ice-wounds its feet; and

its lofty horns are entangled in the branches of the forest, as it passes along. The trees, however, are broken down with ease; and wherever the Moose runs, his track is perceived by their branches being snapped off with his horns. The chase lasts in this manner throughout the whole day; and sometimes it has been known to continue for two, nay, three days together; for the pursuers are often not less excited by famine, than the pursued by fear. By perseverance, however, they generally succeed; and the Indian who first comes near enough, darts his lance with unerring aim, which only increases the efforts of the wounded beast to escape: he now trots heavily on, in his usual pace, till his pursuer once more repeats his blow: yet, again it summons up sufficient vigour to get a-head; but, at last, quite tired, spent with loss of blood, and overcome by fatigue, it sinks down, and becomes an easy prey to the hunters, who esteem its flesh a valuable acquisition. This is easy of digestion; and though some pretend that it occasions the falling sickness, yet, the American hunters, who constantly feed on it in the proper season, never find any such pernicious effect. The skin they dress in the manner of buff. The hoof has been extolled as a remedy for the epilepsy, but, in reality, it has no more virtue than that of any other animal.

At the Cape of Good Hope, there is an animal which the Dutch call an Elk; and it is about five feet high, with a handsome head, resembling that of a stag, but it is small, and much too short, in proportion to the rest of the body. The horns are about a foot in length, and near the head they are very rugged; but towards the extremities are straight, smooth and pointed, which plainly shew, that this creature is improperly named. The neck is easy in its shape, and the upper lip is a very little longer than the lower. The legs are long and slender, and the tail is about a foot in length, quite unlike that of the Elk. The hair on the body is soft, smooth, and of an ash colour; and the flesh has the taste of very fine beef. The weight of these pretended Elks is about five hundred pounds. They frequent the mountainous parts of the country, and where there are good pastures, with well watered streams. They very readily climb up the highest and most craggy rocks, keeping their feet pretty close together, as they pass along. They attempt often to enter the gardens of the Dutch settlements, where, if they get in, they do a great deal of mischief. Their gardens are generally surrounded with a deep ditch, over which there is a long plank laid, or a bridge built. At one of the corners of this bridge they fix the great end of a pole in the ground, which is very strong, and pliable; and to the small end they fix a long rope, by which they bring it down in such a manner, that it will return back when set at liberty. This end so bent, reaches down to the other corner of the bridge, and the fastening of the rope is so contrived, that it will slip off with a very slight touch. The remaining part of the rope is made into a running noose, which is quite open at the entrance of the bridge under the bow, formed by the pole. Now the Elk finding no entrance, except over the bridge, endeavours to pass that way, and consequently must tread upon the part which lets go the rope, by which means one leg is caught in the running noose. By struggling he breaks the pole, and almost always falls into the ditch, where he is sure to be taken.

NATURAL HISTORY of the REIN-DEER.

THIS extraordinary animal is a native of Lapland; and to be found in the frigid regions of the north. Many attempts have been made to reconcile it to warmer climates, but it soon feels the influence of the change, and, by a gradual decline, dies in a few months. The Rein-Deer resembles the American Elk in the fashion of its horns; for both have brow-antlers, very large, and hanging over their eyes, palmated towards the top, and bending forward like a bow. One thing seems peculiar to the Rein-Deer and the elk, which is, that as they move along, their hoofs are heard to crack with

a pretty loud noise: this arises from their manner of treading, for their cloven hoofs, which are moveable, spread as they run along the snow, and inclosing, when lifted up, they strike against each other.

The Rein-Deer is lower and stronger built than the stag: his legs are thicker; his hoofs broader; his hair warmer; his horns more lofty; and divide into two branches near the foot. These, when on a journey, are laid on his back; but the two branches which hang over the forehead, almost cover his face. His pace is rather a trot than a bounding, and this it can continue for a whole day. The female has horns as well as the male, by which the species is distinguished from all other animals of the deer kind whatsoever. When the Rein-Deer first shed their coat of hair they are brown; but, in proportion as summer approaches, their hair begins to grow nearly grey. They are always black about the eyes. They shed their horns at the latter end of November; and they are not completely furnished again till towards autumn. The female always retains hers till she brings forth, and then sheds them. Thus, from these circumstances, we see how greatly this animal differs from the common stag.

In Lapland the Rein-Deer are of two kinds, the wild and the tame. The former are larger and stronger; but more mischievous than the latter. Their breed, however, is preferred to that of the tame, whose female is often sent into the woods, from whence, after having continued some time with the wild male, she returns home. The tame deer are much fitter for drawing the sledge. To this service the Laplander accustoms them betimes, and yokes them to it by a strap, which goes round the neck, and comes down between their legs. The sledge is extremely light, and shod at the bottom, with a skin of a young deer, the hair turned to slide on the frozen snow. The person who sits on this guides the animal with a cord, fastened round the horns, encouraging him to proceed with his voice, and driving him with a goad. No creatures can be more active, patient, and willing: when hard pushed, they will trot nine or ten Swedish miles, or between fifty and sixty English ones, at a stretch; but this frequently proves fatal to the obedient creature. In general, they can go about thirty miles without halting, and without any great or dangerous efforts. But such journeys can be performed only in winter, when the snow is glazed over with ice: and although a speedy method of conveyance, yet it is inconvenient, and troublesome. These animals are made more tractable, and generally more serviceable, by a well known operation: those upon whom it is performed are found to be stronger in drawing the sledge, and become sooner fat when taken from labour. Usually one male is left entire for every six females: these do not begin to breed till they are two years old; and then they continue breeding regularly, every year, till they are superannuated. They go with young about eight months, and bring forth, generally, two at a time. The fondness of the dam for her young, is very remarkable. When they are separated from her, she will return from pasture, keep calling round the cottage for them, and will not desist until, dead or alive, they are brought and laid at her feet. The young follow the dam for two or three years; but their full growth is not acquired until four. They are then broke in for drawing the sledge. They never live above fifteen or sixteen years, and, when arrived at a proper age, the Laplander kills them for the sake of their skins and flesh.

Among the enemies to the Rein-Deer, the gnats deserve particular notice. These insects, bred by the heat of the sun, in the marshy bottoms, and the weedy lakes, with which the country abounds more than any other part of the world, are all, during the summer, upon the wing, and fill the air, in a dry, windy day, like clouds of dust. At this season the horns of the Rein-Deer being in a tender state, consequently possessed of extreme sensibility, a famished swarm of those insects settle upon them, and drive the poor animal almost to distraction. In this case there are but two remedies, to which the quadruped, as well as its master, are obliged to have recourse. The one is, for both to take shelter near their cottage,

cottage, where a large fire of tree mofs is prepared, which, filling the whole place with smoke, keeps off the gnat, and thus, by one inconvenience, expels a greater; the other is to ascend to the highest summit of the mountains, where the air is too thin, and the weather too cold, for the gnats to endure. Here these animals are seen to continue the whole day, although without food, rather than to venture down into the lower parts, where they can have no defence against their unceasing persecutors. But, besides the gnat, there is likewise a gad-fly, that, in the summer is no less troublesome. This insect is bred under their skins, where the egg has been deposited the preceding year; and it is no sooner produced as a fly, than it again endeavours to deposit its eggs in some place similar to that from whence it came. The moment a single fly appears, the whole herd are instantly in motion: they know their enemy, and endeavour, by tossing about their horns, and running among each other, to terrify and avoid it; but, in general, without effect: the gad-fly deposits its eggs under the skin, wounds it in several places, and thus frequently brings on an incurable disorder, which occasions its death. There are also other formidable enemies which Rein-Deer have to dread. The bears sometimes make depredations upon the herd: but of all their foes, the creature called a Glutton, is the most dangerous, and most successful. This animal, which is not larger than a badger, will wait whole weeks together for its prey, concealed in the branch of some spreading tree; and when a wild Rein-Deer passes underneath, it instantly drops down upon it, fixing its teeth and claws in a part of the neck, just behind the horns. In vain the wounded deer flies for protection to the thicket, or among the lowermost branches of the forest; the glutton still keeps its ground; and although it often loses a part of its skin and flesh, which are rubbed off against the trees, yet it still holds fast, until its prey drops with fatigue and loss of blood. The deer has one only method of escape, which is by taking to the water: this element the glutton cannot endure, and therefore quits precipitately its hold, thinking only of providing for its own safety. To these external enemies, we may add several internal maladies, to which the Rein-Deer are subject, and which may also be ranked among their cruel persecutors. It is true they are hardy and vigorous animals, yet not without some peculiar diseases. Their teats are subject to cracking, so that blood comes instead of milk. They sometimes take a loathing to their food. They are subject to ulcers in the hoof, which unqualifies them for travelling, or keeping with the herd. They are also troubled with a vertigo, like the elk, turning often round till they expire. The Laplander judges of their state by the manner of their turning: if to the right, he thinks their disorder is but slight; if to the left, he pronounces it incurable. But the most fatal disorder of all, called by the natives *suddataka*, attacks this animal at all seasons of the year. The moment it is seized with this disease, it begins to breathe with great difficulty; its eyes stare; and its nostrils are expanded: it acquires also an unusual degree of wild ferocity, and attacks all it meets indiscriminately. Still, however, it continues to feed, as if in health; but is not seen to chew the cud, and it lies down more frequently than before. In this manner it continues, every day consuming, and growing leaner, till at last it dies; and not one attacked with this disorder are ever found to recover. It has but lately made its appearance in Lapland, but, during the last fifteen or twenty years, it has spoiled whole provinces of this necessary creature. This is a contagious disease, and the moment any of his herd is infected, the master hastens to kill them immediately, in order to prevent its spreading any farther. When examined internally, there is a frothy substance found in the brain, and the spleen is reduced almost to nothing.

Some herdsmen, in Lapland, are known to possess above a thousand Rein-Deer in a single herd; and there is scarce any part of this animal that is not converted by them to particular uses. The blood is preserved in

small casks to make sauce with the marrow in spring. The horns are sold to be converted into glue. The sinews are dried, and divided, so as to make the strongest kind of sewing thread, not unlike cat-gut. The tongues, which are considered as a great delicacy, are dried, and sold in the more southern provinces. The intestines are cleansed, like our tripe, and are in high esteem. The Laplander finds all his necessities amply supplied from this single animal. When growing old; and at other times before, it is killed, and the flesh dried in the air. It is also sometimes smoked, and laid up for travelling provisions, when the natives migrate from one part of the country to another. In the course of the winter, the Rein-Deer are slaughtered as sheep with us: every four persons in a family are allowed one for their week's subsistence. In spring, the herd is spared, and they live chiefly upon fresh fish. In summer, the milk and curd of the Rein-Deer constitute principally their daily food; and, in autumn, they live wholly upon fowls, which they kill with a cross bow, or catch with springes. The milk, when new, is warmed in a cauldron, and thickened with runnet; after which the curd is pressed into cheeses, which are little, and well tasted; nor do they breed mites as in other countries. The whey which remains is warmed up again, and becomes of a consistence as if thickened with the white of eggs: it is pleasant, well tasted, but not very nourishing. As to butter, they very seldom make any, because the milk affords but a very small quantity of cream; and the butter, in taste and consistence, more nearly resembles suet. They never keep their milk till it turns sour, and do not convert it into a variety of dishes, which the more southern countries are known to do. The only delicacy they make from it is with wood and sorrel, which being boiled with it, and coagulating, the whole is put into casks, or deer-skins, and kept under ground to be eaten in winter. Thus we see there is no part of this animal without its use: even the skin is a valuable article to the natives. From that part of it which covered the head and feet, they make their strong snow shoes, with the hair on the outside. Of the other parts they compose their garments, which cover them all over, and are extremely warm. The hair of these is on the outside, and they sometimes line them within with the fur of the glutton, or that of some other warm furred animal. These skins serve them also for beds. They spread them on each side the fire, upon some leaves of the dwarf birch-tree. Many garments and caps, made of the skin of the Rein-Deer, are sold every year to the inhabitants of the more southern parts of Europe; and they are found so serviceable in keeping out the cold, that even people of the first rank are known to wear them.

Nature seems to have fitted the Rein-Deer to answer the necessities of that hardy race of mankind who live near the Pole. As these would find it impossible to subsist among their barren, snowy mountains, without its aid, so this animal can live there, when its assistance is most absolutely necessary. From the Rein-Deer alone the natives supply most of their wants, in the cold regions of Lapland and Greenland; so that all-bounteous Providence does not leave these poor outcasts entirely destitute, but gives them a faithful domestic, more patient and serviceable, than any other in nature. Lapland is divided into two districts, the mountainous, and the woody. The mountainous part of the country is at best barren and bleak, excessively cold, and uninhabitable during the winter; still, however, it is the most desirable part of this frightful region, and is most thickly peopled during the summer. The natives generally reside on the declivities of the mountains, three or four cottages together, and lead a cheerful and a social life. Upon the approach of winter they are obliged to migrate into the plains below, each bringing down his whole herd, which often amounts to more than a thousand, and leading them where the pasture is in greatest plenty. The woody part of the country is much more hideous and desolate. The whole face of nature there presents a frightful scene of trees without fruit, and plains without verdure. As far as the eye can reach, nothing is to

be seen, even in the midst of summer, but barren fields, covered only with a moss, almost as white as snow; no grass, no flowery landscapes, only here and there a pine-tree, which may have escaped the frequent conflagrations by which the natives burn down their forests. But what is very extraordinary, as the whole surface of the country is clothed in white, so, on the contrary, the forests seem to the last degree dark and gloomy. While one kind of moss makes the fields look as if they were covered with snow, another kind blackens over all their trees, and even hides their verdure. This moss, however, which deforms the country, serves for its only support, as upon it alone the Rein-Deer can subsist. The inhabitants, who, during the summer, lived among the mountains, drive down their herds in winter, and people the plains and woods below.

Such of the Laplanders as inhabit the woods and the plains all the year round, live remote from each other, and having been used to solitude, are melancholy, ignorant, and helpless. They are much poorer also than the mountaineers, for, while one of those is found to possess a thousand Rein-Deer at a time, none of these are ever known to rear the tenth part of that number. The Rein-Deer makes the riches of this people; and the cold mountainy parts of the country agree best with its constitution. It is for this reason, therefore, that the mountains of Lapland are preferred to the woods; and that many claim an exclusive right to the tops of hills, covered in almost eternal snow. As soon as the summer begins to appear, the Laplander who had fed his Rein-Deer upon the lower grounds, during the winter, then drives them up to the mountains, and leaves the woody country, and the low pasture, which at that season are truly deplorable. In the morning, as soon as the Lapland herdsman drives his deer to pasture, his greatest care is to keep them from scaling the summits of the mountains where there is no food, but where they go merely to be at ease from the gnats and gadflies that are ever annoying them. At this time, there is a strong contest between the dogs and the Deer; the one endeavouring to climb up against the side of the hill, and to gain those summits that are covered in eternal snows; the other, forcing them down, by barking and threatening, and, in a manner, compelling them into the places where their food is in the greatest plenty. There the men and dogs confine them; guarding them with the utmost precaution the whole day, and driving them home at the proper seasons for milking. Every morning and evening, during the summer, the herdsman returns to the cottage with his Deer to be milked, where the women previously have kindled up a smoky fire, which effectually drives off the gnats, and keeps the Rein-Deer quiet while milking. The female furnishes about a pint, which, though thinner than that of the cow, is, nevertheless, sweeter and more nourishing. This done, the herdsman drives them back to pasture; as he neither folds nor houses them, neither provides for their subsistence during the winter, nor improves their pasture by cultivation.

Upon the return of the winter, when the gnats and flies are no longer to be feared, the Laplander descends into the lower grounds; and, as there are but few to dispute the possession of that desolate country, he has an extensive range to feed them in. Their chief and almost their only food at that time, is the white moss already mentioned; which, from its being fed upon by this animal, obtains the name of the lichen *rangiferinus*. This is of two kinds: the woody lichen, which covers almost all the desert parts of the country like snow; the other is black, and covers the branches of the trees in very great quantities. However displeasing these may be to the spectator, the native esteems them as one of his choicest benefits, and the most indulgent gift of nature. While his fields are cloathed with moss, he envies neither the fertility nor the verdure of the more southern landscape; dressed up warmly in his deer-skin cloaths, with shoes and gloves of the same materials, he drives his herds along the desert; fearless and at ease, ignorant of any higher luxury than what their milk and smoke-dried flesh afford them. Har-

dened to the climate, he sleeps in the midst of ice; or awaking, dozes away his time with tobacco; while his faithful dogs supply his place, and keep the herd from wandering. The Deer, in the mean time, with instincts adapted to the soil, pursue their food, though covered in the deepest snow. They turn it up with their noses, like swine; and even though its surface be frozen and stiff, yet the hide is so hardened in that part, that they easily overcome the difficulty. It sometimes however happens, though but rarely, that the winter commences with rain, and a frost ensuing, covers the whole country with a glazed crust of ice. Then, indeed, both the Rein-Deer and the Laplander are undone; they have no provisions laid up in case of accident, and the only resource is to cut down the large pine-trees, that are covered with moss, which furnishes but a scanty supply; so that the greatest part of the herd is then seen to perish, without a possibility of assistance. It sometimes also happens, that even this supply is wanting; for the Laplander often burns down his woods, in order to improve and fertilize the soil which produces the moss, upon which he feeds his cattle.

In this manner the pastoral life is still continued near the pole; neither the coldness of the winter, nor the length of the nights; neither the wildness of the forest, nor the vagrant disposition of the herd, interrupt the even tenour of the Laplander's life. By night and day he is seen attending his favourite cattle, and remains unaffected, in a season which would be speedy death to those bred up in a milder climate. He gives himself no uneasiness to house his herds or to provide a winter subsistence for them; he is at the trouble neither of manuring his grounds, nor bringing in his harvests; he is not the hireling of another's luxury; all his labours are to obviate the necessities of his own situation; and these he undergoes with cheerfulness, as he is sure to enjoy the fruits of his own industry. If, therefore, we compare the Laplander with the peasant of more southern climates, we shall have little reason to pity his situation; the climate in which he lives is rather terrible to us than to him; and, as for the rest, he is blessed with liberty, plenty, and ease. The Rein-Deer alone supplies him with all the wants of life, and some of the conveniences, serving to shew how many advantages nature is capable of supplying, when necessity gives the call. Thus the poor little helpless native, who was originally, perhaps, driven by fear or famine into those inhospitable climates, would seem, at first view, to be the most wretched of mankind: but it is far otherwise; he looks round among the few wild animals that his barren country can maintain, and singles out one from among them, and that of a kind which the rest of mankind have not thought worth taking from a state of nature; this he cultivates, propagates, and multiplies, and from this alone derives every comfort that can soften the severity of his situation.

THE VIRGINIAN DEER.

The Virginian Deer is about the size of the English fallow deer, and of a light brown colour. Its tail is longer than that of the English buck. It is a distinct species, and peculiar to America. They are found in vast herds; are always in motion, and very restless; but they are not fierce. Their flesh, though dry, is of the utmost importance to the Indians, who dry it for their winter provision. Their skins are a great article of commerce, vast numbers of them being annually imported from our colonies. In the northern parts of America, they feed, during the winter, on the moss which hangs in long strings from the trees. They have slender horns, bending very much forwards, and have numerous branches on the interior sides; but they have no brow antlers.

THE SPOTTED AXIS.

This animal is about the size of a fallow deer, and of a light red colour; the body being beautifully marked with white spots: along the lower part of the sides next the belly is a line of white. The tail, which is about the length of that of a fallow deer, is red above, and white beneath. It has slender triple-forked horns; the first branch

branch near the base, and the second near the top; each pointing upwards. It inhabits the banks of the Ganges, and the islands of Ceylon and Java. They will bear our climate, and breed in the prince of Orange's menagery near the Hague. They are very tame, and have the sense of smelling to an exquisite degree. Though they are fond of bread, they will not touch a piece that has been breathed upon.

The PORCINE DEER.

The height of this animal, from the shoulders to the hoof, is about two feet two inches; the length of its body, from the tip of the nose to the tail, three feet six inches: its horns are slender, triple pronged, thirteen inches in length, and six inches distant at the base; and its head about ten inches long. The body of this animal is thick and clumsy, its tail about eight inches long, and its legs fine and slender. It is brown on the upper part of the neck, body, and sides, but of a lighter colour on the belly and rump. The late Lord Clive had one of these in his possession, which he brought from some part of India. From the thickness of its body, this animal is also called a hog-deer.

The MEXICAN DEER.

The Mexican Deer is about the size of the European roe; the colour of its hair is reddish, and, when young, spotted with white. It inhabits Mexico, Guiana, and Brasil. It is a species very distinct from the roe of the old continent; and its flesh is inferior to that of the European venison. It has strong thick rugged horns, ten inches long, and bending forward. It has a large head, a thick neck, and its eyes are large and bright.

The GREY DEER.

This is an obscure species, and naturalists are not agreed whether it is a deer, a musk, or female antelope; for the horns were wanting in the animals described by Linnæus. It is of a grey colour, and about the size of a cat; it has a line of black between the ears, and a large black spot above the eyes: it has a line of the same colour on each side of the throat, pointing downwards: the middle of the breast is black; and the fore-legs and sides of the belly, as far as the hams, are marked with black: the ears are long, and the under side of the tail is black.

The HIPPELAPHUS.

The Hippelaphus of Dr. Keys and Gesner, seems to be a sort of an Elk, with the horns of a roe-buck; and is to be met with in Norway. He is of the size of an elk, and in shape, partakes both of the horse and the stag; he has hair like a beard, hanging down from his throat. He has a well compacted body, long slender legs, with a cloven hoof, and a very short tail; but his head and ears are pretty much like those of a mule; only his upper lip hangs over the lower, almost as much as in an elk. He has a mane like a horse, but thinner, and more upright. Likewise from the shoulders to the tail there is a little mane, which grows like bristles along the back-bone.

NATURAL HISTORY of the MUSK.

THE more we search into nature, the more we shall find how little she is known; and we shall more than once have occasion to find, that protracted enquiry is more apt to teach us modesty, than to produce information. Although the number and nature of quadrupeds, at first glance seems very little known; yet, when we come to examine closer, we find some with which we are very partially acquainted, and others that are utterly unknown. There is scarce a cabinet of the curious but what has the spoils of animals, or the horns or the hoofs of quadrupeds, which do not come within former descriptions. There is scarce a person whose trade is to dress or improve furs, but knows several creatures by their skins, which no naturalist has hitherto had notice of. But of all quadrupeds, there is none

so justly the reproach of natural historians, as that which bears the musk. This perfume, so well known to the elegant, and so very useful in the hands of the physician, a medicine that has for more than a century been imported from the East in great quantities, and during all that time has been improving in its reputation, is, nevertheless, so very little understood, that it remains a doubt whether the animal that produces it be an hog, an ox, a goat, or a deer. When an animal with which we are so nearly connected, is so utterly unknown, how little must we know of many that are more remote and unserviceable! Yet naturalists proceed in the same train, enlarging their catalogues and their names, without endeavouring to find out the nature, and fix the precise history of those with which we are very partially acquainted. It is the spirit of the scholars of the present age, to be fonder of encreasing the bulk of our knowledge than its utility; of extending their conquests than of improving their empire.

The musk which comes to Europe, is brought over in small bags, about the size of a pigeon's egg, which, when cut open, appear to contain a kind of dusky reddish substance, like coagulated blood, and which, in large quantities, has a very strong smell; but when mixed and diffused, becomes a very agreeable perfume. Indeed, no substance now known in the world has a stronger or a more permanent smell. A grain of musk perfumes a whole room; and its odour continues for some days, without diminution. But in a larger quantity it continues for years together; and seems scarce wasted in its weight, although it has filled the atmosphere to a great distance with its parts. It is particularly used in medicine, in nervous and hysteric disorders; and is found, in such cases, to be the most powerful remedy now in use: however, the animal that furnishes this admirable medicine, has been very variously described, and is known but very imperfectly.

The description given of this animal by Grew, is as follows. The Musk animal is properly neither of the goat or deer kind, for it has no horns, and it is uncertain whether it ruminates or not; however, it wants the fore teeth in the upper jaw, in the same manner as in ruminating animals; but, at the same time, it has tusks like those of a hog. It is three feet six inches in length, from the head to the tail; and the head is above half a foot long. The fore part of the head is like that of a greyhound; and the ears are three inches long, and erect, like those of a rabbit; but the tail is not above two inches. It is cloven-footed, like beasts of the goat kind; the hair on the head and legs is half an inch long, on the belly an inch and an half, and on the back and buttocks three inches, and proportionably thicker than in any other animal. It is brown and white alternately, from the root to the point; on the head and thighs it is brown, but under the belly and tail white, and a little curled, especially on the back and belly. On each side of the lower jaw, under the corners of the mouth, there is a tuft of thick hair, which is short and hard, and about three quarters of an inch long. The hair, in general, of this animal, is remarkable for its softness and fine texture; but what distinguishes it particularly are the tusks, which are an inch and an half long, and turn back in the form of an hook; and more particularly the bag which contains the musk, which is three inches long, two broad, and stands out from the belly an inch and an half. It is a very fearful animal, and, therefore, it has long ears; and the sense of hearing is so quick, that it can discover an enemy at a great distance.

After so long and circumstantial a description of this animal, its nature is but very little known; nor has any anatomist as yet examined its internal structure; or been able to inform us whether it be a ruminant animal, or one of the hog kind; how the musk is formed; or whether those bags in which it comes to us be really belonging to the animal, or are only the sophistications of the venders. Indeed, when we consider the immense quantities of this substance which are consumed in Europe alone, not to mention the East, where it is in still greater repute than here, we can hardly suppose that any one animal can furnish the supply;

ply; and particularly when it must be killed before the bag can be obtained. We are told, it is true, that the musk is often deposited by the animal upon trees and stones, against which it rubs itself when the quantity becomes uneasy; but it is not in that form which we receive it, but always in what seems to be its own natural bladder. Of these, Taverner brought home near two thousand in one year; and as the animal is wild, so many must, during that space, have been hunted and taken. But as the creature is represented very shy, and as it is found but in some particular provinces of the East, the wonder is how its bag should be so cheap, and furnished in such great plenty. The bag in common does not cost above a crown by retail, and yet this is supposed the only one belonging to the animal; and for the obtaining of which, it must have been hunted and killed. The only way of solving this difficulty, is to suppose that these bags are, in a great measure, counterfeit, taken from some other animal, or from some part of the same, filled with its blood, and a very little of the perfume, but enough to impregnate the rest with a strong and permanent odour. It comes to us from different parts of the East; from China, Tonquin, Bengal, and often from Muscovy: that of Thibet is reckoned the best, and sells for fourteen shillings an ounce; that of Muscovy the worst, and sells but for three: the odour of this, though very strong at first, being quickly found to evaporate.

Musk was some years ago in the highest request as a perfume, and but little regarded as a medicine; but at present its reputation is totally changed; and having been found of great benefit in physic, it is but little regarded for the purposes of elegance. It is thus that things which become necessary cease to continue pleasing; and the consciousness of their use, destroys their power of administering delight.

NATURAL HISTORY of the CAMELO-PARDALIS.

THIS is a very uncommon animal, there having not been above one or two seen in Europe; at

least out of the Turkish dominions, for many hundred years. It is called by the natives Zurnapha, and by some authors Giraffa; but by the Greeks, Camelo-Pardalis; because as they suppose it is generated between a Camel and a Leopard, for Pardalis is the Greek name for a Leopard.

The writers on natural history have been at a loss in what class of animals to place it; however, Linnæus ranks it with that of the deer kind, but whether the horns fall off every year, or not, like those of the deer, is very uncertain. It is a very mild, gentle animal, and has a head like a stag, with blunt horns, about six inches long, covered with hair, and without branches. The neck has some resemblance of that of the camel, but is much longer, being seven feet in length; though the Germans affirm, that that which was seen in their country, had a neck fifteen feet long, adorned with a mane like a horse. The ears, tongue, and feet, are like those of a cow; but the legs are very slender, and what is very remarkable, those before are much longer than those behind; insomuch, that at a distance, you would imagine the animal reared up upon his hind legs. The body is small covered with white hair, spotted with red, which renders the skin very valuable. It has no fore teeth in the upper jaw, and the tail is long, and bushy at the end, with hair as long as hogs bristles; though that on the body is slender, soft, and fine. The fore feet are moved both together when he runs, and not one after another, as other animals do. He is only to be met with in the woods, which makes it very probable, that he feeds on the leaves and buds of trees; for he cannot reach the grass on the ground with his mouth, without straddling very enormously. Some authors have asserted, that he has a tongue two feet in length, and round like an eel; but perhaps without any good authority. Both sexes have horns, but those of the male are longest. He is eighteen feet in length, from the tail to the top of the head; and when he holds up his head it is sixteen feet from the ground. He is judged to be of the deer kind, from the hairiness of his horns.

C H A P. V.

The NATURAL HISTORY of QUADRUPEDS of the HOG Kind.

Containing a descriptive Account of the HOG; the WILD BOAR; the GUINEA; the CHINESE; the PEC-CARY, or MEXICAN; the ETHIOPIAN; the BABYROUessa; the CABIAI, or CAPIBERA; the RHINOCEROS; the HIPPOPOTAME, or SEA-HORSE; the TAPIR; the ELEPHANT, &c.

IN animals of the hog kind those distinctions seem to unite, by which others are separated. They resemble those of the horse kind in the number of their teeth, which in all amount to forty-four, in the length of their head, and in having but a single stomach. They resemble the cow kind in their cloven hoofs and the position of their intestines; and they resemble those of the claw-footed kind in their appetite for flesh, in their not chewing the cud, and in their numerous progeny. Thus this species serves to fill up that chasm which is found between the carnivorous kinds and those that live upon grass; being possessed of the ravenous appetite of the one, and the inoffensive nature of the other. We may consider them, therefore, as of a middle nature, which we can refer neither to the rapacious, nor the peaceful kinds, and yet partaking somewhat of the nature of both. Like the rapacious kinds, they are found to have short intestines; their hoofs also, though cloven to the sight, will, upon anatomical inspection, appear to be supplied with bones like beasts of prey; and the number of their teats also encrease the similitude: on the other hand, in a natural state they live upon vegetables, and seldom seek after animal food, ex-

cept when urged by necessity. They offend no other animal of the forest, at the same time that they are furnished with arms to terrify the bravest.

NATURAL HISTORY of the H O G.

THE male of a Hog is called a Boar, the female, a Sow, and their young a Pig. These are very well known, and therefore need no description; however, it may be observed, that of all animals those of the hog-kind are most brutal; the imperfections of their form seem to influence their natural dispositions; all their appetites are unclean, and their pleasures more beastly than those of other creatures. Their voraciousness probably arises from the great capacity of their stomach, which is in this animal of the largest size, and their uncleanness from the small sense they have of feeling, as mice have been known to lodge in their backs, and eat their fat without their seeming to be sensible of the injury. They may be fattened in a wonderful manner more than any other animal, and the fat is collected between the fleshy panicle, and the skin, which

which is quite otherwise in ruminating animals. The Sow has a double row of paps on her belly to the number of twelve, and she sometimes brings forth twenty pigs at a time. She goes four months with young, and is said to live from fifteen to twenty years. In choosing a Hog, the buttocks ought to be fleshy; the belly large and prominent; the sides long and deep; the snout short and turning a little upwards; and the hair rough, thick set, and strong.

The Sow commonly takes the Boar at eight months old; but there is some difference according to the diversity of the countries, air, and climate in which they are bred; for the warmer the climate the sooner; and the colder the later. One Boar is enough for ten Sows, and he may be fit for the Sow at a year old, or somewhat less; but after six years it will be best to lay him aside. The Boar Pigs are to be castrated while they are young; some say at half a year and others at two years of age. It is the common opinion, that if Sows are splayed before they are fatted, they will grow fat the sooner. The flesh of Hogs, called pork, is best in hot countries; yet the Mahometan religion have prescribed this wholesome food from the greatest part of the East Indies; but in China, and those parts of the East, that do not acknowledge the Mahometan law, their pork is finer than in any other part of the world; and it makes a principal part of the food of that extensive region. In Europe, Westphalia hams are accounted best, and in England, the bacon of Hampshire.

The caul of the Hog is folded behind the stomach; but when it is unwrapped, it is large enough to cover half of the lower belly in some subjects; and in others it will reach to the pubes. The duodenum has some small sinuosities on the right side; and it has a fold behind the kidney of the same side, from whence it passes to the left. The circumvolutions of the jejunum are in the upper region, and on the right side; but those of the illium are in the right illiac, and hypogastric region. The place where this gut joins the cœcum, is different in different subjects. The colon extends forward to the place from whence the cœcum proceeds, and forms circumvolutions that are almost oval; they are placed over the small guts, and are united by the cellular web seeming to form a floating mass. After this it passes to the right behind the stomach, then turns back afterwards more inward, and lastly joins the rectum. The small guts are of the same thickness throughout their extent; and the cœcum is thicker than the colon; for this decreases as it approaches the rectum.

The stomach takes up the fore part of the lower belly, and extends almost the whole breadth from the right to the left. The distance is but very small between the gullet, and the angle formed by the right part of the stomach when it bends upwards; and that part which is to the left of the gullet, is almost as long as that on the right. In most Hogs the liver lies almost as much to the left as to the right, but in some few it is chiefly to the right. It is composed of four lobes, three to the right, and one to the left, either wholly, or in part. The gall bladder is placed in a furrow of the middle lobe, but sometimes it is wanting, and then the gall bladder is within the lobe. The liver of the Boar Pig abovementioned, weighed two pounds and eleven ounces, and was of a livid colour within and without. The spleen of Hogs in general, is about half as broad as long, and the lower part is somewhat more narrow and slender, than the upper. That of this Boar, was of a reddish colour, and weighed three ounces and five drachms; the pancreas consisted of three branches, that united near the pylorus; the longest branch extended to the left kidney, the shortest lay along the duodenum, and the third, which was seated between the two former, was the thickest at the extremity. The kidneys of Hogs are oblong and flat, with a large pelvis; and the nervous centre of the diaphragm has two branches, which extend backwards; the right lobe of the lungs is divided into four, and the left into two; the heart is placed obliquely, and the shape is somewhat different in different subjects. The tongue,

is sprinkled with small white grains or specks; and there are two flat glands near a quarter of an inch long, and half a quarter broad. The palate is crossed with very deep furrows, and the thirteen foremost are terminated, or bordered at the top with a roundish fillet. They are all crossed by another furrow that runs lengthways through the middle of the palate.

The fat of a Hog, called the lard, is anodyne and emollient, and is in great use to make pomatum; in some places, nurses rub the gums of children with it, that they may breed their teeth more easy. Etmuller affirms, that three heads of garlick pounded, with a sufficient quantity of lard, and applied to the soles of the feet, is an excellent remedy against night coughs. It must be done before the fire; and, when in bed, the spine of the back must be rubbed therewith; he assures us, that if this be done three times, the cough will infallibly cease.

The WILD BOAR.

The Wild Boar, which is the original of all the varieties of the Hog kind, is neither so stupid nor so filthy an animal as that which we have reduced to tameness: his body is much smaller than that of the tame hog; his snout is longer; and his ears, which are black, are rounder and shorter. He does not vary in his colour like those of the domestic kind, being always of an iron-grey, inclining to black; his feet and tail are black. His tusks are larger than those of the common hog; some of them, as Mr. Buffon asserts, having been seen almost a foot long. These grow from both the upper and under-jaw, bending upwards circularly, and are exceeding sharp at the points.

The whole litter of pigs follows the sow the three first years, and the family lives in the herd together; uniting their common forces against the wolf, or other beasts of prey. But, when the Wild Boar is arrived at the state of maturity, he becomes conscious of his own strength, and walks the forest fearless and alone. He is then afraid of no single enemy, and will not turn out of his way even for man himself; he does not seem to seek nor to avoid danger. He inhabits most parts of Europe, except the British isles, and the countries north of the Baltic. He is found in Asia, from Syria to the borders of the lake Baikal; in Africa, on the coasts of Barbary. In the forests of South-America, these animals are found in vast droves. They are useful in America, by clearing the country of rattle-snakes, which they devour with safety.

This animal feeds chiefly upon roots and vegetables: being content with such provisions as it procures without danger, it seldom attacks any other animal: but, if an animal happens to die in the forest, or is so wounded that it cannot make any resistance, it becomes his prey, for he never refuses animal food, however putrid, if he can procure it without difficulty.

The hunting the Wild Boar is a favourite amusement among the nobility in those countries where they inhabit. Small mastiffs are generally used upon these occasions, for the hunters are regardless of the goodness of their nose, the Wild Boar leaving so strong a scent that it is impossible for them to mistake its course. When the Boar is driven from his covert, he proceeds slowly and regularly, at a small distance before his pursuers, without appearing to be much afraid. Once in about an half-mile, he turns round, stops till the hounds come up to him, and offers to attack them. The dogs, sensible of their danger, keep off, and bay him at a distance. After gazing upon each other for some time, the Boar proceeds slowly on his course, and the dogs renew their pursuit. The chase is thus continued till the Boar is quite weary, and refuses to proceed. The dogs then attempt to close in upon him; those which are young, and unaccustomed to the chase, are generally foremost in the attack, and are often killed. The old experienced hounds wait till the huntsmen come up, who strike at him with their spears, and soon dispatch to disable him.

The Wild Boar was formerly a native of this island, as appears from the laws of Hoel Dda, who permitted his

his grand huntsman to chase that animal from the beginning of November till the middle of December. William the Conqueror punished with the loss of their eyes, such as were convicted of killing the wild boar, the stag, or the roe-buck; and Fitz-Stephens informs us, that the vast forest, at that time on the north side of London, was the retreat of stags, fallow-deer, wild boars, and bulls.

The GUINEA HOG.

The Guinea Hog is smaller than the common kind, though shaped like ours, it is of a reddish shining colour, with long sharp-pointed ears, and a tail without hair, which hangs down to the heels. It has no bristles; but about the neck and the lower-part of the back, the hair is longer than on the other parts of the body. It is a domestic variety of the common kind, and the flesh is said to be excellent:

The CHINESE HOG.

The belly of this animal almost reaches to the ground; it has short legs, and a tail hanging down to the heels. Its body is usually bare, as all the swine of India generally are.

The PECCARY, or MEXICAN HOG.

The Peccary, in some degree, resembles a small hog of the common kind, but its body is not so bulky; its legs are smaller, its bristles thicker and stronger than those of the European kind, and more like those of a hedge-hog; instead of a tail, it has got a little fleshy protuberance, which does not cover its posteriors: from the shoulders to the breast, it has a band of white; and, upon its back, a lump resembling the navel in other animals, which discharges a liquor of a very fetid smell. It is a native of the hottest parts of South-America, and some of the Antilles, and lives in the forests, chiefly on the mountains. It is not so fat as the common hog, nor does it delight in mire or marshy places.

These animals assemble in great droves; they will fight valiantly with the beasts of prey. The most inveterate enemy is the jaguar, or American leopard, and the body of that animal is frequently found with several of these hogs, slain in combat. It is seldom that dogs will venture to attack the peccary; and, if wounded, it will turn on the hunter. It feeds on fruits, vegetables, roots, toads, and serpents; and is very dexterous in skinning the latter, holding them with his fore-feet. Its flesh is said to be good for food, but, as soon as it is killed, the dorsal gland must be cut out immediately, or the flesh will become so infected as not to be eatable. If this operation be deferred for only half an hour, the flesh becomes utterly unfit to be eaten.

The peccary may be tamed like the hog, has nearly the same habits and inclinations, and feeds upon the same aliments. They are remarkably fierce when their young are attempted to be taken from them; they surround the plunderer, attack him, and frequently make his life pay the forfeit of his rashness. The peccary, like the hog, is very prolific; and the female is followed by the young ones till they come to perfection. Though, when taken young, they are very easily tamed, they never shew any remarkable signs of docility, but continue without attachment; not seeming to know the hand that feeds it.

The ÆTHIOPIAN HOG.

The body of this animal is longer, and the legs shorter than in the common swine. It has small tusks in the lower-jaw, and very large ones in the upper; those of old boars bending up towards the forehead in the form of a semi-circle; it has no fore-teeth, a large broad head, with a nose broad, depressed, and almost as hard as horn. Its mouth is small; the colour of its skin is dusky, and its bristles disposed in little bunches of about five each; which are longest on the beginning of the back, and between the ears. Its ears are sharp-pointed and large, the inside being lined with long

whitish hairs. Its tail is small and flat, does not extend below the thighs, and is covered with hairs disposed into tufts or bunches. They inhabit the hottest parts of Africa, from Senegal to Congo; they are also found in the island of Madagascar. They are very swift and fierce, and will not breed either with the domestic or Chinese sow. One of these animals, at the prince of Orange's menagery near the Hague, was turned out to a Chinese sow, which it killed; and afterwards to a common sow, which he treated very roughly.

The BABYROUËSSA, or INDIAN HOG.

This animal has some weak bristles along the back, but the rest of the body is covered with fine short wool, resembling that of a lamb: the tail ends in a tuft, and is often twisted. The body is square and plump, and the head is oblong and narrow, with a snout proper for rooting in the earth. The ears are small, erect, and sharp-pointed; and the eyes are very small. It has four cutting-teeth in the upper, and six in the lower-jaw; with six grinders to each jaw: it has also two tusks in the lower-jaw, pointing towards the eyes, and standing almost eight inches out of their sockets. From two sockets on the outside of the upper-jaw, proceed two other teeth, twelve inches long, and bending like horns, their ends almost touching the forehead. It inhabits Buero, a small island near Amboyna: it is found also in Celebes, but neither on the continent of Asia or Africa. In the Indian islands, these animals are sometimes kept tame. In their wild state they live in herds, and feed on vegetables: they never, like other swine, ravage gardens. When these animals are pursued and driven to extremities, they will rush into the sea, or any other water, and swim from island to island. They are also expert in diving. The tusks, as may be perceived by their form, are useless in combat; but they delight in resting their heads, by hooking their upper-tusks on some bough. The feet are like those of the European hogs, and their legs long and slender.

The CABIAI, or CAPIBERA.

The Cabiai, in the shape of its body, and the colour and coarseness of its hair, resembles an hog of about two years old. It has a short thick neck, a rounded bristly back, delights in the water and marshy places, produces many young at a time, and, like the hog, feeds upon both animal and vegetable food. The head, however, is longer than that of the hog, the eyes larger, and the snout is split, like that of a rabbit or hare, and furnished with strong thick whiskers. The mouth of the Cabiai is smaller, its teeth are different, and it is without tusks. It has no tail, and, instead of a cloven hoof, like all others of this kind, it is, in a great degree, web-footed, and calculated for swimming, and living in the water. It seems, indeed, to delight in that element, and some naturalists have therefore called it the water-hog. It inhabits South-America, and, like the otter, is chiefly seen frequenting the borders of lakes and rivers. It preys upon fish, which it seizes with its hoofs and teeth, and carries them to the margin of the lake or stream, to devour at its ease. It also feeds upon corn, fruits, and sugar-canes. The cry of this animal rather resembles the braying of an ass, than the grunting of an hog. It seldom appears, except at night, and then not without company. It never ventures far from the water, that element being its only place of safety; for its feet are so long, and its legs so short, that it is a very slow and awkward runner. When pursued by the hunter, it plunges into a lake or river, and continues so long at the bottom, that he can have no hopes of taking it there.

This animal is naturally of a gentle disposition, and, when taken young, is easily tamed. It is then obedient to command, and appears attached to its keeper. Its flesh, which is fat and tender, has a fishy taste; but its head is said to be delicate food. In this respect, it resembles the beaver, whose fore-parts taste of flesh, and the hinder have a strong flavour of the fish it feeds on.

NATURAL HISTORY of the RHINOCEROS:

THIS animal inhabits Beugal, Siam, Cochinchina, Quangsi in China, the islands of Java, and Sumatra, Congo, Angola, Æthiopia, and the country as low as the Cape. Next to the elephant, the Rhinoceros is the most powerful of animals. Bontius informs us, that in respect to bulk of body, it equals the elephant, but is lower on account of the shortness of its legs. It is generally about twelve feet long, from the tip of the nose to the insertion of the tail; and from six to seven feet high.

This animal is so remarkably formed, that a perfect idea of its shape cannot be conveyed in words, we have therefore been particularly careful in giving an accurate delineation of it on copper. Its head is furnished with a single horn, placed near the end of the nose, which is generally from three feet to three feet and an half long. The upper-lip is long, hanging over the lower, and ending in a point. It is very pliable, and serves to collect its food, and deliver it into the mouth: the nostrils are placed transversely: the ears are large, erect, and pointed; the eyes small, and without lustre: the skin is almost naked, rough, and knotty, and lying upon the neck and body in vast folds. The skin, which is of a dirty brown colour, is so hard and thick as to resist a musket-ball: the belly hangs low; the legs are short, strong, and thick; and the hoofs divided into three parts, each pointing forward. It delights in shady forests, and the neighbourhood of rivers and marshy places: like the hog, it loves to wallow in the mire, and is said, by that means, to give shelter in the folds of its skin, to scorpions, centipes, and other insects. It is a solitary, quiet, and inoffensive animal, but swift and furious when it is enraged. It never provokes to combat, but it equally disdains to fly. It brings forth but one at a time; about which it is extremely solicitous.

The scent of this animal is said to be most exquisite; and it is affirmed that it consorts with the tiger: this, however, is fabulous; and founded on their common attachment to the sides of rivers; because they both frequent watery places in the scorching climates where they are bred. It is also reported to have a tongue so extremely rough, as to take off the flesh from the human body by licking it, but Ladvocat affirms, "it is smooth, soft, and small, like that of a dog."

This animal appears chiefly formidable from the horn growing from its snout. It is composed of the most solid substance, and pointed so as to inflict the most fatal wounds. With every blow, the Rhinoceros employs all its force, and the tiger will more willingly attack any other enemy of the forest than this formidable creature. It is defended on every side by a thick horny hide, which cannot be pierced by the claws of the lion or the tiger, and it is armed before with a weapon that even the elephant does not choose to oppose. It is said the elephant is often found dead in the forests, pierced with the horn of a Rhinoceros; and Emanuel, king of Portugal, by way of experiment, actually opposed them to each other, and the Rhinoceros was victorious.

In 1739, a Rhinoceros was shewn in London, which came from Bengal. It was of a gentle disposition, and suffered itself to be handled by all visitors, never attempting to do any mischief, except when hungry or when abused; in such cases, its fury could only be appeased by giving it something to eat. When it was angry, it would jump with violence against the walls of its room, but seldom attempted to attack its keeper, and was obedient to his threats.

The Rhinoceros brings forth at about three years old, and will live till it is about twenty. Its flesh is eaten, and Kolben says, it is very good. Cups are made of its horn, and many medicinal virtues are ascribed to it, when taken in powder; but seemingly without foundation. There are some varieties in this animal found in Africa with a double horn.

The Rhinoceros is the unicorn of Holy Writ, and of

the ancients; the oxyx, and the Indian ass of Aristotle, who says it has but one horn: his informers might well compare the clumsy shape of the Rhinoceros to that of an ass, so that he might easily be induced to pronounce it a whole footed animal. The unicorn of Holy Writ has all the properties of the Rhinoceros.

This animal was known to the Romans in very early times: its figure is among the animals of the Prænestine pavement; and Augustus introduced one into his shews on his triumph over Cleopatra.

NATURAL HISTORY of the HIPPOPOTAME,
or SEA-HORSE.

THE Hippopotame is as large and formidable as the rhinoceros, and, in bulk, is second only to the elephant. The length of the male has been found to be seventeen feet, from the extremity of the snout to the insertion of the tail; the circumference of its body fifteen feet, and its height almost seven; the legs near three feet, and the head almost four. Hasselquist says, its hide is a load for a camel. Its jaws extend about two feet, and it has four cutting-teeth in each jaw, which are above a foot long. The head is of an enormous size; the ears small and pointed, and lined within with a short fine hair: on the lips are some strong hairs scattered in bunches. The hair on the body is very thin, of a lightish colour, and, at first sight, hardly discernible. Those writers who say this animal has a mane on its neck, are mistaken; but the hairs on that part are rather thicker than on the other parts of the body: the skin is very thick and strong, and, though not able to resist a musket-ball, is impenetrable to the stroke of a sabre. The tail is flat and pointed, and about a foot long: the hoofs are divided into four parts, and, in some measure, resemble those of the elephant; but they are unconnected with membranes, notwithstanding the Hippopotame is an amphibious animal.

This creature, whose figure is something between that of an ox and a hog, resides chiefly at the bottom of the great rivers and lakes of Africa, from the Niger to the Cape of Good Hope. It is found in none of the African rivers which run into the Mediterranean, except the Nile; and even there only in the Upper Egypt; and in the lakes and fens of Æthiopia, which that river passes through. It leads an indolent kind of life, and seems seldom disposed for action, except when prompted by the calls of hunger. In the water they pursue their prey with great swiftness and perseverance, and continue at the bottom for thirty or forty minutes without rising to take breath. They traverse the bottom of the stream with as much ease as if they were walking upon land, and make a terrible devastation where they discover plenty of prey. But when the fishy food is not supplied in sufficient abundance, this creature is forced to come upon land, where it moves awkwardly and slowly; and, if it cannot be supplied with food on the margin of the river, it is forced up into the higher grounds, where it commits dreadful havock on the sugar-canes, and plantations of rice and millet: it also feeds on the roots of trees, which it loosens with its great teeth.

When the natives see their possessions thus destroyed by this animal, they beat drums, light fires, and raise a terrible outcry to frighten it back to its favourite element. As it is extremely timorous upon land, they usually succeed in their endeavours. But if the creature should be wounded, or too much irritated, it then becomes formidable to all that oppose it. When it is pursued it takes the water, plunges in and sinks to the bottom, but it frequently rises to the surface, and remains with its head out of water, making a bellowing noise that may be heard at a vast distance. If wounded, it will rise and attack boats or canoes with great fury, and often sink them by biting large pieces out of the sides. People are thus frequently drowned by them; for they are as bold in the water as they are timid on land. This animal, however, possesses a very inoffensive disposition, and never attacks the mariners in their boats,

except they inadvertently strike against it, or otherwise disturb its repose; but they are then in imminent danger of going to the bottom. Dampier informs us, that one of these animals was seen to place itself under a boat, and, rising under it, over-set it, with six men which were in it.

The crocodile and shark have been said to engage with the hippopotame, but an eye witness has declared that he saw them swimming together without any disagreement; and, it is well known, that the shark is only found at sea, and the Hippopotame never ventures beyond the mouth of fresh-water rivers.

Though the negroes will venture to attack the shark or the crocodile in their natural element, and frequently destroy them; they are so sensible of the force of the Hippopotame, that they seldom attempt to engage it.

A herd of females has but a single male: the female always comes upon land to bring forth, and seldom produces above one at a time. These animals are at that time extremely timorous, and as soon as the parent hears the slightest noise, it dashes into the stream, and the young one follows it immediately.

This animal is capable of being tamed. Belon says he has seen one so gentle, as to be let loose out of a stable, and fed by its keeper, without attempting any mischief. The usual method of taking them is by pitfalls. In some parts, the natives place boards full of sharp irons, in the corn-grounds, which these creatures strike into their feet, and so become an easy prey. Sometimes indeed (though that method is very seldom attempted) they are struck in the water with harpoons fastened to cords: and ten or twelve canoes are employed in the chase.

The young ones are said to be excellent food: and the negroes, who are not extremely nice in their diet, find an equal delicacy in the old. Dr. Pocock informs us, that he has seen their flesh exposed to sale on the shambles; and it is said, that the breast in particular is excellent, and as delicate as veal. The teeth of this animal are harder than ivory, and not so liable to turn yellow: they are much used by the dentists to be made into false teeth. The skin, which, when dried, is of impenetrable hardness, is used to make bucklers.

This animal is the behemoth of Job: it was known to the Romans; and Augustus produced one at his triumph over Cleopatra.

The Hippopotame was worshipped at Papremis, a city of Egypt, lest that monstrous animal should envy so many other savage beasts, which divers nations of Egypt had deified.

NATURAL HISTORY of the TAPIIR.

THIS animal bears some distant resemblance in its form to a hog. It has a long snout, capable of being contracted or extended at pleasure. Its ears are erect, its eyes small, and its legs and tail short. The Tapiir grows to the size of an heifer half a year old. When young its hair is short, and spotted with white; when old, of a dusky colour. This creature is found among the woods and rivers on the eastern side of South America, from the isthmus of Darien to the river of Amazons. In the day time it sleeps in the forests adjacent to the banks, and goes out at night in search of food, which is chiefly grass, sugar-canes, and fruits: it swims well, and, when disturbed, takes to the water, where, like the hippopotame, it walks on the bottom as on dry ground. The Indians shoot it with poisoned arrows, and eat its flesh, which is said to be very good. Its skin, which is very thick, the natives make shields of, which cannot be pierced by an arrow. This animal is salacious, slow-footed and sluggish: but will make a vigorous resistance, when attacked.

There is another creature of this kind, called the thick-nosed Tapiir, which has a large head and nose, large eyes, and small rounded ears. Its toes, which are long, are connected near their bottoms by a small web; and their ends guarded by a small hoof. It has no tail,

but has long hard whiskers on the nose. This animal may in some measure be termed amphibious, as it not only feeds on fruits and vegetables, but also on fish, which it is dexterous in catching, and brings on shore to eat: it sits up, holding its prey with its fore-feet, and feeds like an ape. Like the preceding, it inhabits the Eastern side of South America, and makes a noise like the braying of an ass. The flesh of this animal is tender, but has a fishy taste.

NATURAL HISTORY of the ELEPHANT.

THE Elephant is the largest of land animals, and is not less remarkable for its docility and understanding than for its size. All historians concur that next to man, the Elephant is the most sagacious animal; and yet, from its appearance only, we should be led to conceive very meanly of its abilities. It has a long trunk, formed of multitudes of rings, pliant in all directions, and terminated with a single moveable hook, which answers the purpose of a hand to convey any thing into the mouth. The forehead of this animal is very high and rising, the ears long, broad, and pendulous, the eyes extremely small, the body round and full, the back rising in an arch, and the whole animal short in proportion to its height. The legs are thick, clumsy, and shapeless; the hide of a dusky colour, with a few scattered hairs, and full of scratches and scars, which it acquires in its passage through the thick woods and thorny places; the tail like that of a hog; the feet undivided, but the margins terminated by five round hoofs. In the upper-jaw are two vast tusks of six or seven feet long.

This animal, we are told, is seen from seven to fifteen feet high: we have, however, certain accounts of their attaining to the height of twelve feet. The female is less than the male, and the udder is between the fore-legs.

The Elephant is the strongest, as well as the largest of all quadrupeds; and yet in a state of nature, it is neither fierce nor formidable: it is intelligent, tractable, and obedient to its master's will; sensible of benefits, and capable of resenting injuries. In its native deserts, the Elephant is seldom seen alone, but appears to be a social friendly animal. It inhabits India, and some of its greater islands, Cochin-China, and some of the provinces of China. Elephants are found in great plenty in the southern parts of Africa, from the river Senegal to the Cape; and from thence as high as Æthiopia on the other side: they swim well, and delight in marshy places, and to wallow in the mire like a hog. They feed on the leaves and branches of trees; and, if they get into an inclosure, they destroy all the labours of the husbandman in a very short time.

Nothing can be more formidable than a drove of Elephants: wherever they march, the forest seems to fall before them, and, in their passage, they bear down the branches upon which they feed. There is no repelling their invasions, since it would require a small army to attack the whole drove when united; and an attempt to molest them, at that time, would certainly be fatal. They advance towards the offender, strike him with their tusks, seize him with their trunks, toss him in the air, and afterwards trample him to pieces under their feet. They are, however, very mild and harmless, except they are offended, or during the rutting-time, when they are seized with a kind of temporary madness.

In their natural state, they are chiefly found along the sides of rivers; they are also fond of refreshing themselves in the most shady forests and watery places. They cannot live at a distance from the water, and they always disturb it before they drink. After filling their trunk with it, they often divert themselves by spurring it out like a fountain. When an elephant happens to light upon a spot of good pasture, he invites others, by a call, to share in the entertainment; but it requires a copious pasture to supply the necessities of a herd of them: their heavy feet sink deep wherever they go, and

much

much more is destroyed than is devoured. On this account they are obliged frequently to change their quarters. The Indians, and Negroes, who suffer by such visitants, endeavour to keep them away by making loud noises, and keeping large fires round their cultivated grounds; but, notwithstanding these precautions, the Elephants frequently break through their fences, destroy their whole harvest, and overturn their little habitations.

The eyes of the Elephant, as already observed, are very small, but they exhibit a variety of expression, and discover the various sensations with which the animal is moved. The Elephant is not less remarkable for the excellence of its hearing: it appears delighted with music, learns to beat time, to move in measure, and even to accompany the sound of the trumpet, or other instruments, with its voice. Its sense of smelling is also exquisite; but, in the sense of touching, it exceeds all others of the brute creation, and perhaps even man himself. The organ of this sense lies wholly in the trunk; this instrument is both an organ of touching, and of suction: it not only provides for the animal's necessities and comforts, but also serves for its ornament and defence.

In Africa, this animal still retains its natural liberty: the savage inhabitants of that part of the world, are happy in being able to protect themselves from its fury, without attempting to subdue it to their necessities. But when once tamed, the Elephant becomes the most courteous and obedient of all animals. It presently conceives an attachment for the person who attends him, caresses him, and even endeavours to anticipate his wishes. It quickly comprehends the signs made to it, and even the different sounds of the voice: all its actions seem to partake of its magnitude; being grave, majestic, and serious. It is readily taught to kneel down to receive its rider; and, those whom he knows, he caresses with his trunk; and, with the same instrument salutes those which it is ordered to distinguish. It suffers itself to be harnessed, and appears to be delighted with the finery of its trappings. It draws either chariots, cannon, shipping, or small towers with numbers of people in them, with surprizing strength and perseverance; and, notwithstanding its bulk, it is extremely swift.

The Elephant often sleeps standing; but that they are incapable of lying down, is a vulgar error. They are said to go one year with young, and to bring forth one at a time; they are thirty years before they arrive at their full growth, and will live about one hundred and twenty, or one hundred and thirty years. They are much more numerous in Africa than in Asia: in some parts there are such swarms, that the Negroes are obliged to make their habitations under ground for fear of them. The usual method of taking them is in pitfalls, covered with branches of trees: sometimes they are hunted, and killed with lances; a slight wound in the head be-

hind the ear, destroys them in a moment. Their flesh is eaten by the natives, and the trunk is said to be a delicious morsel. Their teeth are frequently picked up in the woods of Africa; but it is uncertain whether they are shed, or from dead animals. The African teeth, which come from Mosambique, are ten feet long; and those of Malabar only three or four: the largest in Asia are those of Cochin-China, which even exceed the Elephants of Mosambique. The skin is very thick, and, when dressed, proof against a musket-ball. The bones are used in medicine.

This animal has a very quick sense of glory. An Elephant was directed to force a large vessel into the water, and, the task proving superior to his strength, the master, in a sarcastic tone, ordered the keeper to take away that lazy beast and bring another. The poor animal was so affected at the reflection, that it instantly repeated its efforts, fractured its skull, and died on the spot.

At the Cape of Good Hope, where it is customary to kill these animals in the chase for the sake of their teeth, three brothers, who were Dutchmen, made a large fortune by that business, and determined to retire to Europe to enjoy the fruits of their labours; but, before their return, they resolved to have a last chase by way of amusement. After finding their game, and beginning the attack in the usual manner, one of their horses threw its rider: the enraged animal instantly seized the unhappy man with its trunk, tossed him up into the air, and received him on one of its tusks; then, turning towards the other two, seemingly with an aspect of revenge, held to them the impaled wretch writhing on the bloody tooth.

From very early times the Indians have employed the Elephant in their wars. Porus opposed the passage of Alexander over the Hydaspes, with eighty five of these animals. Mr. Buffon very readily supposes, that it was some of the Elephants taken by that monarch, and afterwards transported into Greece, which were employed by Pyrrhus against the Romans. Ivory has been used in ornamental works from the time of Solomon; it was one of the imports of his navy at Tharshish, whose lading was gold and silver, ivory, apes, and peacocks. *Kings* I. 10.

The American Elephant is an animal only known in a fossil state. The fossil bones are found in Peru, and the Brazils; but the living animal has evaded our search: it is probable that it yet exists in some of those remote parts of the vast new continent, unvisited yet by Europeans. The Elephant, it is said, is taken for the symbol of eternity, on account of its length of life. On a medal of the emperor Philip, eternity is represented by an Elephant, on which is mounted a little boy holding arrows. In the kingdom of Bengal, in the Indies, the white Elephant is in possession of the honours of the divinity.

C H A P. VI.

The NATURAL HISTORY of ANIMALS of the MONKEY Kind.

Containing a descriptive Account of the OURANG OUTANG, or WILD MAN of the Woods; the APE, the BABOON, the MONKEY, the MAUCOCO, and their numerous Varieties; the GERBUA; the OPOS-SUM, and its Kinds, &c.

ANIMALS of the ape or monkey class have hands instead of paws; their ears, eye-lids, lips, and breasts, resemble those of the human race; and their internal conformation bears some distant likeness. This reflection is sufficient to mortify the pride of those, who make their persons alone the principal object of their admiration. Those animals have fingers and

nails on their hands like those of a man, but more rough and unpolished. Their feet are like larger hands, and are divided into fingers or toes, of which that in the middle is the longest.

They are lively, agile, and full of frolic, chatter, and grimace: from the structure of their body, they have many actions in common with the human kind. They are,

are, in general, fierce and untameable; but some are of a milder nature, and will shew some degree of attachment, but they are naturally mischievous. They are filthy, obscene, lascivious, and thieving. They inhabit woods, and live in trees; they feed on fruits, leaves, and insects. They will leap from tree to tree with great activity, even when loaded with their young, which cling to them. They go in general in vast companies; but the different species never mix with each other, always keeping apart in different quarters. They are the prey of leopards, and others of the cat race: they are also the prey of serpents, which pursue them to the summit of the trees, and swallow them entire. Though they are not carnivorous, they will (purely for the sake of mischief) rob the nests of birds of the eggs and young. In the countries where apes most abound, the sagacity of the feathered tribe is marvellously shewn, in their contrivance to fix the nest beyond the reach of these invaders.

These animals, however, are so very different from each other, that a general description cannot serve; we shall therefore give an history of the foremost in each, and mark the distinctions in every species; carefully observing the manners and the oddities in this phantastic tribe in general points of view.

Apes were held in veneration at Egypt, as were all other animals. Diodorus says, that the worship of apes passed from Egypt into the island of Pityusa, called The Island of Apes, on account of the honours there paid to them.

NATURAL HISTORY of the OURANG OUTANG, OR WILD MAN OF THE WOODS.

THIS name is given to various animals, agreeing in one common character of walking upright, but of different proportions, and coming from different countries. The Ourang Outang, which, of all other animals, most nearly approaches to the human race, is found from three to seven feet high. Its face is flat, and has a deformed resemblance of the human face; its ears are exactly like those of a man. The hair on the head is longer than that of the body, and is reddish and shaggy. The face, paws, and soles of the feet, are swarthy and without hair. In the palms of the hands those lines appear which are usually taken notice of in palmistry. In a word, the whole animal is so nearly a picture of the human species, that we are naturally led to expect a corresponding mind. But this, says Mr. Buffon, is an evident proof that no disposition of matter will give mind; and that the body, how nicely so ever formed, is formed in vain, when there is not infused a soul to direct its operations.

The Ourang Outang described by Dr. Tyson, was brought from Angola, in Africa. The body was covered with black hair, greatly resembling human hair; and, in those places where it is longest on the human species, it was also longest in this. The face resembled the human face, but the forehead was larger, and the head round. The jaws were not so prominent as in monkeys, but flat like those of a man. The ears were also like those of a man; and the teeth had more resemblance to the human, than those of any other creature. And, in short, the whole animal, at first view, presented a human figure. This animal was a gentle, fond, and harmless creature. In its passage to England, those who knew it on board the ship were highly entertained with it, for it would embrace them with the utmost tenderness, opening their bosoms, and clasping its hands about them; and, though there were monkeys aboard, it would never associate with them, and seemed to consider itself as a creature of higher extraction. After it had been a little used to wear cloaths, it grew fond of them, and would endeavour to put them on himself; taking such parts of his dress, as he could not properly manage, to some of the company to assist him in dressing. It would get into bed, place its head on the pillow, and cover itself with the cloaths, like any human creature.

These animals, when taken young, are capable of being tamed, and are taught to carry water, pound rice, and turn a spit. There was one shewn in London in 1738, which was extremely mild, affectionate, and good-natured, and remarkably fond of the people it was used to: it would eat and lay down in bed like a human creature; fetch a chair to sit on; drink tea, which, if he found too hot, he would put into a saucer to cool: it would cry like a child, and be very unhappy at the absence of its keeper. This was a young one, and only two feet four inches high.

The Ourang Outang inhabits the interior parts of Africa, the island of Sumatra, Borneo, and Java. They are solitary, and prefer the most desert places, and live entirely on fruit and nuts. The large ones have prodigious strength, and will over-power the strongest man. Only the young can be taken alive, for the old ones are shot with arrows: they will attack, and even kill, the negroes who wander in the woods; they will drive away the elephants, and beat them with their fists, and pieces of wood; and will throw stones at people that offend them. They sleep in trees, in which they shelter themselves from the inclemency of the weather. They appear grave and melancholy, and are not inclined to frolic even when they are young. They have great agility and swiftness, and sometimes carry away the young negroes. These animals certainly vary in colour; the hair is black on some, and red on others.

We are informed by Le Compte, in his history of China, that, when one of these animals dies, the rest cover the body with leaves and branches of trees. There are instances also of their shewing mercy to the human kind. A negroe boy was taken by one of these and carried into the woods, where he continued with him a whole year without receiving any injury. It is also said that these animals often attempt to surprize the female negroes as they go into the woods, and force them to continue with them for the pleasure of their company, feeding them very plentifully all the time. Le Brosse assures us that he knew a woman of Loango, who had lived three years among them.

The PIGMY APE.

This animal has a flattish face, and ears like those of a man. The body is about the size of a cat; the colour of the hair an olive brown, and yellowish beneath. It feeds on fruits and insects, and is particularly fond of ants. These animals assemble in troops, and turn over every stone in search of them. It inhabits Africa, and is not uncommon in our exhibition of animals. It is very tractable, and of a gentle disposition.

The LONG-ARMED APE.

The Long-armed Ape, called by Mr. Buffon, the gibbon, is a very extraordinary and remarkable creature. It has a flat swarthy face, surrounded with grey hair; and the hair on the body is black and rough. It walks erect, and is without a tail: its eyes are large, and sunk in its head; and it is of different sizes from two to four feet high. The nails on the hands are flat, and those on the toes long. It differs from all others of the monkey tribe by the extraordinary length of its arms, which are long enough to reach the ground when the animal stands erect. It is an inhabitant of the East-Indies, particularly along the coasts of Coromandel; and is a mild and gentle animal.

The MAGOT, OR BARBARY APE.

This animal, like the former, is without a tail, though there is a small protuberance on that part. It has a large callous red rump. The face is prominent, and not so much like that of man as of quadrupeds. The body is covered with a dirty greenish brown hair, and the belly with a dull pale yellow. It has flat nails, ears like human ears, and bare buttocks. It is about three feet and an half high, and is a native of most parts of Africa, and the East. It is a very fierce and mischievous animal; is a very common kind in exhibitions; and, by the force of severe discipline, is made to perform some tricks. In the open fields in India, they assemble

assemble in great troops, and frequently attack women who are going to market, and take their provisions from them.

The TUFTED APE.

The head of this animal is about fourteen inches in length; the face blue, and naked, and the nose of a deep red; the eye-brows are black, and the ears like human ears. It has a long upright tuft of hair on the top of the head, and another under the chin; and two long tusks in the upper-jaw. Its fore-feet resemble human hands, and the nails on the fingers are flat. The fore-part of the body, and the inside of the legs and arms are naked. The outside is covered with mottled brown and olive coloured hair; that on the back is dusky; the buttocks are red and bare; and the length of the animal from the nose to the rump is about three feet three inches. It has a most disgusting appearance, and is very fierce and salacious. It usually goes on all-fours, but will sometimes sit on its rump, and support itself with a stick. It will hold a cup in its hand in this attitude, and drink out of it. This animal feeds principally on fruits.

The SIMIA PORCARIA.

Aristotle mentions a species of Ape under the title of *simia porcaria*; but it must be a species we have not any knowledge of at this time. In the British Museum there is a drawing of one with a nose exactly resembling that of a hog; which may perhaps be the animal which Aristotle meant; but there is no account attending the painting, to enable us to trace its history.

NATURAL HISTORY of the BABOON.

THE Baboon, properly so called, is about three feet and an half high, with a thick body and limbs, and long canine teeth. It has large callosities behind, which are quite naked and red. Its tail, which is about seven inches long, is thick and crooked. Its face is long and thick, and it has a pouch on each side of its cheeks, where it deposits the remainder of its provisions, after it is satiated with eating. The hair with which it is covered, is of a reddish brown. It sometime walks erect, but generally upon all-fours; and, instead of broad round nails like the ape, its hands and feet are armed with long sharp claws. This animal, thus made for strength, and furnished with dangerous weapons, is a formidable enemy. We are informed by the chevalier Forbin, that in Siam large troops of Baboons frequently fall forth from their forests, and attack a village when they know the men are engaged in their rice-harvest; where they make lascivious attacks upon the women, who are obliged to stand on their defence with clubs and other arms, and it is with difficulty that they oblige their ugly suitors to retreat.

Though equally mischievous, they are less formidable at the Cape of Good Hope. Whatever they undertake they perform with surprising skill and regularity. When they rob an orchard or a vineyard, they go in large companies, and previously concert a regular plan for the conducting of their business. On these occasions some of them enter the inclosure, while others are set to watch. The rest form a line without the fence, reaching from their fellows within to their rendezvous without, which is generally in some craggy mountain. Every thing being thus disposed, the plunderers within the orchard, throw the fruit to those that are without, as fast as they can gather it; and it is pitched from one to another all along the line, until it is safely deposited at their head quarters. They are extremely dextrous in catching, and while the business is performed, a profound silence is observed among them. Their sentinel continues upon the watch the whole time; and, if he perceives any person coming, instantly sets up a loud cry, at which the whole company scamper off: but even under these circumstances, they are unwilling to leave the place empty-handed, but carry off some of their plunder in their mouths, some in their hands, and some under their arms.

If they are closely pursued, they first drop that which is under their arms, then that from their hand, and afterwards that from their mouths.

These animals have not been known to breed in our climate. The female in general produces but one at a time, which she carries in her arms, and in a peculiar manner clinging to her breast. Baboons are not carnivorous, but feed principally upon fruits, roots, and corn, and usually keep together in large companies. Their internal parts are more unlike those of man than of quadrupeds, particularly the liver, which resembles that of a dog, divided into six lobes.

The MANDRIL.

The Mandril mentioned by Smith, in his voyage to Guinea, is an ugly disgusting animal, and probably only a variety of that mentioned in the preceding article. He says it grows to a vast size, being from four to five feet high, and has a short tail. The body is as thick as that of a man; the teeth large and yellow; the head extremely large, and the face broad, flat, wrinkled, and covered with a white skin; but what makes it truly loathsome, is that something is always issuing from the nose. It is a native of the Gold Coast, and more frequently walks erect, than upon all-fours; when displeased, it is said to weep like a child. Some years ago one of them was shewn in England, which seemed tame but stupid; and had a method of opening its mouth, and blowing at those who came near it.

The WANDEROW.

The Wanderow is a smaller Baboon than the former, and has a tail from seven to eight inches long; the muzzle is prominent, as in the rest of this kind; but it is remarkable for having a large long white head of hair, and a monstrous white beard, coarse, rough, and descending: the rest of the body is brown or black. In its savage state it is very fierce; but, with proper management, is more tractable than most of its kind.

The LITTLE BABOON.

This animal has a roundish head, a projecting mouth, and ears roundish and naked. The thumb is close to the fingers; the nails of the fingers narrow and compressed, and those of the thumbs rounded: it has a brown face, with a few scattered hairs; the colour of the hair on the body is yellowish, tipped with black: the tail is about an inch long, and the buttocks are covered with hair. Linnæus says it is about the size of a squirrel; but Mr. Balk, in the *Amen. Acad.* says it is as large as a cat. It is a lively species, and inhabits India.

The PIG-TAIL BABOON.

This animal, which is called the Maimon, by Buffon, and the Pig-Tail, by Mr. Edwards, is the last of the Baboons. Its length, from head to tail, is about twenty-two inches. Its principal distinction, besides its prominent muzzle like a Baboon, is in the tail, which is about five inches long, and curled up like that of a hog; from which circumstance Mr. Edwards gave it the name. It is a native of Sumatra and Japan, and cannot well endure the rigours of our climate; though Mr. Edwards kept one of them near a year in London. This creature is very docile, is taught several tricks in Japan, and is carried about the country by mountebanks. One of these people informed Kämpfer, that the Baboon in his possession was an hundred and two years old.

NATURAL HISTORY of the MONKEY.

MONKEYS are small in stature, and have long tails, by which they are distinguished from the apes and baboons, that entirely want the tail, or are large, and have but a short one. The varieties in the form and colour of dogs or squirrels, is not so great as among the Monkeys of the smaller kind. Bosman and Smith enumerate above fifty sorts on the Gold Coast alone; and Condamine says it would fill a volume to describe the different sorts which are found along the river

river Amazons; and which are different from those on the African coast. There is scarce a country in the tropical climates that does not swarm with them; and almost every forest is inhabited by a race of Monkeys distinct from all others; but their differences are very trifling. It is, however, remarkable, that the Monkeys of two cantons never mix with each other: each forest produces only its own; and those guard their limits from the intrusion of all strangers of a different race from themselves.

The Monkey being less than the baboon, is endued with less powers of doing mischief: the ferocity of their nature appears to diminish with their size; they are more easily tamed, and sooner taught to imitate man than the former. They are not so grave and sullen as the ape, and are more gentle than the baboon; they begin early to exert all their sportive mimickries, and are obedient to correction.

The Monkeys may be considered as the masters of every forest where they reside. Neither the lion nor the tiger will venture to dispute the dominion with them, since they carry on an offensive war from the tops of trees, and by their agility escape all possibility of pursuit. These animals, says Le Comte, have a peculiar instinct in discovering their foes, and, when attacked, are very adroit in defending and assisting each other. When they behold a traveller in the woods, they consider him as an invader upon their dominions, and join to repel the intrusion. After surveying him with a kind of insolent curiosity, they jump from branch to branch, and tree to tree, pursuing him as he goes along, and make a loud chattering to summon the rest of the companions together. After grinning and threatening, they begin their hostilities by throwing down the withered branches at him, which they break from the trees. Thus they follow him wherever he goes, jumping from tree to tree with amazing swiftness. It is said, from good authority, that, when any one of them is wounded, the rest assemble round him, putting their fingers into the wound, as if they intended to sound its depth: if the blood flows plentifully, some of them keep the wound closed, while others procure leaves, which they chew, and thrust into it. In these unequal engagements, they seldom make a retreat until many of them are killed; and, when they retreat, the young one clings to the back of the dam, with which she jumps away, without seeming to be embarrassed by the burthen.

The usual method of taking these animals alive, is to shoot the female as she carries her young; and the sportsman always takes aim at the head; which, if he hits, the Monkey falls immediately to the ground, and the young one consequently comes down at the same time, clinging to its dead parent. The negroes on the coast of Guinea are happy to see their numbers destroyed upon a double account; for they dread their devastations, and are fond of their flesh. The Monkey, when skinned, and served up at a Negroe feast, so strongly resembles a child, that an European shudders at the sight.

The manner of plundering among the Monkeys, is much like that of the baboons in a garden, as already mentioned. They generally keep together in companies, march in exact order, and obey the voice of some particular chieftain, distinguishable for his size and gravity. One species of these, which by Mr. Buffon is called the ouarine, have very loud and distinct voices, and are remarkable for the use to which they convert them. Morgrave informs us that he has frequently been a witness of their assemblies and deliberations: every morning and evening they assemble in the woods, to receive instructions; one among the number takes the highest place on a tree, and waves his hand as a signal for the rest to sit around and be attentive. He then, with a loud voice, begins his discourse, and, while he is speaking, the rest observe the most profound silence. When he has finished his harangue, he again waves his hand, as a signal for the rest to reply, and instantly they raise their voices together; until, by another signal of the hand, they are enjoined silence. This is immediately obeyed, and the chieftain replies to

what the others have said; after which the whole assembly breaks up.

They feed upon fruits, the buds of trees, or succulent roots and plants; and are fond of the juice of the palm-tree and the sugar-cane. The fertile regions in which these animals are bred, seldom fail to supply them with these; but, when there is a deficiency, they feed on insects and worms; and if near the coasts, they sometimes descend to the sea-shore, where they eat lobsters, crabs, and other shell-fish. Their manner of managing oysters, though extraordinary, is well attested; they pick up a stone, and place it between the opening shells, which prevents them from closing, and they eat the fish at their ease. They are equally subtle in taking crabs: they put their tail to the hole where that animal takes refuge, and the crab fastening upon it, they withdraw with a jerk, and thus pull their prey upon shore. Being dextrous in laying traps for others, they are very cautious of being entrapped themselves; and, it is said, no kind of snare will take the Monkeys of the West India islands; as they are extremely distrustful of human artifice, to which they have been accustomed.

The Monkey seldom brings forth more than one at a time, though sometimes it produces two. They seldom breed after they are brought into Europe, but those that have bred here exhibit a very striking picture of parental affection. The male and female are never weary of fondling their young, and frequently hand it from one to the other.

In a state of domestic tameness these animals are very entertaining. Father Carli, in his History of Angola, informs us, that when he went into that horrid country to convert the savage natives to Christianity, where he met with nothing but distress, disease, and disappointment, he found more faithful services from the Monkeys than the men; these he had taught to attend him, to guard him when he was sleeping against the thieves and rats, to comb his head, and to fetch his water; and he asserts that they were more tractable than the human inhabitants of the place. It is a just observation, that in those countries where the men are most barbarous and stupid, the brutes are most active and sagacious. The savages of the torrid tracts suppose Monkeys to be men, capable of speech and conversation; but obstinately dumb, for fear of being compelled to labour.

The Monkeys of the new continent are distinguishable from those of the old by three marks. Those of the old have a naked callous substance behind, upon which they sit; which those of America are entirely without; those of the old have nostrils more resembling those of men, with the holes opening downward; but those of America have them opening on each side: those of the antient continent are furnished with pouches on each side of the jaw, where they deposit their provisions; which the American Monkeys have not. It is also remarkable, that many of the American forts are known to hang by the tail, which those of the old continent are never known to do. We shall first enumerate those of the old continent.

The Dog-Faced MONKEY.

This animal has a long thick nose, covered with a smooth red skin; the nails on the fore-feet are flat, and those on the hind-feet like a dog's. These creatures inhabit the hottest parts of Africa and Asia; they keep together in large troops. When passengers are going by, they run up the trees, and shake the boughs at them with great fury; chattering very loud at the same time. They are excessively impudent and indecent; and are, both in their manners and appearance, very detestable animals.

The Lion-Tailed MONKEY.

The face of this Monkey is long, and resembling that of a dog; it is also naked and of a dusky colour. This creature has a full white beard, and large canine teeth. Its body is covered with black hair, except on the belly, where it is of a light colour. Its nails are flat, and the tail

tail is terminated with a tuft of hair, like that of the lion. It is a native of the East-Indies, and the hotter parts of Africa.

The Hare-Lipped MONKEY.

The nostrils of this Monkey are divided like those of a hare. Its nose is thick, flat, and wrinkled. The head is large, the eyes small, the teeth very white, and the body thick and clumsy. Its colour is sometimes brown, sometimes yellowish, and sometimes olive. The tail, which is somewhat shorter than the body, is always carried arched. It is an inhabitant of Guinea and Angola, and is full of frolic and ridiculous grimaces. A few years ago, one that was apparently of this species, was shewn in London, and was about the size of a greyhound.

The Spotted MONKEY.

This animal has a long white beard; the upper-parts of the body are of a reddish colour, marked with white specks. The belly and the chin are whitish. It has a very long tail, and is a species of a middle size. It is a native of Guinea and Congo.

The Green MONKEY.

The Callitrix, or Green Monkey of St. Jago, is distinguished by its beautiful green colour on the back, its white breast and belly, and its black face. It has a long and slender tail, and is of the size of a small cat. It inhabits different parts of Africa. On account of their green colour, they are scarce discernable among the leaves, except they break the branches of trees by their gambols; in which they are very active, and very silent. They make no noise even when they are shot at; but assemble together, knit their brows, and gnash their teeth, as if they intended to attack their foes. They are very numerous in the Cape-Verd islands.

The MANGABEY.

The Mangabey, or white eye-lid monkey, may be distinguished from all others by its eye-lids, which are naked, and of a striking whiteness. It has a long black naked and dog-like face. The colour of the body is tawny and black. It has flat nails on the thumbs and fore-fingers, and blunt claws on the others. Its hands and feet are black; and it is a native of Madagascar.

The TALAPOIN.

The Talapoin may be distinguished as well by its beautiful variety of green, white, and yellow hair, as by that under the eyes being longer than any of the rest. It has a sharp nose, a round head, and large black naked ears; the length of the body of this animal is about a foot, and it has a slender tail, about seventeen inches long. It is a native of India.

The Negroe MONKEY.

This animal has a round head, and a sharpish nose; the face is of a tawny flesh-colour, with a few black hairs on it; the breast and belly are of a swarthy flesh-colour, and almost naked; the hair on the body, limbs, and tail, is long and black. It is about the size of a large cat, and its paws are covered with a black soft skin. It is lively, entertaining, and good-natured, and is a native of Guinea.

The Chinese MONKEY.

This Monkey has a long smooth nose, of a whitish colour; the hair on the crown of the head is long and flat, and parted like that of a man; the colour is a pale brown. It is a native of Ceylon, where troops of them assemble together to rob orchards and corn-fields. If they are drove from one end of the orchard or field, they have the impudence to enter immediately at the other, and carry off with them as much as their mouths and arms will contain.

The NUNA, or Varied MONKEY.

This animal is distinguished by its colour, which is variegated with black and red; and its tail is of an ash-

colour, with two white spots on each side, at its insertion. The length of the animal is about eighteen inches, and the tail two feet. It is a native of Barbary, Æthiopia, and other parts of Africa.

The Douc, or the Large MONKEY of Cochin-China.

This animal is called the Douc in Cochin-China, of which country it is a native. It seems to unite all the characters of the monkey kind. It is as large as the baboon; it has a tail like the monkey, and a flat face like the ape. It also resembles the American monkeys in having no callus on its posteriors. It is a very large species, about four feet long, from the nose to the tail; but the tail is not so long. It is a native of Madagascar, as well as Cochin-China; and often walks on its hind feet.

The Tawny MONKEY.

The face of this animal is a little protuberant, and that and the ears are flesh-coloured. It has a flattish nose, and long canine teeth in the lower-jaw. The hair on the upper-part of the body is pale and tawny, but ash-coloured at the roots; the hinder-part of the back is orange-coloured, and the belly white. It is about the size of a cat, and its tail is shorter than its body. It is a native of India, and is very ill-natured.

The Winking MONKEY.

This animal has a short face covered with hair, and a white nose. The hair on the body is black, marked with some circles of a lighter colour. Its tail is straight, and pretty long; its thumbs are very short, and its buttocks are covered. It is a native of Guinea, is very sportive, and perpetually winking.

The Goat MONKEY.

The beard of this animal is long, resembling that of a goat; it has a naked face of a deep blue, and ribbed obliquely. Its body and limbs are of a deep brown, and its tail is long. There is a drawing of this animal in the British Museum.

Having described the monkeys of the old world, we shall now proceed to those of the continent of America, which have neither pouches in their jaws, nor naked posteriors.

The WARINE.

The Warine, or the Brasilian Guariba, is as large as a fox, with long black hair, and a long tail, always twisted at the end. It has black shining eyes, short round ears, and a round beard under the chin and throat. It inhabits the woods of Brasil and Guiana, and is the largest of the monkey kind to be found in America. It is remarkable for the loudness of its voice, and for making a most dreadful howling. It is common for one of these creatures to mount on an high branch, and the rest to seat themselves on the branches beneath. That which is elevated above the rest sets up a loud and sharp howl, that may be heard at a great distance. After he has harangued the company for some time, he gives a signal with his hand, and the whole assembly joins immediately in the chorus. When a second signal is given, they become silent, and the orator finishes his speech. Their clamour, upon these occasions, is more disagreeable and tremendous than can be imagined. These monkeys are very fierce, mischievous, and untameable.

The COAITI, or Four-Fingered MONKEY.

This Monkey may be distinguished from the rest, by having no thumb, and consequently but four fingers on each of the two fore-paws. But the tail supplies the defects of the hand; and with this the animal slings itself from tree to tree with surprising rapidity. It has five toes on the feet, flat nails, a slender body, and a long tail. This animal is about eighteen inches long. It inhabits the neighbourhood of Carthagena, Brasil, and Peru. These monkeys are very active, and quite enliven the forests of America. In order to pass from top to top of lofty trees, whose branches are too distant for

for a leap, they will form a chain, by hanging down linked to each other by their tails; and swinging in that manner till the lowest catches hold of a bough of the next tree, and draws up the rest; and Ulloa tells us they sometimes pass rivers in the same manner. They are sometimes brought into Europe, but they are too tender to live long in our climate.

The SAJOU.

The Sajou is distinguished by its yellowish flesh-coloured face. Its hands and feet are covered with a black skin, and its tail, which is longer than its head and body, it frequently carries over its shoulders. It is a native of Guiana, and is a very lively species; but, in a state of captivity, it is very capricious in its affections, having a very great fondness for some persons, and as great an aversion to others.

The SAI, or WEEPER.

This animal is called the Weeper, from its peculiar manner of lamenting, when it is either threatened or beaten. It is very much deformed, has a round flattish face, and is of a reddish brown colour. The hair on the head, and the upper part of the body, is black, tinged with brown; beneath, and on the limbs, tinged with red. The tail, which is black, is much longer than the head and body: the hair is very long, and thinly dispersed. Mr. Buffon mentions a variety with a white throat. It is a native of Surinam and Brazil, is of a melancholy disposition, and appears as if it was always weeping; but is very fond of imitating any thing that it sees done. These animals keep in large companies, and make a great chattering, especially in stormy weather.

The SAMIRI, or Orange MONKEY.

This is also one of the sapajou kind, or Monkeys that hold by the tail; and is the smallest and most beautiful of any of them. The hair of the body is short and fine, and of a yellow and brown colour; but, in its native country, of a brilliant gold colour. The feet are of a fine orange colour; the nails of the hands are flat; those of the feet like claws. The tail is very long, and the body of the size of a squirrel. It is a very tender, delicate animal, and held in high estimation. It is a native of Brazil and Guiana, and is seldom brought here alive.

The Horned MONKEY.

This animal is distinguished by two tufts of hair resembling horns on the top of the head. It has bright eyes, is of a dusky colour, and has ears resembling human ears. The body is about fourteen inches long, and the tail fifteen. It is an inhabitant of America, and is one of the sapajou kind.

The Antigua MONKEY.

This Monkey has a black face, and a short nose; the back and sides are orange colour and black; the belly white: the length of the body is eighteen inches; that of the tail is twenty inches. This animal was brought from Antigua, and was lately in the possession of Robert Morris, Esq; of the Navy-Office. It is good-natured, sprightly, and frolicksome.

The Fox-Tailed MONKEY.

Mr. Buffon calls this animal the faki, and he distinguishes it from those of the sapajou kind, or those Monkeys that hold by the tail, by the name of fagoins, which have feeble tails. It is remarkable for the length of the hair on its tail, and is therefore called the Fox-Tailed Monkey. The length of this animal, from the nose to the tail, is about eighteen inches; and the tail is longer. Its hands and feet are black, and it has claws instead of nails. It inhabits Guiana.

The Great-Eared MONKEY.

This is principally remarkable for its ears, which are very large, erect, naked, and almost square. The hair on the body and upper part of the limbs is sleek. The hands and feet are covered with light orange-coloured

hair, which is very fine and smooth. Its nails are long and crooked. The tail, which is twice the length of the body, is black, and the teeth are very white. It is a native of the hotter parts of South-America.

The WISTIRI.

This animal is remarkable for having two very long full tufts of white hair standing out on each side upon its face, under the ears; and for its tail, which is full of hair, and annulated with ash-colour and black. The body is about seven inches long, and the tail eleven: the hands and feet are covered with short hair, and the fingers are like those of a squirrel. It has sharp claws. It is a native of Brazil, and feeds on vegetables and fish.

The MARIKINA.

The Marikina, or filky Monkey, is remarkable for having a mane round the neck, and a bunch of hair at the end of the tail, like a lion: the mane is generally of a bright bay-colour, though sometimes it is yellow. The hair on the body is long, fine, filky, glossy, and of a pale bright yellow. The face is flat, and of a dull purple colour. The ears are round and naked; the hands and feet are also naked, and of a dull purple colour. It has claws instead of nails to each finger: the length of the head and body is ten inches; the tail about thirteen inches. It is a native of Guiana.

The Little Lion MONKEY.

This is the pinche of Mr. Buffon, and has a face of a beautiful black, with white hair descending on each side of the face, like that of a man. The back and shoulders are covered with long and loose brown hair. The rump and half the tail are of a deep orange colour, inclining to red; and, on that account, it is called the red-tailed Monkey, by Mr. Pennant. The remaining part of the tail is black. The throat is black, and the breast, belly, and legs white. Its claws are sharp and crooked; its body eight inches long, and its tail sixteen. It has great agility and vivacity, and has a soft whistling note. It is a native of Guiana, Brazil, and the banks of the river of Amazons.

The MICO.

This is a most elegant and beautiful animal. The head is small and round, and the face and ears of the most lively vermilion colour. Mr. Condamine, to whom one of these animals was made a present of by the governor of Para, says, "the hair on its body was of a beautiful silver colour, brighter than that of the most venerable human hair; while the tail was of a deep brown, inclining to blackness." This description he tells you he made of it while it was alive; he also says that he kept it a year before it died, and afterwards preserved it in spirits of wine, to shew that he did not exaggerate in his description. Its body was eight inches long, and its tail twelve; and it was an inhabitant of the banks of the Amazons.

NATURAL HISTORY of the MAUCAUCO.

THIS is a beautiful animal, about the size of a common cat; but the body and limbs are slenderer, and of a longer make. It has a tail double the length of its body, covered with fur, and alternately marked with broad rings of black and white. But what is principally remarked, is the largeness of its eyes, which are surrounded with a broad black space. The end of its nose is black, the face white, and the ears erect. The head is covered with dark ash-coloured hair; the back and sides with a red ash-colour; and all the hair is soft, glossy, and delicate, smooth to the touch, and erect like the pile of velvet. When it sleeps, it brings its nose to its belly, and its tail over its head. Its hinder-legs are much longer than those before. It is a native of Madagascar and the neighbouring islands. It is a gentle animal, and though it resembles the Monkey in many respects, it has neither its malice nor its mischief. Like

the monkey, however, it seems to be perpetually in motion; and moves, like all four-handed animals, in an oblique direction. These animals are very cleanly, their cry is weak, and, when young, they are very easily tamed. In a wild state they go in troops of about thirty or forty.

The MONGOOZ.

The Mongooz, or Woolly Maucauco, is also a native of Madagascar. It is smaller than the former, and has a soft glossy thick fur, a little curled or waved; of a deep brownish ash-colour. The eyes are black, with orange-coloured circles round the pupil; and the tail, which is of one uniform colour, is very long. The breast and belly are white, and the hands and feet dusky and naked. All the nails are flat, except that on the inner-toe of the hind-feet. These animals are about the size of a cat, and are of various colours; sometimes they have white or yellow paws, and a face wholly brown or black. They sleep on trees, live on fruits, are very sportive, good-natured, and delicate. Their actions somewhat resemble those of a monkey.

The VARI, or Black MAUCAUCO.

This animal is larger than either of the former, and its hair is much longer. It may easily be distinguished from the rest, by the hair round the neck standing out like a ruff. It also differs in its disposition, which is fierce and savage, and it makes so loud a noise in the woods, that it is easy to mistake the noise of two for that of an hundred. The colour of the whole animal is generally black; though sometimes they are white, spotted with black; but the feet are black. This creature is also an inhabitant of Madagascar; and, though naturally fierce, is very gentle and inoffensive, when tamed.

The LORI.

The Lori, or Tail-less Maucauco is remarkable for the singularity of its figure. In proportion to its size, it is the longest of all other animals; having nine vertebræ in the loins, and other quadrupeds have only seven. It has no tail, which makes the body appear still longer. It resembles those of the maki-kind in its hands, feet, and snout, and in the glossy qualities of its hair. It is a tame, harmless, little animal, and is about the size of a squirrel. It is a native of Ceylon and Bengal, where it lives in the woods, and feeds on fruits. It is fond of eggs, and will greedily devour small birds.

The Yellow MAUCAUCO.

This animal has a short dusky nose, small eyes, and short ears, which are broad, and placed at a great distance from each other. The head is flat and broad; and the legs and thighs short, and very thick. It has five toes to each foot, which are separated, and standing all forward. The hair is short, soft, and glossy; and the colour on the head, back, and sides, is yellow mixed with black. The cheeks, the inside of the legs, and the belly are yellow. The tail is of a bright tawny, mixed with black. The length of the body is about nineteen inches, and the tail seventeen. This animal is sportive and inoffensive. One of this kind was shewn in London, in 1768, which, if we may rely on the veracity of its keeper, came from the mountains of Jamaica.

The Flying MAUCAUCO.

It has a long head, a small mouth and teeth, and small round ears. From the neck to the hands, and from the hands to the hinder-feet, extends a broad skin, like that of a flying squirrel: the same skin is also continued from the hinder-feet to the extremity of the tail, which is included in it. The body and the outside of this skin is covered with soft hair, hoary, or black and ash-colour. The legs are cloathed with soft yellow down. It has five toes on each foot, and the claws are slender, sharp, and crooked, which enables it to adhere strongly to whatever it fastens on. This animal is about three feet long, and its tail, which is very slender,

is about a span long. It is a native of the Molucca isles, and Philippines, and feeds on the fruits of trees. It is a species very distinct from the bat, and flying squirrel.

The GERBUA.

To this class of animals we may also refer the Gerbua, which is a very extraordinary animal; it is sometimes called the Egyptian rat, or Pharaoh's rat. Its head is oblong; the crown of it convex, and the sides seem as if it were swelled out. It has an oval body; its snout is short, large and obtuse; the opening of its mouth is small; its upper jaw is large, and composes the whole snout; the under jaw is very small, and hid in the upper one. It has two teeth before in each jaw, convex and sharp; its nostrils are at the end of the snout, broad, round, and near each other, being nearer the upper than the lower part of the snout. On these nostrils is a little round substance, somewhat raised, terminating at the bottom in two excrescences as strait as a line. Its whiskers are copious and in three rows; the first is at the lower edge of the snout; the hair is here very thick, soft, short, and white; the second row is near the nostrils, near the upper part of the snout; these are harsh, long, black, and few in number; the third row is betwixt the other two, towards the back part of the head, and consist of about ten hairs, which are very harsh, and very long, one of them exceeding the animal's whole body in length; they are black and white. Its two eyes are on the side of the head, and situated rather backward, and when compared to the body are large, prominent, and black. The ears are situated near the back part of the head; they are erect, of an oval form, broad at the top, naked, transparent, and the arteries in them are very distinctly seen. The fore feet which are called the hands, are near the neck, very short, round, naked, never touch the ground, and are so hid in the animal's fur, as to be scarcely visible: the toes are separated, small, and almost of equal length. The hind legs, which, comprehending the thighs, are three times as long as those before, and twice as long as the animal's whole body, are set close, and are naked. The thighs have no hair on them. The soles of the feet are long and thick; the toes are separate, close, and of equal length. The tail, which is of square form, and uniform size, is at least three times as long as the body, and is covered with very short harsh hair; at the end is a tuft of long soft hair, for about three inches in length. The body and head are covered with long soft thick hair. The upper part of the head and body of the animal, is of a pale brown to the middle of the sides; the other part, and the belly, are white. It has white hair in form of little circles, near the tail, which is of a pale brown colour, somewhat brighter than the body. Its ears and feet are of a flesh colour. This animal uses only his hind feet in walking; it frequently leaps in its motions. It rests on its hams, at which time its fore feet are not visible. With these forefeet it feeds itself like a squirrel, and the fingers or toes being crooked, it takes in water in them to drink. It sleeps all day, and is awake all night. It eats wheat, and a plant called Sefanus. It is not afraid of men, yet is not easily tamed, and must therefore be kept in a cage. It is a native of Egypt, and the mountains that separate Arabia from Egypt. Its Arabian name is Garbua, and it is about the size of a rat.

NATURAL HISTORY of the OPPOSSUM, and its KINDS.

TO the four-handed animals of the ancient continent, we may add the four-handed animals of the new, that use their hands like the former, as well as their tails, and that fill up the chasm between the monkey tribe and the lower orders of the forest. As the maki kind in some measure seem to unite the fox and the monkey in their figure and size, so these seem to unite the monkey and the rat. They are all less than the former; they have long tails, almost bare of hair;

and their fur, as well as their shape, seems to place them near the rat kind. Some have accordingly ranked them in that class; but their being four-handed, is a sufficient reason for placing them in the rear of the monkeys.

The first and the most remarkable of this tribe is the Opposum, an animal found both in North and South America, of the size of a small cat. The head resembles that of a fox; it has fifty teeth in all; but two great ones in the midst, like those of a rat. The eyes are little, round, clear, lively, and placed upright; the ears are long, broad, and transparent, like those of the rat kind; its tail also increases the similitude, being round, long, a little hairy in the beginning, but quite naked towards the end. The fore legs are short, being about three inches long; while those behind are about four. The feet are like hands, each having five toes or fingers, with white crooked nails, and rather longer behind than before. But it is particular in this animal, that the thumb on the hinder legs wants a nail; whereas the fingers are furnished with clawed nails as usual.

But that which distinguishes this animal from all others, and what has excited the wonder of mankind for more than two centuries, is the extraordinary conformation of its belly, as it is found to have a false womb, into which the young, when brought forth in the usual manner, creep and continue for some days longer, to lodge and suckle securely. This bag, if we may so call it, being one of the most extraordinary things in natural history, requires a more minute description. Under the belly of the female is a kind of slit or opening, of about three inches long; this opening is composed of a skin, which makes a bag internally, which is covered on the inside with hair, and in this bag, are the teats of the female; and into it the young, when brought forth, retire, either to suckle or to escape from danger. This bag has a power of opening and shutting, at the will of the animal; and this is performed by means of several muscles, and two bones, that are fitted for this purpose, and that are peculiar to this animal only. These two bones are placed before the os pubis, to which they are joined at the base; they are about two inches long, and grow smaller and smaller to their extremities. These support the muscles that serve to open the bag, and give them a fixture. To these muscles there are antagonists, that serve, in the same manner, to shut the bag; and this they perform so exactly, that in the living animal the opening can scarce be discerned, except when the sides are forcibly drawn asunder. The inside of this bag is furnished with glands, that exude a musky substance, which communicates to the flesh of the animal, and renders it unfit to be eaten. It is not to be supposed that this is the place where the young are conceived, as some have been led to imagine; for the Opposum has another womb, like that of the generality of animals, in which generation is performed in the ordinary manner. The bag we have been describing, may rather be considered as a supplemental womb. In the real womb, the little animal is partly brought to perfection; in the ordinary one, it receives a kind of additional incubation; and acquires, at last, strength enough to follow the dam wherever she goes. We have many reasons to suppose that the young of this animal are all brought forth prematurely, or before they have acquired that degree of perfection, which is common in other quadrupeds. The little ones, when first produced, are in a manner but half completed; and some travellers assert, that they are, at that time, not much larger than flies. We are assured also, that immediately on quitting the real womb, they creep into the false one; where they continue fixed to the teat, until they have strength sufficient to venture once more into the open air, and share the fatigues of the parent. Ulloa assures us, that he has found five of these little creatures hidden in the belly of the dam three days after she was dead, still alive, and all clinging to the teat with great avidity. It is probable, therefore, that upon their first entering the false womb, they seldom stir out from thence; but when more advanced, they venture forth several times in the day;

and, at last, seldom make use of their retreat, except in cases of necessity or danger. Travellers are not agreed in their accounts of the time which these animals take to continue in the false womb; some assure us, they remain there for several weeks; and others, more precisely mention a month. During this period of strange gestation, there is no difficulty in opening the bag in which they are concealed; they may be reckoned, examined, and handled, without much inconvenience; for they keep fixed to the teat, and cling there as firm as if they made a part of the body of the animal that bears them. When they are grown stronger, they drop from the teat into the bag in which they are contained; and, at last, find their way out, in search of more copious subsistence. Still, however, the false belly serves them for a retreat; either when they want to sleep or suckle, or when they are pursued by an enemy. The dam, on such occasions, opens her bag to receive them, which they enter.

The Opposum, when on the ground, is a slow helpless animal; the formation of its hands, are alone sufficient to shew its incapacity of running with any degree of swiftness: but, to counterbalance this inconvenience, it climbs trees with great ease and expedition. It chiefly subsists upon birds; and hides among the leaves of the trees, to seize them by surprize. It often also hangs by the tail, which is long and muscular; and, in this situation, for hours together, with the head downwards, it keeps watching for its prey. If any lesser animal, which it is able to overcome, passes underneath, it drops upon it with deadly aim, and quickly devours it. By means of its tail, the Opposum also swings from one tree to another, hunts insects, escapes its pursuers, and provides for its safety. It seems to be a creature that lives upon vegetables, as well as animal substances, roots, sugar-canes, the bark, and even the leaves of trees. It is easily tamed, but it is a disagreeable domestic, as well from its stupidity and figure, as its scent, which, however fragrant in small quantities, fails not to be ungrateful when copiously supplied.

An animal greatly resembling the former, is the Marmose, which is found in the same continent. It seems only to differ in size, being less; and, instead of a bag to receive its young, has only two longitudinal folds near the thighs, within which, the young, which are prematurely brought forth, as in the last instance, continue to suckle. The young of these, when first produced, are not above the size of a bean; but continue sucking to the teat, until they have arrived at greater maturity.

The Cayopolin is somewhat larger than the former; and a good deal resembling it in habits and figure, except that its snout is more pointed, its tail longer in proportion, and its colour different, being of an ash, somewhat inclining to yellow; however, I should suppose it to be only a variety of the former.

To this number we may add the Phalanger, so called by Mr. Buffon; a good deal resembling the former, but distinguished by the fashion of its hinder hands: the thumb and the fore finger being joined together, except at the extremities. This animal is about the size of a rat; and has, accordingly, by some, been called the Rat of Surinam.

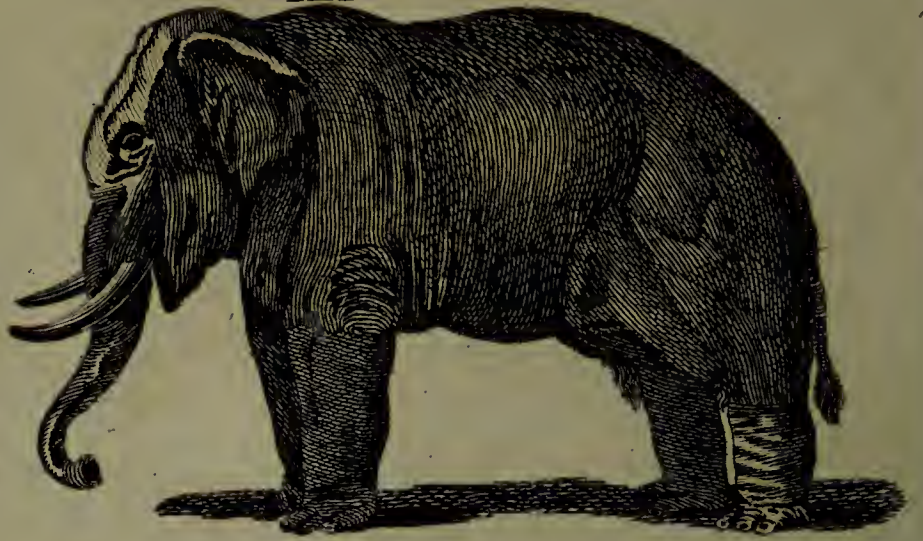
The last animal of this class is called, by Mr. Buffon, the Tarfier. This extraordinary little animal resembles the former, in having four hands, and a long tail; but it differs very much in the extreme length of its hinder legs, which are longer than the rest of its whole body. The bones of that part of the foot called the tarsus, are likewise so very long, that from thence the animal has received its name: the tail is naked in the middle, and hairy only at both extremities; its hair is woolly, soft, and a deep ash colour. As to the rest, it is unknown from what country this animal was brought; but the naturalist from whom we have its description, supposes it to be a native of America.

From this general description of four-handed animals, we perceive what few advantages the brute creation derive from those organs that, in man, are employed to so many great and useful purposes. The being able to pluck their food from the trees, the capacity

THE DROMEDARY



THE ELEPHANT



THE BROWN BEAR



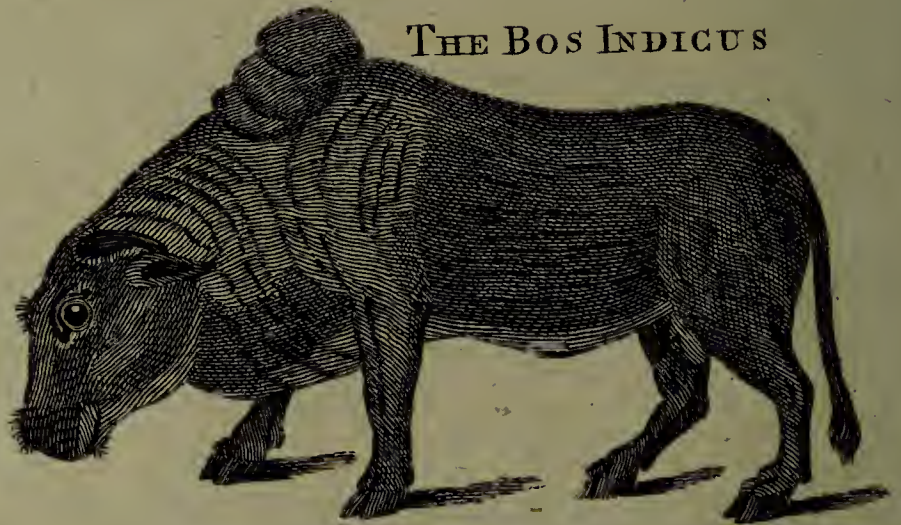
THE WHITE BEAR



THE CATUS PARDUS



THE BOS INDICUS



THE GIRAFFE



THE CHAMOIS



THE ERMINE



city of clinging among the branches; or at most of converting one of those branches into a weapon of offence, are the highest stretches of their sagacity, and the only use their hands have hitherto been employed in: and yet, some superficial men have asserted, that the hands alone are sufficient to vindicate the dominion of mankind over other animals; and that much of his boasted reason, is nothing more than the result of his happier conformation: however, were this so, an ape or a monkey would in some instances be more rational than we; their fingers are smaller, and, in some of them, more finely formed than ours. To what a variety of purposes might they not be employed, if their powers were properly exerted! Those works which we, from the largeness of our fingers, are obliged to go clumsily about, one of these could very easily perform with the utmost exactness; and if the fineness of the hand assisted reason, an ape would be one of the most reasonable beings in the creation. But these admirably formed machines, are almost useless both to mankind and themselves; and contribute little more to the happiness of animal life, than the paws of the lowest quadruped. They are

supplied, indeed, with the organs; but they want the mind, to put them into action: it is that reasoning principle alone, with which man has been endowed, that can adapt seemingly opposite causes, to concur in the same general design; and even where the organs are deficient, that can supply their place, by the intervention of assisting instruments. Where reason prevails, we find that it scarcely matters what the organs are that give it the direction; the being furnished with that principle, still goes forward, steadily and uniformly successful; breaks through every obstacle, and becomes master of every enterprize. A man has been known, without hands or legs, to convert, by practice, his very stumps to the most convenient purposes; and with these clumsy instruments, perform the most astonishing feats of dexterity. We may therefore conclude, that it is the mind alone that gives a master to the creation; and that if a bear or a horse were endowed with the same intellects that have been given to man, the hardness of an hoof, or the awkwardness of a paw, would be no obstacle to their advancement in the arts of dominion or of social felicity.

C H A P. VII.

The NATURAL HISTORY of QUADRUPEDS of the CAMEL Kind.

Containing a descriptive Account of the TURKMAN CAMEL; the ARABIAN; the DROMEDARY; the BACTRIAN; the LLAMA, &c.

NATURAL HISTORY of the TURKMAN CAMEL.

IN Europe and Asia there are four sorts of Camels; one of which is called the Turkman Camel, that is much the strongest and largest, and is more woolly or hairy, and of a darker colour than any of the rest. Their common load is eight hundred pounds; but it sometimes carries much more. This animal cannot bear heat, and therefore they never set it to work in June, July, and August.

The ARABIAN CAMEL.

This is much smaller than the former, of a lighter colour, and not so full of hair, and its burden is above five hundred pounds weight. This can bear heat and thirst much better than the Turkman; nor is there any need that the Arabian Camel be fed with barley, flour, and straw; for the shrubs that grow in the deserts of Arabia, are almost all the food that it requires, which it eats as it goes along. There has been an instance of their travelling without water for fifteen days; but they drank such a quantity as soon as they came to a pond, that it proved fatal to many of them.

The DROMEDARY.

The Dromedary is lighter, and of a more handsome make than the former; and instead of the solemn walk to which the others are accustomed, it will travel about one hundred miles in one day. The Dromedary is five feet and a half high to the top of the bunch, and four feet and a half from the breast to the tail; and this latter including the hair, is two feet and a half long. The neck also is two feet and a half, and the head twenty-one inches from the hind part to the muzzle. The hair is of a fallow colour inclining to ash, and very soft. Under the belly it is no longer than that of an ox; but its length is much greater on the head, under the throat, and on the top of the breast, where it is five or six inches; but the longest of all is on the middle of the back where it is a foot in length. In this place though it is very soft, yet it keeps upright, insomuch, that it makes a great part of the bunch on the back; for when it is kept down by the hand, the back does not seem to rise higher than that of a hog. Perhaps for this

reason, some authors have affirmed, that a Dromedary is generated between a Camel and a Hog.

The BACTRIAN CAMEL.

The Camel with two bunches on its back, is by Linnaeus called the Bactrian Camel, and the only distinction between this and the Arabian Camel, seems to consist therein; some, but very improperly, give the name of a Dromedary to the Bactrian Camel, though it is not so swift of foot as the real Dromedary, which has received its name upon that account.

The Camels of China have two bunches covered with long hair, but they are no larger than a common horse; likewise the neck is shorter and thicker than that of a common Camel. The hair is thick, and as long as that of goats, being sometimes of a brownish yellow colour, and sometimes reddish with a mixture of black; likewise the legs are not so long or so slender in proportion, as those of the common Camel, for which reason this is much fitter to carry burdens. The Arabian Camel has hair of a different nature; for it is curled, and generally longer over all the body than the former, though shorter on the bunch, which is vastly more fleshy. They shed their coat every year except the hair on the bunch, which is generally longer than that on the rest of the body. The hair on the tail is different from that on other parts, for it is grey and very coarse, and exactly resembles that on a horse's tail.

The head of both these animals is small in proportion to the body; the muzzle is cloven like that of a hare, and they have very short ears. The Camel has three dog teeth on each side of the upper jaw, and two on each side the lower. The Dromedary has teeth like those of ruminating animals, for it has no dog teeth nor nippers on the upper jaw before. The feet, which are cloven, are only armed with two small nails at the end; for the under part, which is flat, broad, and fleshy, is only covered with a soft, thick, and somewhat callous skin; but it is very fit for sandy countries, such as the deserts of Asia and Africa. The callosities on the joints of the legs are six in number, namely, two on each fore leg, and one on the upper joint of the hind legs, which is properly speaking in the knee. Besides these there is a seventh more large than the former at the bottom of the

the breast, strongly attached to the breast bone, which has an eminence in this place. It is eight inches long, six broad, and two thick. The stomach is very large, and divided into four, as in other ruminating animals. They are only distinguished from each other by a sort of short necks of a lesser diameter, insomuch that the first stomach, which is exceeding large, is succeeded by another much less; the third is also less than the first, but much longer, and the fourth is like the second. All the intestines together are one hundred and six feet long in the camel; and in the dromedary shorter in proportion. The colon is sixty-six feet long, and its capacity is two inches in diameter at the beginning. The pizzle, of which they make strings for bows, is nineteen inches long, and hooked at the end. The bunches are not formed by the rising of the spine of the back, but consist of white fat almost like suet. The spleen lies over the left kidney, and is nine inches long, four broad, and half an inch thick. The lungs have only a single lobe on each side, and the heart is nine inches long, seven broad, and pointed at the end. The structure of the tongue is pretty remarkable, because contrary to all other tongues. One half of it near the root, which is very thick, has a small round space as a center among several eminences that cover this part, all whose points turn from the center, and appear to be rough when the fingers are drawn towards the center. Among these there are two rows placed in a right line, five in each row, that are like navels, and formed by round folds of a very delicate structure.

The brain, comprehending the cerebellum, is but six inches and a half long, and four broad; and the optic nerve is pierced according to its length with many holes full of blood. The mammillary processes are very large and hollow, having each two ducts; and the pineal gland is of the size of a hazel nut, and composed of three other glands, with a cavity in the middle.

In 1752 there were two of these animals shewn at Orleans in France, one of which was called a dromedary, and was fourteen years old. The other was a female camel of three years of age. The dromedary was six feet high without the two bunches, and ten feet long. There were four nostrils at the end of the muzzle, two of which were very large and wide: but the two others were much smaller, and served for breathing. The eyes were large and prominent, and the fore part of the head was a little hollowed in the middle. The forehead was broad, and covered with tufted hair resembling wool. The ears were short and round, and the neck long; it was adorned with very long brown hair, especially underneath. The knees were large, and the feet were considerably cloven on the upper part, though but very little below, where they were shaped like a heart. On the breast was a broad callosity, on which this animal leaned when at rest; there were two large bunches on the back, so placed that a man might conveniently sit between them. The buttocks were narrow, and the hind legs very high and slender; the hind feet were cloven, and long like those of an ox; the tail was short, and had but little hair, except at the end. The upper lip was cloven, just like that of a hare; and there were no teeth before in the upper jaw: but there were two large teeth on each side about the middle, of which the hindmost was longest, and bent back like the tusk of a boar. It is said they are sometimes obliged to saw these off: farther in the same jaw there was a black stump.

The lower jaw was well furnished with teeth like those of a horse, and the tongue was likewise like that of the same animal; but the palate was as rough as that of an ass. The penis was no thicker than a quill, but it was very long, and bent backwards; and consequently the urine was voided the same way. The testicles were placed behind like those of a boar. The rutting time begins about the fifteenth of January, and then they are very large: but at other times they are scarcely to be perceived. This continues two or three months, and then he makes a terrible noise like the bellowing of a bull; he loses his appetite, becomes extremely lean, and at length all the hair falls off; but this time being over, he soon recovers, and will eat hay, wheat, straw, barley, and oats; but when his stomach is not

good he is fondest of thistles. He drinks but seldom; however, when he does it is several quarts at a time. He generally eats twenty or thirty pounds of hay in a day. He takes long strides when he walks, and can travel eighty or ninety miles in a day. He often trots, but gallops seldom or never; he can carry fifteen hundred weight very easily, and much more if he be obliged to it. This animal is by most mistaken for a dromedary, but is certainly a Bactrian camel.

The female camel of three years old was not half so tall, though the head was very much like that of the former; all the hair was brownish and longer, especially on the back, where there was a single bunch that reached from the shoulders almost to the tail. The nostrils were not so wide, but she had double teeth as well above as below. The udder was placed between the hind legs; and the vulva resembled that of a bitch.

In the year following, at the fair of St. Germain, there was a young camel seen that was just brought into the world: by which means it came to be known how long they go with young, which is exactly a year; however it lived but three days; this perhaps was owing to the coldness of the climate.

In Egypt they make use of camel's milk in various diseases, and with good success; particularly in the dropsy, jaundice, and obstructions of the lower belly. The fat is emollient and resolvent, and is good to ease the pains of the piles. The gall mixed with an equal part of honey, is an excellent liniment against the quinsy.

There is another sort of camel in South America, called by some writers a camel sheep. They are of two sorts, one of which the natives call llamas, and the other vicunaes, or guanacoes. The former is used to carry burthens of fifty or sixty pounds weight, and before the Spaniards introduced horses and mules they had no other beast of carriage. This animal is very common in Peru; but the vicuna or guanaco is an inhabitant of the more southern parts, and yields by much the finest wool. Sir John Narborough in his voyage to the South Sea found a guanaco that was dead, and yet entire and uncorrupted. He had pretty long wool on his back, and down the sides, of the colour of dried rose leaves; but his belly was covered with white wool. He had somewhat the shape of a deer, and was as large as a small colt, with a long neck, and his head, mouth, and ears were like those of a sheep. His legs were very long, and he was cloven footed like a deer, with a short bushy tail of a reddish colour. They herd together in companies of ten, thirty, or forty together; but they are so shy that it is a difficult matter to come near enough to shoot them: for when any one attempts it they neigh like young horses and then run away.

Many writers have no other name for the guanaco but pacos, and it has a greater resemblance to a sheep on account of its having a greater quantity of fine wool above mentioned than a llama. This wool is so extremely fine and bright that it nearly resembles silk; and it is used to make fine stuffs of several kinds. It is certainly of a different species from the llama, because it is much more weak and unfit to carry burthens; neither has it any bunch on its breast. Some travellers affirm, that it has more wool on its neck and head only, than one of our sheep has on its whole body. The flesh is well tasted, sweet, and pleasant, and it is greatly coveted upon that account, as well as for the sake of the wool.

The LLAMA.

The Llama is six feet in length from the neck to the tail, and four in height. The head, neck, mouth, cleft of the upper lip and pizzle, are like those of a camel. It has no fore teeth in the upper jaw, and it is a ruminating animal without horns. It is cloven footed with sharp toes, and the foot is solid at the bottom. Between the breast and belly there is a sort of bunch, from which some sort of matter often drops. It is a mild gentle creature, but impatient of cold. When it is injured by its driver, it throws a liquor from its mouth, which, as some say, falling upon the naked skin corrodes it, and makes it rise in blisters.

C H A P. VIII.

The NATURAL HISTORY of QUADRUPEDS of the DOG Kind.

Containing a particular Description of the DOG, and its numerous Varieties; the WOLF; the FOX; the JACKALL; the ISATIS; the HYÆNA, &c.

THIS class of animals may be principally distinguished by their claws, which have no sheath, like those of the cat kind; by their having six cutting-teeth, and two canine in each jaw: also by their having five toes before, and four behind. But, though this is invariable in the wild species, such as the wolf, &c. the common dogs have frequently five toes on each foot. The tail of those of the dog kind bends towards the left, a character common to the whole species, and first discovered by Linnæus.

NATURAL HISTORY of the DOG.

THE Dog is the most intelligent of all known quadrupeds, and the acknowledged friend of mankind. It seems beyond the power of ill usage to subdue the faithful and constant quality inherent in him. The Dog, exclusive of the beauty of his form, his swiftness, and his vivacity, possesses all those internal qualifications that can endear himself to man. In his domestic state, his sole ambition is the desire to please. With a kind of affectionate humility, he crouches before his master, and is happy to offer his strength, his courage, and all his useful talents, for his service. He waits his orders, and implicitly obeys them: he consults his looks, and perfectly understands them. He is friendly, without interest, grateful for the slightest favours, and sooner forgets injuries than benefits. His only aim is to be serviceable; his only terror to displease. He licks the hand just raised to strike him, and disarms resentment by submission. Ever assiduous in serving his master, he is also a friend to his friends, and indifferent to all the rest.

History, says Mr. Pope, is more full of examples of the fidelity of dogs than of friends. Homer's account of Ulysses's dog Argus, is the most pathetic imaginable, all the circumstances considered, and an excellent proof of the old bard's good-nature. Ulysses had left him at Ithaca, when he embarked for Troy, and found him at his return after twenty years. Mr. Pope thus describes it in verse.

“When wife Ulysses from his native coast
Long kept by wars, and long by tempests tost,
Arriv'd at last, poor, old, disguis'd, alone,
To all his friends, and ev'n his queen unknown;
Chang'd as he was, with age, and toils, and cares,
Furrow'd his rev'rend face, and white his hairs,
In his own palace forc'd to ask his bread,
Scorn'd by those slaves his former bounty fed;
Forgot of all his own domestic crew,
The faithful dog alone his rightful master knew
Unfed, unhous'd, neglected on the clay,
Like an old servant now cashier'd he lay:
Touch'd with resentment of ungrateful man,
And longing to behold his ancient lord again.
Him when he saw—he rose and crawl'd to meet
('Twas all he cou'd) and fawn'd, and kiss'd his feet,
Seiz'd with dumb joy—then falling by his side,
Own'd his returning lord, look'd up, and dy'd!”

Plutarch, relating how the Athenians were obliged to abandon Athens in the time of Themistocles, steps back again out of the way of his history, purely to describe the lamentable cries and howlings of the poor dogs they left behind. He makes mention of one, that followed his master across the sea to Salamis, where he died, and was honoured with a tomb by the Athenians,

who gave the name of the Dog's-Grave, to that part of the island where he was buried. This respect to a dog, in the most polite people of the world is very observable.

The dog is of great importance to us; when at night the guard of the house is committed to his care, he seems proud of the charge; he continues a watchful sentinel, goes his rounds, scents strangers at a distance, and warns them of his being upon duty. This animal also, excited by his friendship for mankind, exerts a degree of superiority over all animals that require human protection. His voice is more readily obeyed by the flock and the herd, than even that of the shepherd and the herdsman. He conducts them, and defends them from danger, and considers their enemies as his own.

Multitudes of dogs are found wild, or rather without masters, in Congo, Lower Ethiopia, and towards the Cape of Good-Hope: they are red-haired, have slender bodies, and turned-up tails, like greyhounds: others are found that resemble hounds. They go in great packs, and attack lions, tigers, and elephants, but are frequently killed by them. There are great numbers of wild dogs in South-America, which are derived from the European race; for the dog was unknown in America before it was introduced there by the Europeans. They breed in holes, like rabbit-holes; and, when they are found young, will instantly attach themselves to mankind, nor will they afterwards desert their masters, or ever join themselves to the wild dogs again. These are very vigilant, and excellent in the chase.

The dog is the only animal whose fidelity is unshaken; almost the only one who knows his name, and answers to the domestic call; the only one that, when he misses his master, expresses his loss by his complaints; and almost the only one who can readily find his way home, after he has been carried to a distant place.

Of all animals the dog is the most susceptible of change in its form; the varieties of this animal being too many for even the most careful describer to mention: each will mix with the other, and produce varieties still more unlike the original stock. The climate, the food, and the education, make strong impressions upon this animal, and produce alterations in its shape, colour, hair, and size; and in every thing but its nature. The same dog carried from one climate to another, seems to become another animal; and different breeds appear to be as much separated as any two animals the most distinct in nature. In short, they are different in every thing but the internal conformation of their parts; it is that which distinguishes the species, and keeps the animal distinct from all others. It is indeed the peculiar conformation of the parts, and the power of producing an animal that can reproduce, that marks the kind, and approximates forms that do not seem made for each other. We may therefore venture to pronounce all dogs to be of one kind; but which of them is the original, from whence such a variety of descendants have sprung, is not easily to be determined. Mr. Buffon makes the chien de berger, the shepherd's dog, or what is sometimes called le-chien-loup, or wolf-dog, the original of all; it being naturally the most sensible; and becomes, without discipline, almost instantly the guardian of the flocks, and keeps them within bounds; reducing the stragglers to their proper limits, and defending them from the attacks of the wolves. We have this variety in England, but it is

both small and weak. Those of France, and the Alps, are much stronger and larger. They are sharp-nosed and sharp-eared, are very hairy, especially about the neck, and have their tails turned up or curled.

Upon comparing other animals with the dog internally, the wolf and the fox appear to have the most perfect resemblance; it is probable, therefore, that the dog which most nearly resembles those, is the original animal of its kind. Hence Mr. Buffon is of opinion, that, as the shepherd's-dog is of all animals of this kind the most like the wolf or the fox, it must certainly be the primitive animal. The dogs that have run wild in America, and in Congo, approach this form. Those of Siberia, Lapland, Iceland, the Cape of Good-Hope, Madagascar, Madura, Calicut, and Malabar, have all pricked ears, and a long nose, and nearly resemble the shepherd's dog. Many of these dogs are also to be found in the temperate climates, particularly among those, who, preferring usefulness to beauty, employ an animal that does not require much instruction to be serviceable. The shepherd's-dog may therefore be considered as the primitive stock from whence these varieties are all derived: he is the stem of that genealogical tree, which has been branched out into every part of the world.

Among the Turks, dogs are never admitted into their houses, though they provide for them and supply them with meat. They will not destroy them, because they feed upon dead carcases and carrion, which may happen to lie exposed to the air, and by that means prevent its being infectious. There is indeed scarce any thing so nasty, that a dog refuses to eat; for a piece of stinking dead horse is as great a delicacy to him, as an ortolan to an epicure. When flesh is not to be obtained, the dog will feed upon many things of the vegetable kind, though he is always much fonder of the former.

A dog has the most exquisite nose of any animal, for he will distinguish his master by the smell among ten thousand people; and by this means he can pursue his footsteps though it be a considerable time after he has passed. The nearer a dog approaches the game, the louder he barks, with intent perhaps to terrify the animal pursued, and make it slacken its pace.

In some parts of Siberia, they make use of dogs as they do of horses, and train them up to draw carriages from one inn to another.

When his master is attacked, the dog will defend him to the utmost of his power; and when his master dies, he seems to lament his loss; and some have been known to pine away, and die with grief upon these occasions.

When first whelped, the dog is not a completely finished animal. In those which bring forth many at a time, the young are not so perfect as in those which bring but one or two. In general their eyes are not opened till they are ten or twelve days old, during which time the bones of the skull are not completed, the body is puffed up, the nose is short, and the whole body but indifferently sketched out. In less than a month the puppy begins to exercise all its senses, and from thence makes hasty advances to its perfection. This animal is capable of reproducing at the age of twelve months; it goes nine weeks with young, and lives to about the age of twelve years.

When a dog has committed a theft, he flinks away with his tail between his legs. He can hardly ever be said to sweat; but, when hot, he foams, and hangs out his tongue. Before he lies down, he goes several times round the spot; and his sleep is attended with a quick sense of hearing: it is also certain that he frequently dreams.

Water appears to be more necessary to the dog than food; he drinks frequently, though not abundantly, and it is imagined he runs mad when abridged of water. This dreadful malady is the greatest inconvenience that results from the keeping this faithful domestic: but it is a disorder not so frequent as the terrors of the timorous would suppose; and the dog has been frequently accused of madness without a fair trial.

The Dog was consecrated to Mercury, as the most

vigilant and crafty of all the gods; because watchfulness and sagacity are the properties of that animal. The flesh of young dogs was reckoned so pure, that it was offered in sacrifice to the gods, according to Pliny; and the flesh of dogs was served up in repasts prepared for the gods. These animals were held in great veneration by the Egyptians; but their respect diminished greatly, when after Cambyfes had killed Apis, and caused him to be thrown into the lay-stall, the Dog alone, of all animals, went to feed on his carcase. The Romans crucified one every year, as a punishment, because the Dogs had not warned them by barking, of the arrival of the Gauls, who besieged the capitol. There was a country in Æthiopia, says Ælian, whose inhabitants had a Dog for their king; and they received his caresses or barkings as tokens of his favour or anger. Round the temple dedicated to Vulcan upon mount Ætna, there are sacred Dogs, says the same writer, who, as if they were endued with reason, fawn upon those that approach the temple with modesty and devotion; but they bite and devour those whose hands are unclean, and drive away men and women who come to rendezvous there.

The use of this animal in medicine has been formerly very great, and in some parts of Europe they still make an oil or balsam of whelps which is kept in the shops. It is recommended against weakness of the nerves, palsy, and rickets. The fat of a Dog is said to be vulnerary, healing and deterfive, and is used by some both inwardly and outwardly. Some would have it to be good taken inwardly against the consumption and epilepsy. The dose is from a scruple to a drachm and a half. Album Græcum, or Dogs dung, when become white by being exposed to the weather, is said to be detergent, attenuant, and resolvent; and was formerly made use of against quinseys, pleurisies, and cholicks; the dose is from half a scruple to a drachm and a half. It is said also to promote sweat, and to restore a due circulation of the blood; but it is now entirely neglected. Many ladies are fond of gloves made of Dog's skin, because they are supposed to be emollient, and to render their arms and hands more soft; but then they wear them chiefly in the night.

The Shepherd's Dog.

The Shepherd's Dog, when transported into the temperate climates, and among civilized people, such as England, France, and Germany, will be divested of his savage air, his pricked ears, his rough, long, and thick hair; and merely from the influence of climate and food, become a matin, a mistiff, or an hound. These three seem to be the immediate descendants of the Shepherd's Dog; and from them the other varieties are produced. This is the *canus domesticus* of Ray.

The HOUND.

The Hound is an animal well known for its use in hunting. There are three sorts, though all produced by the same dam, viz. the Hound, the Harrier, and the Beagle. The ears are long and pendulous, the nose blunt, the mouth large, and their barking or opening, loud and deep. This animal, when transported into Spain or Barbary, where the hair of all quadrupeds becomes soft and long, will be converted into the land-spaniel, and the water-spaniel; and those of different sizes.

The SPANIEL.

From the name it may be supposed that we are indebted to Spain for this breed. These animals vary in size, from the Setting-Dog to the Springing Spaniels, and some of the little Lap-Dogs. This kingdom has long been remarkable for producing excellent Dogs of this sort; great care having been taken to preserve the breed in the utmost purity. They are still distinguished by the name of English Spaniels; and, notwithstanding the derivation of the name, it is probable they are natives of Great-Britain. The Pointer, which is a Dog of foreign extraction, was unknown to our ancestors. The Finder was another species used in fowling; and was the same as our Water-Spaniel.

The

The GREYHOUND.

The Greyhound, or Grehound is the swiftest of all Dogs, and pursues a hare by the sight, and not by the smell. Its head and legs are long; and the body is so exceeding slender, that it appears to be peculiarly adapted to running swiftly. It was formerly esteemed the first in rank among Dogs, as appears from the forest laws of king Canute, who enacted that no person under the degree of a gentleman, should presume to keep a Greyhound. Its varieties are the Spanish Greyhound, which is small and smooth; and the Oriental Greyhound, which is tall and slender; with very pendulous ears, and long hair on the tail.

The Irish GREYHOUND.

This animal, which is also called the great Irish Wolf-Dog, is very rare, even in the only country in the world where it is to be found. It is kept rather for show than use, there being no longer any wolves in Ireland. This animal is extremely beautiful and majestic, and the largest of the Dog kind to be seen in the world. Mr. Buffon supposes these are the true Molossian Dogs of the antients; but does not give his reasons for such a supposition. If these animals are carried into other countries, they soon degenerate; and, even at home, they quickly alter except great care is taken to prevent it. Formerly they were employed in clearing the island of wolves, which greatly infested it: but these being destroyed, the Dogs also are wearing away; as if nature intended to blot out the species, when they had no further services to perform.

The Danish Dog.

This is also a large Dog, and is more slender than the mastiff, which he resembles, except that his head is slenderer and longer. The colour of these animals is generally of a yellowish brown, though some of them are grey, and others quite black. They carry their tails turned up, and have a large high forehead. Perhaps of this kind were the dogs of Epirus, mentioned by Aristotle, lib. III. ch. xxi. or those of Albania, so beautifully described by Pliny, lib. VIII. ch. xl.

The MASTIFF.

The Mastiff is an animal of great size and strength, and a very loud barker. The head is very large; the lips are also large, and hanging down on each side. It has a fine noble countenance. Caius informs us that three of these were reckoned a match for a bear, and four for a lion: but, from an experiment made in the tower by James the First, the lion was found an unequal match to only three of them. Two of the Dogs were disabled in the combat, but the third obliged the lion to seek for safety by flight. Great-Britain was so noted for its Mastiffs, that the Roman emperors appointed an officer in this island, whose whole business was to breed, and transmit from hence to the amphitheatre, such as would prove equal to the combats. The Mastiff is usually kept for guarding houses, yards, and other places.

The BULL-DOG.

The nose of this animal is short, and the under-jaw longer than the upper. It is a strong, fierce, and cruel creature, and frequently bites before it barks. It is peculiar to England; and since the barbarous custom of bull-baiting has declined, the breed is become more scarce. This animal has a large thick head, and carries its tail turned upwards.

The PUG-DOG.

The Pug-Dog, or Dutch Mastiff, is an innocent resemblance of the bull-dog, but much smaller. He has a black muzzle, a flat nose, and yellowish brown hair, with a tail turned up in a curl. The ears are usually cut off from those sort of Dogs, to render their heads rounder. Some of them have a black list along the back. It appears to be a useless animal, and to want that fidelity that this tribe generally possess. It is en-

tirely domestic, and will never follow its master to a considerable distance.

The GAZE-HOUND.

This animal obtained the name of Gaze-hound from its hunting by the eye, and not by the scent. It hunted indifferently the fox, hare, or buck. It would select from the herd the finest deer, pursue it by the eye, if lost for a time, recover it again by its singular distinguishing faculty; and, if the animal should rejoin the herd, the Gaze-Hound would fix unerringly on the same. This species is either lost or unknown among us.

The TERRIER.

The Terrier is a small rough kind of Hound, made use of to hunt the fox or the badger out of their holes, or rather, by their barking, to give notice in what part of their kennel they reside, when the sportsmen intend to dig them out.

The BLOODHOUND.

The Bloodhound was held in great esteem by our ancestors. Its business was to recover any game that had escaped wounded from the hunter, or had been killed and stolen out of the forest. But in those days, when the country was less peopled than at present, it was more employed in hunting thieves and robbers by their foot-steps. At this time, the country being every where peopled, this variety is entirely worn out.

The LEYMMER.

This animal was of a kind that hunted both by scent, and sight, and in the form of its body partook of the hound and the greyhound. It was led in a leyme or thong, from whence it received its name. It is a species at present unknown to us.

The TUMBLER.

The Tumbler, which is also called the Rabbit Dog, looks like a small grey-hound. This animal seems to be at play when he pursues his game. When he goes into a warren, he neither barks nor runs after the rabbits; but, seemingly inattentive, approaches so near as to come within reach, and then seizes them by a sudden spring.

The LAP-DOG.

The Lap-Dog is of various kinds and sizes. The Maltese little Dogs were as much esteemed by the fine ladies of past times, as those of Bologna are among the modern. Small ones are generally preferred, but the more awkward and extraordinary they are, the more they are prized.

The Small Danish Dog.

This is a very gentle and playful animal, and resembles the harlequin Dog, but is shorter. The head is round, the eyes large, and the nose small and slender.

The HARLEQUIN-DOG.

This animal resembles the Danish Dog, but it is longer, and generally black and white; though sometimes white and of a cinnamon colour. There are also several other varieties of them.

The CUR-DOG.

The Cur-Dog, which is also called the House-Dog, is as large as a fox, with upright ears, and a kind of woolly hair beneath the tail. These are generally mongrels, and consequently the shapes and sizes of them must be exceedingly different.

The SHOCK-DOG.

This animal is remarkable for its long curled hair, of which it has such large quantities, that some of the white sort have the appearance of sheep; but their shape is very different, and they have so large a quantity on the head, that they seem to be almost blinded with it.

The Turkish Dog.

The animal called the Turkish Dog differs from the rest of the kind, in being entirely without hair. The skin is bare, and of a flesh colour, with brown spots. They seem to be of the small Danish breed, brought into a warm climate, where, by a succession of generations, they became divested of their hair. They are, therefore, extremely chilly, and unable to endure the cold of our climate, and shiver in the midst of summer.

The LION-DOG.

The Lion-Dog resembles in miniature the animal from whence it takes its name. The hair of the forepart is very long, and that of the hinder-part extremely short. The nose is short; the tail is long, and tufted at the point, like that of a lion. But notwithstanding it so much resembles the lion, it is extremely feeble, timid, and inactive. It came originally from Malta, where it is so very small that women carry it about in their sleeves.

NATURAL HISTORY of the WOLF.

THE Wolf has a long head, a pointed nose, ears sharp and erect, a long bushy tail, long legs, and longish hair. He has large teeth, and is taller than a large greyhound. His colour is generally a pale brown, tinged with yellow, tho' sometimes found white, and, in Canada, sometimes black. The feature which principally distinguishes the visage of the Wolf from that of the dog is the eyes, which opens slantingly upwards, in the same direction with the nose; but in the dog it opens more at right angles with the nose.

The Wolf so nearly resembles the dog, both externally and internally, that he seems modelled upon the same plan. But his nature is so very different, that he only preserves the ill qualities of the dog, without any of the good ones. These two animals are indeed so different in their dispositions, that they have a perfect antipathy to each other. A dog that is stronger, and sensible of his strength, bristles up at the sight of a Wolf, testifies his animosity, valiantly attacks him, endeavours to put him to flight, and does all that is in his power to rid himself of a presence that is hateful to him. They never meet without either flying or fighting. If the Wolf is victorious, he devours his prey: the dog is more generous, and contents himself with his victory.

Wolves are cowardly, though cruel animals; they will fly the presence of man, except they are pressed by hunger, when they prowl by night in vast droves through villages, and destroy any persons they meet. Those which have once had a taste of human flesh, give it the preference; and, perhaps, if they were sufficiently powerful, would eat no other. They have been seen following armies, and arriving in numbers upon the field of battle, where they devoured such dead bodies as were strewed upon the earth, or negligently interred. Those, indeed, which have once fed upon human flesh, choose ever after to attack mankind, and fall upon the shepherd rather than his flock.

Their time of pregnancy is about three months and an half, and the young wolves are found from the latter end of April to the beginning of July. When the she wolves are near the time of bringing forth, they prepare a soft bed of moss in some retired place. They usually bring from five to nine at a litter. The cubs, like those of the bitch, are brought forth blind; the dam suckles them some weeks, and early instructs them to eat flesh, which she prepares for them, by chewing it first herself. The cubs do not leave the den where they have been littered, till they are about six weeks or two months old; after which they follow the dam for several months, and, when they are attacked, she defends them with all her strength, and more than usual ferocity. At other times the female is more timorous than the male; but, at that season, she becomes bold and fearless, choosing

by her own example to teach her young ones future courage. The long continuance of the wolf's pregnancy is sufficient to make a distinction between that animal and the dog. That it is an animal of its own particular species, is likewise evident from the fiery fierceness of the eyes, the howl instead of barking, and the greater duration of its life, which is supposed to be about twenty-one years.

Of all animals, the wolf's appetite for animal food is one of the most vehement, and he has various methods of satisfying this appetite. Nature has given him strength, cunning, agility, and all those requisites which qualify an animal for pursuing, overtaking, and conquering its prey; notwithstanding which, the wolf most frequently dies of hunger. Being long proscribed, and a reward offered for his head, he is obliged to fly from human habitations, and make the forest his place of residence. Naturally dull and cowardly, he is frequently reduced to the verge of famine, when he becomes ingenious from want, and courageous from necessity. When pressed with hunger, he braves danger, and ventures to attack those animals which are under the protection of man, such as lambs, sheep, or even dogs themselves; for all animal food is then equally agreeable. The wolf preys on all kinds of animals, but, in cases of necessity, will feed upon carrion. Horses generally defend themselves against their attacks, but all weaker animals fall a prey to them. Throughout France the peasants are obliged nightly to house their flocks.

It is not certainly known when wolves were extirpated in Scotland; but, according to Hollingshead, they were very noisome to the flocks there in 1577: However, we learn from good authority, that none are to be found there at present. Mr. Buffon, who says there are wolves in Scotland at this time, must certainly have been misinformed. King Edgar is said to be the first who endeavoured to rid this kingdom of such disagreeable inmates, by commuting the punishments for certain crimes into the acceptance of a number of wolves tongues from each offender. In Wales, he converted the tax of gold and silver into an annual tribute of three hundred wolves heads. We find, however, that some centuries after the reign of that Saxon monarch, these animals were again so much increased, as to become the object of royal attention: Edward the First issued out his mandate to Peter Corbet, to superintend and assist in the destruction of them in the several counties of Gloucester, Worcester, Hereford, Salop, and Stafford. Camden informs us, that certain persons at Wormhill, in the county of Derby, held their lands by the duty of hunting and taking the wolves that infested the country, whence they were stiled *Wolve-hunt*. Wolves were so plenty in Yorkshire in the reign of Athelstan, that a retreat was built at Flixton, in that county, to defend passengers from the wolves, that they should not be devoured by them.

They infested Ireland many centuries after they were extirpated in England, for there are accounts of some being found there as late as the year 1710. The wolf is now an inhabitant of Europe, Asia, Africa, and America, but not so high as the arctic circle. The vast forests on the European continent will always preserve them. The wolves of North America are the smallest, and, when reclaimed, are the dogs of the natives. Those of Senegal are the largest and fiercest, and they prey in company with the lion.

Besides being hunted with greyhounds and harriers, wolves are taken and destroyed by other means: they are secured in traps, by poisoned carcasses prepared and placed for that purpose, and caught in pit-falls. We are informed by Gesner, that a friar, a woman, and a wolf, were all taken in one of these pit-falls in the same night; that the woman lost her senses with the fright, the friar his reputation, and the wolf his life. But notwithstanding every art that is practised to destroy them, wolves multiply amazingly in those countries where the woods are plenty. France, Spain, and Italy, are greatly infested with them.

Though this creature may be useful in North-

America,

America, and may be taught to perform the offices of a dog, it is a very noxious animal in Europe, and nothing belonging to him is of any value, except his skin. Of this the furriers make a covering that is both durable and warm, though coarse and inelegant. His flesh is disliked by all other animals, no other creature being known to eat the wolf's flesh, except the wolf himself. When one of these animals receives a desperate wound, he is followed by the rest, who presently dispatch and devour him. The wolf breathes a most foetid vapour from his jaws, and is, in every respect, offensive; a savage aspect, a frightful howl, an insupportable odour, fierce habits, and a perverse disposition, make him detestable while living, and useless after death.

NATURAL HISTORY of the FOX.

THE Fox exactly resembles the wolf and the dog internally, and is a crafty, lively, and libidinous animal. It breeds but once in a year, except some accident happens to its first litter, and generally brings forth four or five cubs, which, like puppies, are produced blind. The female goes with young about six weeks. It has been a common received opinion that this animal would produce with the dog kind, but late experiments prove it to be erroneous, and convince us that this animal will mix only with its own species.

The Fox is smaller and slenderer than the wolf; the former being about two feet three inches long, and the latter three feet and an half. The tail of the Fox is longer in proportion, and more bushy; its nose is smaller, and more nearly resembles that of a greyhound, and its hair is softer. Like the wolf, its eyes are obliquely situated; its ears are directed in the same manner as those of the wolf, and, in proportion to its size, its head is equally large.

The Fox has ever been famous for his cunning and his arts; and he appears to merit the reputation he has gained. Of all animals he has the most significant eye, by which he expresses every passion of love, fear, hatred, &c. He is remarkably playful, but, like other savage creatures half reclaimed, he will, on the least offence, bite those with whom he is most familiar. He is greatly delighted with his own bushy tail, with which he often amuses and exercises himself, by running in circles to catch it; and, in cold weather, he wraps it round his nose.

This animal generally keeps his kennel at the edge of a wood, and yet within an easy journey of some farmhouse. From thence he listens to the crowing of the cock, and the cackling of the hen and chickens. He scents them at a distance; he seizes every opportunity, conceals his approaches, creeps slyly along, attacks his prey, and seldom returns without his booty. When he has acquired a larger prey than he can immediately devour, he carries off a part of the spoil, conceals it at some convenient distance, and again returns to the charge. In this manner he will bring them one by one, and thrust them into the earth with his nose: afterwards, at his leisure, he more completely hides them by ramming the loose earth on them, till the calls of hunger incite him to pay them another visit. When this animal observes any springes for catching birds, he takes care to be before-hand with the fowler, and if he finds any fowls entangled in the snare, he very expertly takes them out. He also finds out birds nests, seizes the partridge and quail while sitting, and destroys large quantities of game. He will feed on flesh of any kind, but his favourite food is lambs, rabbits, hares, poultry, and feathered game. When urged by hunger, he will eat carrots and insects; and, if near the sea-coasts, will eat shrimps, crabs, and other shell-fish. In vain does the poor hedge-hog roll itself up into a ball to oppose him; he teases it till it is obliged to uncover itself, and then he devours it. In France and Italy the Fox does incredible damage in the vineyards, by feeding on the grapes, of which he is very fond.

The chase of the Fox requires less preparation than that of the wolf, and is more pleasant and amusing.

The dogs have no great delight in pursuing the wolf, but they are exceeding alert in following the Fox, which chase they prefer to that of the hare or buck. For every part of this chase, the huntsmen have their cant terms. The first year the Fox is called a cub, the second, a Fox, and the third, an old Fox. His tail is called the brush or drag. He is generally pursued by a large kind of harrier or hound, assisted by a smaller breed called terriers, that follow him into his kennel, and attack him there. As soon as the Fox discovers that he is pursued, he makes to his kennel, and takes refuge at the bottom of it; where, for a moment, he loses the cry of his enemies; but the whole pack presently surround the mouth of his retreat; where their vehemence and rage redouble, and the little terrier courageously ventures in. Sometimes the kennel is under a rock, or among the roots of old trees; in such cases the Fox cannot be dug out, nor can the terrier contend with him at the bottom of his hole: but, when he can be dug out, he is usually carried in a bag to some open country, and there set loose before the hounds. The Fox leaves a strong scent, which always keeps up a full cry, and adds to the entertainment.

The smell of this animal is indeed very strong, but that of the urine is most remarkably foetid. It is so offensive to itself, that it will take the trouble of digging a hole in the ground, and there, after depositing its water, cover it over with the earth. It is said the Fox makes use of its urine to force the cleanly badger from its habitation. Upon the truth of this assertion we will not insist; but it is certain that the Fox makes use of the badger's kennel: not on account of its being unable to form its own retreat; but to save itself some trouble: for after the expulsion of the first inhabitant, the Fox greatly enlarges and improves it; making the addition of several chambers, and providentially contriving several avenues to secure a retreat from every quarter.

There are only three varieties of Foxes in this island, which differ from each other in size, but not in form or colour. The greyhound Fox is the largest, tallest, and boldest, and will even attack a grown sheep: the Mastiff-Fox is less: the Cur-Fox is the least, though the most pernicious of the three to the peasant and the farmer; and is continually lurking about out-houses, barns, &c.

In the colder countries round the pole, Foxes are found of all colours; black, blue, grey, iron-grey, silver-grey, white, white with red legs, white with black legs, white with the point of the tail black, red with the throat and belly white, and with a stripe of black extending the whole length of the back, and another stripe crossing it at the shoulders. The common Fox, however, is more universally diffused than any of the former. It inhabits Europe; the cold and temperate parts of Asia; Barbary, but not the hotter parts of Africa; it abounds in North-America; and is also to be found in South-America. They have the same cunning disposition in all countries, and the same eagerness after prey. They commit the same ravages among game, birds, poultry, and the lesser quadrupeds. Their voice is a kind of yelp, and not a bark; and their bite, like that of the wolf, is very hard and dangerous. Their colour, in general, is a kind of a tawny red, mixed with ash-colour; but in this particular they greatly vary. The fur of the white Fox is not much esteemed, because the hair falls off; the blue Fox skins are scarce, and are therefore bought up with great avidity; but the black Fox skin is held in the greatest estimation, and is sold at a very high price. These skins are frequently made into muffs, and are extremely warm and beautiful.

The Brant Fox, described by Gesner and Linnæus, is of a fiery redness. Mr. Brook received one of these from Pennsylvania, which was not above half the size of the common Fox.

The grey Fox inhabits Carolina, and the warmer parts of North America. It agrees with the common Fox in form; but never burrows. It affords but little diversion to the sportsman, but takes to its retreat after about a mile's chase. It feeds on poultry, birds, &c. and has no strong smell. It is easily tamed.

The silvery Fox, or renard argente, resembles the common Fox in form, and is found in great plenty in Louisiana. They have a beautiful coat; having long silvery hair springing over short brown hair, which gives them a very elegant appearance. As they live in forests which abound with game, they never attack poultry.

The Fox is very prejudicial to the husbandman, by taking away, and destroying his lambs, poultry, geese, &c. especially in places that are near forest-woods, and covert places. The best way of destroying them, is with guns or traps, in the following manner: if you intend to shoot them, procure a sheep's paunch, and tying it to a long stick, rub your shoes well upon it, that the Fox may have no scent of your feet, and draw the paunch after you, with which make a trail a mile or two in length; and order it so as to bring it near some thick-headed-tree. At which place, when you have made your trail, leave the paunch, and with your gun get up into the tree; and as soon as it begins to be dark, you will see him come by you upon the scent of the trail, where you may shoot him. Observe that you draw the trail to windward of the tree, if you can.

But if you mean to catch them with a steel-trap, which is the surest method, choose a place to set it in a plain part of a large field; let it be out of the way of all paths, but not near either a hedge or any shelter. Open your trap, and lay it upon the ground, and cut out in the turf just the exact-form of it, and take out so much earth as may make room to lay it, covering it again very neatly with the turf you cut out; and, if the joints of the turf will not close exactly, get some of the fine mould that is to be found in a new cast-up mole-hill, and fill the joints with it, taking some grass, and sticking it in the mould, as if it grew there. Make all so fine and plain, as that it may deceive your own eye to look upon it. About eight or ten yards from the trap, three several ways, scatter some of the fine mould that you had out of the mole-hill, very thin upon a place about fourteen or fifteen inches square; and upon these places; and where the trap is, lay two or three small bits of cheese, and with a sheep's paunch, as before directed, draw a trail of about a mile long to each of the three places, that are at a distance from the trap, and from thence to the trap, that the Fox may come upon one of those places first, which will make him approach the trap with more boldness, where you will seldom fail of him; but you must observe not to fasten your trap, but to leave it loose, that the Fox may draw it to the hedge-side, or to some cover, or he will bite off his leg, and be gone.

Some bend down a stick in the wood, and set a trap for them in their paths, like that which is set for woodcocks, which hangs them up, or any other sort of vermin.

NATURAL HISTORY of the JACKALL.

THE Jackall is vulgarly called the lion's provider, from an opinion that it rouses the prey for that animal. The fact is, every creature in the forest is set in motion by the cries of the Jackalls: the lion, and other beasts of rapine, attend to the chace by a kind of instinct, and seize those timid animals that betake themselves to flight at the noise of this nightly pack. Though one of the most common among the wild animals in the East, there is scarce any less known in Europe, or more indifferently described by natural historians. It is said to be of the size of a common fox, and resembling that animal in the hinder parts, particularly the tail; and the wolf in the fore-parts, especially in the nose. Its legs are shorter than those of the fox, and its colour of a bright yellow. The Jackall seems to be placed between the wolf and the dog; it appears to have the ferocity of the wolf, and the familiarity of the dog. Its cry is between barking and howling, and is a lamentation resembling that of human distress. In its pursuits it is more noisy than the dog, and more voracious than the wolf. It is an inhabitant of all the hot and temperate

parts of Asia, and is found in Barbary, and other parts of Africa, as low as the Cape of Good Hope. The Jackall never goes alone, but always in packs of forty, fifty, or even two hundred together, and they hunt like hounds in full cry from evening till morning. Nothing can escape them: they make even the smallest animals their prey; and yet, when thus united, have the courage to face the largest: they destroy the flocks and poultry, ravage villages and gardens, and even destroy children that are unprotected. When they cannot obtain living prey, they will feed on roots, fruits, and carrion. They will greedily rake up the dead from their silent graves, and feed on the putrid corpses; for which reason, in many countries, bodies are interred a great depth, and well secured against their attacks. They are constant attendants upon caravans, and armies, expecting that death will furnish them a banquet. Their howling is loud and dreadful. In the day time they are silent, and retire to their dens; and, we are informed by Dallon, that, notwithstanding their natural ferocity, they are sometimes tamed, and kept among domestic animals.

Linnæus mentions an animal of this kind about the size of a large cat, inhabiting Surinam; with the tongue fringed on the sides, and with warts on the cheeks, above the eyes, and under the throat: the colour of the upper-part of the body greyish, and the lower white: it has five toes before, and four behind. It is mentioned by no other naturalist except Linnæus.

NATURAL HISTORY of the ISATIS.

THE hair of the Isatis is softer than that of a common fox. Some of these animals are found blue; some are white at one season of the year, and brown at another. Their hair is much longer in winter than in summer, which is usual with animals of cold climates. The Isatis is very common in all the northern countries bordering upon the icy sea; and is seldom seen but in the coldest countries. It is principally found in the mountains and naked regions of Norway, Siberia, and Lapland. In the form of its body, and the length of its tail it resembles a fox; but is more like the dog in the shape of its head, and the position of its eyes. These animals live in the cliffs of rocks, not being able to burrow on account of the frost; and two or three pair generally inhabit the same hole. They bark like the dog, and go nine weeks with young. They have all the cunning of the common fox; and prey on the young of geese, ducks, and other water fowl, before they can fly. In Greenland, necessity obliges them to feed on berries, shell-fish, or any thing the sea casts up; but their principal food in the north of Asia, and in Lapland, is the Leming, or Lapland marmot. The Leming is a very wandering animal, and the Isatis will desert the country three or four years in pursuit of them. Unless this animal is killed in the winter, the fur is of no value.

NATURAL HISTORY of the HYÆNA.

THE Hyæna is nearly of the size of a wolf, and resembles that animal in the shape of its head and body: the head, however, is a little broader, and less pointed, and the ears are longer. The hair on the body is long, coarse, and rough, and of an ash-colour; marked with long black stripes from the back downwards. Its tail is very full of hair; sometimes plain, and sometimes barred with black. It is more savage and more untameable than other quadruped, and is continually in a state of rage or rapacity; for ever growling, except when it is receiving its food. Its eyes then glisten, the bristles on its back stand erect, and its teeth appear, which altogether give it a most dreadful aspect; and the terror is heightened by its horrible howl, which, it is said, is sometimes mistaken for that of a human voice in distress. The Hyæna, for its size, is the most ferocious, and the most terrible of all other quadrupeds; and its courage is equal to its ferocity: it defends itself against the lion, is a match for the panther, and frequently overcomes

overcomes the ounce. It is an obscure and solitary animal, and chiefly inhabits Asiatic Turkey, Syria, Persia, and Barbary. It resides in the caverns of mountains, in the cliffs of rocks, or in dens under ground, which it has formed for itself. Like the jackall, it violates the repositories of the dead, and greedily devours the putrid contents of the grave: like it too, it preys upon the flocks and herds; and when destitute of other food, will eat the roots of plants, and the tender shoots of the palms. The superstitious Arabs, when they kill a Hyæna, carefully bury the head, lest it should be applied to magical purposes, as the neck was of old by the Thessalian forcerers. It is indeed no wonder that an ignorant Arab should attribute to its remains preter-

natural powers, when even the ancients believed that it changed its sex; and that it had the power of charming the shepherds, and, as it were rivetting them to the place on which they stood. This animal is so cruel, fierce, and malevolent, that, even when taken very young, it cannot possibly be tamed: it lives by depredation, and ravages with insatiable voracity. The voice of this animal is a hoarse disagreeable mixture of growling and roaring.

There is an animal of this kind, inhabiting Guinea, Ethiopia, and the Cape, the colour of which is a reddish brown, marked with distinct round black spots; and is called by Mr. Pennant, the spotted Hyæna.

C H A P. IX.

The NATURAL HISTORY of QUADRUPEDS of the CAT Kind,

Containing a particular Account of the CAT; the LION; the TIGER; the PANTHER; the LEOPARD; the OUNCE; the LYNX; the COUGAR; the CAT-A-MOUNTAIN; the BEAR; the RACCOON; the BADGER, &c. &c.

THE class of the Cat kind are principally distinguished by their sharp and formidable claws, which they can extend and conceal at pleasure. They lead a solitary ravenous life; for most of these ferocious tribe seek their food alone; and, except at certain seasons, are even enemies to each other. The dog, the wolf, and the bear, will sometimes live upon vegetable food; but the lion, the tiger, the leopard, and all of the cat kind, feed only upon flesh.

These animals are, in general, fierce, rapacious, subtle, and cruel; and even unfit for society among each other. It is probable, notwithstanding, that the fiercest might be rendered domestic; but the experiment would be attended with too much trouble. The chariots of conquerors have been drawn by lions, and tigers have tended those herds which they now destroy.

All animals of the Cat kind are nearly allied to each other, though differing in size or in colour: they are equally fierce, artful, and rapacious; and he that has seen one has seen them all. In other creatures many changes are wrought by human assiduity; but all of this kind are inflexible in their forms, and wear the impression of their natural wildness strong upon them. The dog, the cow, or the sheep, vary in different countries; but lions and tigers are every where the same: even the colour is nearly alike in all; and the slightest alterations give the animal a different denomination. The Cat kind are remarkable for the sharpness and strength of their claws, which they thrust from their sheath when they seize their prey: they are also equally remarkable for the roundness of their head, the shortness of their snout, and the large whiskers which grow on the upper-lip. They have also thirty teeth, which are very formidable; but are not so well calculated for chewing their prey as for tearing it. In the dog kind, the greatest strength lies in the under-jaw; but in these the principal force lies in the claws, which they can easily extend, and their gripe is so powerful that nothing can open it. They have not the swiftness of most other animals; but generally catch their prey by surprize, instead of hunting it fairly down.

Notwithstanding all these qualifications for slaughter, animals of the Cat kind are cowardly and timid, and seldom make an attack at a disadvantage: when the force against them is superior, or even equal to their own, they have recourse to flight.

NATURAL HISTORY of the CAT.

THIS animal has been taken under human protection, and is considered as a faithless friend, whose business it is to oppose an insidious enemy. This is

the only animal of the kind, whose services can compensate for the trouble of their education, and whose size is too inconsiderable to make its anger formidable. Though easily offended, and often capricious in its resentments, it has not strength sufficient to do any considerable mischief. There is nothing more playful than the kitten; but, in some degree, it loses this disposition as it grows old, and its innate treachery is displayed. The Cat has only the appearance of attachment: its timid approaches discover that it dreads its master or distrusts his kindness. The caresses of the dog are sincere; the Cat often gains confidence only to abuse it.

This animal is indeed an useful, but a deceitful domestic. It is active, neat, sedate, delicate, and voluptuous: it delights in ease, and seeks the softest cushions to repose on. When pleased, it purrs and moves its tail; and, when angry, spits, hisses, and strikes with its foot. Its eyes shine in the night: and its hair, when rubbed in the dark, emits fire. It is proverbially tenacious of life, and always lights on its feet.

The Cat goes sixty-six days with young, and usually brings about five or six at a time, which are produced blind. For some weeks the female feeds them with her milk, and such small animals as she can take by surprize, by which means they are early accustomed to rapine. These animals engender when they are about a year old, and though they are remarkably salacious, they are very jarring lovers. They live to about the age of ten years.

All animals that are weaker than themselves, are to them an object of destruction, and they do not always reject vegetables. Hares, rabbits, birds, rats and mice, bats, moles, toads, and frogs are all equally pursued, though they may not perhaps be equally acceptable; for the mouse appears to be their favourite game. Nothing discovers the natural malignity of the Cat, so much as the fondness for sporting with their little captives before they kill them. Though the Cat is a domestic animal, it cannot properly be called a dependant. Though perfectly tame, it acknowledges no obedience, and no art can force it to controul any of its inclinations. In general it is more attached to the house in which it resides, than to its human inhabitants, and always remains there if the persons who quit the house do not carry it with them; for they are never so strongly attached to a master as to follow him out of the house: and, if it is carried elsewhere, it seems for a while bewildered with its new situation. The Cat is much afraid of water, of cold, and of disagreeable smells. It delights in being near the fire, or in the sun: is excessively fond of some plants, such as marum, cat mint, valerian, &c. and, when it finds them growing in any garden, it will rub itself

itself against them till it wears them out. It is also fond of rubbing against those persons who carry perfumes.

The teeth of this animal being made rather for tearing than chewing its aliments; it eats slowly and with difficulty; and therefore it prefers the tenderest food, particularly fish, which it eats as well boiled as raw. It does not sleep soundly, and frequently pretends to be asleep, the better to deceive its prey. In walking it treads so softly that it does not make the least noise; and as to the offices of nature, it is remarkably cleanly. Linnæus says, the Cat washes its face with its fore-feet at the approach of a storm. Though this animal is the unaccountable antipathy of many, it is beloved by the Mahometans: and Maillet, who expatiates largely on the beauty of Egyptian Cats, adds, that the inhabitants build hospitals for them.

Cats, of all quadrupeds, were those whose death was the most severely punished by the Egyptians, whether it had been occasioned through inadvertence, or on purpose; a person was equally criminal when he killed a Cat, and that crime could only be expiated by the most cruel torments. But when the Cat dies a natural death, says Herodotus, all the people of the house where that accident has happened shave their eye-brows as a token of sorrow. The Cat is embalmed, and honourably interred. This veneration of the Egyptians for the Cat, was founded on the current opinion among them, that Diana, to avoid the fury of the giants, had concealed herself under the figure of that animal. The god Cat was represented sometimes with its whole native form, and sometimes with the body of a man, bearing a Cat's head.

The WILD CAT.

The Cat in its savage state is much larger than the domestic Cat; and its fur being longer, makes it appear larger than it really is. Its head is bigger, its face flatter, and its teeth and claws much more formidable. Being formed for rapine, its muscles are very strong: its tail, which is of a moderate length, is very thick and flat, marked with alternate bars of black and white, the end always black: the general colour of these animals, in England, is a yellowish white, mixed with a deep grey; and the fur is very soft and fine. These colours, upon close inspection, will be found to be disposed like the streaks on the skin of the tiger. This animal does not differ specifically from the tame Cat; the latter being originally of the same kind, but altered in colour, and some other trifling accidents, as are common to animals which are reclaimed from the woods, and domesticated. The Wild Cat is found in our larger woods; and is the most destructive of the carnivorous kinds in this kingdom. It lives mostly in trees, and feeds only in the night. It multiplies as fast as the domestic Cat, and has been often known to breed with it. The Wild Cat was formerly reckoned among the beasts of chase; as appears by a charter granted by Richard the III to the Abbot of Peterborough, permitting him to hunt the Hare, Fox, and Wild Cat; and it was the object of the sportsman's diversion in much earlier times. It is probable, however, that these are not original inhabitants of this kingdom, but were first introduced in a domestic state, and afterwards, by ill usage or neglect, became wild in the woods.

NATURAL HISTORY of the LION.

THIS animal has a large head, short round ears, and a face covered with short hair. On the upper part of the head, the whole neck and shoulders, and the chin, are long shaggy hairs like a mane. The hair on the body and limbs is short and smooth, and long at the bottom of the belly. It has very strong limbs, and a long tail, with a tuft of long hair at the end. Its colour is tawny, but on the belly inclining to white. The length of the largest Lion, from the nose to the tail, is about eight feet, and the tail four feet. The Lioness is less, and has no mane.

The influence of climate upon mankind is small; he is found to subsist as well under the frozen poles, as beneath the torrid zone: but almost all other animals have their peculiar latitudes, beyond which they cannot live, either perishing with a moderate cold, or expiring for want of a frozen air, even in a temperate climate. The rein-deer never deserts the icy fields of the north, and the Lion degenerates when taken from beneath the line. Man is an inhabitant of the whole earth, but all inferior animals have their peculiar district. Terrestrial animals are found larger, fiercer and stronger in the warm, than in the cold and temperate climates. They are also more courageous and enterprising; all their dispositions seeming to partake of the ardour of their native soil.

The Lion is an inhabitant of all parts of Africa and the hotter regions of Asia, such as India and Persia, and a few are still to be found in the deserts between Bagdat and Bassorah, on the banks of the Euphrates; but they abound chiefly in the torrid zone, where their size is the largest and their rage more tremendous, being enflamed by the influence of a burning sun on a most arid soil. The Lions of Mount Atlas, the tops of which are eternally covered with snow, have neither the strength nor the ferocity of those amidst the scorched and desolate deserts of Zaraa or Biledulgerid. For in those burning deserts, where rivers and fountains are denied, they live in a perpetual fever; a sort of madness, fatal to every animal they meet with. Happily, indeed, the species is not very numerous, and seems diminishing daily, as all modern travellers in these countries have assured us. The Romans, in one year, carried fifty times as many Lions from Lybia, to combat in their amphitheatres, as are now to be found in the whole country. In Turkey, Persia, and the Indies, their numbers are also diminishing daily. This diminution is easily accounted for: it is occasioned by the increase of mankind, who alone are capable of subduing these tyrants of the forest. The arms of even an Hottentot or a negro make them more than a match for this noble animal, and they are generally victorious when they attack him. When they have discovered the Lion's retreat, they arm themselves with spears headed with iron, and provoke him to the combat: four men are generally considered as sufficient for such an encounter. The first against whom the lion flies, receives him on his spear, which furnishes the others with an opportunity of attacking him behind; the Lion, finding himself wounded in the rear, turns that way, which gives the first man time to recover. Thus is he attacked on all sides, till at length they disable and dispatch him.

The arts of man, thus exercised, serve to enervate and discourage these animals, as well as conquer them; for they are brave only in proportion to the success of their former encounters. In the vast deserts of Africa, where man has not fixed his habitation, lions are very numerous, and preserve their natural strength. Accustomed to conquest in their engagements with other animals, they become intrepid and terrible. They have never experienced the dangerous combinations of man, and therefore boldly face him, seeming to brave the force of his arms. Nor are they afraid of numbers; a single lion of the desert frequently attacks an entire caravan, and, when he finds himself overpowered, he maintains an obstinate combat, and faces the enemy till he dies: on the contrary, those lions which inhabit the peopled countries of Morocco and India, having experienced man's superiority, have so far lost their courage, as to be scared away with a shout; and only venture to attack the timid and unresisting flocks and herds, which women and children are sufficient to protect.

From this alteration in the Lion's disposition, it seems probable that the Lion might be tamed. The keepers of wild beasts often play with this animal, pull out his tongue, and even chastise him without a cause, which he usually permits with the utmost composure; but, if his anger should happen to be excited, the consequences are terrible. We are informed that a gentleman kept

a Lion in his chamber, and employed a servant to attend it, who, as is usual, sometimes caressed and sometimes chastised it: this gentleman was one morning awakened by a noise in his room, which he could not immediately discover the cause of; but, drawing the curtains, he perceived the Lion growling over the man's head, which he had separated from the body, and tossing it round the floor with his paws. He therefore caused the animal to be immediately secured.

As the passions of the Lion are strong, and his appetites vehement, it is not extraordinary that his natural ferocity should return; but he seldom exerts it against his benefactors. It appears, indeed, from numberless accounts, that his anger is noble, his courage magnanimous, and his disposition grateful. His courage is tempered with mercy, and he has been known to spare the weaker animals, as if they were beneath his attention.

The eyes of a Lion are always bright and fiery, and they preserve this look of terror even in death. The structure of the paws, teeth, eyes, and tongue, are perfectly the same as in a cat, and these two animals so nearly resemble each other in the internal parts, that there is hardly any distinction but in their size.

When hungry, the Lion attacks any animal that comes in his way; but, as he is a formidable enemy, and therefore carefully avoided, he is sometimes obliged to hide, in order to take them by surprize; and when his prey comes within a proper distance, he springs at it, and frequently seizes it at the first bound. His teeth are so very strong, that he finds no difficulty in breaking the bones of an animal, and he swallows them with the flesh. He laps like a cat, and drinks frequently, but slowly. He requires about fifteen pounds of raw flesh in a day, and prefers that of live animals, or of those which are just killed; seldom choosing to touch the bodies of any creature when they begin to putrify.

The roaring of the Lion, when heard in the night, and re-echoed by the mountains, resembles distant thunder. This roar is his natural note; his cry of anger being a different growl, which is short, broken, and reiterated. His cry of anger is also much louder and more formidable. He then lashes his sides with his long tail, and his mane seems to stand like bristles round his head; the muscles of his face are greatly agitated, and his huge eye-brows cover a great part of his glaring eye-balls; he discovers his teeth and tongue, and extends his formidable claws. Thus prepared for the war, few of the natives of the forest will venture to engage him. The elephant, the rhinoceros, the tiger, and the hippopotame are the only animals that presume to oppose him singly; but neither the leopard nor the wild boar will shun the combat, when provoked. They do not seek the Lion to engage him, but they will not fly at his approach. When compelled by extreme hunger, and then only, the Lion will attack those animals, but otherwise they pass by each other very quietly.

The young Lion always lives in the forest, at a great distance from any human habitation, where he remains while he is able to live by his natural industry; but when he becomes old, and less capable of hunting the savage inhabitants in those retreats, he ventures into places more frequented; attacks the flocks and herds near the habitation of the shepherd or the husbandman, and depends for support rather on his courage than his activity and address. In these desperate sallies, however, he never attacks men, if quadrupeds are to be found, unless they provoke him to engage.

The Lioness goes five months with young, and never produces more than two cubs at a time, which are harmless, pretty, and playful: they remain about twelve months at the teat, and are five years in coming to perfection. As to the length of a Lion's life, naturalists have hitherto been much mistaken; Mr. Buffon, and some others, saying they did not live above twenty or twenty-two years. But Pompey, the great he Lion, which died in the year 1760, was known to have been above seventy years in the Tower; and another lately died there, aged sixty-three years and upwards, which

was brought from the river Gambia. It is indeed highly probable, that, in his native forests, his age is equal at least to that of man.

The attachment of the Lioness to her young is excessive. Though naturally less strong, less courageous, and less mischievous than the Lion, she becomes terrible when she has young ones to make provision for: she then, with more intrepidity than the Lion, throws herself among men, and other animals; destroys every creature she finds, without distinction; loads herself with the spoil, and carries it reeking to her cubs, which she early initiates to cruelty and slaughter. She chooses, for her young, the most retired and inaccessible places, and often hides her tracks by brushing them out with her tail; and, if she has strong apprehensions of danger, she removes her young to another place. If she is obstructed in this office, she defends them courageously, and fights till she expires or conquers.

The Arabs entertain a notion that the Lion spares the tender sex, but Dr. Shaw informs us, that they make no distinction in these days: he likewise acquaints us that the flesh of the Lion is often eaten in Barbary, and that it resembles veal in taste. The animal called puma, which is mistaken for the Lion, is, when compared, a very contemptible animal, without either the shape, the size, or the mane of the Lion.

Plutarch says, that the Lion was consecrated to the sun; because, of all animals with crooked claws, it is the only one that is born with sight, and because it sleeps very little, and with its eyes open; but this is fabulous. The Lion was consecrated to Vulcan in Egypt, on account of its fiery constitution. The poets yoke two Lions to the chariot of Cybele, as appears by several medals. The effigy of a Lion was also carried in the sacrifices of that goddess; because the galli, her priests, had discovered the secret of softening and even taming Lions, to such a point as to touch and caress them without fear, according to Varro. The Leontines adored the Lion, and put its head on their coins.

NATURAL HISTORY of the TIGER.

NO quadruped can be more beautiful than this animal; the glossy smoothness of his hair, the extreme blackness of the streaks with which he is marked, on a ground of a bright yellow colour, agreeably strike the beholder. The elegance of his form is equal to the beauty of his colouring. He is larger than the leopard, though slenderer and more delicate. But the disposition of this animal is as mischievous, as his form is beautiful; as if providence intended to shew that beauty was of no estimation, by bestowing it on the most noxious of animals. The Tiger is peculiar to Asia, and is found as far north as China and Chinese Tartary; but the greatest numbers, the largest, and the most cruel, are met with in India and its islands. The principal distinction of the Tiger, and in which it differs from other mottled beasts, is in the form of its colours, which run in streaks in the same direction as the ribs, from the back down to the belly. On the leopard, the panther, and the ounce, the colours are broken in spots all over the body; but in the Tiger they extend lengthwise, and hardly a round spot is to be found on its skin.

Of all animals the Tiger most resembles the cat in shape, which, if observed through a proper magnifying glass, will convey a tolerable idea of the former. The Tiger is the only animal whose spirit seems untameable: neither force nor flattery has the least effect on its stubborn nature; and with equal malignity it snaps at the hand that feeds it, as that by which it is chastised. One of these animals was lately in the Tower, which had the appearance of being a good-natured inoffensive creature; it had neither ferocity nor anger in its countenance, and yet it was fierce and savage beyond measure; correction could not terrify it, nor indulgence tame it. The lion seldom ravages except when excited by hunger; but the Tiger is insatiable,

and continues the carnage after he is glutted with slaughter. When he discovers a flock or an herd, he gives no quarter, but levels all with indiscriminate fury, hardly finding time to appease his appetite, he is so intent upon satisfying the malignity of his nature. Animals of all kinds, whether wild or tame, fall a sacrifice to his fury, and he sometimes ventures even to attack the lion.

Tigers are the scourge of the country where they inhabit: they lurk among the bushes, on the sides of rivers, and almost depopulate many places; they seem to prefer preying on the human race rather than on any other animals. They do not pursue their prey, but bound on it from their ambush with great elasticity, and from a distance that is almost incredible. If they miss their object, they instantly retire; but if they succeed, they carry off their prey with the greatest ease, even if it is as large as a buffalo. If they are undisturbed, they plunge their head into the body of the animal up to the very eyes, as if it were to satiate themselves with blood. In their devastations, there is a sort of cruelty unknown to the generous lion; as well as a kind of cowardice in their sudden retreat on any disappointment.

There is a popular notion in some parts of India, that the rhinoceros and the Tiger are in friendship, because they are often seen near each other. The truth is, the rhinoceros, like the hog, loves to wallow in the mire; on which account he frequents the banks of the rivers; and the Tiger, to quench his raging thirst, is found in places contiguous to them.

Happily for the rest of nature, this animal is not common; the species being chiefly confined to the warmest provinces of the East. Some travellers have compared the Tiger to an horse, with respect to size, and others to a buffalo; while others have only said it was much larger than a lion. Mr. Buffon informs us that he has been assured by one of his friends, whose veracity he can rely on, that he saw a Tiger in the East-Indies of fifteen feet long. He probably included the tail, in these dimensions; therefore, allowing four feet for that, it must have been eleven feet from the tip of the nose to the insertion of the tail.

To give a complete idea of the strength of the Tiger, we shall quote the substance of a passage from father Frenchard, who saw a combat between a Tiger and two elephants at Siam. It was within a lofty pallisade, about an hundred feet square; at first three elephants were produced, with their heads and part of their trunk covered with a kind of armour: a Tiger was then brought forth from its den, of a size much larger than he had ever seen before. It was at first held with cords, and one of the elephants approaching, gave it several blows on the back with its trunk with such force, that the Tiger fell, and for some time lay motionless; but when he was set at liberty, though the first blows had greatly abated his fury, he made at the elephant with a loud shriek, and aimed at seizing his trunk. The elephant drew it up with great dexterity, received the Tiger on his great teeth, and threw it up into the air: after this it was discouraged from venturing again to approach the elephant; instead of which he made several circuits round the pallisade, frequently attempting to fly at the spectators. At length three elephants were sent against it, who struck it so terribly with their trunks, that it once more lay for dead; and it certainly would have been killed, had not the combat been put a stop to. From this account we may form an opinion of the strength of this animal, which under such disadvantages, ventured to continue the engagement against such potent enemies that were covered and protected from his fury.

We are informed by captain Hamilton, that in the Sundah Rajha's dominions, there are no less than three sorts of Tigers, the smallest of which are the fiercest. The small ones are about two feet high, the second three feet, and the larger sort above three feet and an half high. But the latter, though possessing superior powers, is less rapacious than either of the former. This formidable animal is called the royal tiger, and does not seem so ravenous nor so dangerous.

We have no certain accounts as to the number of young which the Tigress brings forth, but it is said she produces four or five at a time. Though furious at all times, upon this occasion her ferocity is incredible. If she is robbed of her young, enraged she pursues the spoiler, who, in order to save a part, usually drops one of her cubs: this she carries back to her den, and again pursues him; he then drops another, with which she runs to her den as with the former, and the plunderer generally escapes with the remainder before she returns. If she is robbed of all her young, she becomes desperate, boldly approaching the towns, where she commits incredible slaughter.

The skin of the Tiger is much esteemed all over the east, especially in China, where the mandarins cover their seats of justice with it; but in Europe, those of the panther and leopard are held in much greater estimation. The Indians sometimes eat the flesh of this animal, though they do not look upon it as a delicacy. There is an animal of America, improperly called the red Tiger, which Mr. Buffon calls the cougar: it is very different from the tiger of the East.

The Tiger often accompanies the monuments of Bacchus; and the chariot of that god is usually drawn by tigers. Tigers are sometimes seen at the feet of the Bacchanals. Is it to characterise the fury with which they are agitated?

NATURAL HISTORY of the PANTHER.

THIS animal has been mistaken for the tiger by many naturalists; and indeed it approaches next to it in size, in beauty, in cruelty, and in its general enmity to the animal creation. It is however spotted, and not streaked like the tiger; in which particular that animal differs also from the leopard, and most of the inferior ranks of this mischievous family. The Panther is an inhabitant of Africa, from Barbary to the remotest parts of Guinea. It is to Africa what the tiger is to Asia, with this alleviation, that it prefers the flesh of other animals to that of mankind; but, when excited by hunger, attacks every thing that hath life, without distinction. It seizes its prey like the tiger, always by surprize, and will also climb up the trees in pursuit of monkeys and lesser animals. It is an untameable species, always retaining its fierce malevolent aspect, and continual growl or murmur.

The antients were well acquainted with this animal. One would indeed have imagined that the Romans would have exhausted the deserts of Africa, by the numbers they drew from thence for their public shews. Scarus exhibited one hundred and fifty Panthers at one time; Pompey the Great four hundred and ten, and Augustus four hundred and twenty; but though they thinned the coasts of Mauritania of these animals, they swarm in the southern parts of Guinea to this day.

NATURAL HISTORY of the LEOPARD.

THE Leopard, called also the panther of Bengal, is a native of Senegal and Guinea. The principal differences between this animal and the panther abovementioned are these. The large panther is often found to be six feet long, from the nose to the insertion of the tail, and the Leopard or panther of Senegal, seldom exceeds four. The large panther is marked in different places with five or six spots, forming a kind of circle, with a large one in the middle. The latter has a more beautiful coat; the spots are smaller and disposed in clusters, which have a pleasing appearance, as the yellow ground is more brilliant. As to the rest, the spots of both are black, they are both whitish under the belly, and the tails of both are long; but those of the Leopard are rather longer in proportion. These animals spare neither man nor any other creature: when they cannot get a sufficient supply of the beasts of the chase, they descend in crowds from the internal parts of Africa, and make terrible havock among the numerous

QUADRUPEDS



JAGUARA



HYÆNA



ARMADILLO



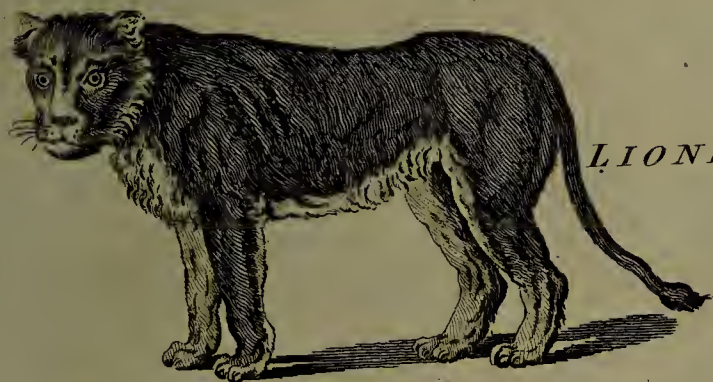
KANGUROO



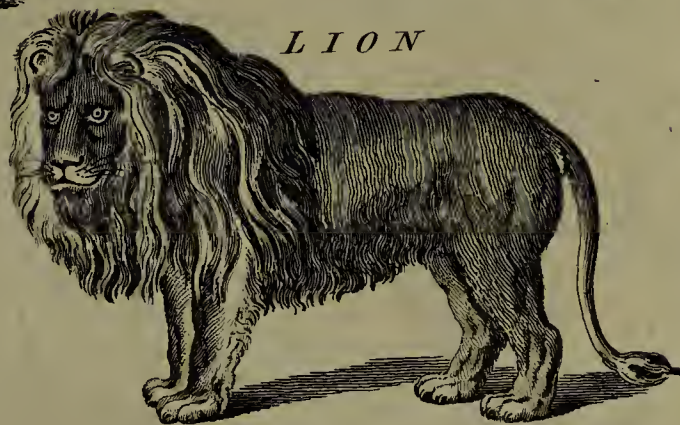
JERBOA



ICHNEUMON



LIONESSES



LION



MANTEGAR



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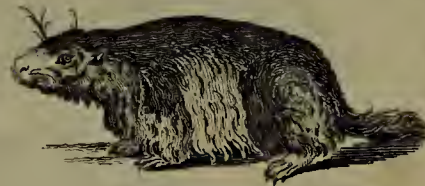
LORIS



MOLE



MARTIN



MARMOTTE



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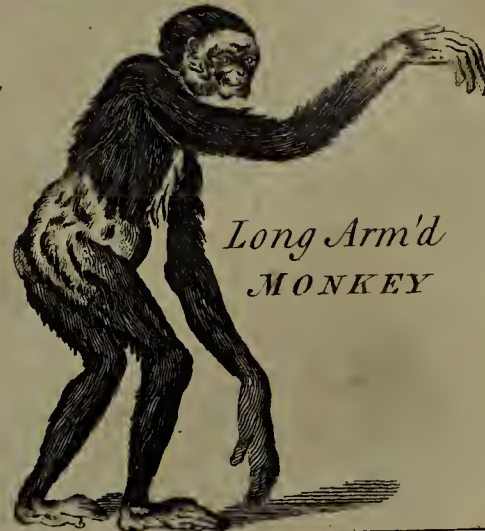
MORSE



MUSTELA



MOSCHIFERUM Animal



Long Arm'd
MONKEY

Taylor sculp.

London; Publish'd by Alex. Hogg, at the Kings Arms, N^o 16, Paternoster Row.



QUADRUPEDS



CHIMPANZEE
or ORANG-OUTANG



CANADA-PORCUPINE



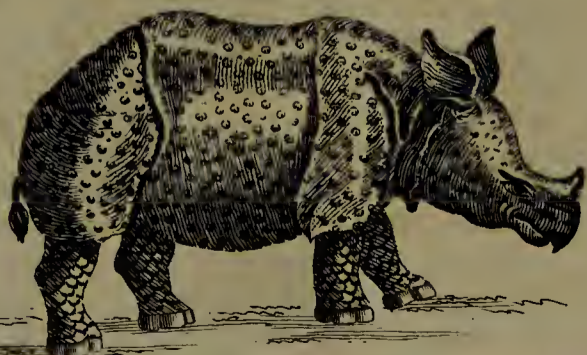
The CRESTED PORCUPINE



RACKOON



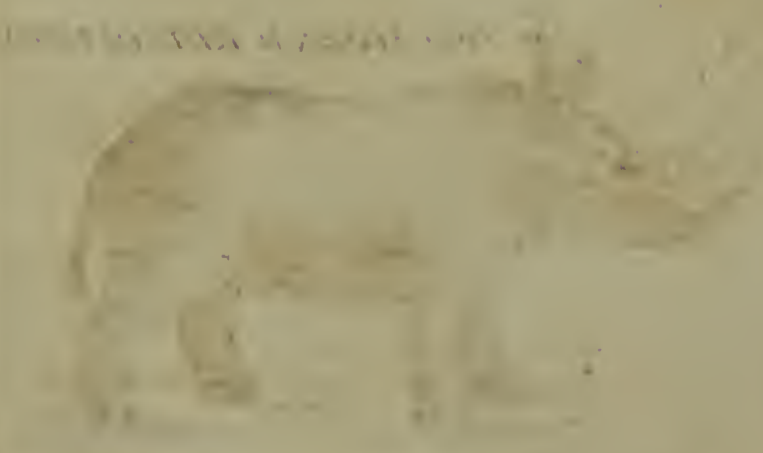
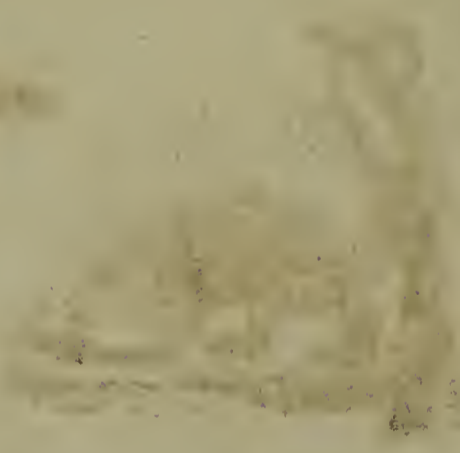
The ONE-HORN'D RHINOCEROS



The TWO-HORN'D RHINOCEROS



Fiastgate sculp.



rous herds that cover the rich meadows of the Lower-Guinea; they tear their prey in pieces both with their claws and teeth; and are always thin, though perpetually devouring. The negresses make collars of their teeth, to which they attribute certain virtues. These animals are taken in pit-falls, covered over with slight hurdles, on which a bait of flesh is placed. Their flesh is said to be well tasted, and as white as veal: their skins are very valuable, and are often brought into Europe.

The jaguar, or panther of America, resembles the two former, except in the disposition of its spots, and that its neck and head are rather streaked than spotted. These three animals have indeed but very slight differences. Mr. Buffon chiefly distinguishes them by the size.

The Hunting LEOPARD.

The face of this animal is slightly spotted, and its body is of a light tawny brown, marked with a great number of small round black spots; not in circles, but each distinct. Its tail is longer than the body, and of a reddish brown colour. It is about the size of a large greyhound, has a long body, narrow chest, and very long legs. It is a native of India, and is tamed and trained for the chase of antelopes. It is carried to the forest in a small kind of waggon, and is chained and hood-winked till it approaches the herd. It does not make its attack immediately as it is unchained, but winds along the ground, and endeavours to conceal itself till it gets a proper advantage, when it darts on the animals with surprizing swiftness. If it does not succeed in its first efforts, consisting of four or five leaps, it misses its prey; and, for that time, gives up the point, and readily returns to its master, having lost its breath, and finding itself unequal in speed.

NATURAL HISTORY of the OUNCE.

THE Ounce is considerably smaller than the panther, and seldom exceeds three feet and an half in length; but its hair is longer than that of the panther, and its tail still more so in proportion. The colour of the Ounce is rather inclining to a cream-colour, but rather whiter towards the belly than on the back: the hair on the belly is also longer than on the back. Its spots are disposed somewhat like those of the panther, except that on the haunches it has rather stripes than spots. This species is of a strong make, and has short legs and a short back. It is a native of Barbary, Persia, and China; and is an animal of a more gentle nature than most of the preceding. Like the last, it is used for the chase of antelopes, and even hares. It is not, like the leopard, conveyed in a waggon, but is carried on the crupper on horseback: it is as obedient as a setting-dog, returns at his master's call, and jumps behind him.

NATURAL HISTORY of the TIGER CAT.

THIS animal is called the Ocelot, by Mr. Buffon, and the Mexican ounce by Mr. Pennant. It is less than the ounce, but its skin is more beautifully variegated. It inhabits Mexico, the neighbourhood of Carthagena, and Brasil. It lives in the mountains, and is very voracious, but fearful of mankind. It preys on calves and different sorts of game. It lurks amidst the leaves of trees, and sometimes will extend itself along the boughs, as if dead, till the monkeys, tempted by their natural curiosity, approaching to examine it, become its prey. The fur is of a reddish colour, beautified with black spots, and streaks of different figures: the ears are striped across with black, but in other respects they resemble those of a cat. The colours however are not permanent, though minutely described by many naturalists, some of them having been seen that were entirely brown.

NATURAL HISTORY of the LYNX.

THE principal distinction between the Lynx and those of the panther kind, is in its tail, which is about half as long in proportion, and black at the extremity. Its fur is much longer, and the spots on the skin are tufted and irregular. Its ears are longer, and tipped with a black tuft of hair at the points. This animal does not exceed the ounce in size, but is rather stronger built, and has only twenty-eight teeth. It is an inhabitant of the hottest parts of South-America, and is a very fierce animal. Like the tiger, it plunges its head into the body of its prey, and sucks out the blood before it devours it. It makes a noise in the night like the howling of an hungry dog; but is a very cowardly animal, and easily put to flight, either by a shepherd's dog, or by a lighted torch, being much terrified at fire. It lies in ambush near the river side; and a singular combat sometimes happens between this animal and the crocodile. When the Lynx comes to the river to drink, the crocodile, which is always ready to surprize any animal that approaches, raises its head out of the water; the Lynx immediately strikes its claws into the only penetrable part of this dreadful reptile, which is the eyes; the crocodile instantly dives under the water, pulling his enemy after him, where they usually perish together.

NATURAL HISTORY of the COUGAR.

THIS animal is called the Red Tiger by Mr. Buffon, but it is extremely different from the tiger of the East. It is a native of the continent of America, from Canada to Brazil; and in South-America is called Puma, and mistaken for the lion. It is the scourge of the colonies in the hotter parts of America, and is fierce and ravenous to the highest degree. It swims over the broad rivers, and attacks the cattle even in inclosures. When pressed with hunger, it does not even spare mankind. But their fury is subdued by the rigour of the climate in North-America: the smallest cur, when accompanied by his master, will there make them seek for security by running up the trees; but then they are equally destructive to domestic animals, and are the greatest nuisance that the planter has. When they lay in wait for the moose or other deer, they lie close on the branch of a tree till the animal passes beneath, when they drop upon him, and immediately destroy him. Wolves are also the prey of this animal. The fur of the Cougar is soft, and esteemed among the Indians, who during the winter cover themselves with it; the flesh is eaten by them, and is said to be as white and as good as veal. The back, neck, rump, and sides of this animal is of a brownish red, mixed with dusky hairs, and the belly is whitish; the teeth are of a vast size, and the claws are white. It purrs like a cat, and has a tail about two feet eight inches long.

NATURAL HISTORY of the SIAGUSH.

THIS is a native of India, Persia, and Barbary, and resembles the lynx in size, in form, and in the singularity of being tufted at the tips of the ears. The upper-part of the body is of a very pale reddish brown; the tail rather darker; and the belly and breast whitish. The Siagush is often brought up tame, and used in the chase of lesser quadrupeds, and the larger sort of birds, which they surprize with great address. It is very fierce when provoked, and when it seizes its prey, it holds it fast in its mouth, and for some time lies motionless on it. This creature is said to attend the lion, and to feed on the remains of the prey which that animal leaves.

NATURAL HISTORY of the ANGORA CAT.

THIS animal has its name from the place it inhabits. It has long hair of a silvery whiteness, and silky texture; but it is remarkably long about the neck, where

where it forms a fine ruff: the hair on the tail is very long and spreading. These animals are in plenty in An-gora; the same country which produces the fine haired-goat. After the first breed, they degenerate in our climate.

NATURAL HISTORY of the CATUS-PARDUS.

THE Catus-Pardus, or Cat-a-Mountain is an American animal, two feet and a half in length from the nose to the root of the tail, and a foot and a half high, with a tail eight inches in length. He is extremely like a Cat except in the tail, which is much shorter in proportion to the rest of the body. Likewise the hair or fur is like that of a Cat, and of a reddish colour, only the belly and inside of the fore-legs have more of the white, and under the throat and lower jaw it is entirely white. The whole skin is beautified with black spots of different figures; for they are long on the back, and round on the belly and paws. On the ears there are black stripes, which run across, but in other respects they entirely resemble those of a Cat. The whiskers are more short in proportion than those of a Cat; and there is no long hair on the eye-brows and cheeks as we see in Cats.

NATURAL HISTORY of the CARCAJOU.

THIS animal, mentioned in a former chapter, is a sort of a Cat, whose tail is so long that it wraps several times round its body, which is of a reddish brown colour. He is an enemy to the moose deer, and when he can overtake one he leaps upon his neck, which he encircles with his long tail, and then opens the jugular vein. The deer has no other way to escape from him than by leaping into the water. Generally this animal, who has no quick smell, takes three foxes along with him, which soon find out the moose deer, and harass him in such a manner, that they force him to the place where the Carcajou waits for him; and after the prey is killed, the foxes come in for their share, as Pere Charlevoix affirms. The Carcajou sometimes lies in wait on the branch of a tree, till the moose deer comes within his reach; and then he leaps upon him, and kills him as before.

There is another animal called the Carcajou, which is of a blackish colour. The head is longer in proportion to the size, and the tail very short. It has also short legs, inasmuch, that it creeps upon the snow rather than walks, and is the slowest of all voracious animals. However, it is a fierce cunning creature; he will sit upon trees to watch the motion of the deer, and when one comes within his reach, he jumps down upon them, fastening on the shoulders, which he tears in an extraordinary manner, and the deer soon falls down with loss of blood.

NATURAL HISTORY of the SERVAL.

THIS is a native of Malabar, and resembles the panther in its spots, but the lynx in size, form, and the length of its tail. It is fierce and untameable, and lives in trees, where it breeds, and seldom descends on the ground. It leaps from tree to tree with great agility, and by the natives of Malabar is called the Marapute. By the Portuguese it is called the Serval, and Mr. Buffon gives it the same appellation. Its fur is of a whitish yellow, with dusky spots all over it. It has a very piercing ferocious look.

From what has been said of this rapacious tribe, a similitude of manners and dispositions may be perceived from the lion to the cat; the similitude of their internal conformation is still more exact, and the whole race may be considered as the most formidable enemies of mankind.

NATURAL HISTORY of the BLACK BEAR.

THERE are three different kinds of the Bear, the Brown Bear of the Alps, the Black Bear of North America, which is smaller, and the great Greenland, or White Bear. Though different in form and disposition, they are doubtless of the same original, and owe their principal variations to food and climate. The Bears of America are small and black, and feed only upon vegetables, particularly maize and potatoes, of which they are remarkably greedy; Du Pratz says the Bear will even reject animal food, though pressed by hunger; but Dr. Goldsmith affirms the contrary, declaring he has often seen the young ones, which are brought over to London, prefer flesh to every kind of vegetable aliment. These animals strike with their fore-feet like a cat, and very seldom use their mouths in fighting, but seize the assailant with their paws, and, pressing him against their breast, almost squeeze him to death. When the females are with young, they retire into the most secret places; lest, when they bring forth, the males should destroy their cubs: their retreat during their pregnancy is so impenetrable that out of the several hundred Bears that are killed in America during winter, (which is their breeding season) hardly a single female is found among them. They bring forth two, and sometimes three at a time; and though the cubs are deformed, they are not so shapeless as to be licked into form, as the ancients pretended. The flesh of a Bear in autumn, when they are become exceedingly fat, by feeding on acorns and other mast, is most delicate food; and that of the cubs is still more excellent; but the paws of the old Bears are reckoned the most delicious morsel. Their fat also, which preserves a certain degree of fluidity, is very white and sweet.

After having fattened himself to the greatest degree, the Bear retires to its den, where he continues forty or fifty days in total inactivity, and abstinence from food; but, at the end of that time, he is forced from his retreat by hunger, and when he comes forth to seek for fresh nourishment, he seems to have slept all his flesh away. It is a vulgar error, that during this time, they live by sucking their paws; they rather subsist upon the exuberance of their former flesh, and only feel the call of appetite, when the fat which they had acquired in summer, becomes almost exhausted.

Their retreats are either in the cliffs of rocks, in the deepest recesses of the thickest woods, or in the hollows of decayed trees, which they ascend and descend with surprising agility. Multitudes of Bears are annually killed in America for the flesh and skins, both of which are valuable, but the latter makes a considerable article of commerce.

The Bear has a long head, small eyes; and short ears, rounded at the top. Its body is covered with very long and shaggy hair. Its limbs are strong, thick, and clumsy; it has a short tail, and large feet. Besides the black, brown, and white Bears, there are some on the confines of Russia, which are black mixed with white hairs, and are called by the Germans silver-bar.

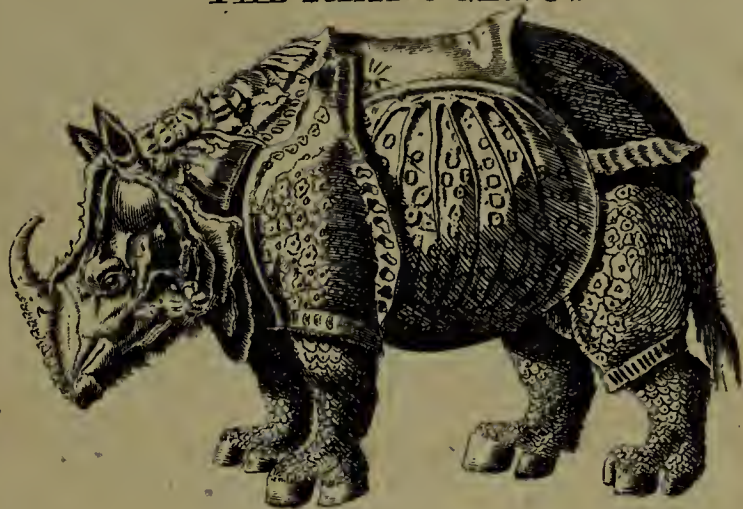
The BROWN BEAR.

The Brown Bear is not only savage but solitary; it is sometimes carnivorous, and will destroy cattle, and eat carrion; but the general food of this and the other varieties, is roots, fruits, and vegetables: it will rob the fields of pease, and pluck up great quantities of them when they are ripe: it will afterwards beat them out of the husks on some hard place, eat them, and carry away the straw. In the winter it will also break into the farmer's yard, and make great havock among his oats.

The voice of the Bear is a kind of growl, and though, when tamed, it appears gentle and placid to its master, yet it should be cautiously managed, as it is often capricious, treacherous, and revengeful. This animal, though in appearance extremely awkward and stupid, is capable of receiving some instruction. There are very few who have not seen it dance upon its hind feet; though its air and motions are so ungraceful, that a bad performer

QUADRUPEDS

THE RHINOCEROS



THE CAT A MOUNTAIN



THE GULO



THE BOAR



THE OTTER



THE JACKALL



THE WOLF



THE CAT



THE SIBERIAN FOX



THE SEA CALF



THE IBEX



THE SEA HORSE



THE HORSE



THE ZEBRA



Remboldson sculp.

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performer at a ball, is said proverbially to dance like a bear. It is taught to perform in this manner, by setting it upon hot plates of iron, and playing to it while it is in this uneasy situation.

When come to maturity the Bear can never be tamed; but notwithstanding its fierceness, the natives in those countries where it inhabits, hunt it, with great alacrity. The most general and least dangerous method of taking it is thus: they mix brandy with honey, of which it is extremely fond, and laying it in the hollow of trees, the animal finds it, devours it, and becomes intoxicated. In Canada, where Black Bears are very numerous, and where their dens are made in trees, which are hollow towards the top, they are taken by setting fire to their retreats, which are frequently from twenty to thirty feet from the ground. The old Bear generally ventures first out of its den, and is shot by the hunters, and the young ones, as they descend, are caught in a noose.

THE WHITE OR POLAR BEAR.

The White Bear grows to a vast size, and as the lion is the tyrant of an African forest, so the Bear is the undisputed master of the icy mountains in Greenland and Spitzbergen. When our mariners land in unfrequented places, upon any of those shores, the White Bears come down to view them: they approach slowly, as if they were undetermined whether to advance or retreat, being naturally a timid animal, but it is encouraged by success. When shot at, or wounded, they endeavour to fly, but if they find themselves incapable of flight, they make a fierce and vigorous resistance till they die. These animals live upon fish, seals, and the carcases of whales; they also feed on human bodies, which they greedily disinter. They delight in human blood, and are so daring as to attack companies of armed men, and even to board small vessels. In the summer, the White Bears reside on an island of ice, or pass from one island to another. They are good swimmers, and dive with great agility; but sometimes a battle ensues between a Bear and a morse or a whale, in which the latter is generally victorious, as being more expert in its own element. If the Bear, however, should be fortunate enough to find a young whale, he is sufficiently repaid for the danger he incurs of meeting with the parent.

The affection between the female White Bears and their young is so strong, that they would rather die than desert each other. This animal is confined to the coldest part of the globe; the frigid islands seem entirely adapted to its nature; for it does not appear from any authority that it is met with farther south than Newfoundland. Such as have appeared in other parts have been involuntarily carried there on floating islands of ice; so that the countries of Norway and Iceland are acquainted with them only by accident.

The flesh of this animal is white, and has the taste of mutton: its fat is melted for train-oil, and that extracted from the feet is used in medicine. The liver is very unwholesome; three of Barentz's sailors having eat some of it boiled, fell dangerously ill. One of this species was shewn in England a few years ago. It roared loud, was very furious, continually in motion, and seemed very uneasy, except when water was poured over him to cool him.

It often happens, that when a Greenlander and his wife are paddling out at sea, by coming too near an ice-boat, a White Bear unexpectedly jumps into their boat, and if he does not overset it, sits calmly where he first came down, and like a passenger suffers himself to be rowed along. It is probable the poor little Greenlander is not very fond of his new guest, however he makes a virtue of necessity, and hospitably rows him ashore.

NATURAL HISTORY of the WOLVERENE or GLUTTON.

THIS animal is called the Wolverene by the factory at Hudson's Bay, but by the natives, Quickhatch. It has a black sharp-pointed visage, and short round ears, almost covered with the hair. On the head, back,

and belly, the hair is reddish, with black tips, so that at the first view those parts appear quite black; the sides are of a yellowish brown: on the throat is a white spot, and on the breast a white mark in the form of a crescent: the legs are of a deep black, and thick, short, and strong. This animal rests on its foot like the bear as far as the first joint of the leg. Its tail is clothed with long coarse hair, reddish at the base, and black at the end. The length of this creature is twenty-eight inches from nose to tail, and the whole body is covered with very long and thick hair, varying in colour according to the season. It is an inhabitant of Hudson's Bay and Canada, and is found under the name of the Glutton in the northern parts of Europe and Asia, being a native of the most rigorous climates. It is a most voracious animal, but so slow of foot, that it is obliged to take its prey by surprize. It often lurks in trees, and falls on the quadrupeds that pass under. It will fasten on the shoulders of the horse, elk, or stag, and continue eating a hole into its body, till the animal falls down with the pain. It searches for the traps intended for fables and other animals, and often is beforehand with the huntsman, who sustains great losses by the Glutton.

It is very fierce in a wild state, and is a terror to both the wolf and the bear. The skin is sold in Siberia for five or six shillings; and it is still more valuable in Kamtschatka, where the women embellish their hair with its white paws, which they esteem a great ornament. The fur is in great estimation in Europe; that of the north of Europe and Asia is much finer, blacker, and more glossy than that of the American kind.

NATURAL HISTORY of the RACCOON.

THIS animal is about the size of a small badger. Its body is short and bulky; it has a sharp-pointed black nose, short ears, and eyes surrounded with two broad patches of black; the upper jaw is longer than the under; the teeth resemble those of a dog; the tail is thick, but tapering, and regularly annulated with black; the fore-feet are shorter than the hinder, and both are armed with five sharp claws. It inhabits the warm and temperate parts of America, and is also found on the mountains of Jamaica. It is easily tamed, and is then very good-natured and sportive, but as unlucky as a monkey, and perpetually in motion. Like the squirrel, it holds its food in its paws whilst eating; in this respect it differs from the monkey-kind, which use only one hand upon these occasions, but the Raccoon and the squirrel use both. Tho' this animal is short and bulky, it is extremely active; with the assistance of its pointed claws it climbs nimbly up the trees; it runs upon the trunk with the same facility that it moves upon the plain; and sports upon the branches of the trees with ease, swiftness, and security. It is very curious and inquisitive, examining every thing with its paws. It is extravagantly fond of sweet things, and strong liquors, and will get excessively intoxicated. Like the fox, the Raccoon is very destructive to poultry, and, like that animal, has a large portion of cunning. It will eat any kind of fruit, green corn, &c. and, if near the coast, will feed on oysters at low water. It will watch the opening of the oyster, and snatch out the fish with its claw; but sometimes the shell closes upon its paw, and keeps it fast till the coming in of the tide, by which means the Raccoon is drowned. The fur of this animal is next to that of the beaver, and is excellent for making hats. There is one very remarkable peculiarity in the Raccoon. In drinking it both sucks up its liquor like the horse, and laps it like the dog.

NATURAL HISTORY of the BADGER.

THE legs of this animal appear very short, and the body almost to touch the ground. It has small eyes, short round ears, and a short thick neck; the nose, chin, lower sides of the cheeks, and the middle of the forehead, are white; it is covered with long coarse hair like bristles, which makes the animal's legs seem much shorter

shorter than they really are. The usual length of the Badger is two feet four inches, exclusive of the tail, which is about four inches. The hair on the body is of three colours, the bottoms are of a dirty yellowish white, the middle black, and the ends grey; whence arose the proverb, "As grey as a badger." It has a gland under its tail, which exudes a substance of a foetid smell: this seems peculiar to the hyæna and the badger. It is a solitary stupid animal, and, remote from man, digs a deep hole with great assiduity. It steals out at night to find subsistence, but seldom quits its retreat in the day-time, choosing, it is imagined, to avoid the light.

The fox, not being expert at digging into the earth, or not choosing to take much trouble, cunningly takes possession of that which has been quitted by the Badger, and, some say, forces it from its retreat, by offensive discharges at the mouth of the Badger's hole.

The Badger is accused of destroying lambs and rabbits; but there appears to be no foundation for the charge: though furnished with strong teeth, as if it was formed for rapine, it is found to be an inoffensive animal, feeding upon roots, fruits, grubs, insects, and frogs. Nature having denied this animal the speed and activity requisite to escape its enemies, hath supplied it with such weapons of offence, that very few creatures would hazard the attacking it: when pursued, it soon comes

to bay, and combats with desperate resolution. It is an indolent animal, and sleeps the greatest part of its time; it is therefore always found very fat. The female brings forth but once a year, which is in summer, and generally produces four or five at a time.

These animals are hunted in the winter nights, and when taken, their hind quarters are sometimes made into hams, which are said to be good eating. The skin, with the hair on, is used for pistol-furniture, and of the hair, brushes are made to soften shades in painting. Badgers inhabit most parts of Europe, as far north as Norway and Russia, and the desert beyond Orenburg, in the Russian Asiatic dominions, north of the Caspian sea. They are also found in China, and are often seen in the butchers shops in Pekin, being much admired by the Chinese. The parts of England in which they now chiefly abound, are Essex, Suffex, and some of the midland counties.

The way to catch Badgers is with a springe, or steel trap, or to dig a pit across their path, five feet deep, and four feet long, making it narrow at the top and bottom, and wide in the middle. This must be covered with small sticks and leaves, that the Badger may not suspect any design, and that he may fall in when he comes upon it. Some hunt them into their holes in a moon-shine night, and then dig them out.

C H A P. X.

The NATURAL HISTORY of QUADRUPEDS of the WEASEL Kind.

Containing a descriptive Account of the WEASEL; the STOAT, or ERMINE; the POLE-CAT; the FERRET; the MARTIN; the SABLE; the GUINEA WEASEL; the ICHNEUMON; the SQUASH; the STIFLING WEASEL; the CIVET; the OTTER; the CAVY, &c.

THE Weasel kind may be distinguished from other carnivorous animals, by their long and slender bodies, which enable them, like worms, to wind into very small openings after their prey. They have indeed received the appellation of vermin, from their resembling the worm in this particular. In the formation and disposition of their claws, these animals differ from all those of the cat kind, as they can neither draw them in nor extend them, as cats are known to do. They are cloathed with fur rather than with hair, and therein differ from the dog kind. All of this kind, however, are more distinctly marked by their actions and dispositions than by their external forms. They are all cruel, cowardly, and voracious, subsisting only by theft, and principally protected by their smallness and insignificancy. Having short legs, they are all slow in pursuit, and obtain a support by cunning, patience, and assiduity. Their prey being precarious, they often live a long time without food; but when they meet with success, they destroy all about them before they begin to feed, and suck the blood of every animal before they regale upon its flesh. The Weasel is the best known of any of this kind, and will serve as a model for all the rest; for the particulars in which they differ from this little animal are not very considerable.

NATURAL HISTORY of the WEASEL.

THE Weasel is the smallest of this numerous tribe, the length of the head and body not exceeding six or seven inches. The tail is about two inches and a half long, and ends in a point. The length of this animal, however, appears very great when compared with its height, which does not exceed an inch and an half. The eyes are small and black; the ears are large, and the lower parts of them doubled in. The head, tail, legs and feet, and the upper part of the body, are of a very pale tawny brown; the lower

part of the body, from the chin to the tail, is white; but on each jaw is a spot of brown, beneath the corners of the mouth. It has whiskers, and thirty-two teeth, which are two more than any of the cat kind have, and they seem well adapted both for chewing and tearing.

Though a very diminutive animal, the Weasel is a very formidable enemy to those that are much larger. Like the rest of its kind, it is very destructive to rabbits, poultry, and young birds, and is also a great devourer of eggs. It is held in different estimation in different parts of the world. It is a most noxious animal in those places where lambs are bred; but where agriculture is chiefly followed, the Weasel is considered as a friend, that destroys such vermin as live chiefly upon corn. The Weasel frequents out-houses, barns and graineries; where, in order to make some atonement for its depredations among our poultry, it presently clears its haunts from rats and mice, being a greater enemy to them than even the cat itself.

This is an untameable and untractable creature. When kept in a cage, either for amusement or inspection, it will not touch its victuals if any person looks on. It seems continually agitated, and so terrified at the sight of mankind, that, if not permitted to hide itself from their view, it will even expire. It must therefore have a sufficient quantity of wool or hay in its cage, under which it may conceal itself and whatever it has to eat. It passes three parts of the day in sleeping, and employs the night in exercise and eating.

At the approach of evening, this animal, in its wild state, is seen stealing from its hole, and creeping about the farmer's yard in search of prey. If it enters the place where poultry are kept, it never attacks the old cocks and hens, but aims immediately at the young ones. It does not eat its prey on the spot; but, after killing it, carries it off to its young or its retreat. This creature is remarkably active, and, in a confined place, scarce any animal can escape it. It will run up the sides of walls with such facility, that few places

are secure from it; and its body is so slender, that there is hardly a hole but what is pervious to it. In winter this animal chiefly confines itself to barns and farm-yards; all this season it makes war upon rats and mice: it creeps also into pigeon-holes, and destroys the young. It ventures farther from the house in summer, and particularly into those places where the rat goes before it. It is found principally in the lower grounds, by the side of waters, and near mills, and frequently conceals its young in the hollow of a tree.

The female makes an excellent bed for her little ones, of which she generally brings forth four or five at a time: like those of the dog kind, all these animals bring forth their young blind; but they soon acquire sufficient strength to accompany the dam in her excursions, and to be accomplices in her petty thefts. This animal, as well as all those of its kind, has a very strong offensive smell, proceeding from the foetid glands beneath the tail. The Weasel smells stronger in summer than in winter, and still more abominably when irritated or pursued. It has no cry, except when it is struck, and then it expresses its resentment and pain by a kind of squeak.

NATURAL HISTORY of the STOAT or ERMINE.

THE difference between the Stoat and weasel is so very inconsiderable, that many naturalists, and among the rest Linnæus, have confounded the two kinds together: the Stoat or Ermine, however, differs from the weasel in size, being usually nine or ten inches long, and the former seldom exceeding six or seven. The tail of the Ermine is always tipped with black, has more hair, and is longer in proportion to the body. This animal indeed, like the weasel, is of a lightish brown, and, like the weasel in the northern parts of Europe, changes its colour in winter, and becomes white; but still the weasel may be distinguished from the Ermine by the tip of its tail, which is always black.

The Ermine is remarkable for the softness, the closeness, and the warmth of its fur, which is the most valuable of any hitherto known. The skins and tails are a very valuable article of commerce in Norway, Lapland, Russia, and other countries, where they are found in prodigious numbers. The Stoat is sometimes found white in Great-Britain, but not often; and then it is called a White Weasel. The Ermine is observed to begin to change its colour from brown to white in November, and to resume the brown the beginning of March.

It is not easy to account for the remarkable warmth of the furs of northern quadrupeds. Nature, it may be said, fits them thus for the climate; and, like an indulgent mother, when she exposes them to the severest rigours of winter, supplies them with a covering, to shield them from its inclemency: but how does nature furnish them in this manner? It is observable in many animals, that a thin sparing diet produces a quantity of hair: children, dogs, and horses, that have been ill fed, are more hairy than those whose food has been more plentiful. This may therefore be one cause that, in winter, the animals of the north are more hairy than those of the milder climates. The whole country is then covered with deep snow, and what the Ermine can procure must be scanty and precarious. The severity of the cold also contracts the pores of the skin, and the hair naturally takes the shape of the aperture through which it grows, as wire is made smaller by being drawn through a smaller orifice. It is however certain, that most of the animals of the arctic climates have garments adapted to the winter as well as to the summer.

This animal resembles the weasel in its habits, and its choice of food; but does not frequent houses. Its haunts are woods and hedges, especially such as border on brooks or rivers. Its agility is equal to that of the weasel, and its scent is equally foetid.

NATURAL HISTORY of the POLE-CAT.

THE Pole-cat is larger than the weasel or the ermine, being about seventeen inches in length, exclusive of the tail, which is six. It is a deep chocolate colour, has a space of white round the mouth; the ears are short, rounded, and tipped with white. It so nearly resembles the ferret in form, that many have supposed them to be the same animal. Like the whole genus, it is long and slender, nimble and active, and will creep up the sides of walls with great agility. Like the rest of the tribe, the Pole-cat is very destructive to poultry of all kinds; it also makes a common practice of robbing the dairy, and is a formidable enemy to pigeons; but the rabbit seems to be its favourite prey: a single Pole-cat is almost sufficient to destroy a whole warren, for it has such an insatiable thirst for blood, that it kills much more than it can devour. The female brings forth about five or six at a time.

Warreners assert that the Pole-cat will mix with the ferret, and that they frequently procure an intercourse between these animals, to improve the breed of the latter; which becomes less eager after rabbits, and consequently less useful, by being long confined. Mr. Buffon denies that the ferret will admit the Pole-cat, yet gives a variety under the name of the Ferret Pole-cat, which has the appearance of being a spurious offspring. In many respects the ferret agrees with the Pole-cat, particularly in its thirst after the blood of rabbits. When alive, the smell of the Pole-cat is rank and disagreeable even to a proverb; the skin is nevertheless dressed with the hair on, and used for tippets, &c. like other furs.

NATURAL HISTORY of the FERRET.

THIS animal is a kind of domestic in Europe. It is a native of Africa in its wild state, from whence it was originally brought into Spain, in order to free that country from the multitudes of rabbits with which it was over-run; and from thence the rest of Europe was supplied with it. It has a very sharp nose, red and fiery eyes, and round ears. The colour of the body is a pale yellow, but it is also found of all the colours of the weasel kind, white, black, brown, and party-coloured. It also resembles the weasel in the slenderness of its body and the shortness of its legs. It is a lively active animal, and the natural enemy of rabbits; it sucks the blood of its prey, but very seldom tears it. Ferrets breed in our climate, and bring from five to nine at a time; but they are apt to degenerate and lose their savage nature, till an intercourse can be procured between the Ferret and the pole-cat, which in some degree restores the former to its natural ferocity. The Ferret has the same disagreeable smell as the pole-cat.

The Ferret is not at present to be found in Great-Britain, except in its domestic state; and it is kept tame entirely for the purposes of the warren. The chief use of a Ferret is to enter the holes of the rabbits, and drive them into the nets that are prepared for them at the mouth. For this purpose it is muzzled, or, instead of driving the animal out, it would only kill it and suck its blood: but, by this contrivance, the rabbit escapes from the Ferret, and precipitately runs to the mouth of the hole, where it is entangled in the net provided for that purpose. Sometimes indeed it happens that the Ferret disengages itself of its muzzle, when it is usually lost, unless it be dug out; for, finding all its wants supplied in the warren, he continues there during summer, and in the winter perishes with cold.

These animals are usually kept in boxes, like rabbit-hutches, and are furnished with wool, of which they make themselves a warm bed to defend them from the rigour of the climate. The Ferret is an useful, but a disagreeable and offensive animal. Its scent is foetid, and its nature voracious: it is tame without any attachment, and has so strong an appetite for blood, that it has been known to kill infants in the cradle. It is easily

easily irritated, and then its smell is uncommonly offensive, and its bite is not to be cured but with great difficulty.

NATURAL HISTORY of the MARTIN.

THE Martin differs from the pole-cat, in being about four or five inches longer; its tail is also longer in proportion, and more bushy at the end. It is a beautiful little animal; its head is small and elegantly formed; its eyes are lively; and its colours are elegant: the back, sides, and tail, are covered with a fine thick down, with long hair intermixed; the bottom is ash-coloured; the middle of a bright chestnut colour, and the tips black; the head is of a reddish brown; the throat and breast are white; the belly of the same colour with the back, but rather paler; the hair of the tail is very long, especially at the top, where it appears thicker than near the insertion. But these animals vary in their colours, inclining more or less to ash-colour, according to their ages or the seasons of the year.

All the motions of the Martin display grace as well as agility: it is easily tamed, and when taken young is extremely playful, being continually in good humour. If it happens to get loose, it is not so strongly attached to its master, but it will take the advantage of its liberty, and retire to its proper haunts. It makes terrible havock among poultry, game, &c. and will destroy rats, mice, and moles. In this country it inhabits woods, and makes its bed in the hollow of trees.

The scent of this animal, instead of being offensive, is considered as a most pleasing perfume. The skin of the Martin is a valuable fur, and is much used for linings to the gowns of magistrates.

There is a variety of this animal, called the yellow-breasted Martin, which differs from the former only in having a yellow breast; the breast of the other being white. It inhabits large forests, especially those of pines, and its prey is the same as the former, but its fur is much more valuable.

NATURAL HISTORY of the SABLE.

THE sable resembles the martin both in form and size, and the weasel in the number of its teeth; the martin having thirty-eight teeth, and the weasel but thirty-four; therefore, in this respect, the sable seems to make the shade between these two animals. It has long whiskers, rounded ears, large feet, white claws, and a long bushy tail. The skin of the sable is the most coveted, and held in the highest esteem of any of the furs of this tribe of animals. It is of a brownish black, and the darkest is the most valuable: a single skin being often sold for ten or fifteen pounds. But the fur, which is so valuable, is not always the same. Some of these species are of a dark brown all over the body, except the ears and the throat, where the hair is yellowish; and there are instances of their being found of a snowy whiteness. The sable resembles the rest of the weasel kind in vivacity and agility, in sleeping by day, and searching for their prey by night, and in the disagreeable odour by which that race is chiefly characterized. These animals inhabit Siberia and Kamtschatka, and some few of them are found in Lapland. They usually live in holes in the earth, or beneath the roots of trees; and sometimes, like the martin, they form their nests in the trees, and will skip from one to the other with great agility. They bring forth about the end of March, or the beginning of April, and produce from three to five at a time, which they suckle about a month.

These animals are hunted in the winter for their skins, as they are only then in season. In Siberia, the hunting of the sable chiefly falls to the lot of the condemned criminals, who are sent from Russia into those dreary and inhospitable forests; and thus the luxuries and ornaments of the vain, are obtained by the miseries of the wretched. These criminals are obliged to furnish a certain number of skins annually, or receive punishment

in proportion as they fall short of the limited quantity. The sable is also killed by the Russian soldiers, who are sent into Siberia for that purpose. Like the criminals, they are taxed a certain number of skins yearly, but, as an encouragement, they are permitted to share among themselves the surplus of the skins which they thus procure.

NATURAL HISTORY of the GUINEA WEASEL.

THIS animal is about the size of a rabbit, of a dusky colour, and its form is like that of a rat. Its upper jaw is much longer than the lower, and its eyes are placed about the mid-way between the ears and the tip of the nose. Its ears are like human ears, and it has a remarkable rough tongue. It inhabits Guinea, and is very common about the negro settlements. It burrows like a rabbit, and is so fierce, that if provoked, it will fly at either man or beast.

NATURAL HISTORY of the ICHNEUMON.

THE Ichneumon is usually of the size of the martin, and greatly resembles it, except that the hair, which is generally of a grizzly black, is rougher and less downy; though the colour is various in different animals from different countries. The tail is less bushy at the end than that of the martin, and every hair has three or four colours, which are seen in different dispositions of its body.

This animal, which is also called the Rat of Pharaoh, has all the strength, agility, and instinct of a cat; it has a more universal appetite for carnage, and a greater variety of methods to procure it. Every living creature which it is able to overcome, it ventures to attack, and preys upon every kind of flesh. Neither the strength of the dog, nor the malice of the cat, can terrify it; neither the claws of the vulture, nor the poison of the viper, can intimidate it; fearless of their venom, it makes war upon all kinds of serpents, and when it perceives the effects of their rage, it obtains an antidote from a certain root, which the Indians call by its name, after which it returns to the attack, and seldom fails of victory. Rats, mice, birds, serpents, lizards, and insects, are all equally pursued by this animal; but it is particularly serviceable to the Egyptians, as it is a great destroyer of the eggs of crocodiles, which it digs out of the sand, and even kills multitudes of the young of those terrible reptiles, before they have been able to reach the water. It is even said, that when it finds a crocodile sleeping on the shore, it boldly enters the mouth of that animal, attacks the enemy in the inside, and, when it has effectually destroyed it, eats its way out again.

The eyes of this animal are sprightly and full of fire, and its physiognomy sensible. Like the rest of its kind, it has glands that open behind, and furnish an odorous substance. It will take the water like an otter, and continue longer under it. It is found in Egypt, Barbary, India, and its islands. It is at present domesticated, and kept in houses in Egypt and India, where it is more useful than a cat in destroying rats and mice. It grows very tame, and will sit up like a squirrel, feeding itself with its fore-feet, and catching any thing that is thrown to it.

The inhabitants of Heracleopolis paid divine honours to the Ichneumon, as to a gracious being, because this little animal is continually seeking the eggs of crocodiles, to break them. "And, what is extraordinary," says Diodorus, "it never eats them, and thus appears condemned by nature to a labour, the utility of which extends only to man. If it did not take that care, the river would be inaccessible to mankind, by reason of the multitude of crocodiles with which the banks would be surrounded. The Ichneumon kills the crocodiles themselves by a piece of craft altogether singular, and which is scarce credible. Whilst the crocodile sleeps on the shore, with its mouth open, the Ichneumon, after rolling

ling itself in the mud, enters on a sudden into its body; there it devours its entrails, and afterwards comes out, without danger, from the belly of the animal, whom it leaves dead." The Ichneumon was consecrated to Latona and Lucina.

NATURAL HISTORY of the SQUASH.

THE upper jaw of this animal is much longer than the lower; its ears are rounded, and its hair pretty long, hard, and upright. It is varied with black and white, and has only four toes on each foot before, though all other weasels have five.

NATURAL HISTORY of the STIFLING WEASEL.

THIS animal has a short slender nose, short ears and legs, and its body is black and full of hair. Its tail, which is long, is black and white. Its length, from the nose to the insertion of the tail, is about eighteen inches. It is a native of Mexico, and probably some other parts of America.

This animal, the conéate of Buffon, the skunk, the zorilla, and fizzler, are all remarkable for the pestiferous, stinking, and suffocating vapour they emit from behind, when attacked, pursued, or terrified. It is indeed their only means of defence. Some turn their tail to their enemy, and emit a horrid effluvia, and others ejaculate their urine to a very considerable distance: the terrible stench immediately stops the pursuers, and, if any of this liquid should happen to fall into the eyes, it almost occasions blindness; if on the cloaths the smell will continue for several days, and cannot be removed by washing: they must even be buried in fresh earth in order to be sweetened. Dogs that have been used to hunt this animal will kill it, but others run back as soon as they perceive the smell. Even those dogs which have been accustomed to them are obliged to relieve themselves, by frequently thrusting their noses into the ground. Professor Kalm says, he was in danger of being suffocated by one that was pursued into a house where he slept; and the cattle were so much affected, that they bellowed through pain. Another, which was killed by a woman in a cellar, so affected her with its stench, that she kept her bed for several days after, and all the meat, and other provisions that were kept there, were so infected, that the owner was obliged to throw them away. Notwithstanding this, the Americans eat its flesh, which they reckon good food; but they are careful to deprive it of those glands which are so abominably offensive.

The Virginian species is capable of being tamed, and will follow its master like a dog, and never emits its vapour except it is injured or frightened.

In other respects, the squash, the conéate, the skunk, the zorilla, and the fizzler, do not materially differ. The squash is about the size of a pole-cat, and its hair is of a deep brown; but, as already observed, it has only four toes on each foot. The skunk also resembles a pole-cat in shape and size, but its colour is partly black and partly white, variously disposed over the body: and the hair is very long, glossy, and beautiful. Mr. Buffon supposes the conéate and the zorilla to be the same; and indeed it appears needless to make a distinction, as they perfectly resemble each other, except in size; the conéate being somewhat smaller. The zorilla resembles the skunk, but is smaller, and more beautifully coloured, its streaks of black and white being more distinct and regular.

NATURAL HISTORY of the CIVET.

LIKE the rest of the weasel kind, the Civet has a long slender body, short legs, and an odorous matter exuding from the glands behind. It also resembles the rest of the tribe in the softness of its fur, the number of its claws, and their incapacity of being sheathed; but it differs from them in being much larger than any of those which have already been described;

its length from nose to tail being about two feet three inches, the tail fourteen inches, and the body pretty thick. It has a long nose like that of a fox. The colour of the Civet varies, but it is usually ash spotted with black; though in the female it is whiter and tending to yellow, and the spots are much larger, like those of the panther; the Civet has whiskers, like the rest of its kind, and its eyes are black and beautiful.

This animal inhabits India, the Philippine islands, Guinea, Æthiopia, and Madagascar. The famous drug musk, or Civet, is produced from an overture between the privities and the anus, in both sexes, secreted from certain glands. Those who keep them, provide for them a box for an habitation, and procure the musk by scraping the inside of the box about twice or three times a week with an iron spatula, and get about a dram each time. But it is difficult to get it pure, being generally mixed with fuet or oil, to add to the weight. The male yields the most, especially if it be previously irritated. When young, they are fed with pap made of millet, and a little flesh or fish, and, when old, they are fed principally with raw flesh. In a wild state they prey on fowl.

Though the Civet is a native of the warmest climates, it will live in temperate, and even cold climates, if carefully defended from the injuries of the weather. Great numbers of these animals are bred in Holland, where no inconsiderable advantage is made of its perfume. The musk of Amsterdam is reckoned the best of any, it being less adulterated than that of any other country.

The perfume of the Civet is so strong that it communicates itself to every part of the animal's body; even the fur and the skin preserve their odour long after they are taken from the body; the perfume of this animal is so copiously diffused, as to be insupportable when shut up in a close room with it. Like all the weasel kind, the scent of this animal, when irritated, is much more violent than ordinary.

The Civet is a fierce animal, and though capable of being tamed, in some degree, is never thoroughly familiar. In their native climates they breed very fast; but, in our temperate latitudes, though they furnish great quantities of their perfume, they are not known to multiply.

This species is distinguished by Mr. Buffon into two kinds, one of which he calls the Civet, and the other the Zibet, but their similarity is so great in every particular, we shall (like all other naturalists except Mr. Buffon) consider these two merely as varieties of the same animal, a little altered by climate, food, or education.

It does not appear that the Civet was known to the ancients, and it is probable they purchased the drug without knowing its origin; for it is certain that perfumes were used by the fine gentlemen at Rome.

NATURAL HISTORY of the GENET.

THE Genet is usually somewhat smaller than the martin, and resembles all those of the weasel kind, in its length, compared to its height: it also resembles them in having a soft beautiful fur, in having its feet armed with claws that cannot be sheathed, and in its appetite for carnage; but it differs from them in having the nose much smaller and longer, resembling that of a fox: the tail, instead of being bushy, tapers to a point, and is much longer. Its paws are smaller, and its ears larger. The Genet is a beautiful animal, spotted with black, upon a ground mixed with red and grey. It has two sorts of hair, the one shorter and softer, and the other longer and stronger. Upon the sides, its spots are distinct and separate, but unite towards the back, and form black stripes. It has a kind of mane the whole length of the back, forming a black streak from the head to the tail; and the tail has alternate rings of black and white, from the insertion to the end.

This animal is an inhabitant of Turkey, Syria, and Spain, and frequents the banks of rivers. It smells faintly of musk, and, like the Civet, has an orifice beneath

neath the tail. It is easily tamed, and, in the houses of Constantinople, is permitted to run about like a cat, and is as useful as that animal in catching mice.

NATURAL HISTORY of the FOSSANE.

IT has a slender body, covered with ash-coloured hair, mixed with tawny: four black lines extend from the hind-part of the head towards the back and shoulders: the shoulders, sides, and thighs are black, and it has regular rings of black the whole length of its tail. It inhabits Madagascar, Guinea, and the Philippine isles. It is fierce, and almost untameable: it destroys poultry, and, when young, is reckoned excellent food.

NATURAL HISTORY of the OTTER.

THE Otter is an amphibious animal, resembling those of the terrestrial kind in shape, hair, and internal conformation; and resembling the aquatic tribes in the manner of living, and in having membranes or webs between the toes to assist it in swimming. From this peculiar make of its feet, it swims faster than it runs, and can overtake fishes in their own element. It has a black nose, and long whiskers; the eyes are very small, and placed nearer the nose than in other animals; the upper-jaw is longer and broader than the lower; the ears are small, erect, and conic: the hair is long and thick. The colour sometimes varies to silvery: the legs are very short, but remarkably strong, broad, and muscular; the toes are covered with hair, and joined by a web. The joints are so loosely articulated, that the Otter is capable of turning them quite back, and bringing them on a line with the body, so as to perform the offices of fins. The length of this animal, from nose to tail, is usually about twenty-three inches; and its tail, which is flat and sharp-pointed, and fullest of hair in the middle, is about thirteen inches.

This animal is found only at the sides of lakes and rivers, and greatly prefers the former, not being fond of fishing in a running stream; for if it hunts against the stream, it swims too slow, and if with the current it over-shoots its prey; but, in rivers, it always swims against the stream, choosing rather to meet the fishes it preys upon than to pursue them. The Otter makes terrible havock in a lake or pond, where it destroys much more than it can devour, and, in the space of a few nights, will sometimes entirely spoil a pond. They are very injurious to fishermen, as they never fail to tear their nets in pieces whenever they happen to be entangled.

Though the Otter is furnished with a supply much greater than its consumption in summer, and frequently kills for its amusement, leaving quantities of dead fish on the margin of the lake, rather as trophies of its victory than of its wants; yet, in winter, when the lakes are frozen over, and the rivers roll in a rapid torrent, this animal is greatly distressed, and is obliged to content itself with grass, weeds, and the bark of trees. Grown courageous from hunger, it comes upon land, and feeds upon rats and insects, and, some say, even upon sheep.

In forming its habitation, the Otter shews great sagacity; it burrows under ground on the banks of some river or lake, and the extreme of its hole is always under water. It works upwards to the surface of the earth, and there makes a small orifice for the admission of air. The Otter brings forth four or five young at a time, and, as it frequents ponds near gentlemen's houses, litters of them have sometimes been found in cellars, sinks, and other drains.

The colour of this animal is a deep brown, except two small spots of white on each side of the nose, and another under the chin. The skin, if the animal is killed in winter, is very valuable, and is much used by the inhabitants of cold countries for lining to their cloaths; but in England, it is seldom used for any thing but covers for pistol furniture. The best furs of this

kind are found in the northern part of Europe and America. The flesh of this animal is extremely rank and fishy. To take the old ones alive is no easy task, as they are extremely strong, and few dogs will venture to encounter them: they bite with great vehemence, and when they have once fastened will never quit their hold.

This animal inhabits all parts of Europe, north and north-east of Asia, and abounds in North-America, particularly in Canada. It is capable of being tamed, when it will follow its master like a dog, and even fish for him.

The Lesser OTTER.

This animal is about three times as small as the common Otter, though resembling it in form: it has roundish ears, a white chin, and a hoary head; though the hair of some are tawny. Its body is tawny and dusky; the short hair being yellowish, and the long hair black: the feet are broad, webbed, and covered with hair. The tail is dusky, and ends in a point. It is a native of Poland, and the north of Europe; and lives on fishes, frogs, and water-insects: its fur is in great esteem, and next in beauty to that of the sable. The skins are often brought over to England. It is a stinking animal, and is caught with dogs and traps. This animal is the same as the minx of America. Lawson says it is a great enemy to the tortoises, scraping their eggs out of the sands and devouring them. It eats fresh-water muscles, the shells of which are found in great abundance at the mouth of their holes, high up in the rivers, on the margin of which they live. It may be domesticated, and is a great destroyer of rats and mice.

The Sea OTTER.

The upper-jaw of this animal is longer and broader than the lower: it has a black nose, and long white whiskers: its ears are small, erect, and conic; and in each jaw are four cutting-teeth: the grinders are broad, and adapted for breaking crustaceous animals and shell-fish. The hair is thick, long, black, and glossy; beneath which there is a soft down. Its legs are thick and short; the toes are covered with hair and joined by a web. The hind-feet are like those of a seal, and have a membrane skirting the out-side of the exterior toe, like that of a goose. It is about four feet two inches long from the nose to the insertion of the tail; and the tail, which is flat and sharp pointed, is about two inches. One of these animals is sometimes found to weigh seventy or eighty pounds.

Sea Otters are very numerous on the coasts of Kamtschatka, and those parts of America opposite to it, which were discovered by the Russians. They are also in the Brazilian rivers, and that of Oronoque. They are inoffensive animals, and so remarkably affectionate to their young, that, at the loss of them, they will pine to death, on the very spot where they have been taken from them. Before the young can swim, the old animals carry them in their paws, lying in the water on their backs. They are very sportive, and chiefly inhabit the shallows, where plenty of sea-weeds are to be found. They feed upon lobsters and other fish. They breed once a year, and bring forth but one at a time, which is deposited on shore. These animals are hunted for the skins, which are very valuable; and the flesh of their young is reckoned very delicate food, equal if not superior to that of lamb.

NATURAL HISTORY of the CAVY.

IN England this animal is called a Guinea-Pig, and by Buffon the Indian-Pig. Its ears are large, broad, and rounded at the sides; its upper-lip is half divided, and its hair is erect, somewhat resembling that of a young pig. The colour is white, or white varied with orange, and black in irregular blotches. It has four toes on the fore-feet, and three on the hind-feet, but is without a tail. It is a native of Brasil, but writers have given no account of it in its wild state. It is become

QUADRUPEDS.



SEA LION



SEA OTTER



SIGAH GUSH



SLOATH



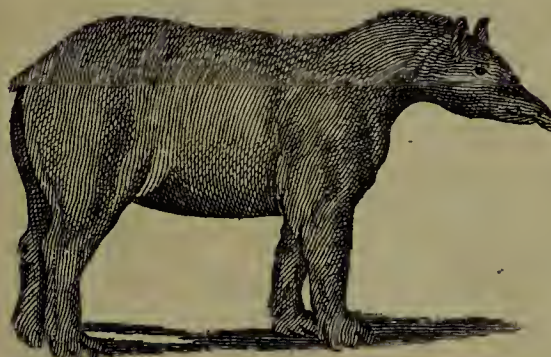
SAILING SQUIRREL



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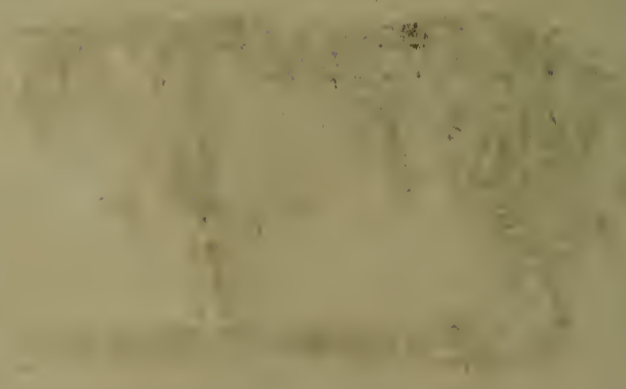
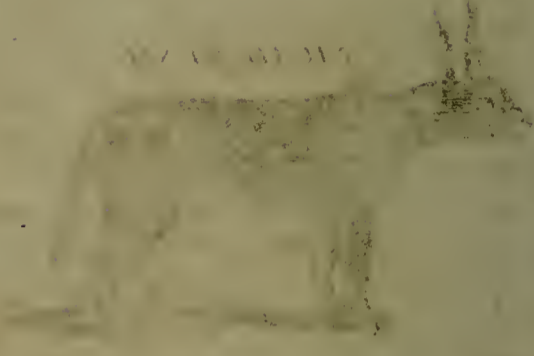
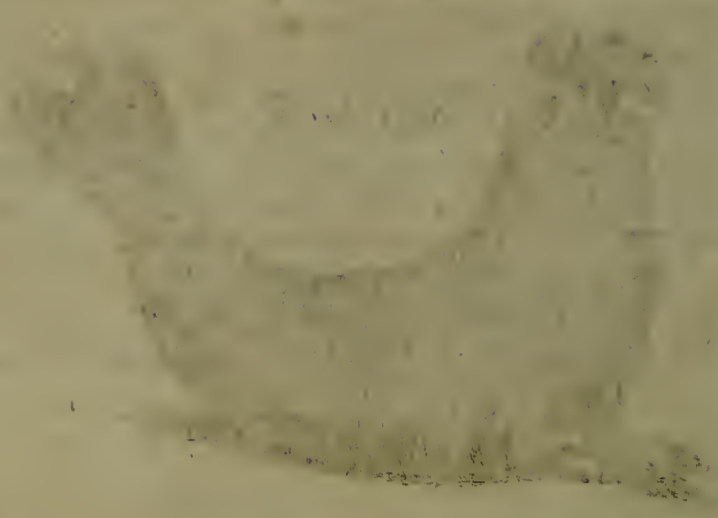
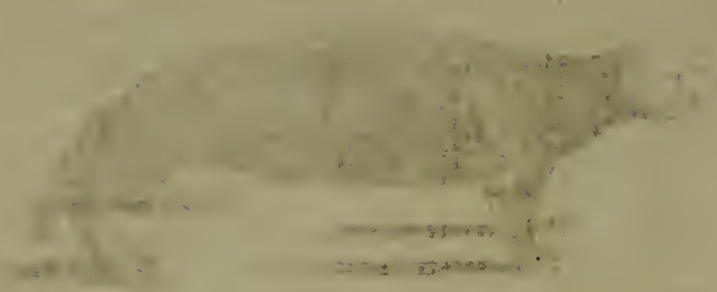
WOLF



ZEBRA



ZERDA



come domestic in Europe, and is a restless, grunting little animal, continually running from corner to corner; and feeds on bread, vegetables, and grains. It breeds at the age of two months, and brings from four to twelve at a time. It is a prolific creature, and breeds every two months. These animals would be innumerable, if some were not destroyed by cats and others killed by the males; and if they were not also very tender animals, and perishing frequently with cold. Rats, it is said, avoid the haunts of this creature.

The ROCK CAVY.

This animal is about a foot in length, has a divided upper-lip, short ears, four toes on the fore feet, and three on the hind, and like the former, is without a tail. The upper part of the body is of the colour of the common hare, and its belly is white. It is a native of Brasil, and lives in the holes of rocks. It is hunted by little dogs, and the flesh of it is superior in flavour to that of our rabbits. Its paces are like that of a hare.

The Spotted CAVY, or HOG-RABBIT.

The spotted Cavy has five toes upon each foot, and only the mere rudiment of a tail. The upper-jaw is longer than the lower, and the ears short and naked. It has long whiskers, and the upper-part of the body is of a dark brown colour; the sides are marked lengthways with lines of grey spots, and the belly is white. It is about ten inches long, and its form is like that of a pig. It inhabits Brasil and Guinea, chiefly in fenny places, and burrows under-ground. It grunts like a pig, and will bite severely. It grows very fat, and is reckoned a great delicacy in Brasil. On the banks of the river St. Francis, a variety of this species is found which is entirely white.

The Long-Nosed CAVY.

This animal is about the size of a rabbit, has a long

nose, a divided upper-lip, short rounded ears and black eyes. The hair is hard and shining, is a mixture of red, brown, and black; of a bright orange colour on the rump, and yellow on the belly. It has black slender legs, four toes on the fore feet, and three on the hind, and a short naked tail. This is also a native of Brasil, and Guiana, and is a voracious little animal. It grunts like a pig, and, sitting on its hind legs, holds its food with the fore-feet when it eats; and what it cannot devour it conceals. It goes very fast, and its motions are like those of a hare. When pursued, it usually takes shelter in an hollow tree. When irritated, its hair bristles on its back, and it strikes the ground with its feet. Its flesh is eaten by the inhabitants of South-America. This animal is capable of being tamed.

There is a species less than the above, and of an orange colour, and another which inhabits Java and Sumatra, about the size of a hare, and of a reddish colour.

The CAPE CAVY.

The length of this animal is about ten inches. It has a thick head, full cheeks, and oval ears, which are almost hid in the fur. The head is of the colour of a hare, and the top of the back dusky, mixed with grey; the sides and belly are of a whitish grey; and the shape of the body is thick and clumsy. It has four toes on the fore-feet, and three behind. The tail is hardly visible. It inhabits the mountains near the Cape of Hood-Hope, and burrows under ground like a rabbit. It is esteemed very good meat by the inhabitants of that part of the world.

The MUSK CAVY.

This animal is almost as large as a rabbit; the upper-part of its body is of a black colour, and its belly white. It burrows like a rabbit, and inhabits Martinico, and the rest of the Antilles. It smells so strong of musk, that it may be pursued by its perfume.

C H A P. XI.

Containing the NATURAL HISTORY of the HARE; the RABBIT; the BEAVER; the PORCUPINE; the MARMOT; the SQUIRREL, &c.

NATURAL HISTORY of the HARE.

THE Hare is one of the most persecuted and most timorous of animals: being a weak and defenceless creature, it is endued, in a remarkable degree, with that preserving passion, fear: this makes it perpetually attentive to every alarm, and keeps it continually lean. To enable it to receive the most distant notices of danger, nature has provided it with very long ears, which, like the tubes applied to the ears of deaf people, convey to it those sounds which are remote, and the animal's motions are directed accordingly. It has large prominent eyes, placed backwards in its head, and so adapted as to receive the rays of light on every side; so that, while it runs, it can almost see behind. The eyes of this animal are never wholly closed; it is so continually on the watch, that it even sleeps with them open. The muscles of the body are strong and without fat; it has therefore no superfluous burthen of flesh to carry. To assist it to escape its pursuers, the hind-legs are formed remarkably long, which still adds to the rapidity of its motion; and so sensible is the animal of this peculiar advantage, that, when it is started, it always makes towards the rising ground.

The various stratagems and doubles it uses, when hunted, are so universally known that it would be super-

fluous to enumerate them. It might reasonably be supposed that an animal so well formed for a life of escape, might enjoy a state of tolerable security, but its enemies are so numerous, that it seldom lives out its natural term. Dogs of all kinds pursue it by instinct. The cat and the weasel kinds exercise all their little arts to seize it. Birds of prey, ants, snakes, and adders drive them from their forms, particularly in summer; but man, its most powerful enemy, destroys greater numbers than all the rest. They are hunted by the sportsman, shot at by the poacher, and caught in springs by the farmer. Persecuted thus on every side, did it not find a resource in its amazing fertility, the whole race would long since have been extirpated.

This animal seldom leaves its form in the day, but takes a circuit in search of food in the night. The colour of a Hare approaching very near to that of the ground, it is on that account more effectually secured from the sight of men, and of beasts and birds of prey. In northern countries, Providence has been so careful to preserve these and many other animals, as to cause them to change colour and become white at the beginning of winter, to render them less conspicuous amidst the snow. Their natural instincts for their preservation are indeed very extraordinary: they make themselves a form, or bed, in those places where the colour

of the grafs moſt reſembles their ſkin: it is open to the ſouth in winter, and to the north in ſummer.

The hare multiplies exceedingly, and breeds when it is only a few months old; the female goes thirty days with young, and uſually brings but two at a time, though ſometimes three or four. Sir Thomas Brown and Mr. Buffon aſſert the doctrine of ſuperfetation, or conception upon conception; but, as the hare breeds frequently in the courſe of a year, their numbers may be accounted for without yielding implicit credit to this aſſertion. The young of the hare is brought forth with their eyes open, and they are ſuckled by the dam for twenty days; after which they leave her, and begin to ſhift for themſelves; ſo that the family connection of theſe animals is but of ſhort duration.

The food of the hare is entirely vegetable; they live upon grafs, roots, leaves, fruits, and corn, and prefer thoſe plants which ſupply a milky juice: they do great injury to nurseries of young trees, by eating the bark off; ſcarce any tree comes amiſs to them, except the lime or the alder; they are remarkably fond of pinks, parſley, and birch.

Theſe animals ſeldom live above ſeven or eight years; in our climate, they paſs their lives in ſolitude and ſilence; and they ſeldom are heard to cry, except when they are ſeized or wounded. Though apparently wild, they are of a complying nature, and eaſily tamed: they even become fond and careſſing, but are incapable of forming any particular attachment; and, though taken ever ſo young, they embrace the firſt opportunity to regain their ancient freedom. The hares of the hot countries, particularly in Barbary, Spain, and Italy, are ſmaller than ours: the beſt in Europe are ſaid to be bred in the Milanefe. They inhabit every part of Europe, moſt parts of Aſia, Japan, Ceylon, Egypt, Barbary, and North America.

The fur of the Hare is of great uſe in the hat manufacture, and as this country cannot ſupply a ſufficient number, many thouſands of the ſkins are annually imported from Ruſſia and Siberia. In the laſt mentioned country they aſſemble in great troops of four or five hundred. The Hare was thought a great delicacy among the Romans, though it was forbidden among the Britons. The fleſh of it is now much eſteemed by the inhabitants of Great-Britain.

The animal called a Hare by our voyagers to Patagonia, is at preſent of a doubtful genus.

NATURAL HISTORY of the RABBIT.

THOUGH the hare and the Rabbit nearly reſemble each other in form and diſpoſition, they are diſtinct kinds, and reſuſe to mix with each other. Mr. Buffon kept ſeveral of both kinds in the ſame place; but, from being at firſt indifferent, they preſently became enemies, and often fought till one of the contending parties was either diſabled or deſtroyed. It is however aſſerted by ſome naturaliſts, that an animal is often produced between theſe two, which, like the mule, is marked with ſterility.

Pliny judiciously remarks, that "Nature has ſhewn great kindneſs, in cauſing thoſe things to be moſt prolific, that are the moſt harmleſs, and the propereſt for our food." This obſervation is finely illuſtrated in the great fruitfulneſs of this animal. Rabbits will breed ſeven times a year, and perhaps bring eight young ones every time: on a ſuppoſition that this happens regularly for four years, a pair will in that time multiply to one million, two hundred ſeventy-four thouſand, eight hundred and forty. From this calculation, we might juſtly be afraid of being over-ſtocked with theſe animals, if their numbers were not diminished by every beaſt and bird of prey, and particularly by man himſelf. But, notwithstanding they have ſo many enemies, Pliny and Strabo inform us, that they were once ſo great a nuisance to the inhabitants of the Balearic iſlands, that, in the time of Auguſtus, they implored the aſſiſtance of a military force from the Romans, in order to extirpate them

Spain is their native country, where they are taken by ferrets as they are with us. They like a temperate climate, and cannot endure much cold; ſo that in Sweden they are obliged to be kept in houſes.

The hare has various arts and inſtincts to eſcape its purſuers, by doubling, ſquatting, and winding; the Rabbit has only one art of defence, but finds more ſecurity in that one, than the hare by all the arts it practiſes. It makes itſelf a hole in the earth, where it continues a great part of the day, and nurſes its young: there it remains ſecure from the fox, the hound, the kite, and almoſt every other enemy.

The female brings forth her young ſeparate from the male. On this occaſion ſhe digs herſelf an hole, different from the ordinary one, and more intricate, and makes a more ſpacious apartment at the bottom of it. She then plucks from her body a large quantity of hair, with which ſhe prepares a kind of bed for her young. She never leaves them the two firſt days, except to procure nourishment, and returns with the utmoſt diſpatch: ſhe continues to ſuckle her young almoſt ſix weeks, when they become ſtrong, and are able to go abroad. During all this time, their ſeparate apartment is ſeldom viſited by the male, but as ſoon as the little family are able to come to the mouth of the hole, he ſeems to acknowledge them as his offspring, takes them between his paws, ſmooths their ſkin, and licks their eyes; each, in its turn, having an equal ſhare in his careſſes.

Rabbits that are bred up tame, conſcious of being already protected, do not take the trouble of digging a hole: theſe, like all other animals under the protection of man, are of various colours; white, brown, black, and mouſe-colour. Moſt of the wild Rabbits are of a brown. This animal, though leſs than the hare, generally lives longer. It is alſo fatter, in general, than the hare, but its fleſh is leſs delicate. Tame Rabbits are larger than wild ones, from their taking more nourishment, and uſing leſs exerciſe, but their fleſh ſofter and more inſipid. The counties of England, which are reckoned moſt famous for theſe animals, are Lincolnſhire, Norfolk, and Cambridgeſhire. The ſkins of the Rabbit, eſpecially thoſe which are white, are uſed for lining cloaths, and are conſidered as a cheap imitation of ermine; but the principal uſe made of Rabbits fur, is in the manufacture of hats; ſome parts of it, however, which are unfit for that purpoſe, have been found as good as feathers for ſtuffing beds and bolſters.

The Angora Rabbit has long hair, waved, and of a filky fineneſs, like that of the goat of Angora. The Ruſſian Rabbit has a double ſkin over the back; into which it can withdraw its head; and another under the throat, in which it can place its fore-feet: in the looſe ſkin on the back, it has ſmall holes, to admit light to the eyes; the colour of the body is a paliſh yellow, and the head and ears are brown.

Rabbits are ſubject to two principal infirmities. Firſt, the rot, which is cauſed by giving them too large a quantity of greens, or from the giving them freſh gathered, with the dew or rain hanging in drops upon them. It is over-moiſture which always cauſes this diſeaſe; the greens therefore are always to be given dry, and a ſufficient quantity of hay, or other dry food, intermixed with them, to take up the abundant moiſture of their juices. On this account, the very beſt food that can be given them, is the ſhorteſt and ſweeteſt hay that can be got, of which one load will ſerve two hundred couple a year; and out of this ſtock of two hundred, two hundred more may be eat in the family, two hundred ſold to the markets, and a ſufficient number kept in caſe of accidents.

The other general diſeaſe of theſe creatures is a ſort of madneſs: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This diſtemper is ſuppoſed to be owing to the rankneſs of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called tare thistle, to eat.

The Brasilian RABBIT.

This animal has very long ears, black eyes, and a white ring round the neck: the face is of a reddish colour, the chin white, and the body somewhat darker than the common hare; it has a whitish belly, and is without a tail. Some of these animals have not the white ring round the neck. They inhabit Brasil, and Mexico, and live in woods, but do not burrow: they are very prolific, and their flesh is very good meat.

The Baikal RABBIT.

The fur of this animal is of the colour of the common hare, but it is red about the neck and feet. It has a long tail, which is black above and white beneath. It is larger than a common rabbit; and inhabits the country beyond lake Baikal. It agrees with the common rabbit in nature, and the colour of the flesh; but the fur is coarse and of no value.

Linnæus mentions the Cape Rabbit, which has red feet, and a tail about the length of the head; he says it inhabits the Cape of Good-Hooper, and burrows: this, however, is the whole account which Linnæus has given of the species.

NATURAL HISTORY of the BEAVER.

THE Beaver is the only animal, among quadrupeds, that has a flat broad tail, covered with scales, serving as a rudder to direct its motions in the water. It has membranes, or webs, between the toes on the hind-feet, but none on the fore-feet, which, as in the squirrel, supply the place of hands. In short, this animal, in its fore-parts, entirely resembles a quadruped, and in its hinder-parts approaches the nature of fishes, by having a scaly tail. It has strong cutting-teeth, short ears, almost hid in the fur, and a blunt nose; the hair is of a deep chestnut brown. Its length from nose to tail is about three feet; and the tail is about eleven inches long, and three broad. It is singular in its conformation, as having, like birds, but one and the same vent for its natural discharges.

About the month of June and July, the Beavers begin to assemble and form a society, which is to continue for the greatest part of the year. They gather together from all quarters, and usually form a company of at least two hundred. Where they meet they generally fix their abode, and this is always by the side of a lake or river. If it be a lake, and consequently has no stream, they dispense with building a dam; but if it be a river, which is subject to floods and falls, they build a dam or pier that crosses the stream, so that it forms a dead water in that part which lies above and below. In order to form this pier, they drive stakes into the ground which are about five or six feet long, placed in rows, wattling each row with pliant twigs, and filling the interstices with clay, which they ram down very close. The side next the water is sloped, and the other perpendicular. The bottom is from ten to twelve feet thick; but the thickness gradually diminishes to the top, which is about two or three. This dam or pier is generally fourscore or an hundred feet in length. If we compare the greatness of the work with the powers of the architect, it will appear enormous; but the solidity with which it is built is still more astonishing than its size.

They erect their houses near the shore, in the water collected by means of the dam. They are built on piles, and are either round or oval. The tops are vaulted, and consequently their inside resembles an oven, and the outside a dome. The walls, which are two feet thick, are made of earth, stones, and sticks, placed together with uncommon art; and the walls within are as neatly plaistered as if they were wrought by the trowel of an experienced mason. There are two openings in each house; one into the water, and the other towards the land. The height of these houses above the water is usually about eight feet. For the convenience of change, in case of floods, they frequently make two or three stories in each dwelling: from two to thirty Beavers inha-

bit each house; and, in each pond, there are from ten to twenty-five houses. Each Beaver prepares its bed of moss, and every family collects a magazine of winter provisions, consisting of bark and boughs of trees, which they deposit under water, and bring into their apartments as occasion may require. In winter they are fondest of the sassafras, the ash, the birch, the plane, and sweet gum: but, during the summer, they are perfect epicures, and daily regale themselves on the choicest plants and fruits which the country affords. Though they are not fond of fish in general, they sometimes feed on crabs and crawfish.

In the construction of their buildings, each performs his part. Some gnaw, with their teeth, large pieces of wood as thick as a man's arm, into beams or pillars; others roll the pieces along the water; some dive under water, and scrape holes in the earth with their feet to receive these pillars; while others are busied in rearing them in their proper places: another party is engaged in collecting twigs to wattle the piles with. Some collect stones, earth, and clay; others temper the mortar; and others on their broad tails carry the materials to the proper places, and, with the same instrument, ram them between the piles, or plaister the inside of their houses. They appoint an overseer in the society, who gives a certain number of strokes with his tail, as a signal for repairing to particular places; either for mending defects, or at the approach of an enemy; and the whole company attend to it with the utmost assiduity. They breed once a year, and bring forth at the latter end of the winter; they have two or three young at a birth.

From the result of the Beaver's labours, we see how far instinct may be aided by imitation; and to what degree animals, which have neither language nor reason, can concur for their mutual advantage. If we examine this creature merely as an individual, we shall find it inferior in cunning to many other quadrupeds, and to almost all in the powers of annoyance and defence. When taken from its fellows, and kept in solitude, or in a state of domestic tameness, it is a mild, gentle, and familiar animal, but appears somewhat dull and melancholy. It has no violent passions nor vehement appetites, but is perfectly calm and indifferent, without attachments or antipathies, neither endeavouring to please, or desiring to offend. It is equally unqualified to serve or to command, and is only adapted to live among its kind. Its talents are displayed only in society: when alone, it has but little industry, and wants the sagacity to guard against the most obvious snares laid for it by the hunter: it never attacks any other animal, and when it is attacked itself, it prefers flight to the combat, and resists only when driven to an extremity; fighting only when its speed can no longer avail.

Besides these associated Beavers, there is another sort, called terriers, which either have not the industry or sagacity to erect houses like the others: they burrow in the banks of rivers, and, like the others, treasure up their winter stock of provision.

Beavers vary in their colour; the finest are black, but the general colour is a chestnut brown, more or less dark; they have been seen white, but not often. Their skins are a considerable article in trade, being the foundation of the hat manufacture. In 1763, the Hudson's-Bay company sold fifty-four thousand, six hundred and seventy Beavers skins in one sale.

Merchants distinguish three sorts of Beavers, though they are all the skins of the same animal; the new Beaver, the dry Beaver, and the coat Beaver. The new Beaver, which is also called the Muscovy Beaver, because it is usually kept to be sent to Muscovy, is that which the savages catch in their winter hunting. It is the best and the most proper for making fine furs, because it has lost none of its hair by shedding. The dry Beaver, which is also called lean Beaver, comes from the summer hunting, which is the time that these animals lose part of their hair. Though this sort of Beaver is much inferior to the other, it may also be employed in furs; but it is chiefly used in the manufacture of hats. The French call it summer Castor or Beaver. The coat Beaver is that which has contracted a certain gross and

oily humour, from the sweat which exhales from the bodies of the savages, who wear it for some time: though this sort is better than the dry Beaver, it is used only in the making of hats.

The valuable drug castoreum is taken from the inguinal glands of these animals. The Russian castor is so much better than the American, that the former sells for two guineas a pound, and the latter about eight shillings and six-pence; the Russian castor being less waxy and more easily pulverised: but though we import this drug from Russia, we export to that country vast quantities of Beaver-skins. Castor is reckoned an excellent medicine in all nervous cases, particularly for hysterical fits, and many female disorders.

Beavers inhabit Europe, from Lapland to Languedoc; they are found in great plenty in the North; and sometimes they are met with in the Rhone, the Gardon, the Danube, the Rhine, and the Vistula. They are in great plenty in the Russian Asiatic dominions; but no where in greater multitudes than in North-America. The flesh of these animals is reckoned delicate food, being preserved, after the bones are taken out, by drying in the smoke: the tail, however, is esteemed as the choicest dainty.

The Musk BEAVER.

This animal has a thick blunt nose, large eyes, and short ears, which are almost hid in the fur. The toes on each foot are separated; those behind are fringed on each side with strong hair, closely set together: the tail is compressed sideways, is very thin at the edges, and covered with scales, intermixed with a few hairs. The head and body is of a reddish brown; and the breast and belly ash-coloured, tinged with red. The fur is very fine; and the length of the body, from nose to tail, is about twelve inches. The length of the tail is about nine inches, and the form of its body exactly resembles that of a Beaver. Charlevoix calls this animal the musk rat. It is a native of North-America, and breeds three or four times in a year, bringing forth from three to six each time: the male and female consort together during summer; and, when winter approaches, they unite in families, and retire into small round edifices, covered with a dome, composed of herbs and reeds cemented with clay. They have several pipes at the bottom of these edifices, through which they pass in search of food, as they are not so provident as the Beavers, in forming magazines. Their habitations, in winter, are covered many feet deep with snow and ice; but they creep out and feed on the roots that lie beneath. They erect a new habitation every year, and desert their old one. The fur of this animal is very soft, and much esteemed. The whole body of this creature has an exquisite musky smell during summer, which it loses in the winter.

The Long-Nosed BEAVER.

It has a long slender nose, and very small eyes, but no external ears: its tail is compressed sideways, and about eight inches long: the colour of the head and back is dusky, and the belly a whitish ash colour. The length of this animal, from nose to tail, is about seven inches. It inhabits Lapland, Russia, and the banks of the Volga and the Yaick. It never wanders far from rivers, and makes holes in the cliffs, with the entrance beneath the lowest fall of the water. It works upwards, but never so high as the surface, but so as to lie beyond the highest flow of the river. It feeds on fish, and is the prey of the pikes and siluri, but communicates to them so strong a flavour of musk as to make them unfit for food. The scent of this is like the former, especially about the tail. The skin of this animal is put into chests to keep the moths away.

NATURAL HISTORY of the PORCUPINE.

THE Porcupine is about two feet long, and fifteen inches high. It has a long crest on the top of the head, reclining backwards, formed of stiff bristles: the body is covered with quills from ten to fourteen in-

ches long, and very sharp at the points. Each quill is thickest in the middle, and inserted into the animal's skin, in the same manner as feathers grow upon birds: these quills are varied with black and white, and between them are a few hairs. The head, belly, and legs, are covered with strong bristles, terminated with soft hair of a dusky colour. Its whiskers are long, and its ears like human ears. It has four toes before, and five behind: its tail is short and covered with quills. All the quills of this animal naturally incline backwards like the bristles of an hog; but when the animal is irritated, they rise and stand erect, like bristles. The muzzle of this animal bears some resemblance to that of an hare, but it is black; the legs are very short, and the eyes small, like those of an hog, and measure only one third of an inch from one corner to the other.

The Porcupine partakes much of the nature of the hedge-hog, and, like that animal, has this formidable apparatus of arms rather to defend himself, than to annoy the enemy; for the opinion of its being able to dart its quills at its enemies, is now universally allowed to be fabulous: they are firmly fixed in the skin, and are only shed when the animal moults them, as birds do their feathers. Ellis, it is true, informs us, that a wolf was found dead at Hudson's Bay, with the quills of a Porcupine fixed within its mouth, but that might very naturally happen; for the wolf, in the rage of appetite, probably attempted to devour the Porcupine, quills and all, and paid for its temerity with its life. It is, however, certain that those Porcupines which have been brought into Europe, have never been known to launch their quills, though irritated to the highest degree. Dr. Shaw, who saw numbers of Porcupines in Africa, says none of them ever attempted to dart their quills; their usual method of defence being to lie down on one side, and at the approach of an enemy, to rise up suddenly and wound him with the points on the other. This animal, it is imagined, is seldom the aggressor, and when attacked by other animals, only directs its quills so as to keep always pointing towards the foe. In general he is then secure, and Kolben asserts that even the lion will not venture to attack him when he is thus on his guard.

Mr. Pennant says the Porcupine is a harmless animal, and lives on fruits, roots, and vegetables. Many other naturalists, particularly Dr. Goldsmith, say it chiefly hunts for serpents, and all other reptiles, for subsistence: that between the serpent and the Porcupine there exists an irreconcilable enmity, and that they never meet without a mortal engagement: that, upon these occasions, the Porcupine rolls itself upon the serpent, by which means it destroys it, and afterwards devours it. Those, however, which are brought to this country to be shewn, are usually fed on bread, milk, and fruits; but they have no objection to meat when it is offered them.

The Americans assure us that these animals live from twelve to fifteen years. The female goes with young seven months, and produces but one at a time, which she suckles about a month. In its defence she is intrepid, but, at other seasons, she is timid, fearful, and harmless.

The Porcupine is eagerly pursued by the Indian hunters, in order to make embroidery of its quills, and to feed on its flesh. With regard to their embroidery, they are very ingenious; they dye the quills of various colours, and split them into slips, with which they decorate their baskets, belts, and many other articles of furniture and ornament. The Porcupine is a dull and torpid animal; extremely voracious, though capable of enduring hunger. It is hardly possible to tame it, and the poet very properly gave it the epithet of fretful; for, when one of these animals was shewn in London, if any person did but touch the bars of the iron cage in which it was confined, it excited its resentment, and its quills were instantly erected.

The Porcupine inhabits India, Persia, Palestine, and every part of Africa: it is found wild in Italy, though not originally a native of Europe. It is brought into the markets of Rome, where it is sold for food. The Italian

Italian Porcupines have a smaller crest and shorter quills than those of Asia and Africa.

The Long-Tailed PORCUPINE.

This animal has large bright eyes, short naked ears, and long whiskers. Its body, which is short and thick, is covered with long stiff hairs as sharp as needles, of different colours as the rays of light fall on them. Its feet are divided into five toes, one of which turns backwards and serves as a thumb: the tail is about the length of the body, and very slender towards the end, which consists of a thick tuft; the bristles are thick in the middle, appear as if they were jointed, and are transparent and shining. This animal inhabits the islands of the Indian Archipelago, and lives chiefly in forests.

The Brasilian PORCUPINE.

This creature, which is also called the couando, is much smaller than the crested porcupine, and its quills are not above a fourth part of the length of those of that animal. It has a short blunt nose, and long white whiskers. It inhabits Mexico and Brasil, lives chiefly in the woods, and feeds on fruits and poultry. It sleeps in the day, and searches for food in the night. It makes a noise with its nostrils, as if out of breath, and grunts like a hog. It climbs trees, but with no great expedition, and, in descending, twists its tail (which is pretty long) round the branches to prevent its falling. Like the first, it is incapable of shooting its quills. This animal grows very fat, and its flesh is white and good. It is very easily tamed, and is a species very rarely brought into Europe.

The Canada PORCUPINE.

This animal, which Mr. Buffon calls the urson, has not so round a body as those already mentioned, but has more the resemblance of a pig in shape. It is covered with long bristly hair, with shorter hair underneath, under which great quantities of quills lie concealed. These quills are white, with a brown point, and bearded, and do not exceed four inches in length. These animals make their nests under the roots of large trees, sleep very much, and feed on wild fruits and bark of trees, especially upon the bark of the juniper. In winter the snow serves them for drink; and in summer they lap water like a dog. When they cannot escape their pursuer, they make towards him sideways, in order to wound him with the quills: but they are no very extraordinary weapon of defence; for, on stroking the hair, they will stick to the hand and come out of the skin. The Indians stick these quills in their noses and ears, to make holes for their ear-rings and other ornaments. The edges of their deer-skin habits are also trimmed with fringes made of these quills, and with them they decorate their bark boxes. These animals are very plentiful near Hudson's Bay, and many of the trading Indians make them their principal food, esteeming them both wholesome and delicate. Mr. Banks brought one of these animals from Newfoundland, which was about the size of a hare, but shorter and more compact; and the length of its tail was about six inches.

NATURAL HISTORY of the MARMOT.

THE Marmot is almost as large as a hare, but it is as corpulent as a cat, and has shorter legs. Its head somewhat resembles that of an hare, except that its ears are much shorter, and almost hid in the fur. The body is cloathed with very long hair, and a shorter fur below. These are of different colours, brownish ash, mixed with tawny; and the legs and lower-part of the body are reddish. This animal has four toes before, and five behind; the length of its body from nose to tail is about sixteen inches; and its tail, which is tufted and well furnished with hair, is about six inches.

The Marmot is chiefly a native of the Alps, though it inhabits Poland, Ukraine, and Chinese Tartary. It feeds indiscriminately on insects, roots, and vegetables, but is remarkably fond of milk, and when lapping it,

makes a murmuring noise, expressive of its satisfaction. When pleased or caressed, it yelps like a puppy; but, when it is enraged, and before a storm, it has a piercing whistle which offends the ear. This is a very cleanly animal, but their bodies have a disagreeable scent, especially in summer. Its flesh is fat and firm, and sometimes eaten, but the scent which is offensive in the living animal predominates after it is dead.

This creature is tamed without any difficulty, and is readily taught to dance, to wield a cudgel, and to obey the voice of its master. Like the cat, it has an antipathy to the dog; and, when it becomes familiar to the family, and is sure of being countenanced by its master, it will even attack a mastiff; but except in this particular, it is a very inoffensive animal; and, unless it is provoked, seems to live in friendship with every creature. It is, however, very apt to gnaw furniture or linen, and even to make holes through wooden partitions. As its legs are very short, and have some similitude to those of the bear, it will, like that animal, frequently sit up and walk upon its hind legs. Like the squirrel, it carries the food to its mouth with the fore-paws, and sits upon its hinder-parts to feed. The Marmot is usually taken to be shewn, especially by the Savoyards, who instruct them to perform a great variety of tricks to entertain the spectators.

But, what particularly distinguishes the Marmot from every other quadruped, except the bat, and the dormouse, is its sleeping during the winter. Though a native of the highest mountains, and where the snow is never wholly melted, it seems to feel the influence of the cold more than any other animal; and in winter its faculties are absolutely chilled up. About the end of September, or the beginning of October, the Marmot prepares its habitation for the winter, from which it never departs till April. This retreat is an hole on the side of a mountain, extremely deep, with a spacious apartment at the bottom, which is somewhat longer than it is broad. Several Marmots reside in this habitation at the same time, without incommoding each other, or injuring the air they breathe. The form of the hole resembles a Y; the two branches being two openings, which lead into one channel that terminates in their general apartment at the bottom. The whole being made on the declivity of a mountain, one of the openings issues out sloping downwards, serving as a kind of drain or sink to the whole family: the other opening, on the contrary, slopes upwards, and answers the purpose of a door. The apartment at the end is lined with moss and hay, of which they take care to make an ample provision during summer. This being a work of great labour, it is undertaken in common; some gather the grass, and others, in their turn, drag it into their hole.

In this retreat they all live together, after they have, with their united labours, made it as convenient as they can: there they remain when the storm is high, when it rains, or when they are apprehensive of danger. They never stir from their chamber but in fine weather, and then they never wander far from their habitation. When they venture from home, one of them is placed upon a lofty rock as a sentinel, while the rest are diverting themselves, or are employed in providing for their winter's convenience. When an enemy approaches, this trusty sentinel acquaints his companions with a whistle, when they all run immediately home, the sentinel bringing up the rear.

It must not be imagined that the hay is intended for provision; nature has kindly apprized them that during the winter they shall not want any. Therefore they make no preparations for food, but employ themselves diligently to render their apartment commodious. When they perceive the first approaches of winter, they close up the two entrances of their habitation, which they perform with such solidity, that it is easier to dig up the earth in any other part, than where they have closed it. At this time they are very fat, and continue so for two or three months; after which their flesh gradually diminishes, and by the end of the winter they are usually very lean. When their retreat is opened,

the whole family is seen, each rolled into a ball, and covered with the hay. In this torpid state they appear entirely lifeless, and when they are taken from their habitation, they appear insensible, except they are brought before a fire, which soon revives them; but they would die if they were too suddenly brought before a large fire.

From what has been said, we may form some conception of the state of these animals which exist half the year without food. It is well known that in those disorders where the circulation is extremely languid, the appetite is proportionably diminished; so, in these animals, as the blood scarce moves, or only moves in the larger vessels, they require no nourishment to supply what is worn away by its motions. Indeed they gradually become somewhat leaner, but even that is not perceptible for some months. With motion enough in their fluids to keep them from putrefaction, and nourishment enough to supply the waste of their languid circulation, they continue rather feebly alive than sleeping.

These animals produce but once a year, and bring forth two or three at a time: the extent of their lives is about nine or ten years.

The Maryland MARMOT.

This animal is about the size of a rabbit, and in other respects greatly resembles the former, except in having a bluish snout, and a longer tail. It is found in Virginia, Pennsylvania, and the Bahama Islands. It lives on wild fruits and other vegetables; and during winter, it sleeps under the hollow roots of trees. Its flesh is excellent, and somewhat resembling that of a pig. When surprized it retreats to holes in rocks. We have no certain information whether this animal sleeps during winter, in the climate of these islands.

The Quebec MARMOT.

This has short round ears, a blunt nose, puffed cheeks, and a dusky face. The hair on the back is grey at bottom, black in the middle, and whitish at the tips. The belly and the legs are of an orange colour; the toes are black, naked, and quite divided. It has four toes, and the rudiments of another on the fore-feet, and five on those behind. Its tail is short, and of a dusky colour, and the body is somewhat larger than that of a rabbit. It inhabits Hudson's-Bay and Canada.

The German MARMOT.

This animal has full black eyes, and large rounded ears; the colour of the head and face is of a reddish brown, and the cheeks white. It has a white spot on each ear, another on each shoulder, and another on each side near the hind legs. The tail is short, and almost naked. It has four toes and a fifth claw on the fore-feet, and five toes behind. The length of the body is about nine inches, and the tail three inches. It is found in Austria, Silesia, and many parts of Germany and Poland. It devours great quantities of corn, and carries still more to its winter's hoard. It has two pouches within its cheeks, which are receptacles for its booty, and are so capacious as to hold a quarter of a pint; these it crams so full that the cheeks seem as if they were ready to burst.

They live under ground; at first they burrow down obliquely, and form an entrance; and at the end of that passage, the male makes one perpendicular hole, and the female several: various vaults are formed at the end of these, serving as lodgings for themselves and their young, and as store-houses for their winter food: each animal has its different apartment, and every sort of grain its different vaults. The lodging apartments are lined with straw or grass, and these apartments are of different depths according to the age of the animal; some not exceeding a foot deep, and others four or five.

In August they begin to lay in their provisions, consisting principally of corn, peas, and beans; and when they have finished their work, they carefully stop up the mouth of their passage. In winter the peasants go to what they call hamster-nesting; and, having found the retreat, they dig till they have discovered the hoard, and

are amply rewarded for their trouble; for exclusive of the skins of the animals, which are valuable furs, they usually find two or three bushels of good grain in the magazine.

These animals are extremely fierce, and make a noise like the barking of a dog: they breed twice or three times a year, and usually bring five or six at a time: they are so very numerous in some seasons, as to occasion a dearth of corn: they would indeed be more numerous than they are, but vast numbers of them are destroyed by pole-cats, which pursue them into their holes. It is remarkable that the hair of these animals sticks so close to the skin, that it is extremely difficult to pluck it off.

The Casan MARMOT.

It is about the size of a rat, and has short round ears. The hair is smooth and of a yellowish brown, with faintish round spots of white. It has four toes before, and five behind, and the tail is about half the length of the body. It inhabits the banks of the Volga. These animals burrow, and sit in multitudes near their holes like rabbits; and when they are alarmed, they whistle with a low note. They are excessive fond of salt, and vast quantities of them are taken on board the barges that load with that commodity at Solikamsky, and fall down into the Volga, below Casan.

The Lapland MARMOT.

This animal has a pointed head, with two very long cutting-teeth in each jaw. Its upper-lip is divided; it has small black eyes, a little mouth, long whiskers, and small blunt ears, reclining backwards. Its legs are very short, and it has four slender toes, covered with hair on the fore-feet, and five toes on those behind: the body and head are about five inches long, and the tail half an inch. The body and head are black and tawny, disposed in irregular blotches, and the belly is of a yellowish white.

These animals appear in immense quantities at uncertain periods in Norway and Lapland. They are indeed the pest and astonishment of the country: they march in troops like the army of locusts, so emphatically described by the prophet Joel. They destroy almost every blade and root of grass, and spread universal desolation: they even infect the ground, and cattle are said to perish which taste the grass that they have touched. They march in legions, and neither fire, lakes, nor torrents, can stop their progress. They bend their course strait forward, and swim over the lakes and rivers. They are so fierce as not to be intimidated in their career, and if a stick is presented to them, they will take hold of it and suffer themselves to be swung about before they will quit their hold. If they are struck, they bark like a dog, and turn about and bite. They are the prey of foxes, lynxes, and ermines, who follow them in troops. At length they perish through want of food, or destroy each other; or they are lost in the sea, or some great water.

Fortunately for the country, this phenomenon does not frequently occur, and is not seen above once or twice in twenty years. It seems like a vast colony of emigrants from a nation overstocked. From what country these animals have travelled, is not certainly known. We are told by Linnæus that they come from the Norwegian and Lapland Alps. Pontoppidan is of opinion that Kolen's rock, which divides Nordland from Sweden, is their native place: but, wherever they come from, it is certain that they never return. Their course seems to be predestinated, and they pursue their fate. It was once seriously believed, that these animals were generated in the clouds, and fell in showers upon the earth.

The Earless MARMOT.

This animal has no external ears, having only a small orifice on each side of the head for the admittance of sounds. It has a blunt nose, a long slender body, and a very short tail. Its colour is a dark grey, or a yellowish brown.

The Marmotta minor is the same animal with this, but

but differs a little in colour: the upper-part of the body of the Marmotta Minor is grey, with some red spots, speckled with yellow. It inhabits Bohemia, Austria, Hungary, and Siberia. It burrows, and forms a magazine of corn, nuts, &c. for its winter provision. The ladies of Bohemia formerly made cloaks with the fur of this animal.

The Podolian MARMOT.

The cutting-teeth of the lower-jaw of this animal are half as long again as those of the upper: the eyes are extremely small, and almost hid in the fur, like those of a mole. It has four toes and a claw on the fore-feet, and five on the hind, and is of an ash-colour. It is about the size of a squirrel, and has a short tail. It inhabits Podolia, Ukraine, Volhinia, and Persia. This animal also burrows, and forms magazines for winter food. It feeds on corn, fruits, and herbs, and lives under ground during the winter, in which season the peasants, frequently turn them up with their ploughs.

The Circassian MARMOT.

This animal has red sparkling eyes, sharp teeth, and ears resembling those of mice. Its body is long, and of an equal thickness. Its hair is long, and of a chestnut colour: it has sharp claws, a long bushy tail, and its fore-feet are shorter than those behind. It is about the size of the German Marmot. This animal is found in the neighbourhood of the river Terek, which flows out of Circassia and falls into the Caspian Sea: it runs up hill very fast, but very slowly down. This creature also burrows, and lives under ground.

NATURAL HISTORY of the SQUIRREL.

THIS animal is so well known as hardly to require any description; but supposing it unknown to any, we might convey some idea of its form by comparing it to a rabbit, observing that it has shorter ears and a longer tail. Its ears are also terminated with long tufts of hair. The colour of the head, body, tail, and legs, of this animal, is a bright reddish brown; the belly and breast white: the eyes are large, black, and lively: the fore-teeth strong, sharp, and well adapted to its food: the legs are short and muscular; the toes long, and divided to their origin; the nails are sharp and strong. In short, the animal, in all respects, is fitted for climbing or clinging to the smallest boughs. It has but four toes on the fore-feet, and a claw in the place of a thumb or interior toe: there are five toes on the hind-feet. The tail of the Squirrel is alone sufficient to distinguish it from any other animal, as it is extremely long, beautiful, and bushy, spreading like a fan, and, when thrown up behind, serves to cover the whole body. When erected, it also serves the little animal as an umbrella, to defend it from the injuries of heat and cold; and, when extended, it is extremely serviceable in taking those vast leaps that the Squirrel takes from tree to tree. It indeed answers another purpose: we are assured by Kleim, Scheffer, and Linnæus, that when the Squirrel is disposed to cross a river, a piece of bark is its boat, and its tail answers the purpose of a sail.

The Squirrel is a beautiful little animal, which may be said to be but about half savage; and which, from its docility and innocence, is deserving of our protection. It is neither carnivorous nor destructive; and its common food is nuts, fruits, buds, and acorns. It is cleanly, nimble, active, and industrious. Like the hare and rabbit, it sits upon its hinder legs, using the fore paws as hands. The Squirrel seldom descends to the ground, except during a storm, but jumps from one branch of a tree to another. This provident little animal never leaves its food to chance; but in summer, which is the season of plenty, it secures in some hollow tree a vast magazine of nuts for winter provision; cautiously foreseeing the dreary season, when the forest shall be stripped of fruits and foliage. In the spring it is diverting to observe the female feigning an escape

from the pursuit of two or three lovers, and to observe the various proofs they give of their agility, which is then exerted in its full force.

The Squirrel never appears in the open fields, nor in the coppices or underwoods. It always keeps among the tallest trees, and avoids as much as possible the habitations of men. It makes its nest of moss and dried leaves, between the fork of two branches, and brings three or four young at a time. It has two holes to its nest, and, as Pliny justly remarks, always stops up that on the side the wind blows. It is extremely vigilant, and if any person should touch the bottom of the tree in which it resides, the Squirrel immediately takes the alarm, flies away to another tree, and travels with great ease along the tops of the forest, till it is perfectly out of danger. When the alarm is over, the animal returns to its nest, by paths that are utterly impassable to any other quadruped. It usually moves by bounds or leaps, and with great facility passes from one tree to another, at the distance of forty feet; and when it is compelled to descend, it runs up the side of another tree with amazing agility. It usually expresses pain by a sharp piercing note, and has another note, expressive of its pleasure or satisfaction, not much unlike the purring of a cat.

The little mansion of the Squirrel is sometimes attacked by a most formidable enemy: the martin is incapable of making a nest for itself, and therefore frequently goes in quest of a retreat for its young; for this purpose it generally fixes upon the nest of a Squirrel, and destroys the tenant to take possession of the mansion. But this calamity does not often happen, and Squirrels may be said to lead the most playful frolicsome life of almost any other animal. The time of their gestation is six weeks, and they bring forth about the middle of May.

Having already just mentioned the Squirrel's mode of sailing, it may not be thought impertinent to give a particular description of it. When these animals, in their progress, meet with broad rivers or extensive lakes, which are very numerous in Lapland, they return into the neighbouring forest, as if by common consent, each in quest of a piece of bark, serving as so many boats to waft them over. When they are all equipped, they boldly commit their little fleet to the mercy of the waves, every Squirrel being seated on its own piece of bark, and fanning the air with its tail, to conduct the vessel to its desired haven. In this manner they frequently cross lakes which are several miles over: but the poor little mariners are not always aware of the dangers of their navigation; for though the water may be calm towards the edges, it is generally more turbulent towards the middle. An additional gust of wind sometimes overturns the whole navy, and a shipwreck of three or four thousand fail ensues. This dreadful catastrophe is generally a lucky accident for the Laplander on the shore, who collects the dead bodies which are thrown up by the waves, feeds upon the flesh, and gets a good price for the skins.

The Squirrel is easily tamed, and becomes a very familiar animal. It delights in warmth, and frequently creeps into a man's pocket or his bosom. It is usually kept in a box, and fed with hazle-nuts, &c. and is a pleasing little domestic. This animal inhabits Europe, North America, and the northern and the temperate parts of Asia. A variety of them is found as far south as the isle of Ceylon. In Sweden and Lapland the colour changes into grey in winter. In Russia and Lapland black Squirrels are sometimes found; and in many parts of England there is a beautiful variety with milk-white tails.

The CEYLON SQUIRREL.

This animal is about three times the size of the European Squirrel; its ears are tufted with black, its nose is flesh-coloured, its cheeks, legs, and belly are of a pale yellow, and its forehead, back, sides, and haunches are black. The tail is of a light grey, bushy, and twice the length of the body. It is an inhabitant of Ceylon.

The BOMBAY SQUIRREL.

This is an inhabitant of Bombay. The ears are tufted; the head, back, and sides are of a dull purple; the belly, and the lower part of the legs and thighs are yellow, and the tip of the tail is orange-colour: the length of the body, from nose to tail, is about sixteen inches, and the tail seventeen. Dr. Hunter had a stuffed skin of this animal in his cabinet.

The GREY SQUIRREL.

The hair of this animal is of a dull grey colour, mixed with black, and sometimes tinged with yellow: the belly and the insides of the legs are white; the ears are plain, the tail is long, bushy, and grey, with black stripes. This animal is about the size of an half-grown rabbit. It inhabits the woods of Northern Asia, North America, Peru, and Chili. These animals abound in North America, where they do incredible damage to the plantations of maiz, by running up the stalks, and eating the young ears. A reward of three-pence per head is allowed by the provinces for every one that is killed; and Pennsylvania alone paid in rewards eight thousand pounds of its currency for what was destroyed in one year. These animals make their nests in hollow trees, with moss, straw, wool, &c. They feed on maiz, pine-cones; acorns, and mast of all kinds. They make holes in the ground, where they deposit a large stock of provision for the winter. When they are in want of meat, they descend from the trees, and visit their magazines; and, during the cold season, they confine themselves to their nests for several days together. They run up and down the trunks of trees, but seldom leap from branch to branch. In many particulars they have the actions of the common Squirrel, and are very easily tamed. This animal is called *le petit gris* by Mr. Buffon, and the furs of this animal, which are imported under the name of petit gris, are very valuable. The flesh of this Squirrel is reckoned very delicate.

The BLACK SQUIRREL.

This animal is sometimes entirely black, but is generally marked with white on the nose, the neck, or the tip of the tail. It has plain ears, and its tail is shorter than that of the grey Squirrel, though its body is about an equal length. It is found in Asia, North America, and Mexico. Like the former, it makes great havock among the maiz, and, like that animal, makes its nest in a hollow tree, and provides a store for the winter.

The VARIED SQUIRREL.

It is about twice the size of the common Squirrel, and has plain ears. The upper part of the body is varied with black, white, and brown, and the belly is tawny. It is a native of Mexico, and lives under ground, where it brings forth its young, and deposits a stock of food for the winter. It lives principally on maiz, and is so fierce, that it cannot possibly be tamed.

The BRASILIAN SQUIRREL.

The Brazilian Squirrel, which Mr. Buffon calls the coquallin, is a very beautiful animal, and remarkable for the variety of its colours. The head and body are variegated with white, black, brown, and orange colour; the inside of the legs and the belly are of a bright yellow. The tail, which is annulated with black and yellow, is about ten inches long, and the body from nose to tail about eight inches. It has no tuft at the extremity of the ears, nor does it climb the trees like most of the kind. It inhabits Brasil and Guiana.

The GROUND SQUIRREL.

The nose and feet of this animal are of a pale red; the eyes are full, and the ears plain. The ridge of the back is marked with a black streak, and each side with a pale yellow stripe, bounded above and below with a line of black. The head, body, and tail, are of a reddish brown, and the breast and belly white. It inhabits the North of Asia, and is found in great abundance in

the forests of North America. These animals never run up trees, except they are pursued, and cannot escape by any other means. They burrow, and form their habitations under ground, with two avenues, that they may get access to one, if the other is stopped up. Their retreats are ingeniously contrived, in the form of a large gallery, with branches on each side, and at the end of each branch a large chamber, serving as a magazine to store their winter provision in. They deposit the acorns in one, the maiz in another, the hickory nuts in a third, and their favourite food, the chinquapin chesnut, in the fourth. If their provisions hold out, they seldom stir from their apartment during winter; but when that is exhausted, they dig into cellars where apples are kept, or barns where maiz is stored, and do incredible mischief; however, vast numbers of them are then destroyed by cats, which are inveterate enemies to them as well as to mice. These animals bite severely, and are so extremely wild, that it is hardly possible to tame them. Their skins are of very little value, but they are sometimes used for the lining of cloaks.

The FAT SQUIRREL.

This animal, which is called *Le loir* by Mr. Buffon, is clothed with soft, ash-coloured hair; the belly being a little whitish. Its length from nose to tail is about six inches, and its tail four and an half. It inhabits France, and the South of Europe: it lives in trees, leaps from bough to bough, and feeds on fruits and acorns. It grows very fat, lodges in the hollow of trees, and continues in a torpid state during winter.

The GARDEN SQUIRREL.

The head and body of this animal is of a tawny colour; the throat, and all the under side of the body, white tinged with yellow. The eyes are surrounded with a large spot of black, reaching to the base of the ears, and another appears behind the ears: the length, from nose to tail, is about five inches, and the tail four. It inhabits France, and the South of Europe; infests gardens, and is very destructive to fruits of all kinds, particularly peaches. It lodges in holes in the water, and brings forth five or six young at a time. It remains torpid during the winter, and has a strong smell like a rat.

The DORMOUSE.

This animal agrees with the Squirrel in its food, residence, and some of its actions. It has round naked ears, full black eyes, and a white throat. It is about the size of a mouse, but plumper, and its body is of a tawny red. Its tail is two inches and an half long, and pretty hairy, especially towards the end. It inhabits woods or thick hedges, forming its nest in the hollow of some low tree, or near the bottom of a close shrub. As it wants much of the sprightliness of the Squirrel, it never aspires to the tops of trees, or to sport among the branches.

Like the Squirrel, towards the approach of the cold season they form a little magazine of nuts, beans, or acorns, for winter provision; and they take their food in the same manner, and in the same upright posture as that animal. The consumption of their hoard, during the rigour of the winter, is but small, for they sleep the greatest part of the time: they retire into their holes, roll themselves up in a ball, and lie almost torpid the greatest part of that gloomy season. In that space they sometimes experience a short revival, by the warmth of a sunny day, or an accidental change from cold to heat, which in some degree thaws their stagnant fluids, when they take a little of their provision, and then relapse into their former state.

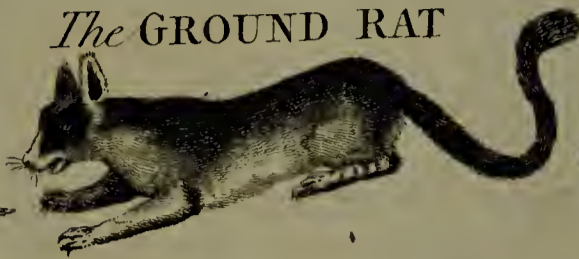
In this manner they continue usually asleep, and only wake occasionally, for above five months in the year, seldom venturing from their retreats, or in any open place, and consequently are but seldom seen: for which reason they seem less common in England than they really are. Their nests are made of moss, grass, and dead leaves; they

QUADRUPEDS

The RAT



The GROUND RAT



The CITILLE



The PACOS



The SQUIRRELL



The PICA



The HARE

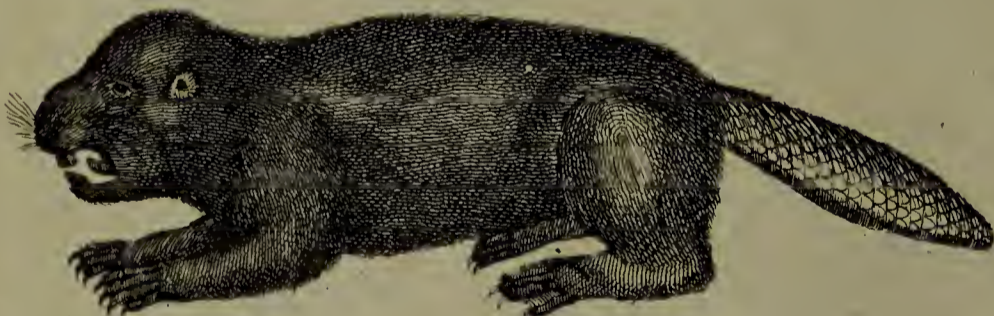
The BONASSUS



The RABBIT



The AGUTI



The BEAVER



The PORCUPINE



The OPOSSUM

they usually bring forth three or four young at a time, and that but once a year, which is in the spring.

The SAILING SQUIRREL.

This animal has a small rounded head, small blunt ears, a short neck, a cloven upper-lip, and two small warts at the outer corner of each eye, with hairs growing on them. It has four toes on the fore feet, and instead of a thumb, a slender bone, two inches and a half long, lodged under the lateral membrane, serving to stretch it out. From thence to the hind legs extends the membrane, which is broad, and a continuation of the skin of the sides and belly. On the hind feet it has five toes, with a sharp bending claw on each. The tail is covered with long hair, disposed horizontally. The colour of the head, body, and tail, is a bright bay, inclining to orange in some parts. The breast and belly are of a yellowish white. The length of this animal, from the nose to the tail, is about eighteen inches, and the tail fifteen. It inhabits Java, and some other Indian islands; leaps from tree to tree as if it flew, and catches hold of the boughs with its tail. These animals are different in size: Linnæus describes one about the size of our Squirrel, and Sir Edward Michelbourne killed one in one of the Indian isles that was larger than a hare. Nieuhoff describes this species under the name of the flying cat.

The FLYING-SQUIRREL.

This little animal, which is frequently brought over to England, is less than a common Squirrel, and larger than a field mouse. Its skin is very soft, and elegantly adorned with a dark fur in some parts of the body, and a light grey in others. It has round naked ears, large prominent sparkling eyes, and very sharp teeth, with which it gnaws any thing very expeditiously. It has

a lateral membrane, extending from the fore to the hind legs, and its tail is covered with long hair disposed horizontally. When it does not leap, its tail lies close to its back; but when it takes its spring, the tail moves backwards and forwards from side to side. This animal at a single bound, will dart from one tree to another at above twenty yards distance, but it sinks considerably before it can reach the place it aims at: sensible of this, it mounts the higher in proportion to the distance it intends to reach. It is assisted in this spring, by a very peculiar formation of the skin or membrane, which extends from the fore feet to the hinder; so that when it stretches its fore legs forward, and its hind legs backward, this skin is extended between them, somewhat like that between the legs of a bat. Thus the little animal keeps buoyant in the air, till the force of its first impulse is expired, and then it descends.

The flying Squirrel, however, does not move like a bird, by repeated strokes of its wings, but rather in the manner of a paper kite, supported by the expansion of the surface of its body, which renders it specifically lighter than it would otherwise be.

This animal inhabits Finland, Lapland, Poland, Russia, North-America, and New Spain. Like the common Squirrel, it is usually found on the tops of trees; but, though better calculated for leaping, it is of a more torpid disposition, and seldom exerts its powers; it therefore frequently becomes the prey of the martin and pole-cat. It is not, like most other squirrels, fond of almonds or nuts, its favourite food being the sprouts of the birch, and the cones of the pine. Though easily tamed, it embraces the first opportunity of deserting: When in its tame state, it is fed with bread and fruits; and generally sleeps by day, though it is very sprightly and agile in the night. These animals usually bring forth three or four young at a time, and live in hollow trees.

C H A P. XII.

Containing the NATURAL HISTORY of the RAT; the MOUSE; the MOLE; and their Varieties.

IF we look through the different ranks of animals, from the largest to the smallest, from the enormous elephant to the diminutive mouse, we shall discover that we suffer greater injuries from the contemptible meanness of the one, than the formidable invasions of the other. We can oppose united strength and art against the elephant, the rhinoceros, or the lion: those we have driven into their native solitudes, and compelled them to remain at a distance, in the most inconvenient regions, and disagreeable climates. But no force can be exerted against their unresisting timidity, no arts can diminish their astonishing increase: legions of rats may be destroyed in an instant, yet the loss is quickly repaired. Nature, which has denied them strength, has supplied the defect by their fecundity.

NATURAL HISTORY of the COMMON RAT.

OF all our smaller quadrupeds, the Rat is the most pernicious. Our meat, corn, paper, cloaths, furniture, and every conveniency of life is a prey to this destructive animal; and it makes equal havock on our poultry, rabbits, or young game. It is to be lamented that it is a domestic animal, always residing in houses, barns, or granaries; and nature has furnished it with such very strong fore-teeth, that it can force its way through the hardest wood or the oldest mortar: it makes an habitation either for its temporary residence, or for a nest for its young, in a hole near a chimney: when it is intended for a nest, it improves the warmth

of it, by forming a magazine of bits of cloth, hay, straw, or wool.

This animal breeds several times in the year, and usually brings forth six or seven young at a time. This species frequently overstock their abode by their fecundity, which obliges them, through deficiency of food, to devour each other. Happily for us, this unnatural disposition prevents even the human race from becoming a prey to them; though indeed there are some instances of their gnawing infants in their sleep.

The common enemy of the Rat is the weasel, which makes infinitely more destruction among them than the cat; the weasel having more agility, and, from the slender form of its body, is enabled to pursue them through all their retreats, which the former cannot. The Norway Rat has greatly reduced their numbers, and in many places almost extirpated them.

Though the common Rat is an animal so universally known, a brief description of it may be excused. The length from the nose to the tail, is about seven inches long, and the tail near eight inches: the nose, which is sharp-pointed, is furnished with long whiskers; the colour of the head, and the whole upper-part of the body, is a deep iron-grey, bordering on black; the throat and belly are of a dirty white, inclining to grey; the feet and legs are almost naked, and of a dirty pale flesh colour. The tail is covered with small dusky scales, mixed with a few hairs, which adds to the general deformity of its detestable figure. The fore-feet want the thumb or interior toe, having only a claw in its place: the hind feet are furnished with five toes.

This

This animal was first introduced into America by the Europeans, and into South-America about the year 1544, when Blasco Nunnez was the viceroy; it is now become the pest of all that continent. It was formerly so great a nuisance that the king of England had a Rat-catcher belonging to his household, which is continued in office to this day by his Britannic majesty; distinguished in a peculiar by his dress, which is scarlet, embroidered with yellow worsted, decorated with the figures of mice destroying wheat-sheaves.

The Norway RAT.

There is no possibility of our deriving any advantage from the destruction of the common Rat, since they are replaced by such mischievous successors; the Norway Rat having the same disposition with the common kind, with greater abilities of doing mischief. This animal never made its appearance in England till about fifty years ago. It burrows in the banks of rivers, ponds, and ditches; takes the water very readily, and swims and dives with great celerity. It does incredible damage to those mounds which are raised to prevent ponds and rivers from overflowing. It forms its holes very near the edge of the water, where it chiefly resides during the summer, and feeds upon small animals, fish, and corn. When the winter approaches, it comes nearer the farm-houses, and burrows in their corn, where it consumes much, but destroys more. Nothing, in short, that can be eaten, escapes the voracity of this creature. It destroys rabbits, poultry, and all kinds of game; and hardly any of the feebler animals can escape its rapacity, except the mouse, which shelters itself in its little hole, that cannot receive an animal so large as the Norway Rat.

Mr. Buffon, and after him Dr. Goldsmith, say these animals frequently bring forth from fifteen to thirty at a time. Mr. Pennant says they produce from fourteen to eighteen young at a time. The bite of these animals is not only severe but dangerous; the wound being immediately attended with a great swelling, and requires a considerable time to heal. These creatures are sometimes so daring as to turn upon their pursuers, and endeavour to fasten on the stick or hand of the person who attempts to strike them.

The head, back, and sides of this animal are of a light brown colour, mixed with tawny and ash-colour; the breast and belly of a dirty white; the feet naked, and of a dirty flesh colour; the fore feet are furnished with four toes, and a claw instead of the fifth. Its length from the nose to the tail, is about nine inches, and the tail the same. It is principally in colour that this animal differs from the black Rat, or what was once called the common Rat, which is now no longer common. This new invader is much stronger; and, since its arrival, has found means to destroy almost the whole species, and to possess itself of their retreats.

Not only the black Rat, but all other animals of inferior strength, were obliged to submit to the rapacity of the Norway Rat. The frog was utterly incapable of combat or defence. It had been purposely introduced into Ireland some years before the Norway Rat, and began to multiply exceedingly. The inhabitants were pleased with the introduction of a harmless animal, that served to rid their fields of insects, and, as they imagined, contributed to render their waters more wholesome. But the Norway Rat soon put a period to their propagation: for being of an amphibious nature, it pursued the frog to its lakes, and seized it in its own natural element. The frog is therefore once more become almost extinct in that kingdom; and the Norway Rat, having fewer animals to destroy, and consequently a smaller portion of provision, is also grown less numerous.

The great increase of these animals would over-run the whole country in a short time, did they not destroy each other. The large male Rat usually keeps in a hole by itself, and is dreaded by its own species as the most formidable of enemies. Thus are these pernicious creatures kept within due bounds; and that their increase may not too much incommode mankind, it is repressed by their own rapacity.

All the stronger carnivorous animals have natural antipathies against the Rat. The dog, though he detests their flesh, pursues them with great alacrity, and attacks them with great animosity. Such as are accustomed to killing these vermin, dispatch them with a single squeeze; but those which shew any hesitation are sure to be sufferers; the Rat always taking the advantage of a moment's delay, and, instead of waiting for the attack, becomes the aggressor, and seizes its enemy by the lip, often inflicting a very dangerous wound.

Another enemy of these animals is the cat; and yet many of them are unwilling to attack the Rat, or to feed upon it when killed. Some of them indeed will pursue and seize the Rat, though they often meet with an obstinate resistance. If very hungry, the cat will sometimes eat the head, but it is generally satisfied with its victory alone. The weasel is a much more dangerous foe to these vermin; but man has contrived a variety of methods of destroying these noxious intruders.

The Rat being so pernicious a creature, we shall add the two following receipts, as they are said to be effectual for destroying those disagreeable vermin.

The first has the sanction of the Dublin society, who, on the 19th of November, 1762, ordered a premium of five guineas to one Laurence O'Hara, for this discovery, which is, "One quart of oatmeal, four drops of rhodium, one grain of musk, and two nuts of nux vomica, finely rasped." This mixture is to be made up in pellets, and laid in the holes and places which the Rats frequent.

The other receipt is thus: "take of the seeds of slaves-acre, or louse-wort, powdered, one fourth part, and of oatmeal three parts; mix them well, and make them up into a paste with honey. Lay pieces of it in the holes, and on the places frequented by Rats or mice, and it will kill such of those vermin as eat of it."

The first step taken by Rat-catchers, in order to clear a house, &c. of those vermin, is to allure them all together to one proper place, before they attempt to destroy them; for there is such an instinctive caution in these animals, accompanied with a surprising sagacity in discovering any cause of danger, that if any of them are hurt, or pursued in an unusual manner, the rest take the alarm, and become so shy and wary, that they elude all the devices and stratagems of their pursuers for some time after. This place, where the Rats are to be assembled, should be some closet, or small room, into which all the openings but one or two may be secured; and this place should be, as near as possible in the middle of the house, or buildings. It is the practice therefore to attempt to bring them all together in some such place, before any attempt be made to take them; and, even then, to avoid any violence, hurt, or fright to them, before the whole are in the power of the operator. The means used to allure them to one place are various: one of those most easily and efficaciously practised is, the trailing some piece of their most favourite food, which should be of the kind that has the strongest scent, such as toasted cheese, or broiled red-herring, from the holes or entrances to their accesses in every part of the house or contiguous buildings, whence it is intended to allure them. At the extremities, and in different parts of the course of this trailed track, small quantities of meat, or any other food, should be laid, to bring the greater number into their tracks, and to encourage them to pursue it to the center place, where they are intended to be taken. At that place, where time admits of it, a more plentiful repast is laid for them, and the trailing repeated for two or three nights.

Besides this trailing and way-baiting, some of the most expert of the rat-catchers have a shorter, and perhaps more effectual method of bringing them together; which is, the calling them, by making such a kind of whistling noise as resembles their own call; and by this means, with the assistance of the way-baits, they call them out of their holes, and lead them to the repast prepared for them at the place designed for taking them. But this is much more difficult to be practised than the art of trailing; for the learning the exact

notes, or cries of any kind of beasts or birds, so as to deceive them, is a peculiar talent, not easily attained to in other cases.

In the practising either of these methods, of trailing or calling, great caution must be used by the operator, to suppress and prevent the scent of his feet and body from being perceived; which is done by overpowering that scent by others of a stronger nature. In order to this, the feet are covered with cloths rubbed over with *assa foetida*, or other strong smelling substances; and even oil of rhodium is sometimes used for this purpose, but sparingly, on account of its dearness, though it has a very alluring, as well as disguising effect. If this caution of avoiding the scent of the operator's feet, near the track, and in the place where the Rats are proposed to be collected, be not properly observed, it will very much obstruct the success of the attempt to take them; for they are very shy of coming where the scent of human feet lies very fresh, as it intimates, to their sagacious instinct, the presence of human creatures, whom they naturally dread. To the above mentioned means of alluring by trailing, way-baiting, and calling, is added another of very material efficacy, which is the use of the oil of rhodium, which, like the *marum lyriacum* in the case of cats, has a very extraordinary fascinating power on these animals. This oil is extremely dear, and therefore sparingly used. It is exhaled in a small quantity in the place, and at the entrance of it, where the Rats are intended to be taken, particularly at the time when they are to be last brought together, in order to their destruction: and it is used also by smearing it on the surface of some of the implements used in taking them by the method below described: and the effect it has in taking off their caution and dread, by the delight they appear to have in it, is very extraordinary.

It is usual, likewise, for the operator to disguise his figure as well as scent; which is done by putting on a sort of gown or cloak, of one colour, that hides the natural form, and makes him appear like a post, or such inanimate thing; which habit must likewise be scented as above, to overpower the smell of his person: and besides this, he is to avoid all motion, till he has secured his point of having all the Rats in his power.

When the Rats are thus enticed and collected, where time is afforded, and the whole in any house and out-buildings are intended to be cleared away, they are suffered to regale on what they like best, which is ready prepared for them, and then to go away quietly for two or three nights; by which means those which are not allured the first night, are brought afterwards, either by their fellows, or the effects of the trailing, &c. and will not fail to come duly again, if they are not disturbed or molested. But many of the Rat-catchers make shorter work, and content themselves with what can be brought together in one night or two; but this is never effectual, except where the building is small and entire, and the Rats but few in number.

The means of taking them, when they are brought together, are various. Some entice them into a very large bag, the mouth of which is sufficiently capacious to cover nearly the whole floor of the place where they are collected; which is done by sinearing some vessel, placed in the middle of the bag, with oil of rhodium, and laying in the bag baits of food. This bag, which before lay flat on the ground with the mouth spread open, is to be suddenly closed when the Rats are all in it. Others drive, or fright them, by slight noises or motions, into a bag of a long form, the mouth of which, after all the Rats are come in, is drawn up to the opening of the place by which they entered, all other ways of retreat being secured. Others again, intoxicate or poison them, by mixing with the repast prepared for them, the *coculus Indicus*, or the *nux vomica*. A receipt for this purpose has appeared, which directed four ounces of the *coculus Indicus* with twelve ounces of oatmeal, and two ounces of treacle or honey, made up into a moist paste with strong beer; but if the *nux vomica* be used, a much less proportion will serve than is here given of the *coculus*. Any similar compe-

sition of these drugs, with that kind of food the Rats are most fond of, and which has a strong flavour, to hide that of the drugs, will equally answer the end. If, indeed, the *coculus Indicus* be well powdered, and infused in the strong beer for some time, at least half the quantity here directed will serve as well as the quantity before-mentioned. When the Rats appear to be thoroughly intoxicated with the *coculus*, or sick with the *nux vomica*, they may be taken with the hand, and put into a bag or cage, the door of the place being first drawn to, lest those which have strength and sense remaining should escape.

By these methods, well conducted, a very considerable part of the Rats in any farm, or other house, and the contiguous buildings, may be taken.

The WATER-RAT.

This animal is about the same size with the latter, but has a larger head, a blunter nose, and smaller eyes. Its ears are very short, and almost hid in the fur, and the tip of its tail is whitish. The head and back are covered with long black hair, and that on the belly is of an iron grey. The length of this animal, from the nose to the tail is seven inches, and the tail is about five. This creature somewhat resembles the beaver, which induced Linnæus, in the first edition of his *Fauna Suecica*, to style it *Castor caudæ lineari tereti*. It is very expert at swimming and diving; and was supposed by Ray and Linnæus to be web-footed; but this has been found to be a mistake, its toes pretty much resembling those of its kind. It inhabits Europe and North-America; but never frequents houses, being usually found on the banks of rivers, ditches, and ponds, where it burrows and breeds, and generally brings forth about six young at a time. It feeds on frogs, small fish, roots, and insects, and is itself the prey of the pike. On *maigre* days, this animal and the otter are eaten in France.

NATURAL HISTORY of the COMMON MOUSE.

THIS timid, cautious, active, little animal is entirely domestic, being never to be found in fields, or, as Mr. Buffon observes, in any countries uninhabited by mankind. Fearful by nature, but familiar from necessity, it attends upon mankind. Indeed all its motions appear to be regulated by fear and necessity: to seek provision is its only inducement to leave its hole, and it seldom ventures farther than a few paces from its home. It does not, like the rat, travel from one house to another, except it be compelled; and, as it requires less nourishment, it does less mischief.

Bold and courageous animals are more easily tamed than those which are cowardly and timid; the fearful being ever suspicious. The Mouse is the most feeble, and consequently the most timid of all quadrupeds, except the Guinea-pig; it cannot therefore be rendered thoroughly familiar. When fed in a cage, it retains its natural apprehensions; and to these it owes its security. No animal has more enemies than the Mouse, and few are so incapable of resistance. The cat, the snake, the hawk, the owl, the weasel, and the rat, destroy this race by millions, and were it not for their amazing fecundity they must long have been extirpated. The Mouse breeds at all seasons; and several times in the year, and usually produces six or seven young at a time, which in less than a fortnight are able to run abroad and shift for themselves. Aristotle gives us an idea of the astonishing fecundity of this animal, by assuring us, that having put a pregnant Mouse into a vessel of corn, he some time after found an hundred and twenty mice all sprung from one original. The early perfection of this animal implies the short duration of its life, which seldom exceeds two or three years.

This animal is too well known to require any further description. It inhabits all parts of the world, except the arctic. This species is often found of a pure white, in which state it makes a most beautiful appearance, the full bright eye appearing to great advantage amidst the snowy colour of the fur. The root of white hellebore

and staves-acre, powdered and mixed with meal, will infallibly poison them.

The LONG-TAILED FIELD MOUSE.

The length of this animal, from the nose to the tail, is about four inches and an half, and the tail four inches; the eyes are black, large, and full; the ears prominent; the head, back, and sides, of a yellowish brown, mixed with some dusky hairs: the breast is of an ochre colour, and the belly white: the tail is slightly covered with short hair. These animals are found only in fields and gardens, where they feed on ants, acorns, and corn; and in some parts of England they are called Bean-mice, from the havock they make among the beans when first sown. They form great magazines in their burrows for winter provisions; but it generally happens that they provide for other animals. The hog in particular, comes in for a share, and the damage sustained by the farmer in the fields, by their rooting up the ground, is principally occasioned by their search after the hoards of the field mice. The nest that they provide for their young, is generally very near the surface, and frequently in a thick tuft of grass. They usually produce from seven to ten at a time.

The SHORT-TAILED FIELD MOUSE.

This animal, as its name implies, has a much shorter tail than the former, not exceeding an inch and an half, and ending in a small tuft. The length of this species, from the nose to the tail, is about six inches. Its colour is inclining to that of the domestic Mouse; the upper part being blackish, and the belly of a deep ash colour. This animal makes its nest in moist meadows, produces from six to eight at a time, and has a strong affection for its young. In its manner this creature resembles the last species: like that it resides under ground, and lives on nuts, acorns, and corn; and, like that, it forms a magazine of provision against winter. But, in the place of its abode, it differs from the former; being seldom known to infest gardens.

The HARVEST MOUSE.

The eyes of this animal are less prominent than those of the former, the upper part of the body is of an iron colour, the lower part white, a straight line along the sides dividing the colours: the tail is a little hairy. The length of the body from the nose to the tail, is two inches and an half, and the length of the tail about two inches. These animals are found in great plenty in Hampshire during the time of harvest; but they never enter houses. Many of them are carried into the ricks of corn in the sheaves, and on breaking up the ricks, some hundreds of them are sometimes killed. In winter they shelter themselves under ground, where they burrow very deep, and form a comfortable bed of dead grass. The nests for their young are made above ground, between the straws of standing corn. They bring forth about eight young at a time.

The ORIENTAL MOUSE.

This animal is chiefly of a grey colour, and the back and sides are elegantly marked with twelve rows of small pearl-coloured spots, extending from the head to the rump. The size of this animal is about half that of the common Mouse, and the tail about the length of the body. It inhabits India, where there is another small species which smells of musk, called cherofo, by the Portuguese who live there.

The GREGARIOUS MOUSE.

It has a blunt nose, a small mouth, and naked ears appearing above the fur. The hair on the upper part of the body is black; the throat, belly, and feet, whitish; the tail, which is about a third part of the length of the body, is thinly covered with white hair; the end black and ash-colour. This animal is somewhat larger than the common Mouse. It is found in Germany and Sweden; it eats sitting up, like a squirrel; burrows, and lives under ground.

The SHREW MOUSE.

The Shrew Mouse is about the size of the domestic Mouse, but differing greatly from it in the form of its nose, which is very long and slender. The teeth are twenty-eight in number, and of so singular a form, as to engage the attention of most naturalists. Gesner supposes that nature, in this animal, seems to have formed teeth of a mixed shape, between those of mice and serpents. The two upper fore-teeth are extremely sharp, with a kind of wing or beard on each side of them, resembling that of an arrow, which is scarce visible but on a close inspection. The other teeth are very small, and placed so close together as hardly to appear separated. The length of this little animal, from the nose to the tail, is about two inches and an half; and the length of the tail about one inch and an half: the ears are short and rounded; the eyes are extremely small, and, like those of the mole, almost concealed in the hair. The colour of the head and back is of a brownish dusky red, and the belly of a dirty white: the tail is covered with short dusky hair; the legs are very short, and the feet are divided into five distinct toes.

The Shrew Mouse inhabits Europe, lives in old walls, holes in the earth, or among heaps of stones; it is frequently found in or near out buildings, hay-ricks, and dung-hills: it lives on corn, insects, and filth of any kind. Either from its food or its nature, it has a strong disagreeable smell; so that the cat, when it is killed, will refuse to eat it. It is said to produce four or five young at a time. It is a very harmless little creature, doing scarce any injury, as it feeds more upon insects than corn, and may be considered rather as a friend than an enemy to mankind.

The WATER SHREW MOUSE.

It has a long slender nose, minute ears, and very small eyes almost hid in the fur: the colour of the head and the upper part of the body is black; the throat, breast, and belly, of a light ash-colour. It has a triangular dusky spot beneath the tail. This animal is much larger than the former, the body being three inches and three quarters long, and the tail two inches. It burrows in the banks near the water. Though formerly well known in England, it was lost till May 1768, when it was discovered in the fens near Revelly Abbey, in Lincolnshire. It is called the Blind Mouse by the farmers, and is at present rarely to be met with.

The MINUTE SHREW MOUSE.

Linnæus says this animal is the least of all quadrupeds. It has small eyes, a very slender nose, broad, short naked ears, and whiskers reaching to the eyes. Its hair, which is very fine and glossy, is grey above, and white beneath. Its head is almost as large as its body, and it has no tail. It inhabits Siberia, lives in some moist place beneath the roots of trees, and feeds principally on seeds. It burrows, runs swiftly, and has a voice resembling that of a bat.

There is another species, called the Murine Shrew Mouse, which inhabits Java, and has a long nose, round naked ears, and long hairs about the whiskers. It is nearly of the size of a common Mouse, and its body is of an ash-colour.

The Brazilian Shrew Mouse has a sharp nose and teeth: the body is of a dusky colour, marked along the back with three broad black strokes. Its body is about five inches long, and its tail two. It inhabits Brasil, and is not afraid of the cat, nor does the cat hunt after this animal, or consider it as its prey.

The Mexican Shrew Mouse, which Mr. Buffon calls le tucan, has a sharp nose, small round ears, two long fore-teeth above and below, and is without sight. Its body is thick, fat, and fleshy, and its legs so short that its belly almost touches the ground. It has long crooked claws, tawny hair, and a short tail: the length of its body is about nine inches. It inhabits Mexico, where it burrows and makes such a number of holes, that travellers cannot tread with safety. If it gets out of its hole, it does not know its way back again, but immediately

mediately digs another. It grows very fat, and is good for food. It feeds on roots and seeds.

NATURAL HISTORY of the MOLE.

THE Mole is formed to live wholly under the earth, as if nature meant that no place should be left entirely untenanted. From our own sensations, we should naturally imagine, that the life of a quadruped, condemned to hunt under ground for its prey, and whenever it removed from one place to another, obliged to force its way through a resisting body, must be the most frightful and solitary in nature; but notwithstanding all these seeming inconveniencies, we discover no signs of distress or wretchedness in this animal. No quadruped appears fatter, none has a more sleek or glossy skin. Though it is indeed denied many advantages that most other animals enjoy, it is more abundantly possessed of others, which they possess in an inferior degree.

The divine wisdom is more agreeably illustrated in many animals; but the uniformity of its attention to every article of the creation, even the most insignificant, by adapting the parts to its destined course of life, appears more evident in the Mole than in any other animal.

The Mole is of a size between the rat and the mouse, but does not resemble either, being an animal of a very singular kind, and very different from any other quadruped. It is clothed with fine short glossy black hair. Its nose is long and pointed like that of a hog; but much longer in proportion. Instead of external ears, it has only holes, and its eyes are so very small that it is extremely difficult to discover them. The ancients and some of the moderns were of opinion, that this animal was totally blind; but Dr. Derham discovered with a microscope, all the parts of the eye that are known in other animals; such as the pupil, the vitreous and the chrySTALLINE humours. The smallness of the eyes is a peculiar happiness to this animal; a small degree of vision being sufficient for a creature that is ever destined to a subterraneous abode. Had these organs been larger, they would have been continually liable to injuries, by the earth falling into them: nature has therefore made them very small, and, as a farther defence from that inconvenience, has covered them with fur. Anatomists mention another wonderful contrivance that contributes to their security, assuring us that they are furnished with a certain muscle, by which they can draw back or exert the eye, whenever it is necessary or in danger.

To compensate for the dimness of its sight, the Mole enjoys two other senses in the highest perfection; those of hearing and smelling: the first gives it the most early notice of the approach of danger; the other, in the midst of darkness, directs it to find its food. The nose also, being long and slender, is well adapted for thrusting into small holes, in search of worms and other insects that inhabit them. The wants of a subterraneous animal can be but few, and these are sufficient to supply them. The Mole has no appetites but what it can easily indulge, no enemy but what it can easily evade or conquer. When it has buried itself in the earth, it seldom stirs out unless compelled by violent rains, or when in pursuit of its prey, it comes too near the surface, and gets into the open air, which may be considered as its unnatural element. It usually chooses the softer grounds, as it can travel through them with less labour, and as the greatest number of worms and insects, on which it preys, are to be found there.

The breadth, strength, and shortness, of the fore-feet, which are inclined sideways in this animal, answer the use as well as form of hands, to scoop out the earth, to form its habitation, or to pursue its prey. Longer legs would have prevented the quick repetition of its strokes in working; and the oblique position of the fore-feet, throws all the loose soil behind the animal. The form of its body is also admirably contrived for its way of life: the fore part is thick and very muscular, giving great strength to the action of the fore-feet: and the

hinder-parts, which are small and taper, enable it to pass with great facility through the earth.

This animal has six cutting-teeth in the upper, and eight in the lower-jaw, with two canine in each. It has so tough a skin that it is difficult to cut through it: the fur is short, close set, and softer than the finest velvet. Tho' usually black; it is sometimes found spotted, and sometimes quite white. This animal is about five inches and three quarters long, and the tail one inch.

As these creatures seldom appear above ground, they have not many enemies, and readily evade the pursuit of those animals that are stronger and swifter than themselves. Inundation is the most fatal to them, and whenever such a calamity happens, numbers of them are seen attempting to save themselves by swimming, and using every effort to reach the higher grounds. In these cases the greatest part of them perish, together with their young which remain in the holes behind. If these accidents did not sometimes happen, they would, from their great fecundity, become extremely troublesome and injurious: as it is, indeed, they are considered by the farmer, in some places, as his greatest pest.

The Mole breeds in the spring, and brings forth four or five young at a time. Its nest is made of moss under the largest hillocks, a little above the surface of the ground; and, among the other Mole-hills, it is easy to distinguish that in which the female has brought forth her young. In order to form this retreat, the female begins by making a spacious apartment, which, at proper distances, is supported within by partitions to prevent the roof from falling. Round this she beats the earth very firm, in order to keep out the rain: the hillock in which this apartment is made, being raised above ground, the apartment itself is consequently above the level of the plain, and therefore less subject to slight inundations. The habitation being finished, she makes a nest for her young, of moss and dry leaves, where they lie secure from wet and danger.

The Mole does great damage in gardens and meadows, by throwing up the soil, and loosening the roots of plants: it is most active before rain, and in winter before a thaw, the worm being then in motion; but in dry weather this animal seldom forms any hillocks, as it then penetrates deeper after its prey, which at such seasons retires far into the ground. The Mole shews great dexterity in skinning a worm, which it always does before it eats it, ingeniously stripping off the skin from one end to the other. As the skin of this animal is extremely soft and beautiful, it is remarkable that it has not been turned to advantage. Agricola informs us; that he saw hats made from it, which were the finest and most beautiful that could be imagined. It is remarkable, though we are assured it is strictly true, that these animals are not to be found in Ireland.

The common method of destroying Moles, says the author of the Farmer's Dictionary, is by traps, made in the following manner.

Take a board about three inches and a half broad, and five inches long: on one side thereof raise two small round hoops or arches, one at each end, like the two hoops or bails of a carrier's waggon, capacious enough for a Mole to creep through easily: in the middle of the board make a hole about the size of a goose-quill, and have in readiness to put into it a stick about two inches and a half long, fitted at one end to the hole, and a little forked at the other. Cut also a hazel or other stick, about a yard, or a yard and an half long, which will rise with pretty strong elasticity, when it is stuck into the ground; and to the end of this stick fasten a very strong noose of horse-hair, made so as to slip easily. Have likewise in readiness four small hooked sticks: then go to the furrow or passage of the Mole, and after you have opened it, fit in the little board with the bended hoops downward, so that when the Mole passes that way, it may go directly through the two semi-circular hoops. But before you fix the board in this manner, put the hair string through the hole in the middle of it; place the noose in a circular form, so as to make it answer to the two hoops; put the small stick before-mentioned gently into the hole in the middle of the board, so as

just to stop the knot of the hair string, without entering so far as absolutely to tighten it. Then fasten the board down with four hooked sticks, and cover it with earth. When the mole, passing in its furrow, comes into this trap, it will displace the small stick that hangs perpendicularly downward, the knot will then be drawn through the hole, and the noose instantly straitened by the rising of the end of the hazel stick to which it is fastened, which will catch the Mole round the neck.

Others, watching their motions in the morning and evening, which are their usual times of stirring, dig them out in a moment with a spade: and, about March, which is their time of breeding, numbers of their young ones may be destroyed by turning up their nests, which are generally in the largest hills; and the old ones who come to seek their young, will presently be taken.

Some approve of the pot-trap, which is a deep earthen vessel set in the ground with the brim even with the bottom of the Mole tracks. The season for using this is when the Moles couple, which is about the beginning of March, or perhaps somewhat earlier.

Mr. Worlidge says, they may be driven from the gardens, meadows, and other places, where a person would not choose to dig, by fuming their holes with brimstone, garlick, or other unfavoury things: and that the putting a dead Mole into a common haunt, will make them absolutely forsake it: to which Mr. Mortimer adds, but only upon report, that white hellebore and the roots of palma christi, dried, powdered, and sifted through a fine sieve, then mixed with barley-meal and eggs, and worked into a paste with wine and milk, will kill them, if laid in little pellets under their hills.

The writers of the Memoirs of the Society of Agriculture at Angers, recommend hazel nuts boiled in an infusion of hellebore, as a sure method of destroying Moles. Two or three of these nuts are to be laid under each Mole-hill, and the creatures, by being fond of that fruit, will be poisoned by eating them.

The way to remove Mole-hills and ant-hills, which are not only disagreeable to the sight, but injurious to the pasture, and a great hindrance to the mowing of the grafs, especially where they are numerous, is, particularly in regard to the latter, either to divide the turf which grows over them, into three parts, with a spade, or other instrument, then to pare it off each way, to dig out the middle or core of the hills, to spread this mould over the other ground, to leave the holes open all the winter, that the ants may be killed, or lay the turf down again in the spring, and to roll those spots after the reinstated turfs are settled, and their grafs has taken fresh roots; or, which is a more expeditious method, to scoop them out at once, with what Mr. Bradley calls a scolloped Mole-hill plough.

When this plough is used, the point of the scolloped spade must be set to the bottom of the hill, by raising the plough-stilts, so that it may go into the ground; and when the hill is almost cut through, the point should be raised up again, by weighing a little on the stilts.

The hollow left by this plough will receive the rain as it falls, and this will drown the remaining ants.

After the Mole and ant-hills, and other inequalities have been thus taken off, the best way is to carry them to a corner of the field, there to break them well to pieces, and mix them with a considerable portion of lime, or other manure suited to the soil, which will effectually destroy every remains of the ants, and convert the whole to good manure, which may then be profitably spread all over the surface of the ground. The spots on which the Mole or ant-hills stood, should be loosened with a spade; and then mixed with lime or other manure, and afterwards be laid down with clean grafs-seeds.

The SIBERIAN MOLE.

It has a very short nose, no ears, and three toes on the fore-feet, with a very large claw on the outer toe. It has four toes on the hinder-feet, its body is of an equal thickness, and its rump quite round. It is of a beautiful green and gold colour, variable with the light. It has no tail, and is a native of Siberia. Mr. Buffon calls it *La Taupe dorée*, or the Golden Mole.

The RADIATED MOLE.

This animal has small fore-legs, with five long white claws on each: the nose is long, and the edges are beset with radiated tendrils. The hair on the body is very short and fine, and of a dusky colour. The hind-legs are scaly, and it has five toes on each foot. The length of this animal, from the nose to the tail, is about three inches and three quarters, and the tail, which is slender and taper, is about an inch and a quarter long. It inhabits North-America, and feeds on roots.

There is another animal found in North-America, called the long-tailed mole, with broadish fore-feet, and scales on the hind-feet, having a few short hairs on them: the claws on the fore-feet resemble those of the common Mole; those on the hind-feet are very long and slender. The fur on the body is soft, long, and of a rusty brown. The tail is two inches long, and covered with short hair. The length of the body is about four inches and an half.

The BROWN MOLE.

This animal has a slender nose, the upper-jaw longer than the under, with two cutting-teeth in the former, and four in the latter, the two middle of which are very small. It has no canine teeth. The fore-feet are broad, and the nails long; the hind-feet are small, with five claws on each. The hair is soft, glossy, and brown at the ends, though grey at the bottom. The feet and tail are white. The length of this animal, from the nose to the tail, is about five inches and an half; the tail is very slender, and about three quarters of an inch long. It is found in North-America.

There is another species found in America, called the Red Mole: it is of a pale reddish colour, has three toes on the fore-feet, and one on the hind. It resembles the European kind in the form of the body and tail.

C H A P. XIII.

Containing the NATURAL HISTORY of the HEDGE-HOG, the SLOTH, the ARMADILLO, the MANIS, the PANGOLIN, the ANT-EATER, the MORSE, the SEAL, the SEA-LION, the MANATI, the SEA-APE, and the BELUGA.

NATURAL HISTORY of the HEDGE-HOG.

THOUGH the Hedge-Hog has a most formidable appearance, it is one of the most harmless animals in the universe. Incapable or unwilling to offend, all its precautions are only directed to its own

security. It is armed with a thousand points, not to invade, but to defend it from the enemy. Other creatures may rely upon their force, their cunning, or their swiftness; but, destitute of all these, this animal has but one expedient for safety, from which alone it often finds protection. Whenever it is attacked, it withdraws all

its vulnerable parts, rolls itself into the form of a ball, and presents nothing but its defensive thorns to the enemy.

The head, back, and sides of this animal are covered with long sharp spines or prickles; the nose, breast, and belly, are cloathed with a fine soft hair; the legs are short, almost naked, and of a dusky colour: the ears are broad, round, and naked; the eyes are small, and placed high in the head; the mouth also is small, but well furnished with teeth; serving, however, only to chew its food, but of little use in attacking other animals, or defending itself against them. The toes on each foot are five in number, long and separated: the prickles which are about an inch in length, are very sharp-pointed; their points are white, the middle black, and the lower part white. The tail is little more than an inch long, and so concealed by the spines as hardly to be visible. The length of this animal, from the nose to the tail, is about ten inches.

When rolled up in a lump, the Hedge-Hog patiently waits till its enemy passes by, or is fatigued with fruitless attempts to annoy it. The cat, the weasel, the ferret, and the martin, soon decline the combat; and even the dog generally makes his attacks in vain. Increase of danger does but increase the animal's precautions to keep on its guard. In attempting to bite, the assailant more frequently receives than inflicts a wound. The enraged dog may bark, and roll the animal along with its paws; but the Hedge-Hog submits patiently to every indignity in order to remain secure. At length the dog, after expressing his chagrin by barking, leaves the inoffensive animal where he found it; who perceiving itself out of danger, ventures to peep out from its ball, and if not interrupted, makes the best of its way to its retreat.

Like most of the wild animals, the Hedge-Hog sleeps by day, and is in motion during the night. It feeds on roots, fruits, worms, and insects; and is erroneously charged with sucking cows, and hurting their udders. But the smallness of its mouth is sufficient to exculpate it from this reproach. It usually resides in small thickets, in hedges, and at the bottom of ditches covered with bushes, where it makes a hole of about six or eight inches deep, and lies well wrapped up in moss, grass, or leaves; and, during winter, rolls itself up and sleeps out that dreary season.

This animal is said to be very hurtful in gardens and orchards, but this conjecture appears to be ill-founded. Mr. Buffon, who kept these animals tame about his house, acquits them of the reproach of being mischievous in the garden. "I permitted several of them," says he, "to go about my garden; they did very little damage, and it was scarce perceivable that they were there: they lived upon the fruits that fall from the trees; they dug the earth into shallow holes; they eat caterpillars, beetles, and worms; they were also very fond of flesh, which they devoured boiled or raw." In short, the Hedge-Hog appears to be a very serviceable animal in ridding our fields of worms and insects, which are so injurious to vegetation.

The barbarity of anatomists furnishes us with an amazing instance of the patience of this animal; they dissected one alive, whose feet they first nailed down to the table; and it endured that, and every stroke of the operator's knife, without a single groan. These animals bring forth about the beginning of summer.

The TENDRAC; or, ASIATIC HEDGE-HOG.

Like the common Hedge-Hog, this animal is covered with prickles, though mixed in a greater proportion with hair; but they do not defend themselves like that animal, by rolling up into a ball. It has a long slender nose, short round ears, and short legs. The face, throat, belly, buttocks, and legs are thinly covered with whitish fine hair. The tail is very short and covered with spines. It is about the size of a mole. It inhabits the isles of India, and that of Madagascar.

There is another which Mr. Buffon calls the Tanrec, which is rather larger. It is covered with spines only on the top and hind part of the head, the top and sides

of the neck, and the shoulders: the rest of the body is covered with yellow bristles, intermixed with a few black, which are longer than the others.

Each of these animals is a variety of the same species, having five toes on each foot. They inhabit the isles of India, and Madagascar. They grunt like hogs, grow extremely fat, and multiply greatly: they frequent shallow water, whether fresh or salt: they burrow on land; and lie torpid six months in the year, during which time their old hair falls off. Their flesh, though very indifferent, is eaten by the Indians, and thought by them a delicacy.

The GUIANA HEDGE-HOG.

This animal has no external ears, but has two orifices which answer the purpose of ears. The head is short and thick; the back and sides are covered with short spines of an ash-colour tinged with yellow. The face, belly, legs, and tail, are covered with soft whitish hair. The length of this animal is about eight inches. It has a short tail, and long crooked claws. It inhabits Guiana.

NATURAL HISTORY of the SLOTH.

THERE are two different kinds of the Sloth, distinguished from each other by their claws; the one having only two claws upon each foot, and being without a tail; the other having a tail, and three claws upon each foot. The former in its native country is called the Unan, and the latter the Ai. The snout of the Unan is longer than that of the Ai, the ears are more apparent, and the fur is different. In the number of ribs also they differ greatly; the Unan having forty-six, and the Ai but twenty-eight. But notwithstanding these differences are so very observable, they have been but little regarded in the description of two animals which bear so strong a resemblance to each other in the general out-lines of their figure, in their appetites, their nature, and their helpless formation.

These animals are both described under the common appellation of the Sloth, and their habits are sufficient to excite our astonishment and curiosity. We shall take our description from the Ai, which differs from the other only in the trifling particulars abovementioned, and in being somewhat more active. It is about the size of a badger, its fur is coarse and irregular, and in some degree resembles dried grass: the tail is so short as to be little more than a stump; the mouth extends from ear to ear. It has a blunt black nose, very small external ears, and small heavy black eyes. Its legs are thick and awkwardly placed. The colour of the face and throat is a dirty white; the body and limbs are covered with hair of a lightish brown colour. The feet of this animal proceed from the body in such an oblique direction, that the sole of the foot seldom touches the ground. When it is therefore obliged to make a step forward, it scrapes on the back of the nails along the surface, and thus wheeling the limbs circularly about, it at length places its foot in a progressive position; the other three limbs are brought about with equal difficulty; and thus it travels at the rate of about three yards in an hour. The poor creature indeed seldom changes place but by constraint, and when strongly impelled by hunger.

The Sloth inhabits many parts of the eastern side of South America. It is the meanest, the most sluggish, and the most ill formed of all animals. It lives entirely upon vegetable food, particularly on the leaves and fruit of trees, and it often feeds even upon the bark, when nothing remains on the tree for its subsistence. It is a ruminant animal, and, like all those of the kind, has four stomachs, which consequently require a large share of provision to supply them, and in less than a fortnight it generally strips a large tree of all its verdure. While any thing remains that will supply its hunger, it keeps aloft, unwilling to descend. But when totally destitute of provisions above, it slowly crawls from branch to branch; in search of something to appease its appetite,

appetite, and at last is obliged to encounter the dangers that attend it below.

It is with the utmost pain and difficulty that this animal ascends a tree, but it is utterly unable to descend in the same manner; it therefore forms itself into a ball and drops from the branches to the ground; and as it is incapable of exerting itself to break the violence of its descent, it drops like a heavy shapeless mass, and, in the fall, feels no inconsiderable shock. There it remains for some time inactive; and then prepares for a journey to some neighbouring tree. This is the most tedious and painful journey that can be conceived: to travel to a tree at an hundred yards distance, is the indefatigable labour of a week. Its motions are almost imperceptible, and it frequently baits upon the road. At every effort to move, it sets forth a most plaintive and melancholy cry, which at once produces pity and disgust. This plaintive sound appears to be its chief defence, for every beast of prey is so affected by the noise as to quit it with horror. When it is arrived at its destined tree, it mounts it with greater ease than it moved upon the plain. It falls to with a most excellent appetite, and by greedily devouring the leaves and bark, destroys the very source that supplies it.

The look of this animal is so piteous as to excite compassion; and its cry is generally accompanied with tears which dissuade every creature from injuring so wretched a being. Its abstinence from food is so powerful, that one of them was known to remain forty days without meat or drink. The strength of its feet is so extraordinary, that whatever it seizes on cannot escape its claws. Kircher informs us that a Sloth seized a dog with its feet, and held him four days in that situation, till the poor animal perished with hunger.

Were we to measure the happiness of this animal by our own sensations, it is certain that nothing can be more miserable, but it may probably have some stores of comfort which we are strangers to, and which may place it upon a level with some other ranks of the creation. If it is sometimes fatigued with pain, distress and labour, it is compensated by a larger portion of plenty, indolence, and security. These animals are, however, very differently formed from all other quadrupeds, and doubtless have different enjoyments. Like birds they have but one common vent for the purposes of propagation and their natural discharges. Like the tortoise, which they resemble in the slowness of their motion, they live a considerable time after their nobler parts are wounded, or even taken away.

The Unan, or Sloth with two toes, inhabits South America, and the isle of Ceylon; though Mr. Buffon has fixed the residence of this genus only to America. Seba expressly says his specimen was brought from Ceylon; and Mr. Pennant assures us that he was informed by a man distinguished in the literary world, who had been long resident in India, that he had seen this animal brought from the Paliacat mountains that lie in sight of Madras. It is therefore evident that it is common to both continents.

Barbot and Bosman describe an animal by the name of Potto, that is met with in Guinea, which is at least a species of this genus, as they ascribe to it the attributes of the former; and these writers were too observant of the animals of Guinea to mistake one, whose characters are so strongly marked as those of the Sloth.

Insignificant as this animal is, who yet can help observing the special hand of a gracious Providence, in the formation and care of it? Not designed for motion, its feet are nevertheless furnished with claws, which enable it to hold fast in that station, which is necessary for it. Helpless as it is, and liable to a thousand mischances on the ground, the universal Provider hath assigned it a place of safety, where it finds plenty of food; and as changing its place, would be uneasy and dangerous, he hath made drinking unnecessary to it, from the nature of its food and its own constitution. To render it, defenceless as it is, the less obnoxious to pursuit, the colour, wherewith the Creator hath clothed it, serves to secure it even from view; and the amazing instinct wherewith it is endowed, and which we

have remarked, abundantly evinces a designing and directing hand.

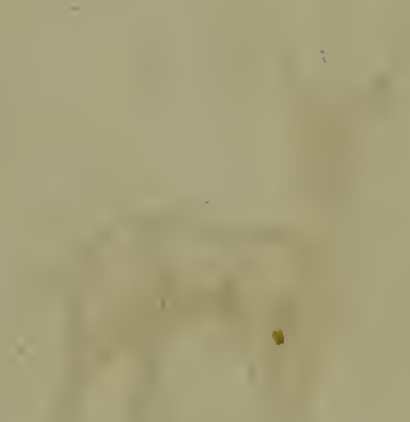
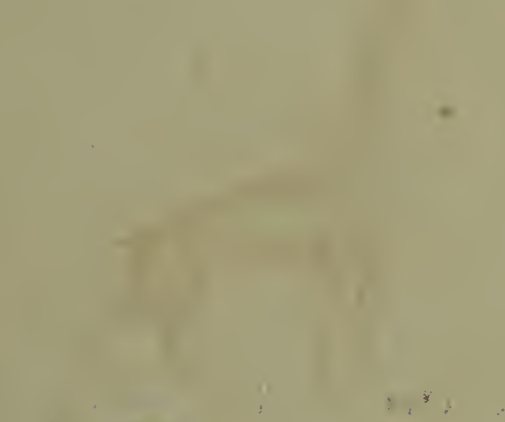
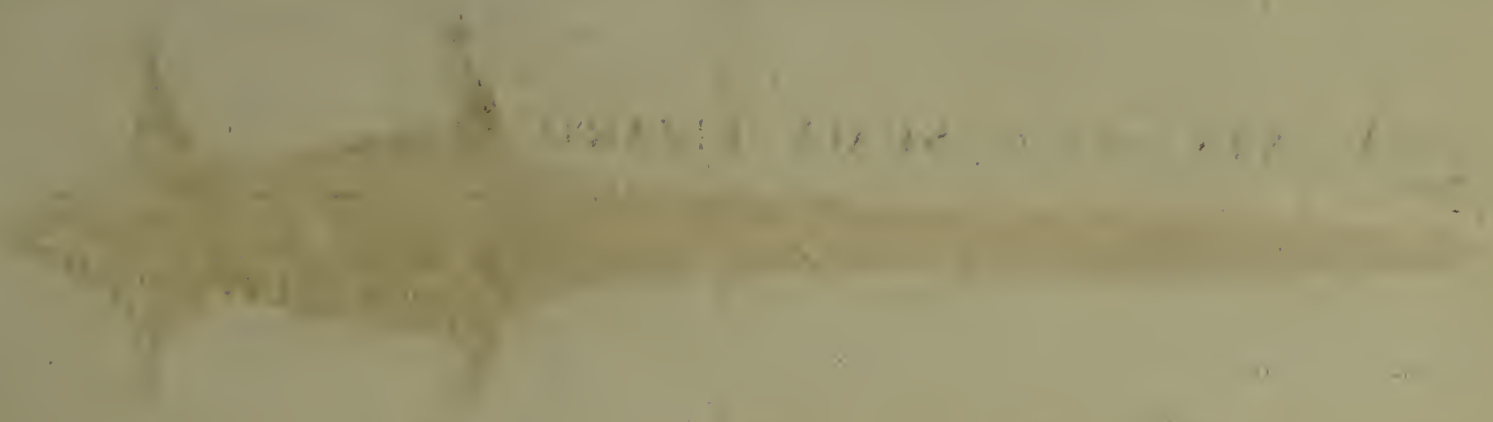
NATURAL HISTORY of the ARMADILLO.

NATURE seems to have reserved all the wonders of her power for those remote and thinly inhabited countries, where the men are savage and the quadrupeds various; and becomes more extraordinary in proportion as she retires from human inspection. The truth is, that wherever mankind are polished or become populous, they shortly rid the earth of these half formed productions, which, in some degree, incumber the soil. In a cultivated country they soon disappear, and continue only in those remote deserts, where they have few enemies but such as they are able to oppose or avoid.

The Armadillo is covered like a tortoise with a shell, or rather a number of shells; therefore its other proportions are not easily discerned. At the first view, it seems a round misshapen mass, with a long head, and a shortish tail. It is of various sizes, from a foot to three feet in length, and covered with a shell elegantly and regularly divided into several pieces, which wrap over each other like those on the tail of a lobster. The difference in the size of this animal, and in the number or disposition of its plates or bands, have been considered by some naturalists as constituting so many species; but in all the animal is partially covered with this coat of mail. This shell, which perfectly resembles a bony substance, covers the head, neck, sides and rump, and the tail to the very point. The throat, breast, and belly, are covered with only a white soft skin; but even in the parts that are softest, the skin seems to have a tendency to ossify. The shell on the upper part of the body is composed of more pieces than one, which, as we have already observed, slide over each other as in the tail of a lobster, and are connected by a yellow membrane, like the folds on the tail of that animal. By this means the Armadillo has a motion in its back, and the armour yields to its necessary inflections. From the bands, which are of various numbers and sizes, these animals have been distinguished into various kinds. In general, however, the shoulders are covered with one large piece, and the rump with another. Between these, on the back, the bands are placed in different numbers, wrapping over each other, and giving play to the whole. They also open down along the back, as well as crossways, so that the animal can move in any kind of direction.

Some of these animals have only three of these bands between the large pieces, and are therefore called three-banded Armadillos: others have six, a third kind eight, a fourth nine, and a fifth twelve; which are all named from their number of bands. In the last, or sixth kind, there is but one large piece, which covers the shoulders, the rest of the body being entirely covered with bands down to the tail. In different kinds, these shells are differently coloured, but they are principally of a dirty grey.

These shells might be sufficient to defend this animal from a feeble enemy, but they could not shield it from a powerful antagonist. Nature has therefore furnished the Armadillo with a method of protecting itself like that of the hedge-hog. Whenever it perceives itself attacked, it draws its head under its shells, leaving no part of it to be seen but the tip of the nose: if the danger increases, the cautions of the animal increase in proportion; it then draws up its feet under its belly, and unites the two extremities, while the tail appears as a band to strengthen the connection: thus it forms itself into a kind of ball, though it is a little flattish on each side. It thus becomes invulnerable, and continues in this position as long as danger seems to threaten it, and sometimes for a considerable time afterwards. While it remains in this situation it is tossed about at the pleasure of every other quadruped, and has very little the appearance of a creature endowed with life and motion.



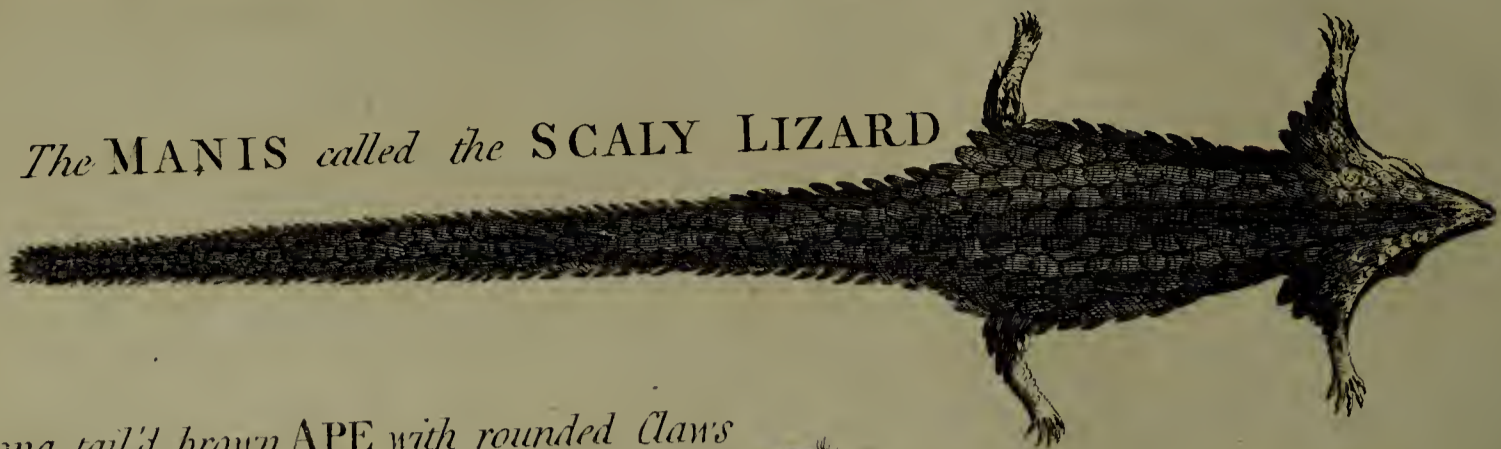
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QUADRUPEDS .

The MANIS called the SCALY LIZARD



The long tail'd brown APE with rounded Claws



The long leg'd APE with no Beard

The hairy Ear'd APE



The CAGUI



The hairy headed SIMIA.



STAG



CAMELO PARDALIS



ELK



TYGER



CAMEL



African ANTILOPE

The Indians take this animal by the tail, when it immediately sticks its claws in the earth so strongly, that there is no moving it till the Indian tickles it with a stick. They have another method, when they find the Armadillo in this position; that is, to lay it before the fire, which soon obliges the poor animal to unfold itself, and to face a milder death, to escape one that is more savage. This animal is also hunted with little dogs, which, by their barking, give notice to their master of its haunts, who digs it out of its burrow. It is, however, extremely dangerous to take it out incautiously, on account of the snakes that usually lurk in the burrows.

This animal inhabits South America; the smaller species live in moist places, the larger in dry, and at a distance from the sea: it burrows under ground, keeps its hole in the day, and rambles out at night. It feeds on potatoes, melons, and roots, and does infinite damage to plantations. It drinks great quantities, grows very fat, and when young, is reckoned delicious eating: but, when old, it has a disagreeable musky taste. These animals breed every month, and produce four at a time. This animal is a native only of America, for before the discovery of that continent, they were utterly unknown. It is an inoffensive creature, unless it finds its way into a garden or plantation. Though natives of the warmest parts of America, they bear the rigour of our climate without any inconvenience. Their motion is a kind of swift walk, but they can neither run, leap, or climb trees; so that they have no other method of escaping from their pursuers, than by making towards their hole as expeditiously as they can: or, if this should happen to be impracticable, to make a new hole before the arrival of the enemy. For this purpose they require but few moments, for in this business even the mole itself cannot be more expert, being furnished with claws extremely large, strong, and crooked, and generally four upon each foot.

The Armadillo is sometimes caught by the tail as it is making its way into the earth, but, in these cases, it usually leaves the tail in the hand of the pursuer, being satisfied to preserve its life with the loss of it. The hunters, sensible of this, never pull the tail with all their force, but hold it while another digs the ground about it, by which means the animal is taken alive. If the Armadillo be near a precipice, it frequently escapes by rolling itself up, and then tumbling down from rock to rock, without the least hurt or inconvenience.

Some naturalists are of opinion, that there is a kind of friendship between the Armadillo and the rattlesnake. It is certain indeed that they live peaceably and commodiously together, and are often found in the same hole; but it is probably a friendship of necessity to the Armadillo: the rattlesnake takes possession of its retreats, which neither of them are disposed to quit, each being incapable of injuring the other.

It has already been observed that all these animals resemble each other in the general character of being clothed with a shell, yet they differ greatly in their size, and in the parts into which their shell is divided. The first of this kind has but three bands between the two large pieces that cover the back, and is called the tatu apara. In this the tail is shorter than in any other kind, and does not exceed two inches in length, though the whole shell, including its several parts, is a foot long and eight inches broad. The second, which is called by Mr. Buffon the encoubert, is distinguished from the rest by six bands across the back. It has a small head and a very long tail, and is about the size of a sucking pig. The third, which is the tатуette of Mr. Buffon, is considerably smaller than the former, and is furnished with eight bands. The fourth is the pig-headed, or American Armadillo, having nine bands: this is larger than either of the former, being about two feet long from the nose to the tail. The fifth is the kabbassou, which is the largest of the kind, and is furnished with twelve bands: some of these measure upwards of three feet in length; but they are never eaten as the others are. The sixth is called the weasel-headed Armadillo, by Mr. Grew in his Rarities, and has eigh-

teen bands, with a large piece before, and nothing but bands backwards. The body of this animal is about thirteen inches long, and the tail five inches. Those which have the fewest number of bands, present great interstices between them when rolled up, and are more easily vulnerable. The largest kinds have the most solid shells, but their flesh is harder, and not so delicious as that of the smaller. It is indeed generally thought unfit for the table.

NATURAL HISTORY of the MANIS, or PHATAGIN.

THE back, sides, and upper part of the tail of this animal are covered with large strong scales. It has a small mouth, a long tongue, and no teeth. It has a slender nose and a smooth head: the body, legs, and tail are guarded by large sharp-pointed striated scales: the throat and belly are covered with hair. It has short legs, and four claws upon each foot, one of which is very small. The tail is a little taper, but blunt at the end. This animal is particularly distinguished by the length of its tail, which is considerably above twice the length of its body; the body not exceeding fifteen inches in length, and the tail at least three feet four inches. It is found in Africa, and the warm latitudes of the East. It approaches so near the genus of lizards, as to appear to be the link of the chain of beings which connects the proper quadrupeds with the reptile class. These animals not being very numerous, it is imagined their fecundity is not great.

NATURAL HISTORY of the PANGOLIN, or SHORT-TAILED MANIS.

OF all other animals, the Pangolin, which is a native of the torrid climates of the antient continent, is the best protected by nature from external injury. The length of the body is three feet, and the tail is about the same length. Like the lizard, it has a small head, a long nose, a thick neck, a long body, short legs, and a long tail. It has no teeth, but is armed with five toes on each foot. Its ears resemble human ears. But it is principally distinguished by its scaly covering, which defends the animal on all parts, except under the shoulders, the lower part of the head and neck, the breast, the belly, and the inner side of the legs; these parts being covered with a smooth soft skin. At all the interstices between the shells of this extraordinary creature, strong hair like bristles are seen, which are yellowish towards the roots, and brown at the extremity. The scales are of different sizes, and appear stuck upon the body somewhat like the leaves of an artichoke, the largest being always towards the tail. The substance of those scales resembles that of horn; they are convex on the outside, and concave in the inner.

When the Pangolin has acquired its full growth, it is said these scales will turn a musket-ball; it therefore fears nothing from the efforts of all other creatures except man. When danger approaches, it rolls itself up like the hedge-hog, presenting no part to the assailant but the cutting edges of its scales. The length of the tail, which might be thought easily separable, increases the security of the animal, by being wrapped round the rest of the body. The shells are so thick and pointed that they repel every animal of prey; serving as a coat of armour that wounds while it resists. The tiger, the leopard, the panther, and the hyæna, in vain attempt to force it; in vain do they tread upon it, and roll it about with their paws, the Pangolin is perfectly secure within, while its invaders suffer for their rashness. Man alone seems furnished with arms to compel it to surrender: the negroes, who consider the flesh of this animal as a very great delicacy; beat it to death with very large clubs.

But though so formidable in its appearance, there cannot be a more inoffensive animal than the Pangolin. If it had the disposition to injure larger animals, nature has rendered it incapable by denying it teeth: the bony

matter which supplies the teeth of other animals, is probably exhausted in this, in supplying the scales that go to the covering of its body; but as it lives entirely upon insects, nature has fitted it for that purpose in a very extraordinary manner. Having a long nose, it may be naturally supposed to have a long tongue; but to add to its length, it is doubled in the mouth, which enables the animal to extend it many inches beyond the tip of the nose. This tongue is round, very red, and covered with an unctuous liquor, which gives it a shining hue. As ants are the insects on which it chiefly feeds, when the Pangolin approaches an ant-hill, it lies down near it, concealing its retreat as much as possible; and, stretching out its long tongue among the ants, keeps it motionless for some time. These insects, allured by the slimy substance with which it is smeared, immediately flock to it in great numbers; and, when the Pangolin supposes it has got a sufficiency, it withdraws the tongue, and swallows legions at a time.

As all the force or cunning of this animal is exerted against these noxious insects, it is extraordinary that the negroes should be so eager to kill it; but savage natures pursue the immediate good, without being solicitous about the future consequences: they hunt this creature, therefore, with the utmost avidity, for its flesh. These animals chiefly inhabit the most obscure parts of the forest, and dig themselves a retreat in the clefts of rocks, where they bring forth their young, and are a solitary species, very rarely to be met with. They have no cry, nor make any other noise than a kind of snorting.

NATURAL HISTORY of the GREAT ANT-EATER.

THIS animal is called the Ant-bear, by Ray. It has a long slender nose, small black eyes, and short round ears; the tongue is slender, thirty inches in length, and lies double in the mouth. The legs are slender, having four toes on the fore feet, and five on the hind: the two middle claws on the fore-feet are very large, strong, and hooked; the hair on the upper-part of the body is black, mixed with grey, and about six inches in length: a black line, bounded above with white, extends from the neck cross the shoulders to the sides. The tail is covered with coarse black hair about a foot long. The length of this animal, from the nose to the tail, is about three feet ten inches, and the tail two inches and a half.

This animal is a native of Brasil and Guiana. It lives chiefly in the woods, and conceals itself under the fallen leaves. It seldom ventures from its retreat, and when it does, the industry of an hour supplies it with food for several days. It feeds entirely upon ants and insects, which, in the countries where it is bred, are found in the greatest abundance, and often build themselves hills which are five or six feet high, where they live in a community. As soon as it discovers their nests, it overturns them or digs them up with its feet; then thrusts its long tongue into their retreats, and, penetrating all the passages of the nests, withdraws it into its mouth loaded with prey. Sometimes when it approaches an ant-hill, it creeps slowly forward on its belly, taking every precaution to keep itself concealed, till it comes within a convenient distance of the place where it intends to make its banquet; there lying closely at its length, it thrusts forth its tongue (which is round and red, and often near two feet long) across the path of those industrious insects, where it lies motionless for several minutes. The ants of that country, some of which are half an inch long, allured by its appearance, come forth and swarm upon it in great numbers, and wherever they touch they remain; for the tongue of this animal is covered with a slimy fluid, which, like bird-lime, entangles every creature that lights upon it: when this instrument has secured a sufficient number of ants, the animal immediately draws it in, and instantly devours them all: then, remaining in the same position, it practises the same arts till its hunger is appeased, and then retires to its lodging-place; where it continues till it is again excited by the calls of hunger.

Helpless as this animal appears to be, and though without teeth, it is fierce and dangerous, and, when driven to an extremity, will fight with its claws with great obstinacy; scarce any creature that gets within its fore-feet can disengage itself: even the panthers of America are often unequal in the combat; for if the Ant-Eater once obtains an opportunity of embracing them, it fixes its talons in their sides, and both fall together, and generally both perish; for such is the stupidity or vindictive desperation of this animal, that it will not extricate itself even from a dead adversary. The Ant-Eater sleeps in the day, and preys by night: its flesh has a disagreeable strong taste, but it is eaten by the Indians.

The LESSER ANT-EATER.

It has a long slender nose, bending a little downward, a little mouth, and small black eyes. Its ears are also small and upright: it has four claws on each of the fore-feet, and five on those behind: the hair is of a pale yellow colour, and hard and shining: a black line crosses the shoulders on each side of the neck, and meets at the lower end of the back. The length of the body of this animal is about nineteen inches, and the tail ten inches. It inhabits Brasil and Guiana, and its manners are much the same as the last. It climbs trees, and takes hold of the branches with its tail.

The LITTLE ANT-EATER.

This animal has a conic nose, bending a little downward; the ears are small and almost hid in the fur: the head, body, limbs, and the upper-part and sides of the tail, are clothed with long soft silky hair, or rather wool, of a yellowish brown colour. It has two hooked claws on the fore-feet, the exterior of which is considerably the largest: it has four claws on the hind feet. The length of the body of this animal is about seven inches and an half, and that of the tail eight inches and an half: the tail is thick at the base, and tapers to a point. It inhabits Guiana, and climbs trees in pursuit of a species of ants which build their nests among the branches. Like the former, it lays hold of the branches with its tail.

There is a fourth species found at the Cape of Good Hope and in Ceylon, having four toes on the fore-feet, and pendulous ears, which distinguish it from other kinds. Kolben describes their manners particularly, saying they are toothless, that if they fasten their claws in the ground, no man has strength sufficient to pull them away; and that they thrust out their clammy tongue into the ant's nest, and draw it into their mouth covered with insects. Mr. Strachan, in his account of Ceylon, describes an animal which the natives call the Talgoi, or Ant-Bear, in the same manner. It is therefore certain that these animals are common to the old and new continents.

By this animal we see the great provider takes care of the most singular of his productions; and those which appear to us most destitute of means to preserve themselves, are often the happiest of all. What an emblem is this voracious depredator of the generation of ants, of those indolent and gluttonous feasters, who live upon the destruction of a thousand inoffensive creatures! Nature leads him to this method, in order to support his being: but the human epicures destroy only to satiate the meanest and most filthy of animal appetites! It raises our indignation, when we behold the industrious ants a prey to such an animal; (whose utility we know not, other than that the fur is very fine and beautiful) but alas, when we reflect upon the human race, do we not see the industrious and laborious a continued prey to, and the great means of supporting the voluptuous and indolent! The king himself, says the wise man, is served by the field; and indebted to the unwearied toils of the meanest of the people! It cannot fail to affect an humane heart to consider the state of things, in this present imperfect scene; the miseries of the poor, and the hardships of far the greater part of mankind. While the view must lead every serious mind to an earnest desire for the speedy accomplishment of the divine purposes,

poses, and for the establishment of that happy holy kingdom, where sorrow, sin, and death, shall never be known.

NATURAL HISTORY of the MORSE, or WALRUS.

THIS animal, which is somewhat of the seal kind, has a round head, a small mouth, and very thick lips, covered both above and below with pellucid bristles as thick as a straw. It has two small fiery eyes, and two little orifices instead of ears: the neck is short, and the body thick in the middle, tapering towards the tail. The skin is thick and wrinkled, having short brownish hairs thinly dispersed over it. Its legs which are short, have on each five toes, all connected together by webs, and having small nails on each of them: the hind-feet are very broad, and the hind legs are usually extended on a line with the body; the tail is very short. The length of this animal, from the nose to the tail, is from twelve to eighteen feet, and it generally measures ten or twelve feet round in the thickest part of the body. Their teeth are generally from two to three feet long, and the ivory is held in greater esteem than that of the elephant, being both whiter and harder. On the coast of the Icy Sea, where these animals are seldom molested, and consequently have time to attain their full growth, the teeth have been sometimes found of the weight of twenty pounds each.

These animals inhabit the coast of Spitzbergen, Nova Zembla, Hudson's-Bay, and the gulph of St. Laurence, and the Icy-Sea, as far as cape Tschuktschi. In some places they appear in herds of hundreds at a time: they are very shy animals, and avoid those places which are much frequented by mankind. They are extremely fierce, and, if wounded in the water, endeavour to sink the boat of their adversaries, either by rising under it, or by striking their large teeth into the sides: they roar very loud, and follow the boat as long as they can keep it in view. They are often seen in great numbers, sleeping on an island of ice; and, if they are disturbed, they plunge into the sea with great impetuosity. At these times it is dangerous to approach the ice, lest they should tumble into the boat, and upset it.

These animals never go upon land until the coast is clear of ice, and then they sometimes go ashore in amazing numbers. As soon as the first arrives upon dry land, it will never move till another comes and forces it forward, by beating it with its large teeth: this receives the same treatment from the next, and so in succession till they are all landed. On the Magdalene isles in the gulph of St. Laurence, the hunters watch the landing of these animals, and as soon as they find a sufficient number for what they call a cut, they go on shore, each armed with a spear, sharp on one side like a knife, with which they cut their throats. Particular care must be taken not to stand in the way of those which attempt to return to the sea, which they do with great agility by tumbling head-long; for their vast weight would crush any person to death. They are killed for their oil, one animal sometimes producing half a tun; and Mr. Buffon informs us, that he has seen braces for coaches made of their skins, which were both strong and elastic.

The Morse produces one or two young at a time; it feeds upon sea-herbs and fish: it will also eat shells, which it digs out of the sand with its teeth. They are said to ascend rocks or pieces of ice by the assistance of their teeth, fastening them to the cracks, and by that means drawing up their bodies. Except mankind, this animal appears to have no other enemy than the white bear, with which it often

combats, and is generally victorious, on account of its large teeth.

The INDIAN MORSE, or WALRUS.

This is the Dugon of Mr. Buffon, and has two short canine teeth or tusks, placed on the upper-jaw, pretty close to each other. It has four grinders on each side of the upper-jaw, placed at a distance from the tusks, and three on each side in the lower-jaw. It inhabits the Cape of Good-Hope, and the Philippine Isles. It is said to go on land to feed on the green moss.

NATURAL HISTORY of the SEAL.

THE Seal resembles a quadruped in some respects, and a fish in others. The head is round, and the nose broad, somewhat resembling that of an otter. It has two canine teeth in each jaw, large whiskers, oblong nostrils, and large black sparkling eyes; the tongue is forked at the end: and it has six cutting teeth in the upper-jaw, and four in the lower. It has no external ears, but holes answering the purpose of ears: the neck is of a moderate length and well proportioned, and the body is the thickest where the neck is joined to it. From thence the animal tapers down to the tail, becoming gradually smaller all the way like a fish. The body is covered with a thick bristly shining hair, the colour of which is very various, being sometimes dusky, sometimes brinded, and sometimes spotted with white or yellow. In most of the above particulars it resembles the quadruped kind, but it greatly differs from all of them in the feet; for, though furnished with the same number of bones with other quadrupeds, yet they are stuck on the body in so remarkable a manner, and are so covered with a membrane, that they would more resemble fins than feet, did not the sharp strong claws, with which they are pointed, shew their proper analogy. The fore-feet, or rather hands, are covered in a thick hairy skin, which, like a fin, assists in swimming; these are distinguished by five long piercing claws. The hind feet are extended on each side of its short tail, covered also with a skin, and both almost joining together at the tail. The usual length of this animal is about five or six feet, though some have been found that have exceeded eight feet. In the formation of the tongue, the Seal differs from every other quadruped: it is forked or slit at the end like that of a serpent.

These animals inhabit almost every quarter of the globe, but they are found in great multitudes towards the north and the south. They swarm near the Arctic circle, and the lower-parts of South-America, in both oceans: they are found in the Caspian sea, in the lake Aral, and lake Baikal, which are fresh waters. In the last they are covered with silver hairs.

The water is the most usual habitation of the Seal, and its food is whatever fish it can catch. But though it can remain under water for several minutes, it cannot, like the fishy tribe, continue there for any considerable time; and a Seal may be drowned like any other terrestrial animal. Being awkwardly formed for going upon land, it seldom ventures at any great distance from the shore, but usually basks upon the rocks, and when disturbed plunges immediately to the bottom of the water. Its hind-feet being turned backwards, they are entirely useless upon land, and when the creature moves, it drags itself forward like a reptile, apparently with great pain and labour. For this purpose it uses its fore-feet, which, though exceedingly short, enable it to move with so much swiftness, that, for a short space, a man cannot easily overtake

it; and it always runs towards the sea, from which it never is far distant.

In the north and icy seas these animals are particularly numerous. It is on those shores where there are few inhabitants, and where the fish resort in great abundance, that they are seen by thousands basking on the rocks, and suckling their young. Like other gregarious animals, they keep a centinel upon the watch, and, upon the least alarm, they plunge altogether into the water.

It is remarkable that these animals generally come on shore in storms and tempests: when every other creature takes refuge from the fury of the jarring elements, the Seals appear in thousands, sporting along the shore, and seem delighted with the general confusion. Perhaps the sea is then too turbulent for them to reside in; and they come upon land because they are unable to endure the shock of their more natural element.

Seals are animals of passage, and perhaps the only quadrupeds that migrate from one part of the world to another. Quadrupeds in general are contented with their native plains and forests, and seldom wander, except compelled by necessity or fear. But Seals change their habitations, and are seen in myriads directing their course from one continent to another. On the northern coasts of Greenland, they are observed to retire in July, and to return again in September, as it is supposed in pursuit of food: but in March they make a second voyage in order to cast their young, and return about the beginning of June, accompanied by their young, observing a certain time and track, like birds of passage. When they engage in this expedition, vast droves of them are seen making towards the north, taking that part of the sea which is clearest of ice, and sailing forward into those seas, where man cannot follow. They are very fat when they leave the coasts to go upon this expedition, but they are excessively lean at their return.

These animals produce two or three young at a time, which, for some short space, are white and woolly: they bring forth in autumn, and suckle their young in caverns, or in rocks, till they are six or seven weeks old, at which time they take the sea. The young are remarkably docile, and understand the voice of the mother among the numerous bleatings of the rest of the old ones; they are obedient to her call, and mutually assist each other in distress or danger. Thus early initiated to subjection, they continue to live in society, hunt and herd together, and have a variety of notes or cries, by which they encourage to pursue, or express to each other their apprehensions of danger. Their voices are said, at some times, to resemble the bleating of a flock of sheep, and at others, to imitate the shriller notes of the cat.

The chief of their food being fish, they are very expert at catching them. Where the herrings are found in shoals, the Seals are often seen, and they devour them by thousands: but, when the herring retires, the Seal is obliged to hunt after fish which are stronger, and more capable of evading the pursuit. In deep waters, however, they are extremely swift, and dive with great rapidity. The smaller and weaker fishes have no other means to escape their tyranny, than by darting into the shallows.

They are the tyrants of the element in which they chiefly reside, and are not destitute of courage even upon land, except on those shores where there are numbers of inhabitants, and from whence they have been frequently pursued. Along the desert coasts, where they seldom meet with any interruption from man, they are bold and intrepid, and make a very desperate resistance; but a slight blow on the nose immediately kills them, otherwise they will endure many wounds. Where they are not fre-

quently disturbed, they usually sleep very soundly; and it is then that the hunters surprize them. The Europeans who go into the Greenland seas upon the whale-fishery, surround them with nets, and destroy them, but the Greenlander takes them in a different manner: he paddles away in his little boat, and when he sees one of these animals asleep on the side of a rock, darts his lance with unerring aim, and buries its point in the animal's side. The Seal instantly plunges into the sea, and dives to the bottom; but the lance has a bladder fastened to one end, which keeps buoyant, and resists the animal's descent; it therefore rises frequently to the top of the water, and every time receives a stroke from the Greenlander's oar, till he at last dispatches it.

These animals are more wary in our climate, and very seldom suffer the hunter to approach them. They frequently appear upon the rocks of the Cornish coast, basking in the sun, or upon the inaccessible cliffs left dry by the ebbing of the tide. There they continue, and are extremely vigilant, continually raising their heads to look about them, to see if any enemy approaches: the only method therefore that can be taken is to shoot them; but if they happen to escape, they hasten towards the sea, throwing up stones and dirt behind them as they scramble along, at the same time expressing their fears by the most piteous moaning. Should they happen to be overtaken, they make a most vigorous defence with their feet and teeth.

The Seal is good food, and is often eaten by voyagers: it is killed for the sake of its skin, and for the oil which is made of its fat; a young seal yielding about eight gallons; their skins are used for waistcoats, covers for trunks, shot-pouches, and many other conveniences: those of the lake Baikal, are sold to the Chinese, who dye them, and sell them to the Mongals to face their fur-coats. These animals are the wealth of the Greenlanders, supplying them with every necessary of life. At the tables of the great, the flesh of this animal was formerly found: among other extraordinary rarities, at a feast provided by archbishop Nevell for Edward the IVth, there were twelve Seals and porpoises provided.

The Seal indeed is common on most of the rocky shores of Great-Britain and Ireland, especially on the northern coasts. In Wales, it frequents the coasts of Caernarvonshire and Anglesea.

The natural history of this animal may be further elucidated by the following extracts from a letter of the reverend Dr. William Borlase, dated October 24, 1763.

"The Seals are seen in the greatest plenty on the shores of Cornwall in the months of May, June, and July.

"They are of different sizes, some as large as a moderate cow, and from that downwards to a small calf.

"They feed on most sorts of fish which they can master, and are seen searching for their prey near the shore, where the whistling fish, wraws, and pollocks resort.

"They are very swift in their proper depth of water, dive like a shot, and rise in a trice at fifty yards distance; so that weaker fishes cannot avoid their tyranny, except in shallow water. A person of the parish of Sennan saw, not long since, a Seal in pursuit of a mullet (that strong and swift fish:) the Seal turned it to and fro in deep water, as a greyhound does a hare: the mullet at last found it had no way to escape, but by running into shoal-water: the Seal pursued; and the former to get more surely out of danger, threw itself on its side, by which means it darted into shoaler water than it could have swam in with the depth of its paunch and fins, and so escaped.

"The

“ The Seal brings her young about the beginning of autumn; our fishermen have seen two sucking their dam at the same time, as she stood in the sea in a perpendicular position.

“ The head in swimming is always above water, more so than that of a dog.

“ They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs, left dry by the ebb of the tide; and if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; seldom longer than a minute; then raise their heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little, and reclining them alternately in about a minute's time. Nature seems to have given them this precaution, as being unprovided with auricles, or external ears; and consequently not hearing very quick, nor for any great distance.”

The GREAT SEAL.

This animal is called the great sea-calf by Mr. Buffon; it resembles the former, but grows to the length of twelve feet. There was one described in the Philosophical Transactions, which was seven feet and a half long, though so young as hardly to have any teeth: the full growth of the common Seal is about six feet. This animal, which is considered as the largest of the Seal family, inhabits the coast of Scotland, and the south of Greenland. The skin is very thick, and is used by the Greenlanders to cut thongs out of for their Seal fishery. This is perhaps the same with the great Kamtschatkan Seal, weighing about eight hundred pounds, and called by the Russians, Lacktach.

The HOODED SEAL.

It has a strong folded skin on the forehead, which it can at pleasure throw over its eyes and nose, to defend them from stones and sand in stormy weather. The hair of this animal is white, with an under-coat of thick black wool, which makes it appear of a fine grey. It inhabits the south of Greenland and Newfoundland; and in the last mentioned place is called the Hooded Seal. The hunters say they cannot kill this animal till they remove the integument on the head.

There is a variety which inhabits Greenland, with rough bristly hair, intermixed like that of a hog, and of a pale brown colour. The natives make garments of its skin, turning the hairy side inwards.

The HARP SEAL.

This animal has a pointed head, and a thick body, of a whitish grey colour, with two black crescents on the sides, the horns pointing towards each other: but it does not attain this mark till the fifth year, and before that period, changes colour annually: the Greenlanders distinguish it by different names every year. It inhabits Greenland and Newfoundland, and is the most valuable kind: the skin is the best and the thickest, and it produces the most oil. It grows to the length of nine feet.

There is a variety of this species in the lake Baikal; it is a large kind with yellow hair, and a large chestnut-coloured mark on the hind part of the back, covering almost a third part of the body.

The LITTLE SEAL.

This is a little sea-calf of Mr. Buffon, and has the four middle teeth of the upper jaw bifurcated, and two in the middle of the lower jaw are trifurcated. It has only the rudiment of an ear: the hair is soft, smooth, and longer than in the common Seal: the colour is dusky on the head and back, and brownish beneath. The webs of the feet extend considerably

beyond the toes and nails, and the length of the animal is from two to three feet. It inhabits the sea near the island of Juan Fernandez, and the Seal hunters affirm that they often observe a small species of about two feet, or two feet and an half in length, on the coast of Newfoundland. Mr. Buffon was certainly imposed on, when he was informed that the specimen he saw in the French king's cabinet, came from India; Dampier, and many modern voyagers to the East-Indies, having asserted that they never saw any Seals there.

The URSINE SEAL, or the SEA BEAR.

There are three marine animals, called the sea-lion, the Sea Bear, and the Manati, which keep a particular situation, and seem divided between the north-east of Asia, and the north-west of America, in the narrow seas between these vast continents. From June to September they inhabit the islands that are scattered in the seas between Kamtschatka and America, in order to propagate and bring forth their young in full security. In September they quit their stations, greatly emaciated: some returning to the Asiatic, and others to the American shores; but, like the sea-otters, they are confined to those seas between lat. 50 and 56.

The Ursine Seal, or Sea Bear, leads a most indolent life during the three months in summer. They are extremely fat when they arrive at the islands; but while they remain there they are hardly ever in motion, confining themselves for whole weeks to one particular spot, and sleeping a great part of the time: they eat nothing, and are totally inactive, except the employment the females have in suckling their young. They live together in families, each male having a great number of females, which he watches with the jealousy of an eastern monarch. Though they are assembled by thousands on the shores, each family is separated from the rest. The old male animals, which are destitute of females, or deserted by them, live apart, and are excessively splenetic, peevish, and quarrelsome. They are remarkably fierce, and so attached to their old haunts, that they would sooner die than be driven from them. They have a strong scent like that of the goat. If another approaches their station, they are roused from their indolence, and immediately snap at it, and a combat naturally ensues. In the conflict they perhaps intrude upon the premises of another, which instantly excites his indignation, so that the discord sometimes becomes universal.

The other males are also easily offended: the principal cause of their disputes is when another attempts to seduce one of their mistresses, or a young female of the family: this insult infallibly produces a combat, and the conqueror is immediately attended by the whole seraglio, who always desert the unhappy vanquished. Sometimes a quarrel arises from their interfering in the disputes of others; and their battles are generally terrible: the wounds they give and receive are very deep, and resemble the cuts of a sabre. At the conclusion of a battle, they usually plunge into the sea to wash away the blood.

The male is very fond of his young, and if any person endeavours to take away his cub, he stands on the defensive, while the female carries it away in her mouth: but if she should happen to drop it, the male immediately quits the enemy, chastises her, and beats her against the stones, till she is ready to expire: when she recovers, she presents herself in the most suppliant manner to the male, falls down submissively before him, and washes his feet with her tears, while he is stalking about in the most insulting manner: but if the cub is carried off, he testifies the deepest affliction, and shews all the tokens of great concern. As the female usually brings but one at

a time, and never more than two, it is probably on that account that he is the more sensibly affected with his misfortune.

These animals are very swift in the water, and swim at the rate of seven miles an hour. When wounded, they will seize the boat in which their enemies are, and carry it along with great impetuosity; and sometimes they even sink it.

The male is considerably larger than the female. The bodies of each are of a conic form, being very thick before, and tapering to the tail. The length of a large one is about eight feet, and the greatest circumference about five: the weight about eight hundred pounds. The nose projects somewhat like that of a pug-dog, the nostrils are oval, the lips thick, and the whiskers long and white. When the mouth is closed, the teeth lock into each other: in the upper-jaw are four cutting teeth, each having two prongs, and on each side is a small sharp canine tooth, bending inwards, with another near it which is larger: the grinders, which resemble canine teeth, are six in number in each jaw: there are four cutting and two canine teeth in the lower-jaw, but only four grinders in each jaw; making in the whole thirty-six teeth. The tongue is slit, and the eyes large and prominent, which it can cover at pleasure with a fleshy membrane: the ears are small and sharp-pointed, hairy without, and smooth within. The length of the fore legs is about two feet, on which are toes which are covered with a naked skin, so that externally they seem a shapeless mass, and have only the rudiments of nails to five latent toes: the hind legs, which are about twenty-two inches long, are fixed to the body quite behind, in some degree like those of Seals, but the animal is capable of bringing them forward, and even uses them to scratch its head. These feet are about a foot broad, and are divided into five toes, each divided by a large web. The length of the tail is not above two inches.

The hair of these animals is long and rough, beneath which is a soft down, of a bay colour: their general colour is black, but the hairs of the old ones are tipped with grey: the females are ash-coloured. The flesh of the old males is very nauseous, but that of the females resembles lamb, and the young ones, when roasted, are as delicate eating as sucking pigs.

NATURAL HISTORY of the SEA-LION.

THE male has an arched projecting snout, hanging five or six inches below the under jaw; the eyes are large, and the whiskers long; the hair on the body is short, and of a dun colour; that on the neck is a little longer: the feet, which are short and dusky, have five toes upon each, furnished with nails; the hind-feet have the appearance of large fins. The length of a full grown male is about twenty feet, and the greatest circumference about fifteen. The female has a blunt nose, knotty at the top, and wide nostrils: the fore legs are twenty inches long, and the toes are furnished with flat oblong nails: instead of legs; the hind parts are divided into two large forked fins, and it has no tail. The body of this animal is covered with short rust-coloured hair; and the length, from the nose to the fins, is about four yards, and the greatest circumference about two yards and an half.

These animals inhabit the seas between Kamtschatka and America. They are seen in great numbers in June and July, which is their breeding season, on the islands which they resort to in order to suckle their young on shore. The male shews no great attachment to the young, but the female is excessively fond of them, and is upon those occasions

remarkably fierce. One of lord Anson's sailors was killed by the enraged dam of a whelp which he had robbed her of. In the evening both male and female swim a little way out to sea, the latter carrying the young on her back, which the male frequently pushes off, meaning, perhaps, by that means to teach it to swim.

Like the sea-bear, they arrive on the breeding islands very fat and full of blood. When these animals are in motion, they have the appearance of a large skin full of oil, from the tremulous movement of the blubber which is sometimes a foot thick, on which account the Spaniards call them wolves of oil. One of these animals has been known to yield a butt of oil, and they are so full of blood, that two hogheads have been filled with what has come from one animal. The flesh, though not excellent, is eatable. It was eaten by lord Anson's people under the denomination of beef, to distinguish it from the flesh of seal, which they called lamb.

Though the old animals have a tremendous appearance, they are excessively timid, except at the breeding season. At other times they plunge into the water with great precipitation; or if awakened from their sleep by blows, or any loud noise, they are in the utmost terror and confusion, falling down and trembling in every part; but, when they perceive it is impossible for them to escape, they grow desperate, roar tremendously, and attack their enemy with uncommon fury. The Kamtschatkans either shoot them with poisoned arrows, or kill them in their sleep with lances. They make shoes of the skin, and sometimes cut it into cords. The blubber and the flesh they esteem very palatable; but the Kamtschatkans make a jelly from the feet, which they think delicious.

Like the former, these animals associate in families, but in smaller numbers: the males are equally jealous of their mistresses, and have frequently bloody battles upon their account. A Sea Lion of superior courage has a greater number in his seraglio than the others. In the Kamtschatkan seas, they generally make choice of some insulated rocks for their station, where their roar is to be heard at the distance of two miles; the cry of the young resembling the bleating of sheep. These animals are of a heavy inactive disposition, fond of wallowing in miry places, and, like swine, lying one upon another, making a noise like the grunting of those animals, and sometimes snorting like horses in full vigour. As they are very inactive on land, a sentinel is placed by each herd to prevent a surprize, who, at the appearance of danger; gives a certain signal to the rest. These animals abstain from food in the breeding season, and before that time is elapsed, become exceeding lean. At other times, they feed on seals, fish, and sea-otters.

NATURAL HISTORY of the MANATI.

THIS animal, in nature, very nearly approaches the whale. Like the whale, it brings forth in the water, and like the whale, suckles its young in that element. Like the whale, it has no voice, and, like that animal, has an horizontal broad tail, without even the rudiments of hind feet. Indeed what are called feet, are little more than fins, serving for swimming; they are never used to assist the animal in walking, or landing, for it never goes ashore, nor ever attempts to climb the rocks, like the seal and the walrus.

In the head and body, the Manati is shaped somewhat like the seal; the fore legs or hands are also very much in the same manner, short and webbed, but having only four claws; these too are proportionably shorter than in the other animal, and placed nearer

nearer the head; consequently they are not adapted to assist its motions upon land. But in the hinder parts, it differs greatly from all the animals of the seal kind; the tail being perfectly that of a fish, and extended like a fan, without even the vestiges of those bones which form the legs and feet of others of the seal kind.

These animals are of an enormous size: Dampier asserts that some of them are twenty-eight feet long, and weigh eight thousand pounds. The skin, which is of a blackish colour, is very tough and hard, and full of inequalities, like the bark of oak, on which are scattered a few hairs, like bristles, about an inch long. In proportion to the animal, the eyes are exceeding small, not exceeding those of a sheep in size. It is destitute of external ears, having only two orifices which are so small as hardly to admit a quill. The tongue is pointed, and very small. It has no teeth, instead of which it has two solid white bones, extending the whole length of both jaws, which serve instead of grinders. The lips are double, and near the junction of the two jaws, the mouth is full of white tubular bristles answering the same purpose as the laminæ in whales, to hinder the food from running out with the water. The lips are also full of bristles; serving, instead of teeth, to cut the strong roots of the sea-plants, which floating ashore point out the vicinity of these animals.

The female Manati produces but one at a time, which she holds with her paws to her bosom, where it sticks close, and accompanies her wherever she goes. The Manati can hardly be called amphibious, as it never entirely leaves the water, only raising its head out of the stream, to reach the grass on the sides of the rivers. It feeds entirely upon vegetables, and therefore never chooses to go far in the open sea, but frequents the edges of the shores, and chiefly the large rivers of South America, where it is often found above two thousand miles from the ocean. It is also found in the seas near Kamtschatka, where it feeds upon the weeds which are growing near the shore. At the bottom of some of the Indian bays, these animals are seen harmlessly grazing among turtles and other crustaceous fishes, neither offering nor fearing any outrage. In calm weather these animals, when unmolested, keep together in large companies near the mouths of rivers. In the time of flood, they come so close to land that a person may stroke them with his hand.

They live in small families, consisting of a male, a female, a half-grown young one, and a very small one; each family not being far distant from another. The females oblige their young to swim before them, while the other old ones surround and guard them on every side. The affection between the male and female is very strong; for, if the latter should happen to be attacked, the former will defend her to the utmost; and if she is killed, he attends her body to the shore, and for several days after continues to swim about the place at which she was landed. These animals bring forth in autumn, and are supposed to go with young about a year.

The Manati has no voice nor cry, and makes no kind of noise except what proceeds from breathing. The internal parts of this animal resemble those of an horse, its intestines being longer than any other creature, the horse only excepted.

These animals are vastly voracious, and when their hunger is appeased, they fall asleep on their backs. During their repast, they are so intent upon their food, that any person may go among them and make choice of which he pleases. Peter Martyr informs us that one of these animals lived in a lake of Hispaniola for twenty-five years, which was so tame as to come to the edge of the shore on be-

ing called, and would even perform the part of a ferry, carrying several people on its back at once to the opposite shore. The back and sides of these animals are usually above water, and as their skin is filled with a species of louse peculiar to them, great numbers of gulls are continually perching on their backs, and picking out the insects.

They remain the whole year in the American and Kamtschatkan seas, but they are so very lean in winter that you may even number their ribs. They are usually taken by harpoons, and after they are struck, it requires the united strength of thirty men to draw them on shore. Sometimes when they are transfixed, they will fasten their paws upon the rocks, and stick so close as to leave the skin behind them before they can be forced off. When one of these animals is struck, its companions swim to its assistance; some of which endeavour to overturn the boat by getting under it; others attempt to break the rope, by pressing it down; and others strike at the harpoon with their tails, with a view of forcing it out, in which they often succeed.

When exposed to the sun, the fat or blubber of the Manati, which lies under the skin, has a most delicious smell and taste, and is far superior to the fat of any other sea animal: it has also this peculiar property, that the heat of the sun will not make it grow rancid, or injure it in the least. It tastes like the oil of sweet almonds, and in all cases where butter is used, it is a most excellent substitute. Any quantity of it may be taken without the least injury, as it has no other effect than that of keeping the body open. The fat of the tail is of a harder consistence, and when boiled is more delicate than the former. The flesh is redder and coarser than beef, and may be kept a great while in the hottest weather, without putrifying. It requires a long time in boiling, and afterwards has somewhat the taste of beef. The fat of the young ones has the flavour of pork, and the lean resembles veal. Some are of opinion, that the flesh of this animal resembles that of a turtle, which is indeed extremely probable, since they are found in the same element, and live upon the same food. The turtle is a delicacy well known among us, and is highly prized by the voluptuaries of the city of London. When our luxuries are sufficiently heightened to introduce the Manati, a single animal would be sufficient for the feast of a lord mayor.

NATURAL HISTORY of the SEA APE.

MR. Stellar describes a very singular animal, which he saw on the coast of America, which he calls the Sea Ape. Its head resembles that of a dog, its ears are short and erect, its eyes large, and it has a kind of beard on each lip. The length of its body is about five feet, and its form thick and round, but largest near the head, and tapering to the tail, which has two prongs. The body is covered with thick hair, which is grey on the back, and red on the belly; but we never could discover either feet or paws. It was extremely frolicksome, and diverted itself with variety of monkey tricks; sometimes swimming on the one side of the ship, and sometimes on the other, observing it with great amazement. It frequently came so near the vessel, that it might be touched with a pole; but if any person moved, it would immediately retire. Sometimes it would raise itself so as to have a third part of its body out of the water, and continue erect for a considerable time; then suddenly darting under the ship, appear in an instant on the other side, in the same attitude; and this it would repeat for thirty or forty times together. Sometimes it would bring up a sea plant, which it would wantonly toss about and catch again in its mouth, playing a number of fantastic tricks with it.

NATURAL HISTORY of the BELUGA.

THE Beluga is another obscure animal of this class; it is found in the sea between Kamtschatka and Tartary; in that between Kamtschatka and America, and in the frozen sea near the mouth of the Jenesei. It measures from fifteen to twenty feet long, and three or four feet round: in its feet and tail it agrees with the seal, but its teeth are like

those of a cow. On the neck are two holes, from which water issues as from a spout. It has a small quantity of hair on its body, but so thinly scattered, that the skin, which is white, appears through it.

These animals live on fish, and assemble in large numbers. They carry their young upon their backs, and avoid shallow places; seldom going up rivers or very near the shore.

C H A P. XIV.

Containing the NATURAL HISTORY of the BAT and its numerous Varieties, viz. the LONG-EARED, the MADAGASCAR, the VAMPYRE, the JAVELIN, the LEAF, the CORDATED, the PERUVIAN, the BULL-DOG, the BEARDED, the SENEGAL, the STRIPED, the HORSE-SHOE, and the NOCTULE.

NATURAL HISTORY of the B A T.

SOME naturalists have thought animals of the Bat kind so much partaking of the nature of the bird and the beast, that they have been at a loss in which rank to place them; but these doubts exist no longer: they are now universally allowed to take their place among quadrupeds; to which they are evidently entitled by their hair, their teeth, and their bringing forth their young alive; as well as by the rest of their habitudes and conformations. The Bat has indeed been placed among birds by Pliny, Gesner, and Aldrovandus, but they did not consider that it wanted every character of that order of animals, except the power of flying. This animal indeed, in some measure, presents the appearance of a bird, when it is seen with an aukward and struggling motion, supporting itself in the air at the dusk of the evening; but naturalists, who ought to watch its habitudes, and inspect its formation, are inexcusable for concurring in the mistake. It not only brings forth its young alive, as already mentioned, but it also suckles them: its mouth is furnished with teeth; its lungs are formed like those of quadrupeds; its intestines and its skeleton perfectly resemble them.

The species of Bat which is most common in England, is about the size of a mouse, or nearly two inches and an half in length. The members, which are usually called wings, are, in reality, only the four interior toes of the fore-feet, produced to a great length, and connected by a thin membrane, which also extends to the hind legs and the tail. The first toe is quite loose, serving as a heel when the animal walks, or as an hook, when it chooses to adhere to any thing. The hind feet are disengaged from the surrounding skin, and divided into five toes, furnished with pretty strong claws, somewhat resembling those of a mouse. The skin or membrane by which it flies is of a dusky colour: the body is covered with a short mouse-coloured fur, tinged with red. The eyes are very small, the ears short, and the extent of the wings nine inches.

This animal makes its first appearance in England early in summer, and begins its flight in the dusk of the evening. It usually haunts the sides of woods, glades, and shady walks; and frequently skims along the surface of water in pursuit of gnats and insects. These, however, are not its only food, for it will not refuse meat of any kind, wherever it can find it. The flight of the Bat is a laborious irregular movement, and, when

interrupted in its course, it finds it difficult to prepare for second elevation; so that if it happens to strike against any object, and falls to the ground, it seldom can escape. It never appears but in the most pleasant evenings, when its prey are generally abroad, and always flies in pursuit with its mouth open. At other times it continues in its retreat, which is generally the chink of a building in a ruinous state, or the hollow of a tree. Even in summer, this little animal sleeps the greatest part of its time, never venturing out by day-light, nor in rainy evenings. It is in quest of prey but a small part of the night, as it presently satisfies the demands of hunger, and returns again to its hole.

At the approach of winter, the Bat prepares for its state of lifeless inactivity, and always prefers a place where it may be safe from interruption, to where it may be conveniently and warmly lodged. It retires into caves, buildings in a ruinous situation, the roofs of houses, or hollow trees, where it remains during the whole winter, in a state of torpid inactivity; suspended by the hind-feet, and closely wrapped up in the membranes of the fore-feet, regardless of the external damps that surround it. This is the only animal that will venture to remain in frightful subterranean abodes, where it continues in a state of torpidity, unaffected by every change of weather.

Those, however, which are not sufficiently provident to procure themselves a deep retreat, where the cold and heat do not essentially vary, are sometimes exposed to great inconveniences; for, in the midst of winter, the weather is sometimes so extremely mild as to warm them prematurely into life, and induce them to quit their holes in pursuit of food, at a time when nature has not provided a supply. These unfortunate adventurers have seldom strength to return; but, having exhausted themselves in a vain pursuit, after insects which are not to be found at that season of the year, are destroyed by the owl, or some other animal of prey.

This creature brings forth in summer, and generally produces from two to five at a time. We are assured, by Linnæus, that the female prepares no nest for her young. She is satisfied with the first hole she meets, where, sticking herself up by her hooks against the sides of her apartment, she suffers her young to hang at the nipple, and continue thus for the first and second day. But, when she becomes very hungry, and finds it absolutely necessary to go abroad, she sticks her little ones against the wall, to which

which they firmly adhere, and patiently wait till her return.

From what has been said, it is very apparent that this animal is closely allied to the quadruped race, and its similitude to that of birds is infinitely less striking. Nature, indeed, has furnished birds with very strong pectoral muscles, to move the wings and direct their flight; so has it also furnished this animal: but the great labour required in flying soon fatigues it, and, though birds can continue whole days upon the wing, the Bat becomes weary in less than an hour, and returns to enjoy the darkness of its retreat.

This Bat, so common in Great Britain, may be considered as an harmless inoffensive animal; though it sometimes steals into a larder, and like a mouse, commits its petty thefts upon the fattest parts of bacon. But this does not often happen, it being principally employed in pursuing insects that are much more noxious to us than this animal can possibly be.

The LONG-EARED BAT.

The ears of this animal are thin, almost pellucid, and above an inch long. The body and tail are only one inch three quarters long. This animal, and all other Bats, except the ternate, and the horse-shoe, have a smaller, or internal ear, serving as a valve to the greater, when the animal is asleep.

The GREAT BAT of MADAGASCAR.

The Bats which are seen in Great Britain, are inoffensive and minute; incapable, from their size, of injuring mankind, and not sufficiently numerous to incommode them; but in the East and West Indies, there is a larger race of Bats, that are truly formidable; one of them is a dangerous enemy; but, when they unite in flocks, they become dreadful. Des Marchais says, that if the inhabitants of the African coast, were to eat animals of the Bat kind, as they do in the East Indies, they would never want a supply of provisions. They are so numerous, that, when they fly, they obscure the setting sun: early in the morning, they are seen sticking upon the tops of trees, and clinging to each other like bees when they swarm. The Europeans often amuse themselves with shooting them, and the negroes are expert in killing them; but they regard the Bat with horror, and would not eat it if they were starving.

The largest that we have any certain account of, is the great Bat of Madagascar, called by Mr. Buffon the Roufette. This animal is about a foot long from the tip of the nose to the insertion of the tail; and its extent from the tip of one wing to the tip of the other, is about four feet. It has large canine teeth; four cutting teeth above, and four below: the nose is black and sharp, and the ears large and naked; the talons are very crooked, strong, and compressed sideways. It has no tail. These animals vary in colour, some being entirely of a reddish brown, others of a brighter red, and others dusky. It resembles the common Bat in the form of its wings, in its manner of flying, and in its internal conformation. This formidable creature is found in Guinea, Madagascar, and all the islands from thence to the remotest in the Indian Ocean. When they repose, they stick themselves on the tops of the tallest trees, and hang with their heads downward; but, when they are in motion, they sometimes settle upon animals, and even upon man himself. They devour indiscriminately fruits, flesh, and insects, and are so extremely fond of the juice of the palm-tree, that they will intoxicate themselves with it till they drop to the ground. At night they are heard in the forests at more than two miles distance, with a most horrible din; but they usually begin to retire at the

approach of day. Nothing is safe from the deprivations of these noxious animals; they destroy fowls and domestic animals, unless they are carefully secured, and frequently fasten upon the inhabitants themselves, attacking them in the face, and inflicting very terrible wounds. It is very probable, as Mr. Buffon remarks, that the ancients have taken their idea of harpies from these fierce and voracious creatures, as they both seem to concur in many parts of the description, being equally cruel, deformed, greedy, and uncleanly.

The Indians eat these animals, and say the flesh is extremely good, especially at certain times of the year when they are very fat. The French, who inhabit the Isle of Bourbon, boil them in their bouillon to give it a relish: but the Negroes hold them in abhorrence. Many are seen much larger than that abovementioned. Beckman measured one that was five feet four inches from tip to tip of the wing; and Dampier saw another which spread farther than he could reach with extended arms. Their bodies are from the size of a pullet to that of a dove: their cry is dreadful, their smell rank, they resist fiercely when attacked, and their bite is terrible.

Linnæus gives this species the title of Vampyre, supposing it to be the kind which draws blood from people in their sleep; but Mr. Buffon is of a contrary opinion, ascribing that faculty to a species found only in South America. Mr. Pennant differs from both those naturalists, and very justly observes, that "there is reason to imagine that this thirst after blood is not confined to the Bats of one continent, nor to one species; for Bontius and Nieuhoff inform us, that they of Java seldom fail attacking those who lie with their feet uncovered, whenever they get access; and Gumilla, after mentioning a greater and lesser species, found on the banks of the Orenoque, declares them to be equally greedy after human blood."

Persons who have been thus attacked, have sometimes almost passed from a sound sleep into eternity. The Bat is so dextrous a bleeder as to insinuate its sharp-pointed tongue into a vein unperceived, and to suck the blood till it is satiated; at the same time fanning with its wings, and agitating the air, which, in that hot climate, lulls the sufferer into a still sounder sleep. It is therefore dangerous to repose in the open air, or to leave open any entrance to these noxious animals. Nor do they always confine themselves to human blood; for Mr. Condamine, in his voyage to South America, informs us, that in certain parts of America they have destroyed all the great cattle which were introduced there by the missionaries.

The VAMPYRE.

This animal, though less formidable, is more mischievous than the former. It is furnished with a horn, and its ears are extremely broad, long, and upright. The hair on the body is ash-coloured and pretty long: the membrane extends from one hind-leg to the other: it has no tail; but from the rump extend three tendons, terminating at the edge of the membrane. It inhabits South-America, lives in the palm-trees, and grows very fat.

This is the Bat which Mr. Buffon supposes to be the principal blood-sucker. It is agreed by all travellers that this Bat is possessed of a faculty of drawing the blood from persons sleeping, but still a very strong difficulty remains to be accounted for; the manner in which they inflict the wound. Ulloa supposes it to be done by a single tooth; but that is utterly impossible, as the animal cannot infix one tooth, without all the rest accompany its motions, the teeth of the Bat kind being pretty even, and the mouth small. Mr. Buffon therefore supposes the wound to be inflicted by the tongue; but others

others imagine that the animal is endowed with a strong power of suction, and that, without inflicting any wound, by continuing to draw, it so greatly enlarges the pores of the skin, that the blood at length passes; and, in confirmation of this opinion, we are told it cannot injure any animal that has a thick skin.

The JAVELIN BAT.

It is of the size of a common Bat, has large pointed ears, and an erect membrane at the end of the nose in the form of an ancient javelin, having two upright processes on each side. It has no tail, its fur is ash-coloured, and it inhabits the warm parts of America.

The LEAF BAT.

This is the *Feuille* of Mr. Buffon; it has small round ears, and a membrane on the nose of the form of an oval leaf. It has a web between the hind-legs, but no tail. The fur is of a mouse-colour, tinged with red. This is also about the size of a common Bat. It inhabits Jamaica, Surinam, and Senegal. In Jamaica it lives in caves in the woods. It feeds on the prickly pear.

The CORDATED BAT.

The colour of the face of this animal is a light red, and that of the body still paler. Its ears are very broad and long, and, at the end of the nose, it has a membrane in the shape of a heart. It has a web between the hind-legs, but no tail. It inhabits Ceylon, and the isle of Ternate, one of the Moluccas.

The PERUVIAN BAT.

The body of this Bat is about the size of a pretty large rat; the colour of the fur is an iron grey; and the extent of the wings two feet five inches. It has a head like a pug-dog, large straight-pointed ears; and, in each jaw, two canine teeth, and two small cutting teeth. The tail is inclosed in the membrane, which joins to each hind-leg, and is also supported by two long cartilaginous ligaments involved in the membrane.

There is a variety with a large head and hanging lips, like the chops of a mastiff. This differs from the former in size, being less; but agrees in all other respects. It inhabits Peru and the Mosquito shore.

The BULL-DOG BAT.

The length of the body of this animal is a little more than two inches, and the extent of the wings nine inches and an half. It has broad round ears, the edges touching each other in front; the nose is thick, and the lips hang down: the upper part of the body is of a deep ash-colour, the lower-part paler, and the tail long; the five last joints of which are disengaged from the skin or membrane. It inhabits the West-Indies.

The SENEGAL BAT.

The length of this animal, from the nose to the rump, is about four inches, and the extent of the wings twenty-one inches. It has a pointed nose, and a long head, and the ears are short and pointed: the head and body are of a tawny brown, mixed with ash-colour; the belly is somewhat paler. The two last joints of the tail extend beyond the membrane. It is a native of Senegal.

The BEARDED BAT.

This is a small species, with hair on the forehead, and very long hair under the chin: the nostrils are open for a great way up the nose; the ears are long and narrow. The upper part of the head and body are of a reddish brown; the lower parts of a dirty white, tinged with yellow. The tail is included in the membrane. It inhabits North America.

There is another species which inhabits North America, that is ten inches and an half from the nose to the tail, and the tail a little more than one inch; the extent of its wings is ten inches and an half.

The STRIPED BAT.

This is an inhabitant of Ceylon; it has a small short nose, and the ears are broad, short, and pointing forward: the upper part of the body is of a clear reddish brown, and the lower part whitish. The wings are striped with black, and sometimes with tawny and brown. The length of this animal, from the nose to the insertion of the tail, is about two inches.

The HORSE-SHOE BAT.

There is a greater and lesser variety of this animal; the greater is about three inches and a half long, from the nose to the tip of the tail, and the extent of its wings about fourteen inches. It has a membrane at the end of the nose, in the form of a horse-shoe; the ears are large, inclining backward, broad at the base, and sharp-pointed. It is destitute of the little or internal ear. The upper-part of the body is of a deep ash-colour, and the lower part whitish. The tail of this creature is inclosed in the membrane. It inhabits Burgundy, in France, and has lately been discovered in some parts of Kent.

The NOCTULE.

The length of this Bat is almost three inches, the tail almost two, and the extent of its wings thirteen; the ears are small and rounded, and the hair of a reddish ash-colour. It inhabits Great Britain and France, and never skims near the ground, but flies high in pursuit of prey.

Mr. Buffon also mentions the *Serotine*, the *Pipistrelle*, and the *Barbastelle*, which are all inhabitants of France, and have nothing peculiarly interesting, except that the *Pipistrelle* is the least of the Bat kind; not being an inch and a quarter long, and the extent of its wings not exceeding six inches and an half.



A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature.

B O O K II.

A New and Complete History and Description of BIRDS in general.

INTRODUCTION concerning BIRDS in general.

EVERY part of nature appears furnished with inhabitants. The forests, the waters, and the depths of the earth have their respective tenants; while the yielding air, and those tracts of seeming space, too elevated for man to soar to, are traversed by multitudes of the most beautiful beings of the creation. Though every rank of animals seems calculated for its destined situation, yet none are more apparently so than Birds: they share the vegetable spoils of the earth, in common with the quadrupeds, and, to compensate for their want of strength, are supplied with swiftness: to avoid that power which they cannot oppose, they are endowed with the faculty of ascending into the air. In the scale of nature, it must be admitted that Birds fall below quadrupeds, and are less imitative of human endowments; yet they certainly are the next in rank, and greatly surpass fishes and insects, not only in the structure of their bodies but in their sagacity.

As Birds are chiefly formed to inhabit the empty regions of air, all their parts are suited to that purpose. Externally they seem surprisigly adapted for swiftness of motion. The shape of their body is sharp before, to facilitate its passage through the air; it then rises by a gradual swell, and fills off in an expansive tail, that assists in keeping it buoyant, while the fore parts are cleaving the air by their sharpness. They have, not unaptly, been compared to a vessel making its way through the water; the trunk of the body answering to the hold, the head to the prow, the tail to the rudder, and the wings to the oars.

Another cause of admiration in the eternal formation of Birds is the position of the feathers, which generally tend backwards; and thus by laying one way and over each other in an exact and regular order, answer all the purposes of warmth, speed, and security. That part of the feathers next the body is furnished with a warm and soft down, and the external part is arrayed with a double beard in two ranks, longer at one end than the other. These beards are a row of little flat thin lamina disposed

and inserted in a line, as perfect and regular as if their extremities had been cut with scissars. But lest these feathers should receive any injury by their violent attrition against the air, or imbibe the moisture of the atmosphere, the Bird is furnished with a gland behind, containing a quantity of oil, which it occasionally presses out with its bill, and lays over every feather that requires dressing. This gland, which is situated on the rump, is furnished with an aperture, surrounded with feathers somewhat like the pencil of a painter. Such poultry, however, as live principally under cover, have a smaller stock of this fluid than those which reside in the open air. The feathers of an hen, for instance, are pervious to every shower, but a swan, a goose, a duck, or a more-hen, and all such Birds as nature has directed to live upon water, have their feathers dressed with oil from the day of their quitting the shell: their magazine contains a provision of this fluid, proportioned to the necessity of its consumption. The flesh indeed contracts a flavour from it, which, in some, it renders so very rancid as to be unfit for food: but, if the flesh is injured by it, the feathers are improved, and made more valuable for all the domestic purposes to which they are usually applied.

The feathers, which form the cloathing of Birds, equally demand our admiration. The shaft of every feather is made proportionably strong, but hollow below to contribute to its lightness, and filled above with a pith to afford nourishment to the beard that springs from the shaft of the feather on either side. Nature has placed these feathers according to their length and strength, the largest and strongest having the greatest share of duty in flight. The beard of the feather does not consist of one continued membrane, because, if it were broken, it could not easily be repaired; it is therefore composed of a great number of layers, each layer somewhat resembling a feather, and lying against each other in close conjunction: these layers are broad, and of a semi-circular form towards the shaft of the feather, to add to their strength, and keep the closer to each other when in action. Towards the external part

of the beard or vane, these layers grow slender and taper; on their under side they are thin and smooth, but their upper external edge is parted into two hairy edges, with a different sort of hairs on each side, broad at bottom, and slender and bearded above.

The wings of Birds come next under consideration; in those which fly, they are usually placed at that part of the body which serves to poise the whole, and support it in the air. They answer to the four legs in quadrupeds, and, at the extremity of this, they have a kind of appendix, which is sometimes called the bastard wing. The quills with which this instrument of flight is furnished, differ from the common feathers only in their size, being considerably larger; but they spring from the deeper part of the skin, their shafts lying almost close to the bone. The beards of the strongest of those quills are broader on one side than on the other, contributing by that means to the progressive motion of the bird, and the closeness of the wing.

All Birds are furnished with two very strong pectoral muscles on each side of the breast bone. In quadrupeds, as well as in men, the muscles of the thighs and the hinder parts of the body, are by far the strongest; but in Birds it is otherwise; the pectoral muscles, which give motion to the wings, or arms, are of enormous strength, while those of the thighs are weak and slender. By means of these, a Bird can move its wings with a degree of strength which is almost incredible, when the size of the animal is considered. The flap of a swan's wing would break the leg of a man, and an eagle has been known to kill a man on the spot by a similar blow. Such is the force and lightness of the wing, that no machine, which human skill can contrive, is capable of giving such force to so light an apparatus. The art of flying, therefore, has so frequently been sought after in vain, and indeed it cannot possibly be attainable; for man cannot increase the force of his flying machine, without increasing its weight also.

In all Birds, nocturnal ones excepted, the head is smaller in proportion to the body than in quadrupeds, that it may more readily cleave the air in flying, and prepare a more easy passage for the body. Their eyes are also flatter and more depressed than in quadrupeds, and the pupil on each is encompassed by small plates of bone under the outer coat of the organ, to strengthen and defend it from injuries. Birds have also a kind of skin, called the nictitating membrane, with which they can with pleasure cover their eyes, as with a veil, though their eye-lids continue open. This membrane proceeds from the larger or more obtuse corner of the eye, and probably serves to wipe, cleanse, and moisten its surface. The eye of Birds is admirably adapted for vision, by a particular expansion of the optic nerve, which renders the impressions of external objects more vivid and distinct.

The sense of seeing, in birds, is infinitely superior to that of other animals; and indeed it appears necessary to the support and safety of those creatures. Were the eye less perfect, the Bird, from the rapidity of its motion, would strike against almost every object in its way; and it could hardly find subsistence unless possessed of a power to discern its food from above with astonishing sagacity. A kite, for example, from an almost imperceptible height in the clouds, darts on its prey with the most unerring aim; and an hawk perceives a lark at a distance beyond the reach of the human eye.

Birds have no external ears, being only furnished with holes to convey sounds to the auditory canal. The horned owl, indeed, and a few other Birds, seem to have external ears; but this appearance is occasioned by some feathers sticking out beyond the rest on each side of the head. These feathers en-

compassing the ear-holes in Birds, may perhaps supply the defect of the exterior ear, and collect sounds to be transmitted to the internal sensory. The extreme delicacy and sensibility of this organ is shewn by the facility with which some Birds learn tunes, and by the greatest exactness of their pronunciation in repeating words.

The sense of smelling appears equally perfect in the generality of Birds. Many of them scent their prey at a vast distance, and others are protected by this sense against their insidious pursuers. In decoys for catching ducks, the men who attend upon that business always keep a piece of turf burning near their mouths, upon which they breathe, lest the fowl should smell them and make its escape.

The legs and feet of Birds are made very light, for their easier transportation through the air. The toes of those which are calculated for the waters, are webbed; in others they are separate, the better to enable them to hold objects or cling to the branches of trees with safety. Such as have long legs, have also long necks, as they would otherwise be incapable of gathering up their food. But it does not naturally follow that those which have long necks should have long legs, for swans and geese, whose necks are extremely long, have very short legs, and these are better fitted for swimming than for walking.

The bones of every part of the body of Birds are extremely light and thin, and all the muscles very slight and feeble, except that which affords motion to the wings. The tail serves to counterbalance the head and neck, to guide the animal's flight like a rudder, and to assist when it is ascending or descending. If we particularly examine the internal parts of Birds, we shall find the same wonderful conformation fitting them for a life in air, and increasing the surface by reducing the solidity. Their lungs, which are usually called the sole, adhere to the sides of the ribs and back, but the ends of the branches of the wind-pipe open into them; while these have openings into the cavity of the belly, and convey the air drawn in by breathing into certain receptacles resembling bladders, extending the length of the whole body. The wind-pipe makes many convolutions or turnings in the bodies of some Birds, and it is then called the labyrinth. This difference of the wind-pipe is often found in animals that appear to be of the same species. For instance, the wind-pipe of the tame swan makes a straight passage into the lungs; while that of the wild swan, which to all external appearance seems the same animal, pierces through the breast-bone, and has several turnings there, before it comes out again and goes to enter the lungs. This is a difficulty which no naturalist has hitherto been able to account for. These turnings cannot be intended to form the voice, because those fowls which are without them are vocal: we cannot therefore ascertain whence some Birds derive that loud and various modulation in their warblings, but this we can venture to assert, that Birds, in proportion to their bulk, have much louder voices than animals of any other kind; for the screaming of a peacock is as loud as the bellowing of an ox.

Though Birds are destitute of a bladder for urine, they have large kidneys and ureters, by which this secretion is made, and carried away by one common canal.

From the simple conformation of Birds, they have, as may naturally be supposed, but few diseases: one however, they are subject to, from which quadrupeds are exempt; this is their annual moulting; for, once in every year, all manner of Birds cast off their old covering, and obtain a new one. They are all disordered during the moulting season; the courageous Bird then loses its fierceness, and such as are weakly often expire under this natural operation.

ration. Additional feeding cannot at that season maintain their strength, when they always cease to breed; that nourishment which produces the young being wholly absorbed by the demand required for supplying the growing plumage.

Those, however, who have the management of singing-birds, have a method of accelerating this moulting-time. They enclose the bird in a dark cage, where, by keeping it excessive warm, they throw the poor little animal into an artificial fever. This produces the moult before its proper time; the old feathers fall off, and are succeeded by a new set, more brilliant and beautiful than the former. The bird-fanciers say this increases the vivacity of the animal, and improves its singing; but it should also be observed, that not above one bird in three survives the operation.

Nature has kindly provided that, in winter, when there are the fewest provisions, the appetites of birds shall be least craving. At the beginning of spring, when food begins to be plenty, the strength and vigour of these animals return. The abundance of provisions and the mildness of the season then incite to love, and all nature teems with life, which it seems disposed to continue.

At the return of spring, those vital spirits, which in some degree were locked up during the winter, begin to expand. Those warblings which had been hushed during the colder seasons, now begin to animate the fields, and every grove and bush resounds with the delightful concert. But this harmony of the grove, so much admired by man, is not meant for his amusement; it is usually the call of the male to the female; his efforts to amuse her during the times of incubation or sitting; or, it is a challenge between two males contending for the affection of a favourite.

Birds begin to pair at the approach of spring, and then provide for the support of a future progeny. The loudest notes upon these occasions are usually from the male; the hen expressing her consent in a short interrupted twittering. This compact, for a season at least, is faithfully observed: many birds live together for years with inviolable fidelity; and when one dies, the other does not long survive it. We must not, however, expect to find this conjugal fidelity among the poultry in our yards, where their freedom is abridged, and their manners corrupted by slavery: we must look for it in our fields and our forests, where nature continues in unadulterated simplicity, and where every little animal seems prouder of his progeny than pleased with his mate.

When fecundation is performed, the female begins to lay. Such eggs as have been impregnated, (and such only) are prolific; the others which are produced without any congress, continue barren, and become addled by incubation. But previous to laying, the nest is to be made, which is done with no small degree of assiduity, and apparent design. Some naturalists assert that birds of one kind always make their nests in the same manner, and of the same materials; but it is certain, that they vary this as the materials, places, or climates differ. The red-breast, for instance, makes its nest of oak leaves in some parts of England, and in other parts with moss and hair. Some birds that build a very warm nest in this island, are less solicitous in the tropical climates, where the heat of the weather promotes the business of incubation. In general, however, every species of birds has a peculiar kind of architecture, which is adapted to the number of eggs, the climate, or the respective heat of the animal's own body. Where the eggs are numerous, a warm nest is requisite, that the animal heat may be equally diffused to all. The wren, for instance, makes its nest very warm; for, having a great many eggs, it is necessary to distribute warmth to them in com-

mon. On the contrary, the plover has but two eggs, which its body is at once capable of covering, and consequently it is not so solicitous about the warmth of its temporary habitation. Climate sometimes occasions great alterations; some water-fowl, that make a very slovenly nest with us, are more particular in the structure of it in the cold regions of the north: where they take every precaution to make it warm, and some kinds are known to strip the down from their breasts, to line it more effectually.

Birds usually resort to hatch in those climates and places where their food is found in the greatest plenty, and always in that season when provisions are in the greatest abundance. Aquatic birds, and those of the largest kinds, select the places which are remote from man, their food in general being different from that which is cultivated by human labour. Some have only the serpent to fear, and fabricate their nests so as to hang upon the end of a small bough, forming the entrance from below, which secures them from the serpent, or the monkey tribes. But the small birds, which feed upon fruits and corn, and commit their petty thefts upon the produce of human industry, use every precaution to conceal their nest from man. On the contrary, the large birds, remote from human society, endeavour to render theirs inaccessible to wild beasts or vermin.

While the female is hatching, her patience is astonishing; neither the calls of hunger, nor the approach of danger, can force her from the nest. Though fat when she begins to sit, yet, before incubation is over, she is usually reduced to skin and bone. Ravens and crows furnish the female with food while she is sitting; but this is not the practice of most of the smaller birds: during the whole time the male sits upon some neighbouring tree, and fooths her with his singing, frequently taking her place when she is weary, or extremely hungry, and continuing upon the eggs till she returns. Sometimes, indeed, the eggs acquire too great a degree of heat, when the hen removes to let them cool a little, and afterwards returns with pleasure and perseverance to resume her task.

The production of young seems to be the great æra of happiness in animals of this class. At that time nothing can exceed their industry and spirit: in defence of its young, the most timid becomes courageous; and those of the rapacious kind are at this season uncommonly fierce and active: they hasten with their prey, yet throbbing with life, to the nest, and early initiate their young to scenes of slaughter and cruelty. Birds of a milder nature are not less busily employed: the minuter kinds discontinue their singing, being engaged in the more important pursuits of common subsistence.

While the young continue in the nest, the old ones provide them with a regular supply of food; and that one may not receive more nourishment than the rest, each of the young is served with the repast in turn. If they discover that man has been busy with their nest, or has handled the little ones, they sometimes abandon the place by night, and provide a more secure though less commodious retreat for their brood. When the whole family is fully plumed, and they are capable of avoiding danger, they are led forth in fine weather, and taught the paternal art of providing for their subsistence. They are conducted to the places where their food is to be found; they are instructed in the method of taking it and carrying it away; and then led again to the nest, where they continue a day or two longer. At length, when they are fully enabled to provide for themselves, the old ones, for the last time, take them abroad, conduct them to the accustomed places, and finally forsake them; all connection between them being totally at an end.

Those

Those birds which are hatched earliest in the season are the strongest and most vigorous: the animals themselves seem sensible of this, and endeavour to produce early in the spring; but if their endeavours are obstructed, by having their nests robbed, or any other accident, they still persevere in their efforts for a progeny, and it sometimes happens that they are retarded by a variety of accidents to the midst of winter. The number of eggs which any bird can lay in the course of a season, has never yet been ascertained; it is however certain, that such as would have laid but two or three at the most, if their eggs are taken from them from time to time, will lay at least ten or a dozen; and a common hen, if moderately fed, will lay about an hundred from the beginning of spring to the latter end of autumn. It is generally observed, however, that the smallest and weakest animals are the most prolific, while the rapacious and strong are abridged by sterility. Such kinds as are easily destroyed, are therefore as easily repaired; and nature, where she has denied the power of resistance, has given fertility as a compensation.

Birds in general, though naturally timid, are seldom scared away from their usual haunts. Though perfectly formed for a wandering life, and supplied with powers to satisfy all their appetites, and though they are so well qualified for changing place with ease and rapidity, yet most of them remain contented in the districts where they have been bred, seldom exerting their powers in proportion to their endowments. The rook, if undisturbed, will never desert his native grove; the blackbird does not quit his usual haunts; and the red-breast claims a certain district, from whence he seldom wanders, but, though seemingly mild, drives from his limits every one of the same species, without pity or remorse.

Fear, climate, or hunger are the chief incitements to migration; from one of these powerful motives those which are called birds of passage, annually forsake us for some time, and make their regular returns. The curiosity of mankind has been greatly excited by these annual emigrations, and yet few subjects remain so much involved in darkness. It is generally supposed, that the cause of their retreat from these parts of Europe, is either a scarcity of food at certain seasons, the alteration of the climate, or the want of a secure asylum from the persecution of man, during the times of incubation and bringing up their young. Thus, in Sweden, the starling at the approach of winter, finds subsistence no longer in that kingdom, and therefore descends every year into Germany; and the hen chaffinches of the same country are observed to fly through Holland in large flocks every year, to pass their winter in a milder climate. Some birds undertake journies that might intimidate even human perseverance. In spring, the quails forsake the burning heats of Africa for the milder sun of Europe, and after continuing with us during the summer, steer their flight back to enjoy the temperate air of Egypt, which then begins to be delightful. These undertakings appear to have been preconcerted; some days before their departure, the assembly in some open place, and by a kind of chattering, seem to debate on the method to proceed. Their plan of operations being resolved upon, they all take flight together, and frequently appear in such immense numbers, that, to mariners at sea, they have the appearance of a cloud. The greatest number, among which are the strongest, carry their plan into execution; but there are many that grow weary in the way, and, quite exhausted by the fatigues of their flight, drop down into the sea, and sometimes by falling upon the decks of vessels, become an easy prey to the mariners.

Among the variety of water-fowl that visit our shores, how few are known to breed here? It is cer-

tain that they cannot quit this country merely for the want of food; to obtain a secure retreat, is perhaps their principal motive. This country is too populous for birds so shy and timid as these usually are: many species of birds which now migrate, remained with us throughout the year, when a great part of this island was an uncultivated tract of woods and marshes. In former times, the great heron and the crane bred familiarly in our marshes, and seemed to animate our fens; but they now forsake the country. Like most cloven-footed water-fowl, they built their nests upon the ground, and were exposed to every invader. But as agriculture increased, and the country grew populous, these animals were more and more disturbed. Until then they had little to fear, the surrounding marsh defending them from all the carnivorous quadrupeds, and their own strength from birds of prey; but upon the intrusion of man, they were at length obliged to seek, during the summer, some lonely habitation, at a distance from dangers and alarms.

Though the tribes of the duck kind are numerous, there are only five that breed here, viz. the tame swan, the tame goose, the sheldrake, the eider-duck, and a small number of the wild ducks. The rest unite with that amazing multitude of wild fowl which annually repair to the dreary lakes and deserts of Lapland, from the more southern countries of Europe: there they perform in full security the duties of incubation and nutrition. From the thickness of the forests in those regions, the ground continues moist and penetrable during the summer season; and the woodcock, snipe, and other birds with tender bills, can feed with convenience and ease; while those which are web-footed find plenty of food from the insects, which are incredibly numerous.

When they migrate from the north, they usually quit their retreat in September, and disperse themselves over all the southern parts of Europe. To observe the order of their flight is entertaining; sometimes they range themselves in a long line, and sometimes they march angularly, forming two lines which unite in the center, like the letter V reversed. The leader at the point seems to cleave the air, to facilitate the passage for those which are to follow; and, when he becomes weary of this laborious station, he retreats into one of the wings of the file, and is succeeded by a fresh commander. About the beginning of October, they make their appearance among us: at first they circulate round our shores, and afterwards by severe frost are compelled to repair to our lakes and rivers. Some, however, of the web-footed fowl, of hardier constitutions than the rest, endure the rigours of their northern climate the whole winter; but when the winters are uncommonly severe, they find it necessary to seek for more southern skies. In these cases only we are visited by the diver, the wild swan, and the swallow-tailed sheldrake; nothing but the severity of their own winters at home being able to compel them to visit our coasts.

It may appear astonishing how such irrational animals should be able to perform such long journies; how they should know whither to steer, when they engage in such an enterprize; but the same instinct which governs all their actions, perhaps operates here. Indeed they rather follow the weather than the country; they steer only from colder or warmer climates into those of an opposite nature; and, as they proceed, finding the variations of the air agreeable to them, they go on till they discover land to repose on.

There is, however, a circumstance attending the migration of swallows, which wraps this subject in great obscurity. At the approach of the European winter, it is universally allowed that they are

seen,

seen, in amazing numbers migrating into warmer climates: it is also well attested that their return into Europe is about the beginning of summer, but it is equally true that many of them continue torpid here during the winter, making their retreats, like bats, into old walls, or the hollow of trees; or even sinking into the deepest lakes, where they find security for the winter season, by remaining in clusters at the bottom.

It seems to be difficult to account for this difference in these animals, thus variously preparing to encounter the winter. It has been supposed that in some of them the blood might lose its motion by the severity of the cold, and thus the Bird became torpid; but Mr. Buffon, by placing many of this tribe in an ice-house, discovered that the cold by which their blood was congealed was also fatal to them. It therefore remains a doubt to this hour, among naturalists, whether there may not be a species, apparently like the rest, but differently formed within, in order to fit them for a state of insensibility during the winter here. Some indeed have suggested that those which were found thus torpid, were such only as were too weak, or hatched too late to join in the general emigration. But it was upon such as these that Mr. Buffon tried his experiment, and they all died under the operation.

Though there are some birds, which by emigrating, become inhabitants of almost every part of the earth; yet in general every climate has Birds peculiar to itself. Those of the Temperate Zone are not very remarkable for the beauty of their plumage, but the smaller kinds fully compensate for this defect by the melody of their voices. The Birds of the Torrid Zone are bright, vivid, and beautiful in their colours, but are either totally silent, or have most horrible screaming voices. The Frigid Zone, where the seas abound with fish, is stocked with Birds of the aquatic kind, in much greater plenty than in Europe.

Birds, in all countries, live longer than the quadrupeds or insects of the same climate. Even the life of a man is short when compared to that which some of these animals enjoy. It is said that swans have lived three hundred years; geese have been known to live eighty years; and linnets and other small Birds are often found to reach fourteen or fifteen years, though imprisoned the whole time in cages.

Birds in general, are proportionably smaller than quadrupeds; that is, the greatest of one class is far superior in magnitude to the greatest of the other. The ostrich, which is the largest of Birds, bears no proportion to the elephant; and the smallest humming-bird, which is the least of the class, is considerably smaller than the mouse. The extremities of nature are plainly discernible in these; the ostrich seemingly covered with hair, and incapable of flight, approaches the quadruped class; while the humming-bird, which does not exceed the humble bee in magnitude, and has a fluttering motion, seems nearly allied to the insect. But these extremities are rather objects of human curiosity than utility. It is the middle order of Birds which man has taken under his protection, and which administer to his pleasures or necessities. How far these animals are capable of instruction is manifest to those who have the management of hawks; and a very surprising instance of this was seen a few years ago in London: a Canary Bird was taught to pick up the letters of the alphabet, and to place them at the word of command, so as to spell the name of any person in company. The motions which upon this occasion were given by the master, and obeyed by the little animal, were unobserved by every other spectator.

The most obvious distinction of Birds is those

that live by land, and those that live by water; land and water fowl are easily distinguishable by the legs and toes. Land Birds have their toes divided, without any membrane or web between them, and seem calculated for the purposes of running, grasping or climbing: but the legs and feet of water fowl are formed for the purposes of wading in the water, or swimming on its surface. The legs of those that wade are usually long and naked: swimming fowls have the toes webbed together like those of a goose, which, like oars, serve to drive them forward with greater velocity. The formation of land and water fowl is indeed as distinct as their habits; and nature seems to point out this obvious distribution in methodizing these feathered animals: but as the number of Birds already known amounts to above eight hundred, and new ones are daily adding to the catalogue, it is not sufficient that we are able to distinguish a land from a water fowl; we ought to be capable of distinguishing the different kinds of Birds from each other, and even the varieties in the same kind, when they are presented to our view.

All Birds are divided by Linnæus into six classes. 1. Those of the *rapacious kind*. 2. *The pie kind*. 3. *The poultry kind*. 4. *The sparrow kind*. 5. *The duck kind*, and 6. *The crane kind*. The various kinds of land Birds are comprehended in the first four, and those which belong to the water, in the two last.

Birds of the *rapacious kind* are such carnivorous fowl as live by rapine: they are distinguished by their beak, which is hooked, strong, and notched at the point; by their short muscular legs, their strong toes, and their sharp and crooked talons; by the strength of their body, and the impurity of their flesh; by the nature of their food; and by the cruelty and ferocity of their manners.

The beak of the *pie kind* is different from that of the rapacious kind, and in some degree resembles a wedge, being fitted for the purposes of cleaving. Their legs are short and strong, their body slender and impure, and their food miscellaneous. They nestle in trees, and the female is fed by the male during the time of incubation.

The bill of the *poultry kind* is a little convex, for the purposes of gathering their food. The upper part of the beak hangs over the lower, their bodies are fat and muscular, and their flesh white and pure. They live principally on grain, which is moistened in the crop. They make an artless nest on the ground, and lay a great number of eggs. They are strangers to connubial love, and, unlike the other classes of birds, are promiscuous in their amours.

All the beautiful and vocal class of Birds that adorn our fields and groves are comprehended under the *sparrow kind*. Their bills resemble forceps for catching hold of any thing: their legs are formed for hopping, their bodies are tender, and in such as feed upon grain are pure: but impure in such as feed upon insects. They live chiefly in trees, and many of them shew great knowledge of architecture in the structure of their nests: they display great fidelity in the connubial state.

In birds of the *duck kind*, the bill serves as a kind of strainer to their food; it is smooth, covered with skin, and nervous at the point. The legs of these Birds are short, and their feet formed for swimming, the toes being joined together by a web. They live in waters, and chiefly build their nests upon land.

Birds of the *crane kind* have the bill formed for the purposes of searching and examining the bottom of pools: their legs are long, their toes have no web between them, their thighs are half naked, their body slender and covered with a thin skin, their tail short, and their flesh savoury. They

live in lakes, and chiefly build their nests upon the ground.

Such is the division of Linnæus with respect to Birds; but we have ventured to differ from him in several particulars, though, like him, we have divided the history of them into six classes; first giving the history of four or five birds that cannot well

be ranged systematically, viz. the ostrich, the cassowary, the emu, and the dodo. These, from their extraordinary magnitude, are sufficiently distinguishable from others, and, from their incapacity of flying, lead a different life from the rest of the feathered creation.

C H A P. I.

Containing the NATURAL HISTORY of the OSTRICH, the EMU, the CASSOWARY, the DODO, the EAGLE, the CONDOR, the VULTURE, the FALCON, the GOSHAWK, the KITE, the BUZZARD, the KESTRIL, the HOBBY, the SPARROW-HAWK, the MERLIN, the BUTCHER-BIRD, and the OWL.

NATURAL HISTORY of the OSTRICH.

THE Ostrich is the first of the feathered tribe that seems to unite in itself the class of quadrupeds and birds; for though it has the general outline and properties of a bird, it retains many of the marks of the quadruped. It resembles the camel in appearance, and is almost as tall; it is cloathed with a plumage that more resembles hair than feathers, and its internal parts are as much like those of quadrupeds as of the bird creation. This animal, therefore, may be considered as filling up that chasm in nature which separates one class of beings from another.

Of all birds the Ostrich is the largest. Travellers assure us that they are sometimes found as tall as a man on horseback; and some of those which have been shewn in England, exceeded seven feet in height. The head and bill resemble those of a duck, the neck has some similitude to that of a swan, and the legs and thighs are like those of an hen; though the whole appearance bears a strong resemblance to that of a camel. But, to descend to particulars, this animal is usually seven feet high from the top of the head to the ground, and about four from the back to the ground: when the neck is stretched out in a right line, it measures six feet from the head to the rump, and the tail about a foot more. One of the wings is a foot and an half long without the feathers, and with the feathers, three feet. The plumage is generally black and white, though it is said to be sometimes grey: the largest feathers, which are at the extremities of the wings and tail, are usually white; the next row is black and white; and the small feathers on the back and belly are a mixture of black and white. This animal has no feathers on the sides of the thighs nor under the wings: that half of the neck which is next to the body, is covered with smaller feathers than those on the belly and back, and like them are a mixture of black and white.

These feathers are peculiar to the Ostrich: other birds have several sorts, some of which are soft and downy, and others hard and strong; but almost all the feathers of an Ostrich are as soft as down, and utterly unfit to serve it for flying, or to defend it against external injury. The webs on the feathers of other birds are broader on one side than on the other, but in those of the Ostrich the shaft is exactly in the middle. The head and the upper part of the neck of this animal are covered with very fine white shining hair, with small tufts in some places, consisting of about ten or twelve hairs, which grow from a single shaft about the thickness of a pin. At the end of each wing there is a kind of spur resembling the quill of a porcupine, which is of an horny substance, hollow, and about an inch long. There

are two of these on each wing, the largest of which is at the extremity of the bone of the wing, and the other about a foot lower. The neck appears proportionably more slender than that of other birds, from its not being covered all over with feathers.

The bill of the Ostrich is short and pointed; the external form of the eye resembles that of a man, the upper eye-lid being furnished with eye-lashes which are longer than those on the eye-lid below: the tongue is very short and small, and composed of cartilages, and ligaments, intermixed with fleshy fibres.

The thighs, which are large and plump, are covered with a flesh-coloured skin, which appears greatly wrinkled. Some of these animals have a few small scattered hairs on their thighs, and others are entirely without: the legs are covered with large scales, and the ends of the feet are cloven, having two very large toes on each, which are also covered with scales: the toes are of unequal sizes; that on the inside is the largest, and is about seven inches long, including the claw, which is three quarters of an inch in length, and nearly the same in breadth. The other two has no claws, and does not exceed four inches in length.

The internal parts of the Ostrich are peculiarly formed: at the upper part of the breast under the skin, the fat is two inches thick; and on the forepart of the belly it is two inches and an half thick in some places, and as hard as suet. It has two distinct stomachs, the lowermost of which somewhat resembles the crop in other birds, and is considerably larger than the other. The second stomach or gizzard, has externally the shape of a man's stomach, and when opened is always found full of variety of substances, such as beans, barley, hay, grass, stones, &c. some of which are as large as a pullet's egg. The kidneys, which are eight inches in length and two in breadth, differ from those of other birds in not being divided into lobes; and the heart and lungs are separated by a midriff, as in quadrupeds.

The Ostrich is a native of the Torrid Regions of Africa, and has long been celebrated by those who have mentioned the animals of that region. The flesh of this animal is proscribed in scripture as unfit to be eaten. It is described by most of the ancient writers, and consequently was well known in their times. It seems particularly formed to live among the sandy and burning deserts of the Torrid Zone, and it seldom migrates into tracts that are more mild or fertile. The Arabians assert that the Ostrich never drinks, and indeed the place of its habitation seems to confirm the assertion. In the most solitary and horrid deserts, where there are few vegetables to cloath the surface of the earth, and where the rain never comes to refresh it, Ostriches

are

are seen in large flocks, which to a distant beholder, appear like a regiment of cavalry. The most barren desert is capable of supplying these animals with provision, as they can eat almost any thing; and those dreary tracts are doubly grateful, as they afford both food and security.

Of all animals, the Ostrich is the most voracious: it will devour leather, grass, hair, stones, metals, or any thing that is given to it; but those substances which the coats of the stomach cannot soften, pass whole; so that glass, stones, or iron, are excluded in the same form in which they were devoured. All metals, indeed, which are swallowed by any animal, lose a part of their weight from the action of the juices of the stomach upon their surface. A quarter pistole, which was swallowed by a duck, lost seven grains of its weight in the gizzard before it was excluded; and it is probable that a greater diminution of weight would happen in the stomach of an Ostrich: considered in this light it may be said to digest iron, but not in that extensive sense which is propagated by vulgar error. Valisnieri found the first stomach of an Ostrich filled with a jumbled collection of brass, copper, iron, tin, lead, wood, stones, glass, cords, nuts and grass; and, among the rest, a piece of stone above a pound weight. It is probable that this animal is obliged to fill up the great capacity of its stomach in order to be at ease; and when nutritious substances are not to be obtained, it supplies the void with any thing that offers.

In their native deserts, these animals live chiefly upon vegetables, where they lead a social inoffensive life, the male assorting with the female with connubial fidelity. Their eggs are very large, some of them measuring above five inches in diameter, and weighing above fifteen pounds. The season for laying depends entirely upon the climate in which the animal is bred: in the north of Africa, this season is about the beginning of July; in the south, it is towards the latter end of December. These birds are very prolific, and usually lay from forty to fifty eggs at a clutch. The shells of these eggs are extremely hard, and it has been currently said that the female deposits them in the sand, to be hatched by the heat of the sun; but this opinion is erroneous; for Kolben, who has seen great numbers of them at the Cape of Good Hope, affirms that they sit on their eggs like other birds, and that the male and female take this office by turns, as he had frequent opportunities of observing. In those hot climates, indeed, there is less necessity for the continual incubation of the female, than in the more temperate zones; and she more frequently leaves her eggs, which are in no danger of being chilled by the weather: but though she deserts them by day, she always carefully broods over them by night. Some authors also inform us that Ostriches forsake their young as soon as they are excluded from the shell; but this is certainly a mistake; for Kolben assures us that the young ones are not able even to walk for several days after they are hatched; during which time the old ones are very assiduous in supplying them with grass, and defending them from danger. The young are of an ash-colour the first year, and are covered all over with feathers, but after some time they drop those feathers, and those parts which usually are covered, assume a different and more becoming plumage.

It is on account of the beauty of a part of the plumage of this harmless animal, particularly the long feathers of which the wings and tail are composed, that man has been so active in pursuing it to its deserts. Pliny assures us that in his time the caps and helmets of the soldiers were adorned with these plumes; the ladies of the East use them as an ornament in their dress, and the ladies of Great Britain have lately decorated their heads with the feathers

of this animal. They are also used by undertakers, who place them upon hearses, and the heads of the horses which draw them, when the nodding plumes add greatly to the solemnity of the funeral. Those feathers are the most valuable which are plucked from the animal when living; those which are taken after its death being dryer, lighter, and more subject to be worm-eaten.

The savage nations of Africa hunt these animals for their flesh as well as for their plumage; they consider it as a great dainty, and sometimes breed them tame that they may eat the young ones, of which the female is said to be the most delicate food. The ancient Romans had no aversion to the flesh of the Ostrich; Aspicus gives us a receipt for making sauce for it. Even among the Europeans to this day, the eggs of the Ostrich are said to be nourishing and well tasted, but they are too scarce to be often fed upon.

The Arabians train up their best and fleetest horses for the chase of the Ostrich. As soon as the hunter comes within sight of its prey, he advances with a gentle gallop, so as still to keep the bird in view, but not to terrify him from the plain into the mountains. The Ostrich is the swiftest of all known animals which make use of their legs in flight; therefore, when he observes himself pursued at a distance, he at first runs but gently, either from the insensibility of his danger, or supposing himself sure of escaping. In this situation there is a strong similitude between him and a man running at full speed: his wings, like two arms, keep working with a motion correspondent to that of his legs, and his speed; if properly employed, would soon take him out of the view of his pursuers; but instead of moving in a direct line, he takes his course in circles; while the hunters relieve each other, meet him at unexpected turns, and keep him wholly employed for two or three successive days. At length, finding all power of escape impossible, and exhausted with hunger and fatigue, he endeavours to hide himself from those enemies which he cannot avoid, by covering his head in the sand, or the first thicket he arrives at. Some of these animals venture to face their pursuers, and, though in general the most gentle animal in nature, when driven to desperation, will valiantly defend themselves with their beaks, wings, and feet; and so great is the force of their motion, that a man would be utterly unable to withstand them.

Sometimes, in order to take the Ostrich, a man covers himself with that animal's skin, and placing an arm through the neck of it, counterfeits all the motions of this creature. By this artifice they approach it, and it frequently becomes an easy prey. It is also sometimes taken by dogs and nets.

Whole flocks of Ostriches are bred by the inhabitants of Dara and Lybia, and are tamed without much trouble. But, in this domestic state, they are not only prized for their feathers and their flesh, but they are often ridden upon, and used as horses. Moore assures us that he saw a man travelling upon an Ostrich, at Joar; and Adamson asserts, that at the factory of Podore, he saw two young Ostriches, the strongest of which ran swifter than the best English racer, though he carried two negroes on his back.

It is however generally agreed, that the Ostrich is a very stupid bird, and soon forgetful of its young. As an instance of its stupidity, it hides its head in the reeds when pursued, thinking itself thus totally covered from the sight; and as another proof, we are told, that they who go in pursuit of them, draw the skin of an ostrich's neck on one hand, which is found a sufficient lure to take them with the other. It is spoken of in the scripture as the symbol of cruelty and forgetfulness. See Lament. iv. 3. Job

xxxix. 13, &c. which latter passage in Dr. Young's fine paraphrase, we here subjoin :

Who in the cruel Ostrich has subdu'd
A parent's care, and fond inquietude?
While far she flies, her scatter'd eggs are found,
Without an owner on the sandy ground:
Cast out on fortune, they at mercy lie,
And borrow life from an indulgent sky:
Adopted by the sun, in blaze of day
They ripen under his prolific ray.
Unmindful she, that some unhappy tread
May crush her young in their neglected bed.
What time she skims along the field with speed,
She scorns the rider, and pursuing steed.

Upon this last line Dr. Young observes from Xenophon, that Cyrus had horses which could overtake the goat, and the wild ass, but none that could reach this creature; and that one thousand golden ducats, or an hundred camels, was the stated price of a horse that could keep equal pace with them. The ingenious Abbé la Pluche remarks, that in all countries where the Ostrich is known, when they would speak of a mother who has little care of her children, they always compare her to an Ostrich.

Modern travellers, however, have represented the Ostrich in a much less odious light as a parent, than the antient naturalists.

NATURAL HISTORY of the EMU.

THIS bird, which is also called the American Ostrich, is an inhabitant of the new continent; and travellers seem to have been more solicitous in proving its affinity to the ostrich, than in mentioning those peculiarities which distinguish it from all others of the feathered creation. It is chiefly found in Guiana, in the inland provinces of Brazil and Chili, and the vast forests bordering on the mouth of the river Plata.

The Emu is second in magnitude to the ostrich; it is by much the largest bird in the new continent, and usually measures six feet in height from the head to the ground. Its legs are about three feet long, and its thighs are almost as thick as those of a man: the toes are different from those of the ostrich, the American bird having three, and the other only two. In the length of its neck, the smallness of its head, and the flatness of its bill, it resembles the ostrich, but in other respects, it is more like the cassowary. The form of its body appears round, the wings are short, and very ill suited to flying, and it is entirely destitute of a tail. It is covered on the back and rump with longish feathers that fall backwards; those on the back being grey, and those on the belly white. It moves swiftly, and seems to be assisted in its motion by a kind of tubercle behind, like an heel: in its course it uses a very singular kind of action, lifting up one wing, which it keeps elevated for a time; when, letting that drop, it raises the other, and moves with such swiftness, that the fleetest dogs are thrown out in the pursuit.

The Emu is a bird but little known; travellers have therefore given a loose to their imaginations in describing it. Nierenberg's account is too extraordinary to be credited; and Wafer asserts that he has seen great quantities of this animal's eggs on the desert shores, north of the river Plata, where they are buried in the sand, to be hatched by the heat of the climate: but it is more probable that the eggs which Wafer had seen, were those of the crocodile, which are known to be hatched in this manner.

The young are familiar as soon as they are hatched, and follow the first person they see. Wafer asserts that he has been followed by many of them

when they were young, but as they grew older they became more cunning and distrustful. The flesh, especially of those which are young, is good for food. As these animals are by nature so familiar, they might easily be reared up tame, and might probably answer domestic purposes, like the turkey or the hen; especially as their maintenance could not be expensive; for, if the account of Narborough is to be relied on, they live entirely upon grass.

NATURAL HISTORY of the CASSOWARY.

THE Cassowary, with regard to magnitude, is next to the emu: it appears indeed more bulky to the eye, its body being nearly equal, and its neck and legs much thicker and stronger in proportion. From the point of the bill to the extremity of the claws, it is about five feet and an half long, and the legs are about two feet and an half high. The largest toe, including the claw, is five inches long; and the claw alone of the least toe is three inches and an half long. The wing is so small as not to appear, being hid under the feathers of the back. The head, being without feathers, appears small, like that of an ostrich, having on the top a crest three inches high, like that of an helmet, and of an horny substance; but it does not cover the whole top, extending only from the middle of the crown to the bill. In most other birds, a part of the feathers serve for flight, and differ from those that serve merely for covering; but in the Cassowary, all the feathers are of the same kind, and outwardly of the same colour. They are generally double, having two long shafts which grow out of a short one that is fixed in the skin. The stem or shaft is flat, shining, black, and knotted below, with a beard proceeding from each knot: the beards at the end of the large feathers are perfectly black, and towards the root of a grey tawny colour, shorter, and like down, so that nothing appears except the ends, which are hard and black; the other part being entirely covered. The feathers on the head and neck are so short and thinly sown, that the bird's skin appears almost naked. The feathers on the rump are extremely thick, but in all other respects are like the rest, excepting their being longer. The wings, when stripped of their feathers, are only three inches long, adorned at the ends with five prickles, of different lengths and thickness, bending like a bow: the longest of these prickles is eleven inches, and it is a quarter of an inch in diameter at the root, being thicker there than towards the extremity.

The colour of the eye in this animal, which is a bright yellow, and the globe being above an inch and an half in diameter, added to the peculiar oddity of the natural armour on the head, give it an air equally fierce and extraordinary. The hole of the ear is very large and open, having only a few small black feathers spreading over it. The neck is of a violet colour, inclining to that of slate, with spots of red in several places behind. The skin which covers the fore part of the breast, on which the Cassowary leans and rests, is hard, callous, and without feathers.

The internal parts of this animal are very remarkable; it unites with the double stomach of animals that live upon vegetables, the short intestines of those which live upon flesh: the intestines of the Cassowary are not above a thirteenth part of the length of those of the ostrich. The heart is but an inch and an half long, and an inch broad at the base. It may be said upon the whole, that it has the head of a warrior, the eye of a lion, the defence of a porcupine, and the fleetness of a courser.

FALCON GENTIL



EAGLE



GUINEA HEN



CARACARA



BUTCHER BIRD



DODO



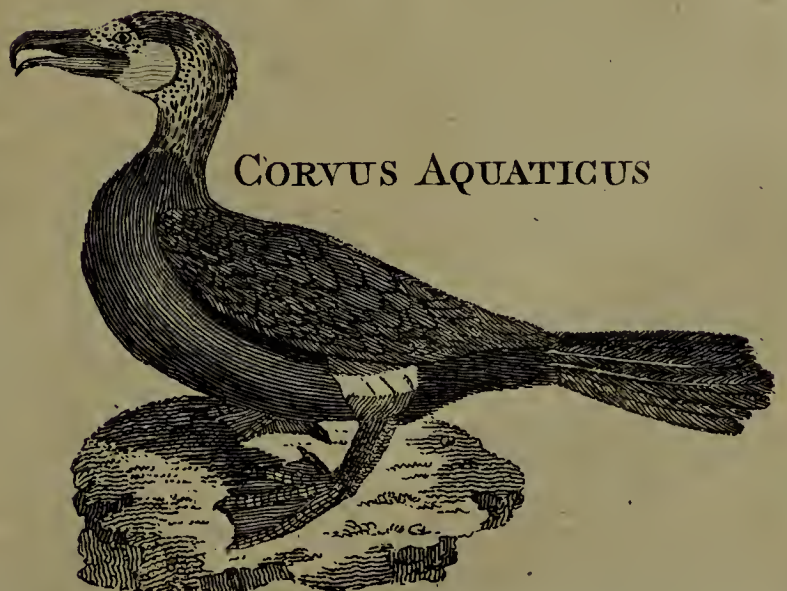
GRUS BALEARICA



CORACIAS



CORVUS AQUATICUS



But, notwithstanding the Cassowary is thus formed for a life of hostility, and for its own defence, it is a gentle inoffensive animal. It never attacks others, and when attacked itself, instead of the bill, it rather makes use of its legs, kicking like a horse, or running against its pursuer, and after beating him down, treading on him.

The manner of going of this animal is remarkably singular: instead of moving directly forward, it kicks up behind with one leg, and making a bound onward with the other, it travels with such velocity, that the swiftest racer would not be able to keep pace with him.

The Cassowary, like the ostrich, is extremely voracious, swallowing every thing that comes within the capacity of its gullet. The Dutch assert that it not only devours glass, iron, and stones, but even burning coals without testifying the smallest fear, or suffering the least injury.

The eggs of the Cassowary are of a grey ash-colour, inclining to green: they are neither so large nor so round as those of the ostrich. The largest are about fifteen inches round one way, and about twelve the other. The shell, which is not very thick, is marked with a number of little tubercles of a deep green.

The natural climate of this animal seems to be the southern parts of the most Eastern Indies. His domain appears to begin where that of the ostrich terminates. The latter has never been found beyond the Ganges; and the former is never seen nearer than the islands of Banda, Sumatra, Java, the Molucca islands, and the corresponding parts of the continent. Yet even here the Cassowary does not seem to have multiplied in any considerable degree, for a king of Java made a present of one of these birds to the captain of a Dutch ship, considering it as a great rarity. The ostrich, that is an inhabitant of the desert regions of Africa, continues numerous, and is still the unrivalled tenant of its own inhospitable climate. But the Cassowary, which inhabits a more peopled and polished region, becomes scarcer every day; for, in proportion as man multiplies, the savage and noxious animals fly before him. They desert their ancient habitations at his approach, and seek a more peaceable though barren retreat; voluntarily exchanging plenty for freedom, and encountering all the dangers of famine, to avoid the oppressions of man, who calls himself the lord of the creation.

NATURAL HISTORY of the D O D O.

SWIFTNESS is generally the attribute of birds, but the Dodo is not entitled to this distinction; on the contrary, its appearance strikes the imagination, as if it was a thing the most unwieldy and inactive of all nature. Its body is almost round, massive, and covered with grey feathers; it has two short thick clumsy legs resembling pillars, which seem to be but barely sufficient to support it. The neck is thick and purfy, and the head consists of two great chaps, that open beyond the eyes, and are large, black, and prominent; so that when the animal extends its chaps, it appears to be all mouth. The bill is extremely long, and thick, and of a bluish white, sharp at the end, and each chap crooked in opposite directions, so as to resemble two pointed spoons that are laid together by the backs. It has a stupid and voracious physiognomy, which is increased by a bordering of feathers round the root of the beak, that appear like a cowl or hood, and finish this picture of stupid deformity.

The bulk of this animal, instead of contributing to its strength, only adds to its inactivity. The ostrich, the cassowary, and the Dodo, are alike in-

capable of flying, but the two former supply that defect by their speed in running: the Dodo is scarce able to support its own weight, and moves forward with the utmost difficulty; it seems among birds what the sloth is among quadrupeds, equally incapable of defence or flight. It has wings, indeed, which are clothed with soft ash-coloured feathers, but they are too short to enable it to fly. It has a tail furnished with a few small curled feathers; but this tail is misplaced and disproportioned.

The Dodo is a native of the isle of France; and the Dutch, who first discovered it there, gave it the appellation of the nauseous bird, not only on account of its disgusting figure, but also from the disagreeable flavour of its flesh: but succeeding observers contradict this first report, and assert that its flesh is good and wholesome eating, and that three or four Dodos are sufficient to dine an hundred sailors. Some are of opinion that this is the same bird which travellers have described under the title of the bird of Nazareth, which description agrees with every particular, except that the feathers of the female of the bird of Nazareth are said to be extremely beautiful.

NATURAL HISTORY of the GOLDEN EAGLE.

THIS is the largest and noblest of the Eagle kind; it weighs about twelve pounds, its length is three feet, and the extent of its wings is about seven feet four inches: the bill, which is three inches long, is of a deep blue colour, and the eye of an hazel colour: the sight and sense of smelling are very acute. The head and neck are covered with narrow sharp-pointed feathers, and of a dark brown colour, edged with tawny; but, in very old birds, those on the crown of the head turn grey. The whole body is of a dark brown, and the feathers on the back are finely clouded with a deeper shade of the same: the wings, when not extended, reach to the end of the tail: the quill feathers are of a chocolate colour, and the shafts white: the tail is of a deep brown, irregularly barred and spotted with an obscure ash-colour, and generally white at the roots of the feathers: the legs are yellow, short, and very strong, being three inches in circumference, and feathered down to the very feet: the toes are covered with large scales, and armed with most formidable claws, the middle of which being two inches long.

This species is found in the mountainous parts of Ireland, where it breeds in the loftiest cliffs. It usually lays three or four eggs, though seldom more than two are prolific; Providence denying a large increase to rapacious birds, because they are noxious to mankind; but graciously permits an unlimited multiplication of such animals as are of service to him. This Eagle is sometimes seen in Caernarvonshire, and there are some few instances of their having bred upon Snowdon hills.

Eagles in general fix upon those places which are remotest from man, upon whose possessions they seldom make their depredations, choosing rather to follow the wild game in the forest, than to risque their safety to satisfy their hunger.

The Eagle may be considered among birds, as the lion among quadrupeds: they are both sovereigns over their fellows of the forest, and, equally magnanimous disdain all petty plunder, pursuing only such animals as are worthy the conquest: the Eagle also disdains to share the plunder of another bird, rejecting every kind of prey which he has not acquired by his own pursuits. However hungry he may be, he never submits to carrion; and, when satisfied, never returns to the same carcass, but leaves it for other animals less delicate than himself.

Like the lion, he keeps the desert to himself alone;

alone; it being equally extraordinary to see two pair of Eagles on the same mountain, as two lions in the same forest; and by keeping thus separate they find a more ample supply. These animals have a strong similitude in other respects; the eyes of both are sparkling, and nearly of the same colour; their claws are of the same form, and their cry equally loud and terrifying. Formed for war, they are enemies of all society, and are equally fierce, proud, and incapable of being tamed. Infinite art and patience are required to tame an Eagle; and even when taken young, and brought under by long assiduity, it is still but a dangerous domestic, and seldom is brought to have an attachment for its feeder.

Though at all times a formidable neighbour, the Eagle is still more so when bringing up its young. Both male and female at that time exert all their force and industry to supply their brood. Smith informs us, in his history of Kerry, that a poor man in that county got a comfortable subsistence for his family, during a summer of famine, by robbing the Eaglets of the food which the old ones brought in vast quantities: he protracted their attendance beyond the natural time, by clipping the wings of the young and retarding their flight. Had the countryman been surprized in this employment by the old Eagles, he might have woefully experienced their resentment. It is dangerous to leave infants in places where Eagles frequent, an instance being recorded in Scotland of two being carried off by them; but fortunately the theft was discovered in time, and the children restored unhurt out of the Eagle's nest to the affrighted parents.

In the same country a peasant resolved to rob the nest of an Eagle that had built in a small island in the lake of Killarney. He watched an opportunity, and, while the old ones were away, he stripped and swam to the island. After robbing the nest of its young, and fastening them in a string, he was preparing to swim back with them; but, while he was yet up to his chin in the water, the old Eagles returned, and missing their young, immediately attacked the plunderer, and, in spite of all his resistance, dispatched him with their beaks and talons. In order to extirpate these pernicious birds, there is a law in the Orkney islands, which obliges the master of every house in the parish where an Eagle is killed, to give the person who destroyed it a hen.

Of all animals the Eagle flies highest; and from thence the ancients have given them the epithet of the Bird of Heaven.

The Eagle has always been reckoned the king of birds; whether on account of the superiority of his strength, the terror which he inspires into so many other animals on whom he preys, his natural fierceness, or the rapidity and elevation of his flight. Bochart tells us, that this bird lives a century, and increases in bulk to his death. If this be true, we may easily credit the relation of Athenæus, who says, that Eagles were carried by way of ornament at the triumph of Ptolemy, whose wings were twenty cubits long.

The voracity of this bird is so great, that he ravages all the neighbouring places, which are scarce sufficient to furnish him with prey necessary for his support: Hence, as we have already observed, two eagles are not to be found in the same quarter. Aristotle and Pliny say, that the Eagles chase their young ones, not only out of the airies or nests, but even out of the country where they inhabit as soon as they are able to fly. They are not contented with the larger birds, as hens, geese, and cranes, but pursue rabbits, hares, lambs and kids, which they lift from the ground and carry off. Nay some tell us of their attacking even bulls. As the Eagle lives wholly on the flesh of such animals as he kills,

so he quenches his thirst with their blood, and never drinks water but when he is sick. It is said, that the swan is the only bird, which can resist him, and that frequently he does it with success. All the other birds are afraid of the Eagle to a sovereign degree; they quake and tremble at his cry; and even the dragon, when he hears him, takes refuge in his den. Nor are the fishes safe from his voracity: he perceives them even at the bottom as he skims over seas and lakes; plunges immediately down with the rapidity of an arrow, and drags them to the bank, where he devours them. This wonderful instinct is referred to Job xxxix. 27, &c.

Sharpness of sight is a quality of the Eagle, which sets him above all other birds: he seems even to be sensible of that advantage: and, to preserve it in his species, as soon as his young begin to have strength, he turns them towards the sun, and makes them fix their eyes upon it; if any one cannot bear the heat and force of the rays, he chases him from the nest, as if he judged him unworthy of his protection and assistance, but attaches himself to the rest with a remarkable affection, even to the exposing his own life to preserve them, and fighting obstinately against all who would take them from him: he is seen fluttering in various ways round his nest to teach them to fly. He takes them afterwards upon his back, in such a manner, that the fowler cannot hurt the young, without piercing through the body of the old one: quits them in the middle of his course in order to prove them; and if he perceives that they cannot as yet support themselves alone, and that they are in danger of falling, he darts himself below them with the greatest rapidity, and receives them between his wings. He is the only bird into which nature has instilled this kind of instinct; which the scripture has chosen as an expressive symbol of the tenderness with which God protected his people in the wilderness. "I bare you," says he, "on Eagles wings, and brought you unto myself:" Exod. xix. 4. So Deut. xxxii. 11: "As an Eagle stirreth up her nest, fluttereth over her young, spreadeth abroad her wings, taketh them, beareth them on her wings,—so the Lord, &c.

It is said that the reason why Eagles who have not the fibres of their eyes stronger than other animals can look stedfastly on the sun, and support its fiercest rays, is, because they have two eye-lids: one, with which they shut their eyes intirely: the other, which is thinner, they draw over them, when they look upon a luminous object, which renders the glaring light much more supportable. However this be, it is certain, that the Eagle rises to a prodigious height. To this instinct he owes the renewal of his strength and youth, in which the learned, and even the critics themselves are agreed; every ten years his feathers become heavy and less proper for flight: he then makes an effort and approaches nearer the sun than usual, and after being excessively heated, he plunges immediately into the sea: his feathers fall off, and new ones supply their place, which restore him to his pristine strength. When it moults, it is said to fall into a languishing condition, so as neither to be able to hunt after its prey as usual, nor to create terror in other birds.

Ælian attributes to the Eagle a peculiar instinct of gratitude. He says, that one, which Pyrrhus had brought up, and which followed him every where, was so sensible of that illustrious warrior, that he would not quit his body or take any nourishment. Another threw himself into the funeral-piles, where he saw them burning the corpse of him who had kept him till that moment.

The nest of the Eagle is usually built in the most inaccessible cliff of the rock, and generally sheltered from the weather by some jutting crag that hangs over it; but they are sometimes wholly exposed to
the

the winds, as well sideways as above; for the nest is flat, though built with great labour.

Eagles, says Mr. Pennant, are equally remarkable for their longevity, and for their power of sustaining a long abstinence from food. One of these species, which, at the time of his writing his *British Zoology*, had been nine years in the possession of Mr. Owen Holland of Conway, lived thirty-two years with the gentleman who made him a present of it; but he knew not its age when the latter received it from Ireland. The other remark is verified in the same bird; for, through the neglect of servants, it endured hunger for twenty-one days, without any sustenance whatever.

Such are the general characteristics and habitudes of the Eagle; but in some these habitudes differ: the sea Eagle and the osprey, for example, live principally upon fish, and consequently build their nests on the sea-shore, and by the sides of rivers, on the ground among reeds. They catch their prey by darting down upon them from above; the Italians therefore call them *Aquila Piombina*, or the *Leaden Eagle*; comparing their violent descent on their prey, to the fall of lead into water.

The BALD EAGLE.

The body of the Bald Eagle is brown; the head, neck, and tail, white, and the upper part of the legs brown. It is an inhabitant of North-Carolina, and is remarkable for habits peculiar to itself. These Eagles breed in that country all the year round; and as soon as the young are just covered with down and a kind of white woolly feathers, the female Eagles lay again. These eggs are left to be hatched by the warmth of the young Eaglets that continue in the nest; the flight of one brood always making room for the next, that are but just hatched. These birds fly very heavily, and cannot overtake their prey like the rest of their tribe. These Eagles generally attend upon fowlers in the winter; and, when any birds are wounded, they are sure to be seized by them, though they may escape the fowler. This animal will also frequently steal young pigs, and carry them alive to the nest, which is a filthy place, composed of twigs, sticks, and rubbish, and generally almost full of half-eaten bones, and putrid flesh.

The RING-TAIL EAGLE.

This bird is common to the northern parts of Europe and America. It is equal in size to the royal Eagle; the bill is of a blackish horn colour; the whole body of a dark brown, slightly tinged with rust colour; but its remarkable characteristic is the band of white on the upper-part of the tail, which distinguishes it in all countries where it is found. The legs are feathered to the feet, the toes yellow, and the claws black. It is also called the white tailed Eagle.

The SEA EAGLE.

This bird is found in several parts of Great-Britain and Ireland. Turner says it was too well known in England in his days, for it made horrible destruction among the fish; he adds, that fishermen anointed their baits with the fat of this bird, imagining that it had a peculiar alluring quality: they were so superstitious as to believe; that whenever the Sea Eagle hovered over a piece of water, the fish (as if charmed) would rise to the surface with their bellies upwards, and in that manner present themselves to them.

Though the Sea Eagle is no uncommon species, it seems at present to be little known, and has not been described by any writer since Clusius, except by Pennant in his *British Zoology*. It has generally been confounded with the golden Eagle, to which it bears some resemblance. The colours of the head,

neck, and body, are the same with the golden Eagle, but much lighter, the tawny part in this predominating: in size it is far superior: the bill is larger, more hooked, and more arched: underneath grow several short strong hairs or bristles, forming a sort of beard: some writers have therefore supposed it to be the *aquila barbata*, or bearded Eagle of Pliny. The interior sides, and the tips of the feathers of the tail, are of a deep brown: the exterior sides of some are of an iron colour, in others spotted with white: the legs are strong, thick, and of a yellow colour, and feathered but little below the knees; which is an invariable distinction between this and the golden Eagle: this nakedness of the legs, however, is of no small convenience to a bird that preys among the waters. The claws are of a deep and shining black, exceeding large and strong, and hooked into a perfect semi-circle. Writers all agree that this Eagle feeds principally on fish, which it seizes as they are swimming near the surface, by darting itself down upon them, but not by diving or swimming, as some authors have asserted, who for that purpose have invented them one webbed-foot to swim with, and another divided foot to take its prey with. Martin, speaking of these Eagles in the Western Isles, says, they fasten their talons in the back of the salmon, which are often on the surface, and sometimes above water.

The BLACK EAGLE.

The Black Eagle is about half the size of the golden Eagle; the body in general is blackish; the head and neck mixed with red. On the middle of the back, between the wings, there is a large white spot mixed with red feathers, which, approaching the rump, become entirely of a darkish red. The feathers on the wings resemble those of a common buzzard, except that there is a dark streak running cross the prime feathers; and one that is whitish, terminating in an ash-colour at the tip of the wings.

The OSPREY.

Though Mr. Ray places this bird among the hawks, yet from one of the species lately taken, it appears to be of the Eagle kind, and it was indiscriminately known by the name of the Osprey and the Eagle above one hundred and sixty years ago, as appears by Dr. Kay's description; it is therefore restored to the *aquiline* rank, under the name of the Osprey.

This bird frequents rivers, lakes, and the sea shores: it makes its nest among reeds, and lays three or four white eggs of an elliptical form, somewhat less than those of a hen. It principally feeds on fish, which it seizes in the same manner that the sea Eagle does; not by swimming, but by precipitating itself on them. Turner says it also preys on cootes and other water-fowl. The feet of the Osprey are formed like those of other birds of prey; though Linnæus, copying the errors of ancient writers, asserts that the left foot is palmated.

The bird which is here described was a female: it was twenty-three inches long, and weighed sixty-two ounces; the breadth was five feet four inches; the wings, when closed, reached beyond the end of the tail, which consists of twelve feathers, like all the tails of those of the hawk kind; the two middle feathers were dusky; the others barred alternately with brown and white on the inner webs: on the joint of the wing next the body was a spot of white; the quill feathers of the wings were black; the secondary feathers and the coverts dusky, the former having their interior webs varied with brown and white. The head was small and flattish; the crown white, marked with oblong dusky spots; the cheeks, chin, breast, and belly were white, except that the last was spotted with a dull yellow; a bar of brown extends

extends from the corner of each eye, along the sides of the neck, pointing towards the wing. The legs were very short, thick, and strong: their length being only two inches and a quarter, and their circumference two inches: their colour was a pale blue, the outward two turned easily backward; and, what claims our attention, the claw belonging to it is larger than that of the inner toe; in which particular it differs from every other bird of prey; but it seems peculiarly necessary to this kind, for the better securing its slippery prey.

The CROWNED EAGLE.

This curious kind of the Eagle species, is a native of Africa: the description here given, is taken from the ingenious and accurate Mr. Edwards, who thus describes the bird: "the Crowned Eagle is about a third part less than the larger sort of Eagles which we see in Europe, but appears to be strong and bold like them. The bill, and the skin which covers the upper mandible, (in which the nostrils are placed) are of a dusky brown colour: the corners of the mouth are cleft in pretty deep under the eyes, and are of a yellowish colour: the circles round the eyes are of a reddish orange colour: the fore-part of the head, the space between the eyes, and the throat are covered with white feathers, with small black spots: the hinder-part of the head and neck, the back and wings, are of a dark brown, or blackish colour, the outer edges of the feathers being of a lighter brown; the quills are darker than the other feathers of the wings; the ridge in the upper parts, and the tips of some of the lesser covert feathers of the wings are white: the tail is of a brown colour, barred across with black, and on its under-side appears of a dark and light ash-colour: the breast is of a reddish brown, with large transverse black spots on its sides; the belly and covert feathers under the tail are white spotted with black: the thighs and legs down to the feet are covered with white feathers, beautifully spotted with round black spots: the feet and claws are very strong; the feet are covered with scales of a bright orange colour; the claws are black. It raises the feathers on the hinder part of the head, in the form of a crest or crown, from which it takes its name."

Like the other birds of the same name and species, the Crowned Eagle is remarkable for its voracity, and sharpness of sight.

The other birds of the Eagle kind, where there are no remarkable peculiarities, are sufficiently described in the general account of the Eagle; we shall, however, give the distinct mark of every other bird of the Eagle species.

The Common Eagle is of a brown colour, the head and upper part of the neck inclining to red; the feathers of the tail are white, except that they grow blackish towards the ends: the four outer ones on each side are of an ash-colour, and the legs are clothed with feathers of a reddish brown.

The White Eagle is entirely white.

The Rough-footed Eagle is of a dirty brown, spotted with white on the legs and under the wings: the feathers of the tail are white at the beginning and the point; the feathers on the legs are of a dirty brown spotted with white.

The Erne is of a dirty iron colour above, and iron colour mixed with black below; the head and neck are ash-colour mixed with chestnut; the points of the wings blackish, the tail white, and the legs naked.

The Jean le Blanc is of a brownish grey above, and white, spotted with tawny brown below; the feathers on the outside, and at the extremity of the tail, are brown; on the inside they are white streaked with brown: the legs are naked.

The Brasilian Eagle is of a deep brown, with ash-

colour mixed in the wings; the tail white, and the legs naked.

The Oroonoko Eagle has a topping, and is of a deep brown above; and white, spotted with black, below; the upper part of the neck is yellow; the feathers of the tail are brown, with white circles; the feathers of the legs are white, spotted with black.

The Eagle of Pondicherry is of a chestnut colour, except that the six outward tail feathers are half black.

NATURAL HISTORY of the CONDOR, or CONDOR of AMERICA.

NATURALISTS are in doubt whether to refer the Condour of America to the eagle tribe, or to that of the vulture. Its great strength, force, and vivacity, might plead for its place among the former; but the baldness of its head and neck might be thought to degrade it among the latter. It is evident, however, that if size and strength, combined with rapidity of flight and rapacity, deserve pre-eminence, no bird can be placed in competition with it. The Condour possesses, in a higher degree than the eagle, all the qualities that render it formidable, not only to the feathered kind, but to beasts, and even to mankind.

The goodness of the Creator is evidently discerned in that plentiful provision, which he hath made, of creatures beneficial to mankind: nor are the footsteps of his gracious wisdom less manifest, in the care which he hath taken to prevent the over-spreading increase of such as are pernicious and destructive. A more remarkable proof of which we cannot have, than in the wonderful bird before us; which, happily for mankind, is rare, and seldom found: for, was the increase of the species large, it would spread universal havock and devastation.

The Condor or Condour, is a native of South-America. Captain Strong, as Sir Hans Sloane informs us, in the Philosophical Transactions, No. 208, shot one of them on the coast of Chili, not far from Mocha, an island in the South-Sea. It was shot, sitting on a cliff, by the sea-side, and was sixteen feet from wing to wing extended. He gave Sir Hans one of the feathers, which is now in the British Museum, and is two feet four inches long; the quill part five inches three quarters long, and one inch and a half about in the largest part. It weighed then, says he, three drams, seventeen grains and a half, and is of a dark brown colour.

To this account Sir Hans Sloane adds the testimony of Garcilasio de la Vaga, who declares, "that several of the fowls have been killed by the Spaniards, and measured from end to end of their wings extended, fifteen or sixteen feet. Nature, he observes, to temper and allay their fierceness, hath denied them the talons, which are given to the eagle; their feet being tipped with claws like a hen: however, their beak is strong enough to tear off the hide, and rip up the bowels of an ox! Two of them will attempt a cow or a bull, and will devour him: and it hath often happened that one of them hath assaulted boys of ten or twelve years of age, and hath eaten them." The Spanish inhabitants, on the coast of Chili, told Capt. Strong, that they were ever in dread, lest this rapacious bird should prey upon their children. And it is said that the Americans hold out to it, as a lure, the figure of a child, made of a very glutinous clay; upon which it descends with excessive rapidity, and strikes its pounces into it so deep, that it cannot, after that, get away. Mr. Condamine has frequently seen them in several parts of the mountains of Quito and Peru, and has observed them hovering over a flock of sheep; and he thinks, that they

they would have attempted to carry one off, if it had not been for the shepherd. The Indians assert that they will carry off a deer, or a young calf in their talons, as eagles would an hare or a rabbit.

Garcilasio further adds, that their colour is a mixture of black and white; and the tail is like a magpie's: they have on the fore-part of their heads a comb, not pointed or toothed like that of a cock; but rather even, in the form of a razor. When they come to alight from the air, they make such a prodigious noise with their wings, as is enough to astonish or make a man deaf. Labat acquaints us, that those who have seen this animal, declare that the body is as large as that of a sheep, and that the flesh is tough, and as disagreeable as carrion. It never is seen in forests, on account of the extreme length of its wings, because it would not have room to fly: but it frequents the sea shores, and the banks of rivers, where it is likely to meet with prey.

What a blessing it is to mankind, that there are but few (enough to keep up the species, and not overcharge the world) of this monster in the feathered creation! and into what can we resolve this rarity of a species so pernicious, but into the wise and over-ruling care of that adorable Providence; which we are assured, by the mouth of unerring truth, extendeth his concern, not only to man, but to the meanest of the feathered tribe; "not a sparrow falleth to the ground without our heavenly Father!" they who, as weakly as wickedly, endeavour to attribute all things to chance and second causes; would do well to inform us, how it comes to pass, that the vast and destructive Condor is so seldom found, is so slow in increase; while the fowls of an useful and beneficent sort, multiply so amazingly, and so plentifully contribute to our support and delight? Why should the hen or the turkey, the duck or the partridge, lead forth such a numerous brood; while the lone terror of Peru sits desolate, with its single offspring, on the top of the rocks?

The balance of animals, preserved in the creation, is a manifest token of the divine Providence. "The whole surface of our globe, says an ingenious naturalist, can afford room and support only to such a number of all sorts of creatures: and if by their doubling, trebling, or any other multiplication of their kind, they should increase to double or treble that number, they must starve or devour one another. The keeping therefore the balance even is manifestly a work of the divine Wisdom and Providence. To which end the great Author of Being hath determined the life of all creatures to such a length; and their increase to such a number, proportional to their use in the world. The life of some creatures is long, and their increase but small; and by that means they do not overstock the world. And the same benefit is effected where the increase is great, by the brevity of such creatures lives, by their great use, and the frequent occasions there are of them for food to man or other animals. It is a very remarkable act of the divine Providence, that useful creatures are produced in great plenty, and others in less. The prodigious and frequent increase of insects, both in and out of the waters for the supply of the fish, birds, &c. may exemplify the one; and it is observable in the other, that creatures, less useful, or by their voracity pernicious, have commonly fewer young, or seldomer bring forth; of which many instances may be given in the voracious beasts and animals; but the Condor of Peru is a particular and very sufficient instance.

P. Feuillée, the only traveller who has accurately described this bird, gives us the following circumstantial account. "In the valley of Ilo in Peru, I discovered a Condor, perched on a high rock before me: I approached within gun-shot and fired; but as my piece was only charged with swan shot,

the lead was not able sufficiently to pierce the bird's feathers. I perceived; however, by its manner of flying, that it was wounded; and it was with a great deal of difficulty that it flew to another rock, about five hundred yards distant on the sea shore. I therefore charged again with ball, and hit the bird under the throat, which made it mine. I accordingly ran up to seize it; but even in death it was terrible, and defended itself upon its back, with its claws extended against me, so that I scarce knew how to lay hold of it. Had it not been mortally wounded, I should have found it no easy matter to take it; but I at last dragged it down the rock, and, with the assistance of one of the seamen, I carried it to my tent to make a coloured drawing.

"The wings of this bird, which I measured very exactly, were twelve feet three inches (English) from tip to tip. The great feathers, which were of a beautiful shining black, were two feet four inches long. The thickness of the beak was proportionable to the rest of the body, the length about four inches; the point hooked downwards, and was white at its extremity, and the other part was of a jet black. A short down, of a brown colour, covered the head; the eyes were black, and surrounded with a circle of reddish brown. The feathers on the breast, neck, and wings, were of a light brown; those on the back were rather darker. Its thighs were covered with brown feathers to the knee. The thigh bone was ten inches long; the leg five inches: the toes were three before, and one behind: that behind was an inch and an half; and the claw with which it was armed was black, and three quarters of an inch long; the other claws were in the same proportion; and the leg was covered with black scales, as also the toes; but in these the scales were larger.

"These birds usually keep in the mountains, where they find their prey: they never descend to the sea-shore but in the rainy season; for, as they are very sensible of cold, they go there for greater warmth. Though these mountains are situated in the Torrid Zone, the cold is often very severe: for a great part of the year they are covered with snow, but particularly in winter.

"The little nourishment which these birds find on the sea-coast, except when the tempest drives in some great fish, obliges the Condor to continue there but a short time. They usually come to the coast at the approach of evening; stay there all night, and fly back in the morning."

Some are of opinion that the Condor is not confined to America only: the great bird called the rock, described by Arabian writers, and so much exaggerated in fable, is supposed to be a species of the Condor. The great bird of Tarnassar in the East Indies, and the vulture of Senegal, which carries off children, are probably no other than the bird we have been describing. However this be, we are not to regret that it is hardly ever seen in Europe, as it appears to be one of the most formidable enemies of mankind. They chiefly inhabit the deserts of Pachomac, where men seldom venture to travel. Those wild regions are alone sufficient to inspire a secret horror; the forests are vocal with the roaring of wild beasts, the hissing of serpents, and the mountains are rendered terrible by the Condor.

Happy Britain, as in a thousand other particulars, so in the peculiar favour of heaven on thy climate; which no pernicious or rapacious animals inhabit; through which never stalks, furious with hunger, the devouring tyger; over which never hangs, threatening devastation, the voracious and unwieldy Condor! Happy Britain, whose fields smile with plenty; and over whose plains roves fair Freedom, unmolested, and blest to her wish.

NATURAL HISTORY of the VULTURE.

IN the description of birds, the first rank has been usually given to the eagle; not because it is stronger or larger than the Vulture, but because it is more generous and bold. The eagle, unless pressed by famine, will not accept of carrion; nor will he ever devour what he has not earned by his own pursuit. The Vulture, on the contrary, is indelicately voracious, and seldom attacks living animals, when it can be supplied with the dead. Putrefaction and stench, instead of deterring, only serve to allure him. The Vulture among birds is what the jackall and hyæna are among quadrupeds, who prey upon carcases, and disinter the dead.

Vultures are easily distinguished from all those of the eagle kind, by the nakedness of their heads and necks, which have no other covering, than a very slight down or a few scattered hairs. Their eyes are more prominent; those of the eagle being buried more in the socket. Their claws are also shorter and less hooked. They are different from all other birds of prey, in having the inside of the wing covered with a thick down. Their attitude is less upright than that of the eagle, and their flight more difficult and heavy.

They are also strongly marked by their nature, which, as we have already observed, is cruel, indolent, and unclean. Their sense of smelling is amazingly great, nature having supplied them with two large apertures or nostrils without, and an extensive olfactory membrane within. Their intestines are formed differently from those of the eagle kind; for they partake more of the formation of such birds as live upon grain.

The Vulture, which is common in many parts of Europe, and but too well known on the western continent, is an absolute stranger in England. In Arabia, Egypt, and many other kingdoms of Africa and Asia, Vultures are very numerous. The down on the inside of their wings is converted into a very warm and comfortable kind of fur, and is frequently exposed to sale in the Asiatic markets.

In Egypt the Vulture is of singular service. In the neighbourhood of Grand Cairo, there are large flocks of them, which no person is permitted to destroy: they devour all the carrion and filth of that great city, which might otherwise tend to corrupt and putrefy the air. They accompany the wild dogs of that country, and frequently feed with them very deliberately upon a dead carcase. As both are extremely voracious, and both lean and bony to a very great degree, it is remarkable that this odd association produces no quarrels; but these birds and quadrupeds seem to live amicably, and nothing but harmony subsists between them.

In America, where the hunters pursue beasts only for their skins, these birds are seen to attend. They keep hovering at a little distance; and, when the beast is dead and abandoned, they call out to each other, run eagerly to the carcase, and, in a very short time, pick all the flesh from the bones.

Catesby informs us that they are attracted by carrion at a very great distance. "It is pleasant," says he, "to behold them when they are eating, and disputing for their prey. An eagle generally presides at their entertainments, and makes them all keep their distance till he has done. They then fall to with an excellent appetite: and their sense of smell is so exquisite, that the instant a carcase drops, we may see the Vultures floating in the air from all quarters, and come fousing on their prey." Some have imagined that they eat nothing which has life; but this is only when they are unable to overcome their prey; for when they discover lambs, they shew no mercy; and serpents are their ordinary food.

In the Brasils, where Vultures are found in great abundance, when they find a carcase which they have liberty to tear at their ease, they eat so voraciously that they are unable to fly. At all times, indeed, they are birds of a slow flight, and cannot raise themselves from the ground; but, when they are over-fed, they are entirely helpless: however, if they are pursued, they soon get rid of their burthen; for they can at any time vomit up what they have eaten, and then they fly off with greater facility.

It is entertaining to observe the hostilities between noxious animals. Of all creatures, the two most at enmity are the Vulture of Brasil and the crocodile. The female of the latter, which in the rivers of that part of the world grows to the size of twenty-seven feet, lays from one to two hundred eggs in the sands, on the side of the river, where they are hatched by the heat of the climate. The crocodile takes every precaution to hide from all other animals the place where she deposits her burthen; but an assembly of Vultures sit silent and unseen in the branches of some neighbouring forest, and observe the operations of the crocodile, with the pleasing expectations of succeeding plunder. They patiently wait till she has laid the whole number of her eggs, covered them in the sand, and retired to a convenient distance: then all together, they pour down upon the nest, uncover the eggs, and devour the whole brood without remorse.

Men, who have been pressed by hunger, have been tempted to taste the flesh of the Vulture; but it is lean, stringy, nauseous, and unfavoury: it smells and tastes of the carrion by which it was nourished, and sends forth a stench that is insupportable. These birds usually lay two eggs at a time, and produce but once a year. They make their nests in inaccessible cliffs, and in places so remote that they are seldom found. Those in Europe principally reside in the places where they breed, seldom venturing in the plains, except when the snow and ice, in their native retreats, have banished all living animals but themselves; then they brave the perils they must encounter in a more cultivated region.

In this tribe we may range the golden Vulture, the ash-coloured Vulture, and the brown Vulture; which are all inhabitants of Europe; the spotted, and the black Vulture of Egypt; the bearded Vulture; the Brazilian Vulture; and the king of the Vultures in South-America. They are all equally indolent, filthy, and rapacious, and perfectly agree in their nature.

The GOLDEN VULTURE.

The Golden Vulture, in many particulars, resembles the golden eagle, but is larger in every proportion. It is four feet and a half in length, from the end of the beak to that of the tail, and to the end of the claws forty-five inches. The length of the upper chap is about seven inches, and the tail twenty-seven inches: the lower part of the neck, breast, and belly, are red. The feathers on the back are of a black colour; and on the wings and tail of a yellowish brown. Others of the kind differ from this in colour and dimensions; but they are all strongly marked by their naked heads, and a beak straight in the beginning, but hooked at the point.

The KING of the VULTURES.

The King of the Vultures is a native of America, and is somewhat larger than a Turkey-cock. It is chiefly remarkable for the odd formation of the skin of the head and neck, which is bare: the skin, which is of an orange colour, arises from the base of the bill, and extends on each side to the head; from whence it proceeds like an indented comb, and falls on either side, according to the motion of the head. A scarlet coloured skin surrounds the eyes, and the iris

iris has the colour and lustre of pearl. The head and neck are destitute of feathers, having a flesh-coloured skin on the upper part, a fine scarlet behind the head, and a dusky coloured skin before: farther down behind the head, arises a tuft of black down, from whence issues a wrinkled skin, which extends beneath the throat on each side, which is of a brownish colour, mixed with blue and reddish behind: below, upon the naked part of the neck, a collar is formed of soft longish feathers of a deep ash-colour, which surround the neck, and cover the breast before. The bird sometimes withdraws its whole neck, and frequently a part of its head, into this collar, and appears to view as if it had withdrawn the neck into the body. It is sufficiently distinguished by these marks from all others of the Vulture kind; and it cannot be denied that the king of the Vultures is the most beautiful of all this deformed family; but neither its habits nor instincts vary from the rest of the cowardly, indolent, and filthy tribe.

The Vulture was consecrated to Mars and Juno; perhaps on account of the evils which these two deities did to mankind. It was also one of those birds, whose flight and cries were observed with the most exactness in augury.

The BEARDED VULTURE.

The Bearded Vulture is about the size of an eagle; and from the tip of the bill to the end of the tail, measures about three feet four inches. The breadth, when the wings are extended, is seven feet six inches, and the prime quills are upwards of twenty-three inches in length. The bill is of a flesh colour inclining to purple, darkest towards the point, and about four inches in length. From the root of the lower chap hangs a remarkable tuft of black feathers; and the inside of the mouth is blue. The eyes are placed just above where the mouth extends, each eye being encircled with a brightish yellow. The sides and fore-part of the head is black; the nostrils are covered with stiff black feathers, and there is a blackish line from each corner of the mouth, which tends a little downwards, in the form of whiskers. The rest of the head, and the whole of the neck are covered with white feathers, which are short on the head, but long, loose, and pointed on the neck, like those of a cock. The upper side of the neck, the back, wings, and tail are of a dark brown colour, and the lesser covert feathers of the wings have dashes of a bright reddish brown along the shafts, but very narrow. The bottoms of all the feathers are white, and there is also a very thick, soft, white down all over the body under the feathers; the under side of the breast, belly, thighs, and coverts under the tail are white, tinged with a reddish brown; and the legs are covered with short, white downy feathers. The feet are of a lead colour, the claws dusky, and the middle and exterior toes on each foot are joined by a strong skin. The Vulture here described was brought from Santa Cruz, on the coast of Barbary.

The BRASILIAN VULTURE.

This bird is also called the Mexican Vulture, it being found in that country as well as in Brasil. Macgrave says it is about the size of a kite; but, according to Mr. Ray, its bulk is equal to that of a raven. It has a long tail, but the wings are of a moderate length, and the whole plumage of the body is black. The head is small, and covered with a wrinkled skin of various colours; being yellow on the left side below the eye, and blue above, as well as on the top of the head. The remaining part is reddish. The beak is pretty long, very crooked, and covered half-way with a saffron-coloured skin: In the middle of the upper part of the beak there is a wide nostril, with only one hole, and placed cross-

wise. The extreme part of the beak is white, and without any skin, and the eyes resemble the colour of a ruby, with a round black pupil. Labat calls these birds a kind of turkey-cocks, which feed wholly upon carrion, and never touch fruit, corn, or herbage.

The brown, the spotted, and the black Vulture of Egypt agree with the general description of the Vulture, and are distinguished only by their colour.

NATURAL HISTORY of the FALCON.

FALCONRY is now given over in this kingdom, though it was the principal amusement of our ancestors. A person of rank scarce ever appeared without his hawk in his hand; which in old paintings is the criterion of nobility. Harold, who was afterwards king of England, when he went on a most important embassy into Normandy, is painted embarking with a bird on his fist, and a dog under his arm; and in an ancient picture of Henry VI. a nobleman is represented in the same manner. In those days it was thought sufficient for the sons of noblemen to wind the horn, and to carry their hawk with a grace; study and learning being then confined to the children of meaner people. That hawking was the accomplishment of the times, appears by Spencer, who makes Sir Tristram boast, in book vi. canto 2. that

Ne is there hawke which mantleth her on perch,
Whether high trowing, or accoasting low,
But I the measure of her flight doe search,
And all her pray, and all her diet know.

The expence which attended this sport was incredible: among the Welch princes, the king's falconer was the fourth officer in the state; but, notwithstanding his honourable appointment, he was permitted to take no more than three draughts of beer from his horn, lest he should get intoxicated and neglect his duty. In the reign of James the first, Sir Thomas Monson gave a thousand pounds for a cast of hawks. It is not therefore surprizing that the laws were formerly so extremely rigorous to preserve a pleasure that was carried to such an extravagant pitch. By statute of King Edward III. it was made felony to steal a hawk; and to take its eggs, even in a person's own ground, was punishable with imprisonment for a year and a day, together with a fine at the king's pleasure. In the reign of Elizabeth, the imprisonment was reduced to three months; but the offender was to suffer imprisonment till he found security for his good behaviour for seven years. This diversion was in such high esteem, not only in England, but among the great all over Europe, that Frederic, one of the Emperors of Germany, thought it no indignity to write a treatise upon hawking. The art of gunning indeed was but little practised in the earlier times, therefore the hawk was valuable, as well for its affording diversion, as for its supplying the delicacies of the table, that could not otherwise be obtained.

The generous race of hawks which have been taken into the service of man, are distinguished from the rest by the peculiar length of their wings, which reach almost as low as the tail. In these, the first quill of the wing is almost as long as the second; it terminates in a point, which begins to diminish from about an inch of its extremity. The generous breed are thus distinguished from that of the baser race of kites, sparrow-hawks, and buzzards, whose tails are longer than their wings, and in which the first feather of the wing is rounded at the extremity. In the generous race the second feather of the wing is the longest, but among the kites, spar-

row-hawks, and buzzards, the fourth feather of the wing is the longest.

The generous race are endowed with natural powers, of which the other kinds are destitute. From the length of their wings, they are swifter to pursue their game; from a confidence in their swiftness, they are bolder to attack it; and, from an innate generosity, they have an attachment to their feeder, and consequently are more docile and tractable than birds of a baser kind.

The hawk may be taught to fly at any game whatsoever; but falconers have generally confined their pursuit to such animals only as yield them profit in the capture, or pleasure in the pursuit. The hare, the partridge, and the quail, repay the trouble of taking them; but the Falcon's pursuit of the heron, the kite, or the woodlark, affords the most agreeable diversion; when they see themselves threatened by the approach of the hawk, they immediately take to the skies, instead of flying directly forward, as most other birds do. They fly almost perpendicularly upward, while their eager pursuer endeavours to rise above them: they both gradually diminish from the gazing spectator below, till they are totally lost in the clouds; but they descend shortly after, and are seen struggling together, the one using every effort of rapacious attack, and the other desperately defending itself. A period is presently put to the unequal combat; the Falcon comes off victorious, and the other, killed or disabled, becomes the prey of either the bird or the sportsman.

Other birds generally fly strait forward, by which the sportsman loses sight of the chace, and is in danger of losing his Falcon also, therefore they are not much pursued. The pursuit of the lark by a couple of merlins, is considered as excellent diversion: one of them soars above the lark, while the other, lying low for the best advantage, waits the success of its companion's labours: thus, while the one stoops to strike its prey, the other seizes it as it descends.

The Norwegian breed of hawks was anciently in high esteem with our countrymen: they were thought bribes worthy a king. Jeffry Fitzpierre gave two good Norway hawks to king John, to obtain for his friend the liberty of exporting one hundred weight of cheese; and John, the son of Ordgar, fined to Richard I. in one Norway hawk, to gain the royal interest in a certain affair.

The GYR FALCON.

This elegant species exceeds all other Falcons in size, and approaches nearly to the magnitude of an eagle. The bill is yellow, and very much hooked; the throat is of a pure white; and the whole plumage is of the same colour, except that it is marked with dusky lines, spots, or bars. On the head, breast, and belly, there are narrow dusky lines, thinly scattered, and pointing downward: the feathers of the back and wings are marked with black spots, in the shape of an heart, and the middle feathers of the tail with a few bars. The thighs are clothed with long feathers of a pure white. The legs are yellow, and feathered a little below the knees. This Falcon is sometimes found entirely white: when falconry was in fashion, it was used for the noblest game, such as cranes and herons.

The PEREGRINE FALCON.

The size of this bird is equal to that of the moor-buzzard; the bill is strong, short, and very much hooked; blue at the base, and black at the point. The feathers on the forehead are whitish; the crown of the head is black intermixed with blue, and the hind part of the neck black; the back, scapulars, and coverts of the wings are elegantly barred with deep black and blue. The quill feathers are dusky;

marked with elliptical white spots placed transverse; the tail is barred with several strokes of dusky and blue: the throat is white; the fore-parts of the neck and upper-part of the breast white, tinged with yellow. The rest of the breast, belly, and thighs, is white inclining to grey, and crossed with dusky strokes pointed in the middle. The feathers of the tail are of an equal length, beautifully barred with blue and black. This species was shot in Northamptonshire.

Signior Loranzi, in describing the male Peregrine Falcon, has made all his colours darker, and the head and upper part of the body almost black; but the fore part of the neck, the breast, and the belly, agree with the description above. It is probable, however, that the bird here described is the female Peregrine Falcon.

The SACRÉ.

This is the largest of the Falcon kind, except the gyr Falcon. It has a large head, a short blue beak, and a body longer in proportion than the rest of the tribe. The head is grey, the crown flattish, the eyes large and black, the nostrils small, the back and breast spotted with brown. The inside of the thighs are white, spotted with black. The feet and legs are generally blue, though sometimes they are whitish spotted with yellow, and their backs are ash-coloured with a reddish cast.

The MOUNTAIN FALCON.

This bird is about the size of the gohawk, but thicker in the body. It has a round head, except on the top, where it is a little flattish, and covered with ash-coloured feathers mixed with black. The beak is strong, short, and crooked; at the upper end of which are a great many fine slender feathers, resembling hairs. The throat and part of the breast are spotted with ash-colour. The body is usually of a brown dappled colour, like rusty iron, but sometimes it is blackish, with small strokes of white. The thighs are clothed with long black feathers, and the feet are nearly of the same colour. It is a very rapacious and untractable bird.

The GREY FALCON.

The grey Falcon is about the size of a raven: the bill, which is of a bluish colour, is short, strong and very hooked: the head is small and flat at the top, the fore-part of a deep brown, and the hind-part white. The sides of the head and throat are cream-coloured; the belly white, with oblong black spots; the hind part of the neck, and the back are of a deep grey. The wings are very long, and, when closed, reach beyond the tail. The first quill feathers are black, with a white tip, the others of a bluish grey, and their inner webs irregularly spotted with white. The tail is long, and resembles a wedge in shape: the two middle feathers are the longest, and plain, the rest are spotted: the legs are naked, long, and yellow.

The FALCON GENTLE.

It is necessary to be observed, that great caution ought to be used in describing the hawk kind, no birds being so liable to change their colours the two or three first years of their lives. Inattention to this has caused the number of hawks to be multiplied far beyond the reality: the marks to be attended to in order to form the characters of the species, are those on the quill feathers and the tail, which never change. Writers on falconry have given different names to the same kinds in different periods of their lives, which naturalists have adopted, and described as distinct kinds: even Mr. Ray has been so far misled as to copy them. Though the Falcon, the Falcon Gentle, and the haggard, are made distinct species,

cies, they, in reality, form but one. This point is effectually cleared up by a French author, who wrote in the beginning of the last century: speaking of the Falcon, he say, "S'il est prins en Juin, Juillet, et Aoust, vous le nommerez gentil: si en Septembre, Octobre, Novembre ou Decembre, vous le nommerez Pellerin ou Passager: s'il est prins en Janvier, Fevrier et Mars, il fera nommé Autenere; et apres estre muë une fois et avoir changé son cerceau, non auparavant, vous le direz Hagar, mot Hebrieu, qui signifie estrangier." That is, "If it is taken in June, July, or August, it is called The Gentle: if in September, October, November, or December, it receives the appellation of the Pilgrim or Passenger: if it is taken in January, February, or March it is named Autenere: and, after having once moulted, it is called Hagar, a Hebrew word which signifies stranger."

The Falcon gentle is smaller than the peregrine Falcon, with a smaller and a rounder head, and a shorter back, but exactly resembles it in shape. The head is flattish on the top. It has fine large black eyes, encircled with fine yellow rings. The upper-part, and the sides of the head, are of a dusky brown, spotted with a fine black. The neck is surrounded with a light yellow ring, not unlike a collar, and a black line on each side extends from the corner of the mouth to the middle of the throat. The breast, thighs, and belly, are of a fine yellow colour, with small black streaks pointing downwards. The wings, back, and upper-side of the tail are of a dusky black, and, when closed, reach almost to the end of the tail.

As it evidently appears, from the authority above quoted, supported by the opinion of Mr. Pennant, that the common Falcon, the Falcon gentle, and the Haggard, are one and the same bird, we shall not trouble our readers with unnecessary repetitions, which would only tend to confuse them.

The WHITE FALCON.

This bird is of a pure white all over the body, except a few faint yellowish spots, which cannot be distinguished without a close examination. The wings indeed are perfectly white, without any of those yellow spots. This colour is sufficient to distinguish it from all other birds of the same kind.

The TUNIS, or BARBARY FALCON.

This is a sprightly majestic bird, with a large black beak, and open yellow nostrils. The eyes are of a dark hazel-colour, encircled with yellow rings. The top of the head is of a pale ash-colour, beautifully spotted with black; and the feathers on the back, shoulders, and part of the wings, are nearly of the same colour, and equally ornamented with black spots. The breast, belly, and thighs are yellowish inclining to white; the upper-part of the breast being a little shaded with blue. The wings are very long, reaching, when closed, almost to the end of the tail, which is of a bluish colour; with six or seven dusky coloured streaks running across it. Part of the thighs and the lower part of the belly, are marked with curious long red spots, resembling ermine.

The LANNER.

This species breeds in Ireland: the bird here described was caught in a decoy in Lincolnshire, pursuing some wild ducks under the nets. Mr. Pennant received the description of it from Taylor White, Esq. It is smaller than a buzzard; the crown of the head is of a brown and yellow clay colour: above each eye, to the hind part of the head, passes a broad white line: and beneath each, a black mark pointing down: the throat is white; the breast tinged with dull yellow, and marked with brown

spots pointing downwards; and the thighs and vent are spotted in the same manner: the back and coverts of the wings are of a deep brown, but lighter towards the edges. The quill feathers are dusky; the inner webs marked with oval rust-coloured spots, and the tail is spotted like the wings. The legs, which are of a bluish cast, are short and strong, which according to Mr. Willoughby, are the characters of the Lanner.

NATURAL HISTORY of the GOSHAWK.

THIS bird is larger than the common buzzard, and of a longer and more elegant form: the bill is blue towards the base, and black at the tip; the skin at the base of the bill is of a yellowish green: over each eye is a long white line, and on each side of the neck a bed of broken white. The head, the hind part of the neck, the back, and wings are of a deep brown colour: the breast and belly are white, beautifully marked with numerous transverse bars of black and white: the tail is long, and of a brownish ash-colour, marked with four or five dusky bars placed remote from each other. Mr. Willoughby distinguishes this species and the sparrow-hawk by the name of short-winged hawks, because their wings, when closed, do not reach so far as the end of the tail. The Goshawk was much esteemed among falconers, and taught principally to pursue cranes, geese, pheasants, and partridges.

NATURAL HISTORY of the KITE.

THE Kite may be distinguished from all the rest of this tribe, by his forky tail, and his slow floating motion, being almost for ever on the wing. He appears to rest himself upon the bosom of the air, and not to make the smallest effort in flying. Pliny supposes the invention of the rudder arose from the observation men made of the various motions of the tail, when the Kite was steering through the air: it is certain indeed that the most useful arts were originally copied from animals, however we may have improved upon them. Among the Samoids, the Esquimaux, and those nations which are in a state of nature, their buildings are inferior to those of the beavers; such hardy human beings being only capable of making very imperfect copies of them.

The Kite lives chiefly upon accidental carnage, as almost every bird in the air is able to escape him. He may therefore be considered as an insidious thief who only prowls about, and, when he perceives a small bird wounded, or a young chicken that has strayed too far from its mother, instantly seizes the hour of calamity, and, like a famished glutton, destroys it without mercy. His hunger indeed sometimes urges him to seeming acts of desperation. A Kite is frequently seen flying round and round for some time to mark a clutch of chickens, and then, on a sudden, to dart like lightning upon the little unresisting animal, and carry it off, while the hen laments, and the boys cast stones in vain, to scare it from its plunder.

This bird usually breeds in large forests or woody mountainous countries: it lays two, and sometimes three eggs; which like those of all other birds of prey, are rounder and blunter at the smaller end than those of other birds. They are white, with dirty yellow spots. The motion of the Kite in the air is so smooth and even as hardly to be perceptible; sometimes it will remain quite motionless for a considerable space of time, and, at others, glide through the sky without the least apparent action of its wings. It is observed by lord Bacon, that when

Kites fly high, it portends fine and dry weather. These have been reckoned birds of passage by some authors, but they certainly continue in England throughout the year.

The length of this species is twenty-seven inches, the breadth about five feet, and the weight forty-four ounces: the bill is two inches long, and very much hooked at the end: the skin at the base of the bill is yellow, and the head and chin of a light grey; though sometimes white, marked with oblong streaks of black: the neck and breast are of a tawny red, but the middle of the feathers are black. The spots are less numerous on the belly and thighs, and under the tail they almost disappear. The back is brown, the first five quill feathers are black, and on the inner webs of the others are large blotches of white: the coverts of the wings are varied with tawny black and white; and the tail is of a tawny red; the outer feathers on each side being of a darker hue than the rest. The thighs are clothed with very long feathers, and the legs are yellow and strong. These birds, however, sometimes differ in their colours, some having been seen that were entirely tawny.

NATURAL HISTORY of the COMMON BUZZARD.

OF all birds of the hawk kind, the kite is the best known, but the Buzzard is the most common in England. It is a sluggish inactive bird, and sometimes remains whole days together perched upon the same bough. He may be considered rather as an assassin than a pursuer, and lives more upon frogs, mice, and insects, which he can easily seize, than upon birds which he is obliged to follow. His summer food is obtained by robbing the nests of other birds, and sucking their eggs. He resembles the owl in his countenance more than any other rapacious bird of day. The stupidity of his disposition is portrayed in his figure; and so little is he capable of receiving instruction from man, that it is common to a proverb to give to a stupid person the name of Buzzard.

This bird breeds in large woods, and usually builds on an old crow's nest, which it enlarges and lines with wool and other soft materials: it lays two or three eggs, which are sometimes entirely white, and sometimes spotted with yellow. If the hen Buzzard should happen to be killed, the cock will hatch and bring up the young. The young accompany the old ones for some little time after they have quitted the nest, which is a remarkable circumstance; for all other birds of prey drive away their brood as soon as they can fly. This bird is subject to some variety in its colours; but usually the breast is of a yellowish white, spotted with oblong rust-coloured spots, pointing downwards: the back of the head and neck, and the coverts of the wings are of a deep brown, edged with a pale rust colour. The feathers on the shoulders and the sides of the back are brown, but white towards the roots; the middle of the back is covered only with a thick down. The ends of the quill feathers are dusky; their lower exterior sides ash-coloured, and their interior sides blotched with darker and lighter shades of the same. The tail is barred with ash-colour and black, the bar near the tip being black, and much broader than any of the rest: the tip itself is whitish.

The length of this species is about twenty-two inches, the breadth, with the wings extended, fifty-two, and the weight about thirty-two ounces.

This bird is subject to variety in its colours, some having been seen whose breasts and bellies were brown, and only marked over the crown with a large white crescent.

The HONEY BUZZARD.

The Honey Buzzard differs from the common kind, in the membrane at the base of the beak, called the cere, which is blackish, and the beak is of the same colour: the circle round the pupils of the eyes are of a fine yellow, the head is ash-coloured, the neck, back, scapulars, and covert feathers of the wings are of a deep brown; the breast and belly are white, marked with dusky spots pointing downwards: the tail is long and of a dullish brown, having three broad dusky bars; between each of which are two or three narrow ones of the same colour. The legs are short, strong, and thick, and the claws large and black. It is in length, from the beak to the end of the tail, about twenty-three inches, about twenty-two in breadth when the wings are extended, and weighs about sixteen ounces. This bird runs swiftly like a hen, and the female is larger than the male. The eggs are of an ash-colour with dark spots.

Mr. Willoughby informs us that the Honey Buzzard builds its nest with small twigs, and covers them with wool, and as he has found the combs of wasps in the nest, he gave this species the name of the Honey Buzzard; and he adds, that it feeds on the young of those insects, on frogs, lizards, &c.

The TURKEY BUZZARD.

This bird is a little larger than a wild goose, and the feathers are a mixture of black, grey, and white, but the greater part are black; the bill is thick, crooked and pointed, and the claws thick and very short. Some imagine it to be a kind of eagle; and it is said that when an ox lies down in the field to repose, if these birds happen to see him, they fall immediately upon him and devour him: an hundred or more at a time are sometimes employed in this business. They have excellent eyes, and can discover their prey at a vast height.

The MOOR BUZZARD.

Though this bird is called in Latin *Milvus*, or Kite, it is more properly a Buzzard, not having a forked tail, the distinguishing mark of the kite. It is called *le bufard de marais* by Brisson. It frequents heaths, moors, and marshy places, and never soars like other hawks; but usually sits on the ground, or on small bushes. It makes its nest in the midst of a tuft of grass or rushes, and lays two or three eggs. It is a fierce voracious creature, and makes great havoc among rabbits, young wild ducks, and other water fowl. The usual length of this bird is twenty-one inches; the breadth, with the wings extended, four feet three inches; the tail is black, and the skin at the base of it yellow; the irides are also yellow. The whole bird, the head only excepted, is of a chocolate brown, tinged with rust colour. On the head is a large yellowish spot, and some have been seen whose heads were entirely white; others again have been found with a whitish spot on the coverts of the wings; but these are only to be considered as varieties. The legs of this bird, which are long and slender, are covered with feathers a little below the knee; and, in general, the make of the body is longer and less bulky than that of other birds of prey. The uniform colour of its plumage, and the great length and slenderness of its legs, distinguish it from all other hawks.

The hen-harrier, whose female is called the ring-tail, has its name from being an enemy to hens. It differs from others of this kind in having a white tail, except the middle feathers, which are entirely grey; and in having upright feathers about the ears, surrounding the head like a crown. This bird is usually about twenty inches long, and three feet nine inches broad, when the wings are extended.

NATURAL HISTORY of the KESTRIL.

THIS bird is also called the Stannel and the Windhover. The male of this beautiful species is but about fourteen inches in length, two feet three inches in breadth, and six ounces and an half in weight: its colours immediately distinguish it from all other hawks. The crown of the head, and the greater part of the tail, are of a fine light grey, and on the lower part of the latter is a broad black bar; the tip is white; the back and coverts of the wings are red inclining to purple, embellished with elegant black spots. The interior sides of the quill feathers are dusky, deeply indented with white. The female weighs eleven ounces, the colours are not so bright as in those of the male; the breast is of a dirty white, and the middle of each feather has an oblong dusky streak, pointing downwards.

The Kestrel breeds in the hollows of trees, in the holes of high rocks, towers, and ruinous buildings. They lay four eggs at a time, which appear as if they had been besmeared over with red, and only here and there a spot of white is to be seen. Its food is field mice, small birds, and insects, which it will discover at a vast distance. This is the hawk so frequently seen in the air, fixed in one place, and fanning it with its wings; at which time it is watching for its prey. When falconry was in fashion in this island, the Kestrel was tamed, and trained for catching small birds and young partridges.

NATURAL HISTORY of the HOBBY.

THE Hobby was used in the humbler kind of falconry; particularly in what was called daring of larks. The lark is greatly terrified at the sight of a Hobby, inasmuch that, in order to avoid it, they will fly into a waggon, a coach, or even into a man's bosom as an asylum. Mr. Willoughby admits that the Hobby breeds in England, but asserts it is a bird of passage: the length of the male is about one foot, the breadth two feet three inches, and the weight seven ounces; the crown of the head and back are of a deep blue, inclining to black: the hind part of the head is marked with two palish yellow spots, and each side with a large black one pointing downwards: the coverts of the wings are of the same colour with the back, except that they are slightly edged with rust colour: the interior webs of the secondary and quill feathers are varied with oval reddish spots. The two middle feathers of the tail are of a deep dove colour, and the rest are barred on their interior sides with rust colour, and tipped with a dirty white. The spots on the breast of the female are of a brighter colour than on that of the male: the female is also much larger, and her legs have a tinge of green, though she resembles the former in other respects.

NATURAL HISTORY of the SPARROW-HAWK.

THE difference in size between the male and female Sparrow-Hawk, is very disproportionate; the former usually weighing about five ounces, the latter nine ounces: the length of the male is generally about twelve inches, and the breadth twenty-three; the length of the female fifteen inches, and the breadth twenty-six.

Like other birds of the hawk kind, these vary greatly in their colours; in some, the back, head, coverts of the wings, and tail, are of a deep bluish grey; in others of a deep brown, edged with a rusty red. The quill feathers are dusky, with black bars on their outer webs, and spotted with white on the lower part of their inner webs. On the tail, which

is a deep ash-colour, there are fine broad black bars, and the tip is white; the breast and belly are of a cream-colour, adorned with transverse waved bars, of a deep brown in some, and orange coloured in others. The skin at the base of the bill, the irides, and the legs are yellow. The colours of the female are different from those of the male: the head is of a deep brown, the back and coverts of the wings are brownish mixed with dove colour; the tail is of a brighter dove colour: the waved lines on the breast are more numerous than those on the breast of the male, and the breast is whiter.

This is the most pernicious hawk we have in England, and makes great depredations among pigeons and partridges. It builds in high rocks, large ruinous buildings, and hollow trees. It lays four eggs, which are white, encircled with red specks near the larger end. Mr. Willoughby places the Sparrow-Hawk among the short-winged hawks, or such whose wings will not reach the end of the tail when closed.

The Sparrow-Hawk was held in great veneration among the ancient Egyptians, because it represented their god Osiris: if any person had killed one of these birds, whether by accident or design, he was irremissibly punished with death. Among the Greeks, the Sparrow-Hawk was consecrated to Apollo, or the sun. It served for omens. It was also one of the symbols of Juno, because it had a fixed and piercing sight, like that goddess, when she was actuated by jealousy.

NATURAL HISTORY of the MERLIN.

THOUGH smaller than any of the hawk kind, and not much larger than a thrush, the merlin displays a degree of courage that renders him formidable to birds of six times his magnitude. He has often been known to kill a partridge or a quail at a single pounce from above. The bill is of a bluish lead colour, and round the neck, a little below the head, there is a ring of a yellowish white. The back, and upper part of the body are of a deep bluish ash-colour, adorned with streaks and spots of iron grey, and edged with the same: the quill feathers are almost black, marked with reddish spots: the under coverts of the wings are brown, embellished with round white spots. The tail, which is about five inches long, is crossed with alternate bars of dusky and reddish clay colour: the breast and belly are of a cream colour, with oblong brown spots pointed downwards. The legs are yellow, and the wings, when closed, reach within an inch and an half of the end of the tail. This and the sparrow-hawk were often trained for hawking; and this species, small as it is, was inferior to none in point of spirit. It was used principally for taking partridges, which it was remarkable for killing by a single stroke on the neck: the female, as in other birds of prey, is larger than the male. The Merlin flies low, and is frequently seen about the roads, skimming from one side of the hedges to the other, in search of prey. This bird was known to our British ancestors by the name of Llamysden; it was used in hawking, and its nest was valued at twenty-four pence, a large sum of money in those early days!

NATURAL HISTORY of the GREATER BUTCHER BIRD.

THE Greater Butcher Bird is about the size of a black-bird; its bill, which is black, is about an inch long, and hooked at the end. To this mark, together with its carnivorous appetites, it is indebted for its rank among the rapacious birds; but

but its slender legs and feet, and its toes, which are formed differently from the former, seem to make it the shade between such birds as live wholly upon flesh, and such as live principally upon grain and insects. Its habits seem indeed to correspond perfectly with its conformation, as it will feed indiscriminately upon flesh and insects, and, in some measure, is found to partake of a double nature. Its appetite for the former, however, is most prevalent, for when it can obtain flesh, it always gives it the preference to insects. Thus circumstanced, the life of this bird, is a life of continual combat and opposition: its size being too insignificant to terrify some of the smaller birds of the forest, it frequently meets with those that are willing to try its strength, and it never declines the engagement.

It is astonishing to behold with what intrepidity this little creature will engage with the pie, the crow, and the kestrel, all of which are considerably larger than itself, and sometimes prey upon flesh in the same manner. The Butcher Bird not only fights upon the defensive, but frequently begins the attack, and always with advantage; particularly when the male and female unite to protect their young, and to drive away the more powerful birds of rapine. They do not, at that season, wait the approach of their invader; it is sufficient that they see him at a distance preparing for the assault. They immediately fall forth with loud cries, and attack with uncommon fury. They are generally victorious in these kinds of disputes; but it sometimes happens that they fall to the ground with the adversary, and the combat ends with the destruction of both the assailant and the defender.

The most redoubtable birds of prey are upon friendly terms with the Butcher Bird; the kite, the buzzard, and the crow, seem rather to fear it than endeavour to offend it. Nothing better displays the respect paid to the claim of courage, than to see this little bird, so contemptible in appearance, fly in company with the lanner, the falcon, and all the tyrants of the air, fearless of their power or their resentment.

Small birds are its usual food; it seizes them by the throat, and strangles them in an instant; the Germans therefore call this bird *Wurchangel*, or the suffocating angel. When it has thus killed the bird or insect, it fixes them upon some neighbouring thorn, and then pulls them to pieces with its bill. When confined in a cage, they treat their food in much the same manner; sticking it against the wires before they attempt to devour it. Nature has not furnished it with strength sufficient to tear its prey to pieces with its feet, as the hawks do; it is therefore obliged to have recourse to this expedient.

During summer, such of the Butcher Birds as constantly reside here, remain among the mountainous parts of the country; but in winter they descend into the plains, and nearer human habitations. The nests of the larger kind are made on the highest trees, but those of the smaller are built in bushes in the fields and hedge-rows. They lay about six eggs, which are white, encircled at the larger end with a ring of brownish red. The outside of the nest is composed of white moss, interwoven with long grass, and the inside is well lined with wool. It is usually fixed among the forking branches of the tree. When the young are first produced, the female feeds them with caterpillars and other insects, but in a short time afterwards, she accustoms them to flesh, which the male is very assiduous in procuring.

In their parental care they differ from most other birds of prey: instead of driving out their young from their nest to shift for themselves, they carefully attend them, and do not forsake them even when they are capable of providing for themselves; for

the whole brood live in one family together. Each family lives apart, and usually consists of the male, female, and five or six young ones: peace and subordination is preserved among them, and they hunt together in concert. These birds are easily distinguishable at a distance, not only from their being in companies, but from their peculiar manner of flying, which is seldom direct or sideways, but generally moving up and down.

This bird weighs about three ounces, and is about ten inches in length and fourteen in breadth; its bill is one inch long, black, and hooked at the end: the nostrils are oval, covered with black bristles pointing downwards. The head is very large, and the muscles that move the bill are very thick and strong. The crown of the head, the back, and the coverts on the joints of the wings are ash-coloured, the rest of the coverts are black; the quill feathers are black, with a broad white bar in the middle, and all of them are tipped with white, except the four first feathers, and four of those next the body: the tail consists of twelve feathers, the longest of which is in the middle. Each side of the head is white, with a broad black stroke crossing from the bill to the hind part of the head: the throat, breast, and belly are of a dirty white, and the legs are black. The female is of the same colour with the male, except on the breast and belly, which are marked with numerous semicircular lines.

The RED BACKED BUTCHER BIRD.

The male weighs about two ounces; the female two ounces and two drams. The length of the male is seven inches and an half, and the breadth eleven inches; the head and the lower part of the back are of a fine light grey, a broad black stroke runs across the eyes from the bill: the upper part of the back and the coverts of the wings are of a bright iron colour; the breast, belly, and sides, are of an elegant blossom colour; the two middle feathers of the tail are the longest, and entirely black. The lower part of the others are white. In the female, the stroke across the eyes is of a reddish brown; the head of a dull rust colour inclining to grey; the breast, belly, and sides of a cream colour, marked with semicircular dusky lines; the tail is of a deep brown, except that in both the male and female, the exterior webs of the outward feathers on each side are white. These birds build their nests in low bushes, and lay about six eggs, which are white, encircled on the larger end with a ring of brownish red.

The WOOD-CHAT.

The size of this bird is about equal to the preceding: the bill is of the colour of horn; the feathers that surround the base are whitish, a black line crosses the eyes, and goes downward on each side of the neck: the head and the hind part of the neck are of a bright bay; the upper part of the back dusky; the coverts of the wings and tail dusky: the quill feathers are black, with a white spot on each towards the bottom; the throat, breast, and belly are of a cream colour; the two middle feathers of the tail are black; the exterior edges and the tips of the rest white. In the female, the upper part of the head, neck, and body are reddish, striated with brown; the lower parts of the body are of a cream colour, with rays of brown: the tail is reddish inclining to brown, and tipped with red.

The LEAST BUTCHER BIRD.

This species is less than either of the former; it is found near the marshes in London, and has been seen near Gloucester. This is also a bird of prey, though not much larger than a tit-mouse; an evident proof that an animal's courage or rapacity does

not

not depend upon its size. Its form resembles that of a long-tailed tit-mouse. The bill is yellow, short, strong, and very convex: the head is of a fine grey; and beneath each eye is a long triangular tuft of black feathers; the throat is white, and the middle of the breast flesh-coloured; the sides and thighs of a pale orange; the hind part of the neck, and the back of an orange bay. The secondary feathers of the wings are black edged with orange; the quill feathers are dusky without, and white within; the lesser quill feathers being tipped with orange; the two middle feathers of the tail are the longest, the others shorten gradually on each side, the exterior on each side being of a deep orange colour. The legs are black. The female has not the black mark beneath each eye, nor the fine flesh-colour on the breast: the crown of the head is of a brownish-rust colour spotted with black.

NATURAL HISTORY of the OWL.

HAVING described the rapacious animals of the day, we now come to a race equally cruel and rapacious, which add treachery to their savage disposition, and carry on their depredations in the night.

Owls, like other nocturnal robbers, surprize their prey at those hours of rest, when the tribes of nature are in the least expectation of an enemy. Thus, in nature's chain, no link appears to be broken; every place, every season, every hour of the day and night is bustling with life, and furnishing instances of industry, self-defence, and invasion.

Birds of the Owl-kind have a general mark by which they are distinguished from others; such is the formation of their eyes, that they see better in the dusk, than in open day-light. Thus, in the eyes of tigers and cats, which are formed for a life of nocturnal depredation, there is a quality in the retina that takes in the rays of light so copiously as to permit their seeing in almost total darkness; so in these birds there is the same conformation of that organ; and though they cannot see where there is an absolute exclusion of light, they are sufficiently quick-sighted, when every thing is imperceptible to us. Nature, in the eyes of all animals, has carefully shut out too much light, or admitted a sufficiency, by the contraction and dilatation of the pupil. In these birds the pupil is capable of shutting very close, or being greatly extended: by contracting it, the brighter light of the day, which would act too powerfully upon the sensibility of the retina, is excluded; by dilating it, the bird takes in the fainter rays of the night, by which it is enabled to discover its prey, and seize it with greater facility in the dark.

But though birds of the Owl kind are dazzled with refulgent light, yet they do not, as some have imagined, see best in the darkest nights. Their vision is best in the dusk of the evening, or the grey of the morning, when they are not incommoded with too much or too little light. It is then that they quit their solitary retreats to hunt or to surprize their prey, and their labours are, in general, attended with success. Almost all other birds are then asleep, or preparing for repose, and the most unguarded becomes the prey of these rapacious animals. But the nights when the moon shines are the times of their most successful plunder.

The faculty, however, of seeing in the night, or of being entirely dazzled by day, is not alike in every species of these nocturnal birds. Some see in the night better than others, and some are so little dazzled by day-light, that they perceive their enemies and avoid them. The common white or barn Owl, for instance, sees the smallest mouse that peeps

from its hole, though the barn is shut at night, and the light in a manner totally excluded: on the contrary, the brown Owl is often seen to prowl along the hedges by day, like the sparrow-hawk, and frequently with good success. In proportion as each of these animals best bears the day-light, he proceeds the earlier in the evening in pursuit of his prey. The great horned Owl is the foremost in quitting his retreat, and penetrates the woods and thickets very soon in the evening. The horned Owl, and the brown Owl, are later in their excursions; but the barn Owl seldom leaves his hiding-place till midnight, seeming to prefer almost total obscurity to the dusk of the evening, or the grey of the morning.

As these birds are incapable of supporting the light of the day, or at least of seeing and readily avoiding their danger at that time, they remain concealed in some obscure retreat, adapted to their gloomy dispositions. Their usual places of abode are the cavern of a rock, the darkest part of a hollow tree, the battlements of a ruined and unfrequented castle, or some obscure hole in a farmer's barn or out-house.

At the approach of evening the Owl sallies forth, and skims rapidly up and down along the hedges. The barn Owl, indeed, as it lives chiefly upon mice, is contented to be more stationary: he places himself upon some shock of corn, or on the point of an old house, and watches in the dark with great vigilance and perseverance.

These birds have a most hideous note, which is often heard in the silence of midnight, and breaks the general pause with an horrid variation; but though this note is different in all, it is alarming and disagreeable in each of them. Mankind are united in allowing the cry of the Owl to be disagreeable; and the screech Owl's voice was formerly considered among the people as a presage of some sad calamity that was speedily to happen.

But while they are in pursuit of their prey, this note is seldom heard; that important business is always transacted in silence, as they by no means intend to disturb or forewarn those little animals they wish to surprize. When they have been successful, they soon return to their solitude: when they find but little game, they continue upon the watch still longer; and sometimes, hearkening to the voice of appetite, rather than to that of prudence, they pursue so long that broad day breaks in upon them, and leaves them dazzled, bewildered, and at a distance from their retreat. Thus situated, they are obliged to take shelter in the first tree or hedge that presents itself, where they conceal themselves all day, till the returning darkness enables them to take a plain of the country to discover where they are. But it frequently happens that, with all their precaution to conceal themselves, when thus surprized by day-light, they are discovered by other birds, from whom they must expect no mercy. The black-bird, the thrush, the jay, the bunting, and the red-breast, all surround him, and employ their little arts of insult and abuse. The smallest and most contemptible of the Owl's enemies, are then the foremost to injure and torment him. They taunt him with their cries, flap him with their wings, and endeavour to appear courageous; as they are apprehensive of no danger: the wretched bird of night, not knowing where to attack, or where to fly, sits patiently and suffers all the indignities they offer: astonished and dizzy, he answers their insults by awkward and ridiculous gestures, by turning his head about, and rolling his eyes with an air of stupidity. The appearance of an Owl by day-light is enough to set the whole grove into a kind of uproar; for the aversion all the small birds have to this animal, on the consciousness of their own security, makes them pursue him without cea-

sing, while, by their mutual cries, they encourage each other to assist in this laudable undertaking.

Sometimes, indeed, the little birds pursue their insults with the same imprudent zeal with which the Owl himself has pursued his depredations: they hunt him till the evening returns, which restoring his faculties of sight, he makes his pursuers pay dear for the sport which he had furnished them. Whatever mischief one species of Owl may do in the woods, the barn Owl makes a sufficient recompence by its activity in destroying mice; a single Owl being supposed to be more serviceable than half a dozen cats in ridding the barn of its domestic vermin.

The Owl, or bird of night, was consecrated to Minerva, as the symbol of vigilance, because it is awake during the night. It was reckoned a bird of ill omen. In Virgil, a solitary Owl perched on the roof of the palace, affrights Dido with its dismal groans. Æscalaphus, says Ovid, was changed into an Owl, a bird which forebodes only misfortunes.

The GREAT HORNED OWL.

This bird, at the first view, appears as large as an eagle, but, when more closely observed, he will be found much smaller. His head, body, wings, and tail, are shorter; his head larger and thicker. His horns are composed of feathers, which rise about two inches and an half high, and which he can erect or depress at pleasure: his eyes are large and transparent, encircled with an orange-coloured iris: his ears are large and deep: the bill is black; the breast and belly are of a dull yellow, marked with slender brown strokes pointing downwards: the thighs are of the same colour, but unspotted. The back, and coverts of the wings, are varied with deep brown and yellow: the quill feathers are of the same colour, with a broad bar of red near the ends of the exterior ones: the tail is marked with dusky and reddish bars, but appears ash-coloured beneath: the feet are feathered down to the claws.

The Great Horned Owl usually breeds in the cavern of a rock, the hollow of a tree, or the turret of some ruined castle. Its nest, which is almost three feet in diameter, is composed of sticks, bound together by the fibrous roots of trees, and lined with leaves of trees. It usually lays three eggs, which are as large as those of a hen, and of a colour somewhat resembling the bird itself. The young are very voracious, and the parents are assiduous and expert in providing food for them. This species is sometimes found in the north of England, in Cheshire, and in Wales.

The LESSER HORNED OWL.

The horns of this species are small, consisting only of a single feather each, which it can raise or depress at pleasure; and, in a dead bird, these horns are hardly to be discovered. This kind is less common than the former; but it is found in the mountainous woody parts of our island: both are solitary birds, and avoid inhabited places. These species might with propriety be called long-winged Owls; their wings, when closed, reaching beyond the end of the tail.

The head of the Lesser Horned Owl is small, resembling that of an hawk, the bill is dusky: the circle of feathers which immediately surrounds the eyes, is black; the larger circle is white, terminated with tawny. The feathers on the head, back, and coverts of the wings are brown, edged with a dullish yellow: the breast and belly are of the same colour, with a few long narrow streaks of brown pointing downwards: the thighs, legs, and toes, are covered with yellow feathers; the quill feathers are dusky, barred with red: the tail is of a deep brown, embellished with a yellow circle on each side of the shaft of each feather. The tip of the tail is white.

This Owl never makes a nest for itself, but is satisfied with the old nest of some other bird, which it has often been obliged to abandon. It lays four or five eggs. At first the young are all white, but they change colour in about a fortnight.

There is still a smaller kind of the Horned Owl, which is not much larger than a thrush, and has remarkably short horns.

The WHITE OWL.

The White Owl is almost domestic, inhabiting, the greater part of the year, barns, hay-lofts, and other out-houses, and is extremely useful in clearing those places of mice. It quits its perch about twilight, and takes a regular circuit round the fields, skimming along the ground in quest of field mice, and then returns to its usual residence. In the breeding season it takes to the woods. The elegant plumage of this bird sufficiently compensates for the uncouthness of its form: a circle of soft white feathers surround the eyes: the upper-part of the body, the coverts and secondary feathers of the wings, are of a fine pale yellow, with two grey and two white spots on each side of the shafts: the exterior sides of the quill feathers are yellow, the interior white, with four black spots on each side: the lower side of the body is entirely white; the interior sides of the feathers of the tail are also white; the exterior are marked with some obscure dusky bars: the legs are feathered to the feet, and the feet are covered with short hairs. The usual length of this bird is about fourteen inches, and the breadth three feet.

Owls in general are very shy of man, very indocile, and difficult to be tamed. The White Owl, in particular, as Mr. Buffon asserts, cannot be taught to endure captivity; but it is probable he means if it be taken when old. He informs us that they live ten or twelve days in the aviary where they are shut up; but they refuse all kind of nourishment, and at last die of hunger. By day they remain motionless upon the floor of the aviary; in the evening they mount on the highest perch, where they incessantly make a noise like a man snoring with his mouth open. "This seems," says Mr. Buffon, "designed as a call for their old companions without; and, in fact, I have seen several others come to the call, and perch upon the roof of the aviary, where they made the same kind of hissing, and soon after permitted themselves to be taken in a net."

The BROWN OWL.

The head, wings, and back of this bird are of a deep brown, elegantly spotted with black: the coverts of the wings and the scapulars, are adorned with white spots: the exterior edges of the four first quill feathers are ferrated: the breast is of a very pale ash-colour, mixed with tawny, and marked with oblong jagged spots: the circle round the face is ash-coloured, spotted with brown. It inhabits the woods, where it remains the whole day. These Owls are very clamorous in the night, and approach our dwellings. They frequently enter pigeon houses, where they make great havock. They breed in hollow trees, or ruinous buildings, and lay about four white eggs of an elliptic form.

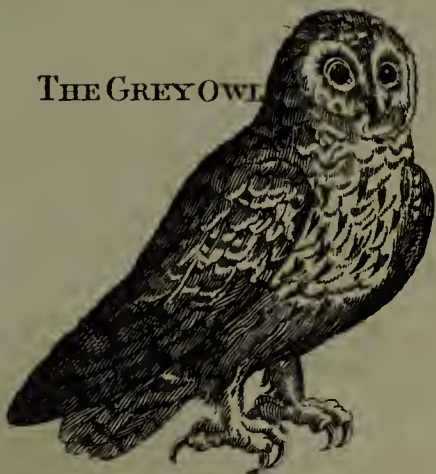
The LITTLE OWL.

This elegant species hardly exceeds a thrush in size, though the fullness of its plumage makes it appear larger. It has a light yellow ring round the eye, and the bill is of a paler colour: the feathers which encircle the face, are white, tipped with black. The head is brown, spotted with white: the back and coverts of the wings are of a deep olive brown, the latter being spotted with white: on the breast is a mixture of brown and white: the belly is white spotted with brown: the tail is of the same colour

with

BIRDS.

THE GREY OWL



THE ASIO



THE EAGLE OWL



THE LITTLE OWL



THE SCOPS



THE CUCKOW



THE SPOTTED WOODPECKER



THE WRYNECK



THE ROYSTON CROW



THE MEROPS



THE GREEN PARROT



THE HAGGARD FALCON



THE QUAIL



THE SEA LARK



THE MOOR BUZZARD



THE KESTREL



THE BUZZARD



with the back, and each feather is barred with white. The legs and feet are covered with feathers down to the claws.

To these might be added the Screech-Owl, with blue eyes, and plumage of an iron grey: the Howlet, with dusky plumes and black eyes. And to this catalogue might also be added others of foreign denominations, which differ but little from our own; if we except the Harfang, or Great Hudson's-Bay Owl, which is the largest of all the nocturnal tribe,

and as white as the snows of the country where it is produced.

All this tribe of birds, however they may differ in their size and plumage, agree in the general characteristics of seeking their prey by night, and having their eyes formed for nocturnal vision. Their bodies are muscular and strong; their feet and claws admirably adapted to the tearing of their prey, and their stomachs for digesting it.

C H A P. II.

Containing the NATURAL HISTORY of BIRDS of the POULTRY KIND, viz. the COCK and HEN, the HAMBURGH COCK, the PEACOCK, the TURKEY, the PHEASANT, the GUINEA-HEN, the BUSTARD, the COCK of the WOOD, the BLACK COCK, the GROUS, the PTARMIGAN, the PARTRIDGE, and the QUAIL.

BIRDS of the Poultry Kind are the most harmless and the most serviceable to man: he may compel the rapacious tribes to assist his pleasures in the field, or induce the warblers to delight him with their songs; but he derives the most solid advantages from the Poultry kind, which make a considerable addition to the necessaries of life, and furnish some of the greatest delicacies for the table.

Most of the domestic birds of the Poultry Kind, which we maintain in our yards, are of foreign extraction; but there are others to be ranked in this class, that are still in a state of nature. The tame Poultry which we have imported from distant climates have increased amazingly among us; but those wild birds of the Poultry Kind, that have never yet been taken into keeping, have been diminished and destroyed.

Birds of the Poultry Kind are such as have white flesh, and, in proportion to their head and limbs, have bulky bodies. They have short strong bills for picking up grain: their wings are short and concave, and consequently they cannot fly far. They lay a great many eggs, and lead their young brood abroad in quest of food, the very day they are hatched; the young, from the instructions of the mother, being able instantly to help itself. They usually make their nests on the ground. The toes of all these are united by a membrane as far as the first articulation, after which they are divided. We may therefore rank under this class the common cock, the peacock, the turkey, the pintada or Guinea hen, the pheasant, the bustard, the grouse, the partridge, and the quail. All these birds bear a strong similitude to each other, being equally granivorous, fleshy and delicate to the palate.

The rapacious class are formed by Nature for war, and she seems equally to have qualified these for peace, society and repose. Their wings are ill-formed for wandering from one region to another, for they are but short; their bills are also short, and incapable of annoying their opposers: their legs indeed are strong, but their toes are calculated for scratching up their food, and not for holding or tearing it. These are sufficient indications of their inoffensive nature; while their fat and fleshy bodies render them unwieldy travellers, and incapable of straying far. We therefore find them chiefly in society, and though, like other animals, they sometimes have their disputes; yet, when they live in the same district, or are fed in the same yard, they are taught subordination; and in proportion as each is acquainted with his own strength, he never ventures in the combat a second time, where he knows he shall be vanquished.

All the birds of this kind seem to lead an indolent voluptuous life; as they are furnished with a strong stomach, usually called a gizzard, they are extremely voracious. When closely confined, and separated from all their former companions, they still enjoy the pleasure of eating, and grow fat and unwieldy in their prison. Many of the wilder species of birds, when in captivity, pine away, grow gloomy, and some even refuse all manner of sustenance; none except those of the poultry kind grow fat under confinement; they seem to lose all remembrance of their former liberty, being perfectly satisfied with indolence and plenty. They may be considered as sensual epicures, solely governed by their appetites, which destroy among them that connubial fidelity for which most other kinds are remarkable. Eagles and other ferocious birds are true and gentle to each other: when their connections are once formed, they end but with their lives; and in every exigence and every duty, the male and female lend faithful assistance to each other.

But it is very different with the poultry kind. Their courtship is extremely short, and their congress fortuitous. Heedless of his offspring, the male leaves all the care of providing for posterity to the female. Wild and irregular in his appetites, he ranges from one to another, and claims every female which he is strong enough to keep from his fellows. When opposed to birds of prey, he is dastardly and timorous, but extremely valiant among those of his own kind: to see a male of his own species is generally sufficient to produce a combat. As he considers the farm-yard as his seraglio, every creature that pretends to be his rival, becomes his enemy. The female, equally a stranger to fidelity or attachment, yields to the most powerful. She seems an unconcerned spectator of the effects of their fury, and readily rewards the conqueror.

The female takes upon herself all the labour of hatching and rearing her young, and selects a place for hatching as remote as possible from the cock. She does not indeed bestow much trouble in making a nest, well knowing that her young ones are to forsake it the moment they part from the shell.

She does not require the assistance of the male in providing for her young; they have not food put into their mouths as in other classes of the feathered kind; but, following the parent, they peck their food wherever it is to be found. She conducts them to places where they are likely to have the greatest quantity of grain, and shews them, by her example, what is proper for them to eat. Though at other times voracious, she is then extremely moderate, and chiefly intent upon pointing out the food to the

the young clutch, hardly taking any nourishment herself. Her parental care seems to triumph over every appetite; but that care decreases in proportion as her young ones become more able to provide for themselves; and, when they cease to require her aid, all her voracious habits return.

NATURAL HISTORY of the COCK and HEN.

OF all other birds, the Cock seems to have been first reclaimed from the forest, and taken to supply the accidental failure of the luxuries or necessities of life. Having been longest under the care of man, he exhibits the greatest number of varieties, not two birds of this species being seen to resemble each other exactly, in form and plumage. The tail, which is so great an ornament to the generality of these birds, is entirely wanting in others. The toes are usually four in animals of the poultry kind, but in one species of the Cock, which abounds in the environs of Dorking in Surry, they amount to five. The feathers, which in most of them lie so sleek and in such beautiful order, are in a peculiar breed all inverted, and stand the wrong way. Nay, there is a species from Japan, which, instead of feathers, seem to be covered over with hair. These and many other varieties are to be found in this animal, which seem to be the marks this early prisoner bears of his long captivity.

When the Cock was first made domestic in Europe, is not well ascertained; but it is generally supposed he came first into the western world, from Persia. The Cock is called the Persian bird by Aristophanes, who tells us he enjoyed that kingdom before some of its earliest monarchs. In the most savage parts of Europe, this animal was so early known, that the Cock was one of the forbidden foods among the ancient Britons. Indeed, the domestic fowl seems to have banished the idea of the wild one. Persia itself, from whom we first received it, seems no longer to know it in its natural form; and if it was not sometimes seen wild in the woods of India, as well as those of the islands of the Indian Ocean, we perhaps might doubt, as we do with regard to the sheep, in what form it first existed in a state of nature. But we cannot entertain those doubts: the Cock is seen in his ancient state of independence in the islands of Tinian, in many other islands of the Indian ocean, and in the woods on the coasts of Malabar. In his wild state, his comb and wattles are yellow and purple, and his plumage black and yellow. There is another remarkable peculiarity in those of the Indian woods; their bones, which are white when boiled with us, are there as black as ebony. Whether this tincture proceeds from their food, as the bones of an animal are tinted red by its feeding upon madder, or from what other cause; is a point not easily determined.

When they were first propagated in Europe, there were distinctions which now no longer subsist. Those with a reddish plumage were esteemed by the ancients as invaluable, and the white ones were considered as utterly unfit for domestic purposes. Aristotle seems to make his division of these birds from their culinary uses; the one sort he calls generous and noble, being remarkable for fecundity; the other ignoble and useless, from their sterility. These distinctions are very different from our modern notions of generosity in this animal; that which we call the game Cock being much less fruitful than the ungenerous dunghill Cock, which we look upon with contempt for his want of spirit, compared with the other animal. The Athenians, like us, had their Cock-matches; but it is probable they did not, like us, make choice of the most barren of the species for the purposes of combat.

It is certain, however, that no animal in the world is more courageous than the Cock, when opposed to one of his own species; and wherever refinement and polished manners have not taken place, Cock-fighting is a principal diversion. In India, China, the Philippine islands, and all over the East, it is the sport and amusement even of princes. In England, it is declining daily, and in a short time it will probably become the pastime of only the lowest vulgar. It is the prevailing opinion, that we have a bolder and more valiant breed than is to be found elsewhere: but the truth is, they have Cocks in China equal if not superior to ours in valour, and are also stronger and larger. It is surprising that those men who venture hundreds, nay even thousands upon the prowess of a single Cock, have not taken every method to improve the breed, and particularly that of crossing the strain, as it is called, by a foreign mixture. But, as Cock-fighting is a mean ungenerous amusement, we would not wish to promote it by our instructions.

The extraordinary courage in the Cock, is supposed to proceed from his being the most salacious of all other birds, and the only animal whose spirits are not abated by indulgence. But he presently becomes old, and exhausted; and in three or four years absolutely unfit for the purposes of impregnation.

The Hen seldom clutches a brood of chickens above once a season, though it sometimes happens that she produces two. A domestic Hen will lay upwards of two hundred eggs a year, when properly supplied with food and water: she will continue to lay when she is not impregnated by the male, but eggs of this kind, though equally proper for food and all other domestic purposes, can never by hatching be brought to produce a living animal.

We may judge of the eggs of all other birds by those of the common hen, in which the yolk and the white are readily distinguished; but there is one kind of white which surrounds the yolk, and another which encompasses that: there are also ligaments which support the yolk, near the center of the egg, and two membranes, one surrounding the yolk, and the other the white; there are also a third and fourth which encompass them, and a shell that defends the whole; which serves to preserve the chicken from any accident till it is formed, and ready to come out of its prison. The cicatricula, or small white spot on the membrane which surrounds the yolk, is the real germ that contains the chicken in miniature.

The changes produced in this germ, from time to time, cannot possibly be discovered, on account of the fluids which surround it. The white, however, is thought to serve instead of milk to feed the young, and the yolk to be that part from whence the growth proceeds.

The Hen, if left to herself, forms but a very indifferent nest, a hole scratched in the ground among a few bushes, is the only preparation she usually makes for the season of her patient expectation. Nature, almost exhausted by its own fecundity, informs her of the proper time for hatching, which she herself testifies by a clucking note, and by discontinuing to lay. Frugal housewives, who find the eggs more profitable than the chickens, often practice arts to protract this clucking season, and sometimes entirely remove it. Their methods are these: when the hen begins to cluck, they stint her in her provisions; and if that does not produce the desired effect, they plunge her into cold water. This effectually retards her hatching, but it often produces a cold, and the poor bird dies under the operation.

If the Hen were permitted to pursue her own inclinations, she would seldom lay above twenty eggs in the same nest, without attempting to hatch them;

but if her eggs are removed in proportion as she lays, she still continues to lay, vainly expecting to encrease the number. In the wild state she seldom produces more than fifteen eggs, but her provision is then obtained with more labour, and she is perhaps sensible of the difficulty of maintaining too numerous a family. When she begins to set, her patience and perseverance are incredible, she continues immoveable for some days; and when forced from the nest by the calls of hunger, she quickly returns to her duty. During the time of her sitting she carefully turns her eggs, and often removes them to different situations; till at length, at the end of about three weeks, the young brood begin to give signs of their wishing to be released from their confinement; when by the repeated efforts of their bill they have broke themselves a passage thro' the shell, the hen still continues to sit till they are all excluded. The strongest chicken are generally the first advocates for liberty; the weak ones follow after; and some, which are still more feeble, even die in the shell. When the whole family are produced, she leads them forth to instruct them in the art of providing for themselves. Her affection and her pride seem then to alter her very nature, and render her an amiable bird. No longer cowardly or voracious, she boldly ventures to attack any creature that she supposes would do them any injury, and abstains from every kind of food that her young can swallow. When marching at the head of her little troop, she acts the commander, and has a variety of notes to summon them to their food, or to warn them of approaching danger.

Schemes have been contrived by which a hen that, in the ordinary way, produces but a dozen eggs in the year, may produce as many chickens as eggs; and consequently about two hundred. The contrivance we mean is the artificial method of hatching chickens in stoves, as practised at Grand Cairo, in Egypt; or in a chemical laboratory properly graduated, as has been effected by Mr. Reaumur. The Egyptians built spacious ovens of a form very different from ours, in which they placed a great number of eggs, and by means of a gentle fire, kept them in the same degree of heat as if they were under the hen. Here they remain till the usual time of hatching, and by this means they sometimes produce ten or twelve thousand chickens at a time. But, in our cold climate, the great difficulty is not in the hatching, that being easily performed, but in the clutching the chickens after they have been excluded. Reaumur has made use of what he calls a woollen Hen; which was nothing more than putting the young ones in a warm basket, and placing over them a thick woollen canopy: but the whole apparatus was attended with so great an expence, as to render the scheme rather an object of curiosity than profit.

The Cock is allowed to be a short-lived animal, but how long it would live if left to itself, has not been ascertained. As they are kept only for profit, and in a few years become almost useless, very few would, from mere motives of curiosity, make the tedious experiment of maintaining a proper number till they die. Androvandus is of opinion, that if they were permitted to live, they would attain the age of ten years; and it is probable that this may be the full extent.

The flesh of a Cock contains a great deal of oil and volatile salt, but it is not so much esteemed as that of a Hen, or rather of a Pullet, because it is drier, has a less agreeable taste, and is harder of digestion. The flesh of a Pullet also contains a great deal of oil and volatile salt, and is a most excellent aliment. It is pectoral, easy of digestion, and affords great nourishment. It agrees with all ages and constitutions; but is best suited to those

who are delicate, and lead sedentary lives; for labouring people require stronger, and more substantial food. Eggs are a common aliment, and are equally useful in health and sickness. They digest easily, are very nourishing, abate the acrimony of the fluids, appease coughs, and clear the voice. They are also good for the breath, and greatly exhilarate the spirits; but they should not be boiled till they are hard.

The flesh of a chicken has nearly the same properties as that of a pullet, but it is more delicate and juicy.

The countryman's farm or habitation cannot be said to be completely stored or stocked without Fowl as well as beast, which yield a considerable advantage by their eggs, brood, bodies, and feathers. Any poor cottager that lives by the highway-side may keep them; they being able to shift for themselves the greatest part of the year, by their feeding on insects, corn, or any thing almost that is eatable by other sort of animals; and therefore they are kept to great advantage at barn-doors, and other places, where corn or straw is scattered.

Those Hens that are the best breeders, and the best layers, are to be chosen; the oldest being always the best fitters, and the youngest the best layers; but no sort will be good for either, if they are kept too fat. The best age to set a Hen for chickens, is from two years old to five; and the best month to set them in, is February, though any month between that and Michaelmas is good. Observe to let them have constantly meat and drink near them while they sit, that they may not stray from their eggs, and chill them.

If fowls are fed with buck or French wheat, or with hemp, canary, or millet seed, which is commonly sown in March, it is said, they will lay more eggs than ordinary: and buck-wheat, either whole or ground, and made into paste, which is the best way, is a grain that will fatten fowls or hogs very speedily; but the common food to fatten them with is barley-meal, wet with milk or water; but wheat-flour is better; yet if you intend to bring up chickens, give a barley-corn or two to each of them, as you take them out of the nest, and so continue to feed them until they are fit for fattening.

The Cock was sacred to Minerva, as the symbol of watchfulness, to denote that true wisdom never sleeps. He often accompanies Mercury, who passes for a vigilant God. Cocks were sacrificed to the Lares, because those animals are brought up in houses, whereof the Lares are the guardians.

The BANTAM COCK and HEN.

The Bantam Cock is a small, but a very courageous animal, and will fight any thing that opposes him. He has a reddish bill, fine red eyes, and a curious comb on the crown of the head. His ears are covered with a tuft of white feathers, and his neck and back with long streaming feathers of orange colour mixed with yellow. The breast and the lower part of the belly are black. It has long stiff feathers on the thighs, reaching considerably below the knees, and the legs are covered with small feathers as far as the toes. The tail consists of stiff black feathers, among which are two large ones hanging over the rest in the form of a sickle. It is now pretty common in England, though it takes its name from Bantam in the East-Indies, from whence it was originally brought.

The Bantam Hen is small and beautiful; the bill is yellowish, and it has a small white comb, with a few white hairs on the top of the head. The skin round the eyes is reddish and bare, and the ears are covered with a brown tuft of feathers: the rest of the body, and the wings and tail are yellow, mottled with dark brown. The thighs and legs are feathered almost

down to the toes. The colours of the Bantam Hen frequently vary.

The HAMBURGH COCK.

This is a very stately fowl: his bill is thick at the base, but ends in a sharp point. His eyes are of a fine yellow, encircled with dark-coloured feathers, under which there is a tuft of black ones which covers the ears. It has a reddish comb, reaching about half way over the head, the hind part being covered with dark-coloured feathers, inclining to black. The throat and gills are of the same colour, with a mixture of orange coloured and red feathers, waving round the neck, which are black at the extremities. The breast and belly are of a dark colour, spotted with black: the thighs, and the lower part of the belly are of a shining velvet black. The upper part of the neck and back is of a darkish red, and the tail consists of red, orange-coloured, and shining black feathers. The legs are of a lead-colour, except at the bottom of the feet, which are yellow.

The PEACOCK.

The Peacock, say the Italians, has the plumage of an angel, the voice of a devil, and the guts of a thief. Indeed there is none of the feathered creation can vie with him for beauty, when he appears with his tail expanded; but the horrid scream of his voice lessens the pleasure we should otherwise receive in viewing him; and his insatiable gluttony renders him one of the most noxious domestics that man has taken under his protection.

India first gave us Peacocks; and we are assured that they are still found in vast flocks, in a wild state, in the islands of Ceylon and Java. So beautiful a bird could not be permitted to continue long at liberty in its distant retreat; for so early as the days of Solomon, we find apes and Peacocks, among the articles imported in his Tharshish navies. A monarch so conversant in every branch of natural history, who spoke of trees from the "cedar of Lebanon, even unto the hyssop that springeth out of the wall: who spoke also of beasts and of fowl," would certainly instruct his officers to collect every curiosity in the countries they visited; which gave him a knowledge that distinguished him from all the princes of his time: Ælian relates that they were brought into Greece from some barbarous country, and were held in such high esteem among them that a male and female were valued at Athens at above thirty pounds of our money. When Alexander was in India, we are told he found vast numbers of wild Peacocks on the banks of the Hyapotis, and was so struck with their beauty, as to order a severe punishment on any who should kill or disturb them. When this bird was first introduced among the Greeks, they were so struck with the beauty of it, that every person paid a stated price for seeing it; and several people came from Lacedemon and Theffaly, purely to satisfy their curiosity.

Though the Peacock was first introduced into the West, merely on account of its beauty, mankind were tempted, from its figure, to think of serving it up for a different entertainment, the elegance of the feathers in some measure stimulating the appetite. Hortensius, the orator, was the first who served them up at an entertainment at Rome, and they were afterwards considered as the first of viands, and one of the greatest ornaments of every feast. But their fame for delicacy did not long continue; for in the times of Francis I. we find it was a custom to serve up Peacocks to the tables of the great, not in order to be eaten, but only to be seen: their manner was to strip off the skin, and, after preparing the body with the warmest spices, they again covered it up in its former skin, with all its plumage in full display.

The head and neck, beginning at the breast, are of a deep blue, and the head is small in proportion to the body; on the crown of which is a tuft, consisting of fine green shafts of feathers, bearing a greater resemblance to the stalks of plants newly sprung up, than to feathers. The bill is whitish, and cloven pretty deep: the neck is long and slender; the wings are black towards the back, and red towards the belly. The tail, when spread, appears to be double; the lesser being of a dusky colour, and not standing up like the long one. The long feathers spring out of the rump, and the shorter seem calculated to support them. The long feathers of the tail are of a chestnut colour, embellished with most elegant lines, which shine with gold; but the tips are of a dark green. The eyes of the feathers are party-coloured, of a deep green, shining like a chrysolite, and of a gold and sapphire colour. They consist of four circles, variously tintured; the first is golden, the second chestnut, the third green, and the fourth or middle, blue. The legs are armed with spurs like the common cock, and the belly is of a bluish green. Peacocks delight in spreading their tails to display their beauty, and they are certainly most elegant birds.

The Peacock, like other birds of the poultry kind, feeds principally on corn, and is particularly fond of barley. But, as it is a proud capricious bird, there is hardly any food that it will not sometimes covet. Insects and plants are often eagerly sought, even when it has a sufficiency of its natural food before it. In the indulgence of these pursuits, walls cannot easily confine it; the tops of houses it strips of their tiles or thatch, lays waste the labours of the gardener, roots up his choicest feeds, and nips his favourite flowers in the bud. The beauty of this bird is therefore but a poor compensation for the mischief it occasions, and many of the more homely looking fowls have deservedly the preference.

In this country the Pea-Hen seldom lays above five or six eggs before she sits. Aristotle describes her as laying twelve; and it is probable she may be thus prolific in the East-Indies, as they are very numerous in the forests where they breed naturally. These birds live about twenty years; and they have not that beautiful variegated plumage that adorns the tail, till their third year.

Taverner informs us, that near the city of Baroch, in the kingdom of Cambaya, whole flocks of these birds are seen in the fields: that they are extremely shy; run off swifter than the partridge, and hide themselves in thickets. They perch upon trees by night, at which time the fowler approaches them with a kind of banner, on either side of which a Peacock is painted. At the top of this decoy a lighted torch is fixed, and the bird, when disturbed, flies to that which is painted, supposing it to be a real bird, and is thus caught in a noose provided for that purpose.

There are varieties of this bird, some being white, and others crested. That which is called the Peacock of Thibet, is the most beautiful of the feathered creation, having in its plumage all the most vivid colours, disposed in a manner that it is impossible for art to imitate, and form a pleasing figure to delight the eye of the beholder.

The Pea-Hen has no great variety in its colours, the wings, back, belly, thighs, and feet, being all brown, inclining to ash-colour: the top of the head and tuft are of the same colour; except that on the top of the head a few greenish spots are dispersed. The irides are of a lead colour, and the chin entirely white. On the neck the feathers are green and undulated, but at the extremities near the breast they are white.

NATURAL HISTORY of the TURKEY.

THE Turkey was unknown to the ancient naturalists, and even to the old world before the discovery of America. It was a bird peculiar to the new continent, and is now the most common wild fowl of the northern parts of that country. It was first seen in France in the reign of Francis I. and in England in that of Henry VIII. The first birds of this kind must therefore have been brought from Mexico, which conquest was completed in 1521. Ælian indeed mentions a bird found in India, which some have supposed to be the Turkey; but Gesner and Pennant are of opinion, that it was either the peacock, or some bird of that genus. Those who have resided in the East-Indies, inform us, that though the Turkey is bred there, it is not considered as a native of the country, but only as a domestic bird.

With us Turkeys are, when young, the tenderest of birds; yet, in their wild state, they are found very numerous in the forests of Canada, which are covered with snow above nine months in the year. In their natural woods they are much larger and more beautiful, than in their state of domestic captivity, their feathers being of a dark grey, bordered at the edges with a bright gold colour. These feathers are wove into cloaks by the savages, to adorn their persons; they also form them into umbrellas and fans, but never think of taking those animals into keeping, which they are supplied with in sufficient abundance by the woods. The hunting of the Turkey makes one of the savage's principal diversions, and its flesh contributes greatly to the support of his family. When he has discovered the place of their retreat, he takes with him his dog which he has trained to the sport, and sends him into the midst of the flock. As soon as the Turkeys perceive their enemy, they run with such swiftness as to leave the dog at a great distance behind: he still continues to follow them, knowing from experience that they must soon be tired, as they cannot run fast for any considerable time. At length he obliges them to take shelter in a tree, where, quite exhausted with fatigue, they sit till the hunter arrives, who, with a long pole, provided for that purpose, knocks them down one after the other.

Turkeys are furious among themselves, but extremely weak and cowardly against other animals which are less powerful than themselves. The common cock frequently makes the Turkey keep at a distance. Indeed the Turkey-cock will fly from the most contemptible animal that will venture boldly to face him. On the contrary, any thing that seems to fear him, he pursues with the insolence of a bully; particularly children and lap-dogs, to which he seems to have a peculiar aversion. After such an exploit, he returns to his female train, displays his plumage around, struts about the yard, and seems to glory in his valour.

The female seems to be of a milder disposition: she lays eighteen or twenty eggs, larger than those of a hen, which are whitish, and speckled, or rather freckled with dusky yellow spots. Though extremely tender when young, they become more hardy as they grow older, and attend the mother to considerable distances, in pursuit of insects, which they prefer to any other food; they are consequently not very expensive to the farmer.

Norfolk Turkeys are said to be the largest of this island, weighing from twenty to thirty pounds each. But in the East-Indies, where they are known only in their domestic state, they are often seen to weigh fifty or sixty pounds.

The Turkey expands its tail in the manner of a peacock: the neck and head are bare of feathers, and covered only with a purple or reddish skin,

which, when it assumes stateliness, swells, and is blown up, as it were, to a considerable size. It has a red fleshy appendix, or carbuncle, resembling a worm, upon the upper chap of the bill, which it can raise or contract at pleasure. The tail consists of eighteen feathers, and each wing has twenty-eight prime winged feathers. The legs have a kind of rudiment of spurs, which are very conspicuous. The flesh of a hen Turkey is sweet and delicate, and not inferior to that of a pullet; but that of a Turkey-cock is not so excellent.

"Most of our housewives," says a Swedish author on husbandry, "have long despaired of success in rearing Turkeys, and complained that the profit rarely indemnifies them for their trouble and loss of time: whereas, continues he, little more is to be done than to plunge the chick into a vessel of cold water, the very hour, or if that cannot be, the day it is hatched, forcing it to swallow one whole peppercorn, and then restoring it to its mother. From that time it will become hardy, and fear the cold no more than a hen's chick. After which it must be remembered, that these useful creatures are subject to one particular malady whilst they are young, which carries them off in a few days. When they begin to droop, examine carefully the feathers on their rump, and you will find two or three, whose quill part is filled with blood. Upon drawing these the chick recovers, and after that requires no other care, than what is commonly bestowed on poultry, that range the court-yard.

"These articles are too true to be denied; and, in proof of the success, three parishes in Sweden have, for many years, gained several hundred pounds by rearing and selling Turkeys."

NATURAL HISTORY of the PHEASANT.

NEXT to the peacock, the Pheasant is the most beautiful of birds, as well for the vivid colour of its plumes, as for their happy mixtures and variety. The pencil cannot represent any thing so glossy, so brilliant, or points so finely blending into each other. It is said, that when Cræsus, king of Lydia, was seated on his throne, adorned with all the pomp of Eastern splendour, he asked Solon if he had ever seen any thing so fine! The Greek philosopher, unawed by the objects before him, or priding himself in his native simplicity, replied, that after having seen the beautiful plumage of the Pheasant, he could be astonished at no other finery.

It is certainly a most elegant bird. The iris of the eyes is yellow, and the eyes are surrounded with a scarlet colour, sprinkled with small black specks. On the fore part of the head there are blackish feathers mixed with a shining purple. The top of the head, and the upper-part of the neck are tinged with a darkish shining green. In some Pheasants the top of the head is of a shining blue, and the head and neck appear either blue or green, according to the situation of the spectator. The feathers on the breast, the shoulders, the back, and the sides, are blackish; with edges of a most exquisite colour, which appear either black or purple, according to the different light in which the bird is viewed; and under the purple there is a transverse streak of gold colour. The tail is about eighteen inches long, from the end of the middle feathers to the root: the legs, feet, and toes, are of the colour of horn. On the legs there are black spurs, which are shorter than those of a cock: two of the toes are connected by a membrane. The hen is not so beautiful as the cock, she being nearly of the colour of a quail: she lays eggs but once a year, which sometimes amount to eighteen or twenty in number.

This bird is not only beautiful to the eye; it is also delicate when served up to the table; but, as if disdainful of the protection of man, it has left him to take shelter in the thickest woods and the remotest forests. The cock, the turkey, the pintada, and all others of the domestic kind, when once reclaimed, have still continued in their domestic state, and persevered in the habits and appetites of willing slavery. But the Pheasant, though taken from its native warm and pleasant retreat, has still continued its attachment to native freedom, and now continues wild among us, making the most envied ornament of our parks and forests, where it feeds upon acorns, berries, and grain, the scanty produce of this cold climate.

But though, in the woods, the Hen-Pheasant lays from eighteen to twenty eggs in a season, yet, in a state of captivity, she seldom produces above ten. In the wild state, she hatches and rears up her brood with patience, vigilance, and courage; but when kept tame, she attends improperly to this duty, so that a hen is generally her substitute to sit for her. The Pheasant therefore had better be left at large in the woods, than be again reclaimed to captivity. When wild, its fecundity is sufficient to stock the forest; its elegant plumage adorns it; and unlimited freedom adds a finer flavour to its flesh.

Many have lately endeavoured to take these birds once more from the woods, and to keep them in places fitted for their reception. Like others of the poultry kind, they have but little sagacity, and are easily taken. At night they roost upon the highest trees of the wood; and come down by day among the brakes and bushes in search of food. In the winter their foot-steps may be traced in the snow, and they are frequently taken in springs. They are the most easily shot of any birds, for when they rise, they always make a whirring noise, which is a sufficient notice to the sportsman; and being a large mark, and flying very slow, the most indifferent gunner can hardly miss them.

When Pheasants are taken young into keeping, they become as familiar as chickens. The female, in her natural state, makes her nest of dry grass and leaves; therefore, when brought up tame, the same materials should be laid for her in the pheasantry, which she herself, in general, will dispose in a proper manner. If she neglects to sit upon her eggs, a common hen must be procured to hatch them, which task she will perform with perseverance and success. It is extremely difficult to rear the young ones, and care must be taken to supply them with ant-eggs, that being the food the old one leads them to gather when wild in the woods. In order to make these go the farther, they may be chopped up with curds or other provision. These birds, when young, require to be fed with great exactness, both with regard to quantity and time; and it is necessary sometimes to vary their food; wood-lice, earwigs, and other insects being occasionally very agreeable to them. The place in which they are reared, must be kept extremely clean, and their water should be changed two or three times a day: they should not be exposed in the morning till the dew is off the ground, nor suffered to remain abroad after sun-set. When they become adult, they are capable of shifting for themselves, and then they are remarkably fond of oats and barley.

When full grown, the Pheasant seems to feed indifferently upon every thing that offers, and we are assured by a French writer, that one of the king's sportsmen shooting at a parcel of crows, which were gathered round a dead carcase, upon his coming up he saw, to his great surprize, that he had killed as many Pheasants as crows; but this account seems to be exaggerated, tho' it is admitted by other respectable writers that these birds are of a carnivorous disposition.

There are many varieties of the Pheasant as well as of all other domestic fowls. There are white Pheasants, crested Pheasants, and spotted Pheasants; but the golden Pheasant of China is the most beautiful of all others.

The HORNED INDIAN PHEASANT.

The size of this bird is between that of a hen and a turkey, and in shape it greatly resembles a turkey. The bill is brown; and on the fore-part of the head, and all round the eyes it is covered with a kind of blackish hair. The top of the head is red, and over each eye, pointing backwards, there is a horn of a callous substance. A flap of loose skin hangs down the fore-part of the neck, which is of a beautiful blue, with orange coloured spots. The neck and breast are reddish, inclining to orange, and the breast and lower part of the neck are spotted with white; each spot being encompassed with a black ring. The back, wings, tail and belly are of a yellowish brown, which gradually intermixes with the red round the bottom of the neck. The whitish spots on the backs, wings, tail, and belly, resemble pearl drops, the sharp ends being towards the head. These are all encompassed with black, and the thighs are brownish. It has spurs, and the legs and feet resemble those of a cock.

The RED CHINA PHEASANT.

This bird is somewhat smaller than the European Pheasant, and has a bill of a brownish colour. The feathers on the upper-part of the head are also brownish, but it has a very curious crest of long scarlet feathers hanging down on the back of the neck, and beautifully variegated with scolloped lines. The back is yellow, and the fore-part of the neck, breast, and belly, are of a beautiful red. The covert feathers of the wings are of a deep blue, interspersed with black spots; but the first row of the other feathers are spotted with brown on a yellow ground.

The WHITE CHINA PHEASANT.

This resembles the red China Pheasant in size and form, but it has a dusky yellow bill, with a curious crest of black feathers extending from the base of the bill to the upper-part of the head, and hanging down the hinder-part of the neck. The eyes are surrounded with a ring of white feathers, and that is encompassed with a fine scarlet circle, spotted with red. This also continues to the hinder part of the head. The neck, back, and wings are white, variegated with a few dark spots and shades; the breast, belly, and thighs are black; the feet are scarlet, and the claws are black.

The PEACOCK PHEASANT.

According to Mr. Edwards, this is also a Chinese bird. On the upper feathers of the wings there are blue spots like eyes, and the tail is spotted with green. Like the common cock, its legs are armed with spurs.

We are informed by Tertre that there is a bird called a Pheasant in the Caribbee Islands, which is extremely beautiful, and is as large as a capon; but it has longer legs, and its feet resemble those of a peacock. The feathers on the neck and breast are of a shining blue, and the back is of a brownish grey. The wings and tail are short, and entirely black. The flesh is as good as that of the European Pheasants.

The BRASILIAN PHEASANT.

This is rather smaller than the common hen, but the tail is broad and about twelve inches long. The plumage is principally black, intermixed with a little brown and white. It can at pleasure erect the black feathers on the head in the form of a crest.

crest. The upper-part of the neck is naked, having only a red skin on it. The lower-part of the body, and the hind-part of the wings are clothed with black and white feathers intermixed. The tail, and the upper-part of the legs are black, and the feet are of a beautiful red. It is also called by the natives Jacupema, a name given to it on account of its cry, which is Jacu Jacu. This bird is easily tamed, and its flesh is esteemed good wholesome food.

NATURAL HISTORY of the GUINEA HEN, or PINTADA.

THE Guinea Hen is about the size of a common hen, but as it has longer legs, it appears much larger. Its head is naked, its back is round, and its tail turns downwards like that of a partridge. The head is covered with a kind of helmet, and the whole plumage is black or dark grey, speckled with white. It has wattles which proceed from the upper lip, and not from the lower chap as in cocks. This gives it a very peculiar air, and its restless gait and odd chuckling sound, sufficiently distinguish it from all other birds.

The Guinea Hen came originally from Africa, but is now well known all over Europe. In different countries, however, it has different names. By some it is called the Barbary Hen; by others the Tamis Bird; and by others, the Bird of Numidia. We have given it the name of the Guinea Hen, because it was probably first brought to us from that part of Africa.

They are seen in vast flocks in many parts of their native country. All their habits are like those of the poultry kind, and they agree in every other respect, except that the male and female so exactly resemble each other, that they can hardly be distinguished. The only observable difference lies in the wattles, which in the cock are of a bluish cast; in the hen, they incline a little to a red. In our climate, they lay about five or six eggs in a season; but they are more prolific in their sultry regions at home. They are kept in this country rather for show than use, as their flesh is not much esteemed, and great attention is required in rearing them.

The ears of the Guinea Hen are placed behind the wattles, and are quite uncovered, but the apertures are very small. The feet are of a greyish brown, covered with large scales before; but there is only a rough skin behind, and the hinder toe is short.

NATURAL HISTORY of the BUSTARD.

THIS is the largest land-bird that is a native of Britain: it is much larger than the turkey, the male at a medium weighing twenty-five pounds. The breadth is about nine feet, and the length almost four. The male has a tuft of feathers about five inches long on each side of the lower mandible. The head and neck are ash-coloured; the back is barred transversely with black, bright, and rust colour. The greater quill feathers are black; the belly white; and the tail, which consists of twenty feathers, is marked with broad bars of red and black: the legs are of a dusky colour.

The female is about half the size of the male; the crown of the head is of a deep orange colour, traversed with black lines, and the rest of the head is brown. The lower part of the neck before, is ash-coloured. In other respects it resembles the male, only the colours of the back and wings of the male are brighter.

The Bustard was once much more numerous among us than it is at present; but the increased

cultivation of the country, and the extreme delicacy of its flesh, has greatly thinned the species. It would probably have been long since extirpated, but for its peculiar manner of feeding. Had it continued to seek shelter among our woods, it must have been destroyed in proportion as they were cut down. If in the forest, the fowler might approach it unobserved; and the bird, from its magnitude, would be so excellent a mark, that it could not easily be missed. But the Bustard now inhabits only the open and extensive plain, where it is plentifully supplied with food, and where every invader may be seen at a great distance.

These birds are frequently seen in flocks of fifty or more, in the extensive downs of Salisbury-Plains, in Newmarket and Royston Heaths, in Cambridgeshire, the Dorsetshire uplands, and so on as far as March or Lothian, in Scotland. They run very fast, and when on the wing, can fly slowly for several miles without resting; but they take flight with great difficulty, and are sometimes run down with grey-hounds. They generally keep near their old haunts, seldom wandering above twenty or thirty miles. Their food consists of the berries which grow among the heath, and those large earth-worms that appear in great quantities on the downs, before sun-rising in the summer. These being replete with moisture answer the purpose of liquids, and enable them to remain a long time without drinking, on those dry and extensive tracts. But, as a security against drought, nature has furnished the males with a pouch, the entrance of which lies immediately under the tongue, and which will contain near seven quarts; and this they probably fill with water, to supply the hen when sitting, or the young till they can fly.

Like other birds of the poultry kind, Bustards change their mates at the season of incubation, which is about the latter end of summer. They make their nests upon the ground, by scraping a hole in the earth, and sometimes lining it with a little straw or grass. They lay only two eggs, which are about the size of those of a goose, of a pale olive brown with dark-coloured spots. They are about five weeks in hatching, and the young ones run about the instant they are out of the shell.

These birds live about fifteen years; but they cannot be propagated in a domestic state, as they cannot then be supplied with a sufficiency of that food which they principally delight in.

There are also Bustards in France, which appear in large open plains, particularly near Chalons, where, in the winter, vast numbers of them assemble; one of which is always placed as a centinel, on an eminence at a distance from the flock, to give notice of the smallest appearance of danger.

The INDIAN BUSTARD.

This bird is about twenty inches in length, and slenderer in proportion than any bird of this kind. The bill is of a whitish colour, and longer than those of our English Bustards. The sides of the head are of a bright brown, but the top of the head and the whole neck, are covered with black feathers hanging loosely. The back, rump, and tail, are of a light brown. On the tail are transverse black bars. All the covert feathers of the wings are white, except that the smaller ones about the joint are edged with black. The greater wing feathers nearest the back, are brownish, spotted with black, and the middle quills are white, with transverse bars speckled with black. The greater quills are white on their outer webs, and the tips gradually become of a dark ash-colour. The whole of the under side, from the breast to the tail, is clothed with black feathers. The legs are long, and the toes short; the legs are also bare a considerable distance

tance above the knee. The toes are three; all pointing forward, as in other birds of this kind, and are covered with whitish scales, but the claws are dusky.

This bird is an inhabitant of Bengal, in the East-Indies, and was first described by Mr. Edwards, who took it from a drawing in the possession of Dr. Mead.

The LITTLE BUSTARD.

The Little Bustard is about the size of a pheasant. The bill is of a flesh-colour at the base, and black at the point: the head, the back part of the neck, the back, and the covert feathers on the wings, are brown, marked with irregular spots of black. The throat is white, and the fore-part of the neck of a lightish brown, with a dusky mixture. The covert feathers on the inside of the wings, and the ridges of the wings are white; the outer quills are white at the bottom, but black at the points. The breast and sides are white, spotted with black, and the belly and thighs wholly white. The feathers of the tail are brown, speckled with very small spots of white, and barred with transverse black lines. It has only three toes, which all stand forwards, and the legs and feet are covered with yellow scales.

NATURAL HISTORY of the COCK of the WOOD.

THE female is called the hen of the wood. This species is found in no other part of Great-Britain, than on the northern islands of Scotland, and even there it is not often seen. It was formerly found in Ireland, but the breed now appears to be extinct there. It inhabits woody and mountainous countries; particularly forests of pines, birch-trees, and junipers; feeding on the tops of the former, and the berries of the latter, which sometimes give the flesh such a flavour, that it is hardly eatable. It seldom lays more than six or seven eggs, which are white, marked with yellow, and about the size of a common hen's egg.

The length of the male is about two feet eight inches, and the breadth three feet ten inches, and often weighs fourteen pounds. The female is smaller, not exceeding twenty-six inches in length, and forty in breadth. The male and female also differ greatly in colour: the colour of the bill of the male is a pale yellow; the nostrils are covered with dusky feathers; the head, neck, and back, are elegantly marked, slender lines of grey and black running transversely. The feathers are long on the hind part of the head, and there is a large tuft of long feathers beneath the throat. The upper-part of the breast is of a rich glossy green; the rest of the breast and belly is black, intermixed with white feathers. The coverts of the wings are crossed with undulated lines of black and reddish brown: the exterior webs of the greater quill feathers are black, with a white spot at the setting on of the wings. The tail consists of eighteen feathers, the middle of which is the longest; they are black, spotted with white on each side: the legs are very strong, covered with brown feathers.

The bill of the female is dusky, the throat red; the head, neck, and back, marked with transverse bars of red and black: on the breast are some white spots, and the lower part is of a plain orange colour: the tail, which is of a deep rust colour, is barred with black. She usually lays her eggs in a dry place, and on mossy ground. During the time of incubation, when she is obliged to leave her eggs in quest of food, she covers them up so judiciously with moss, or dry leaves, that it is no easy matter to discover them. As soon as the young are hatched,

they run after the mother with great agility, though sometimes they are not entirely disengaged from the shell. The hen leads them forward into the woods, shews them the ants eggs, and the wild mountain berries, which are their principal food while they are young. The strength of their appetites increases with their age, and as they advance in both, they feed upon the tops of hether, and the cones of the pine-tree. Thus they soon arrive to perfection; and as they are hardy birds, and their food continually before them, it might naturally be supposed they would increase abundantly; but the contrary is the truth; their numbers are reduced by rapacious birds and beasts, and still more by contests among rivals.

The whole brood follows the mother for about a month or six weeks, when the young males entirely desert her, and live together in great harmony till the beginning of spring. At this season they begin to feel the genial access, and a period is put to all their former friendships. They, for the first time, consider each other as rivals, and the fear of rivalry totally extinguishes the spirit of society. They attack each other with the fury of game-cocks, and are at that time so inattentive to their own safety, that two or three of them are sometimes killed at a single shot.

NATURAL HISTORY of the BLACK COCK.

THIS is also called the heath-cock, and black game. Like the former, these birds delight in woody and mountainous situations. In summer they feed on bilberries, and other mountain fruits, and in the winter on the tops of the heath. This species, and the cock of the wood, are frequently seen in the woods, perching like the pheasant. In the summer they frequently descend from the hills to feed on corn: they never pair, but, in the spring, the male takes his station upon some eminence, where he crows and claps his wings: this signal is a sufficient summons for every female within hearing. The hen usually lays about six or seven eggs. At the beginning of winter, the young males forsake their mother, and remain in flocks of seven or eight till spring; at which time they inhabit the woods. Like the cock of the wood, they are then very quarrelsome, fight together like game-cocks, and are so entirely off their guard, that they may easily be shot.

The Black Cock is about one foot ten inches in length, and two feet nine inches in breadth, and weighs almost four pounds: the bill is dusky; the plumage of the body is black, glossed with a shining blue over the neck and rump. The coverts of the wings are of a dusky brown. On the thighs and legs are dark brown feathers, with white spots on the former: the tail is forked, and consists of sixteen black feathers. The feathers under the tail, and the inner coverts of the wings are white. The female does not exceed two pounds in weight; she is about eighteen inches in length, and two feet six inches in breadth. The head, neck, and breast, are marked with alternate bars of black and dullish red. The back, coverts of the wings, and tail are of the same colours, but the red is deeper. The tail, which is a little forked, consists of eighteen feathers, variegated with red and white.

NATURAL HISTORY of the GROUS.

THIS bird is also called the moor-cock, or the red game. It is about one third larger than the partridge, and the colour resembles that of a woodcock, but is somewhat redder. It has a small head,

head, a slender body, a short black bill; the throat is red; the plumage on the head and neck is of a tawny red: the back and scapular feathers are of a deeper red, with a large black spot on the middle of each feather: the breast and belly are of a dullish brown, inclining to purple, crossed with several narrow dusky lines. The female is smaller, and her colours are duller than those of the male. The breast and belly are spotted with white, and the tips of some of the coverts of the wings are also white. These birds build their nests upon very low trees or shrubs, and lay from six to ten eggs, which are white, with a greenish cast, and speckled with reddish spots. The young brood follows the hen the whole summer: in the winter they join in flocks of about forty or fifty, and become remarkably shy and wild: they generally keep on the tops of the hills, and are seldom found on the sides, or in the valleys; their food is the mountain berries, and the tops of heath. They strike with their bill like a hen, and fly with their feet hanging down.

NATURAL HISTORY of the PTARMIGAN.

MR. Brisson joins this bird with the white partridge of Mr. Edwards, but these are two very different birds. The Ptarmigan is either of a pale brown or ash-colour, mottled with dusky spots. The tail of the Ptarmigan consists of sixteen feathers; the two middle of which are ash-coloured, mottled with black, and tipped with white; the two next are black, with a slight mark of white at their ends. These birds are found in this island only in the Scottish Highlands: their weight is about fourteen ounces, their length thirteen inches and three quarters, and their breadth twenty-three inches. Their feet are cloathed with feathers to the claws: the nails are long, broad, and hollow: the first circumstance guards them from the rigour of the winter, and the other enables them to form a lodge under the snow, where they lie in heaps, to protect themselves from the cold.

NATURAL HISTORY of the PARTRIDGE.

THE Partridge may be said to be the property of the sportsman; the British laws have even taken it under their protection; and, like a peacock or a hen, it may be considered as a private property. The only difference is, that the Partridge is fed in our farms, and the others in our yards: the former have it in their power to change their master, by changing their habitation, and the latter are contented captives.

In England, the Partridge is a favourite delicacy at the tables of the rich; and the desire of keeping it to themselves, has induced them to procure such laws for its preservation, as do not seem to harmonize with the general spirit of legislation. By an act passed in the tenth year of the reign of his present majesty, any person who shall wilfully take, kill, or destroy any pheasant or Partridge, or use any gun, dog, snare, net, or other engine for that purpose, in the night, between one hour after sun-setting, and one hour before sun-rising, shall for the first offence be committed to gaol, or the house of correction, for any time not exceeding six months, nor less than three; and for every such subsequent offence, for any time not exceeding twelve months, nor less than six: and shall also within three days after commitment for the first or any subsequent offence, be once publicly whipped in the town, &c. where such gaol or house of correction shall be, between the hours of twelve and one in the day.

What can be more arbitrary than to talk of pre-

servating the game, which can have no other meaning than that the inferior people shall abstain from what the rich have taken a fancy to keep for themselves? If Partridges and pheasants, like common cocks or hens, could be made legal property, be taught to keep within certain districts, and to feed only on those grounds which belong to the man whose entertainments they improve, it might then, with some appearance of justice, be admitted, that a man who fed them had a right to claim them: but, the case is otherwise: they feed every where, and upon every man's ground. Those birds which are nourished by all, by the law of reason belong to all; nor can any one man, or any body of men, claim any exclusive right to them, while they continue in a state of nature.

It is said in our old law books of authority, that all wild animals, such as deer, hares, foxes, and the like, are those which on account of their swiftness, or fierceness, fly the dominion of man; and in those no person can have a property, unless they are tamed, or reclaimed by him. Hence it appears, that, by the common law, every man hath an equal right to such creatures as were not naturally under the power of man; and that the mere capture or seizure of them, created a property in them.

The immense quantity of game about the environs of Paris, has been considered as a badge of the slavery of the people; and yet the French have no game laws for the remoter parts of the kingdom: the game is indeed preserved for the king in some few places, but is free in almost every other part of France. In England the prohibition is general; and the peasant, or even the farmer, cannot possess what even slaves in other countries are entitled to.

The cock Partridge weighs about fifteen ounces, the female thirteen: the bill is white, and the crown of the head is brown spotted with reddish white. The cheeks and forehead are of a deep orange colour, but much paler in the males than in the other sex. The neck and breast are beautifully marked with narrow undulated lines of ash-colour and black; and in the hind part of the neck is a strong mixture of rust colour. On the breast of the male there is a broad mark in the shape of an horse-shoe, of a deep orange hue. On the back, each feather is marked with several semi-circular lines of black and reddish brown: the greater quill feathers are dusky, spotted with pale red upon each web. It has eighteen feathers in the tail, the six outermost on each side being of a bright rust colour; the others are marked with irregular lines of black and pale reddish brown. The legs are whitish.

The partridge is found in every country, and in every climate; as well in the frozen regions about the Pole, as the torrid tracts under the Equator. Wherever it resides, it appears to adapt itself to the nature of the climate. In Greenland, it is brown in summer; but when the icy winter appears, it has a new covering suited to the season: its outward plumage then assumes the colour of the snows, amongst which it seeks its food, and it is cloathed with a warm down beneath. Thus by the warmth, and the colour of its plumage, it is doubly fitted for the place; the one defending it from the cold, and the other preventing it from being noticed by the enemy. The Partridges of Barakonda are longer legged and swifter footed; and seek a residence in the highest rocks and precipices.

All naturalists agree that the Partridge is immoderately addicted to venery. Those who are excited by curiosity to be more particularly informed concerning this particular, we beg leave to refer to Pliny, lib. x. c. 23, and Edwards's preface to Gleanings, part 2.

Their manners and habits, in other respects, resemble all those of the poultry kind; but their cunning and instincts seem superior to those of the larger kinds.

kinds. Living in the very neighbourhood of their enemies, they have perhaps more frequent occasion to put their little arts in practice, and learn, by habit, the means of evasion or safety. Whenever a dog or any other formidable animal, approaches the nest of a Partridge, the hen practises every art to draw him away. She keeps at a little distance before him, feigning to be incapable of flying; and just hopping up and falling down before him; but never going to so great a distance as to discourage her pursuer. At length having entirely drawn him away from her secret treasure, she at once takes wing and disappears.

The danger being over, and the dog withdrawn, she calls her young, who immediately assemble at her cry, and follow her. They are usually from ten to fifteen in a covey. A Partridge will live from fifteen to seventeen years, if unmolested. Partridges, properly speaking, make no nest, being satisfied with laying their eggs upon the ground, where they find a little hay or straw. The eggs are of a greyish colour, with a yellowish cast, and have a pretty hard shell. There is a bird of this kind called the red Partridge, which is rather larger than that above mentioned, and perches upon trees. That which we have particularly described above, is what we are best acquainted with in England, and always keeps upon the ground.

The places that Partridges most delight in, are corn-fields, especially while the corn grows; for that is a safe retreat, where they remain undisturbed, and under which they usually breed. They frequent the same fields after the corn is cut down, and that with another intent; for they then feed on the corn that has fallen from the ears, and find a sufficient shelter for them under covert of the stalks, especially of those of wheat stubble. When the wheat-stubble is much trodden by men or beasts, they retire to the barley-stubble, and will there hide themselves in coveys of ten or fifteen. When the winter comes on, and the stubble-fields are trodden down or ploughed up, they then retire to the upland meadows, where they lodge in the high grass, and among rushes; sometimes they resort to the low coppice-woods, especially if there are corn lands near them.

The HUDSON'S-BAY PARTRIDGE.

This Partridge is not much unlike those in England with regard to the shape of the head, but its bill is shorter and blunter. It has small red combs over the eyes, and the shape of its body resembles that of a pigeon, but it is considerably larger. When the snow is on the ground, they feed on the buds of poplar. They run like an English Partridge, and in the summer they are nearly of the colour of our Partridges; but in the winter they are white, excepting only the large tail feathers, which are tipped with black. They moult these white feathers in the spring, and resume the brown ones against the summer season.

The MOUNTAIN PARTRIDGE of JAMAICA.

The length of this bird, from the tip of the bill to the end of the tail, is ten inches, and the breadth, when the wings are extended, about sixteen. The head is small, and the bill like that of a pigeon. The upper-part of the body is of a reddish purple-colour, the lower-part is lighter, and under the belly it is whitish. The iris of the eyes is yellow, and the eye-lids are of a beautiful red. The legs and feet are red, like those of pigeons, and are about two inches long. It feeds upon berries, and is usually found among the mountains. It generally makes its nest in low trees, with twigs placed transversely, and lined with hair and cotton, for the better preservation of the eggs, and that the young may repose upon a soft bed.

The MOUNTAIN PARTRIDGE of HERNANDEZ.

This is larger than our Partridge, and the bill and feet are of a bright red colour. The whole body is clothed with a mixture of brown, pale and dusky yellow. The wings underneath are of an ash-colour, but they are speckled above with tawny white and yellow spots.

There is another bird called the Partridge of Damascus, which is smaller than the common Partridge, though the bill is longer. In other respects they strongly resemble each other.

The red Partridge of Aldrovandus is about twice the size of those of our own country, being equal in magnitude to a common hen. It has a red bill and legs, and is spotted on the breast and sides like ours; but the head, neck, breast, and rump, are chiefly ash-colour. This bird is a stranger in England, but is to be met with in the islands of Jersey and Guernsey.

NATURAL HISTORY of the QUAIL.

THE Quail is not above half the size of a partridge: the length is seven inches and an half, the breadth fourteen. The feathers of the head are black, edged with rusty brown: the crown of the head is divided by a pale yellow line; beginning at the bill, and extending to the back; above each eye there is another line of the same colour: the chin and throat are whitish: the breast is of a pale yellowish red, spotted with black. The scapular feathers, and those on the back, are marked with a long pale yellow line in the middle, and with iron-coloured and black bars on the sides. The coverts of the wings are of a reddish brown, elegantly barred with paler lines; bounded on each side with black. The tail, which consists of twelve short feathers, is barred with black, and very pale brownish red. The legs are of a palish hue. In its habits and nature it resembles all others of the poultry kind, except that it is a bird of passage.

When we consider the heavy manner of its flying, and its dearth of plumage in proportion to its corpulence, it appears surprizing that a bird, so apparently ill qualified for migration, should venture to take extensive journeys: but, however extraordinary, it is certainly a bird of passage. Bellonius assures us that when he went from Rhodes to Alexandria, about autumn, several Quails, flying from the north to the south, were taken in his ship; and sailing at spring time the contrary way, from south to north, he observed them on their return, when many of them were taken in the same manner. This account is confirmed by the testimony of many others, who assert that they choose a north wind for these adventures; the south being very unfavourable, as it retards their flight by moistening their plumage.

But though it is universally admitted that the Quail is a bird of passage, it still remains a doubt whether they take such long journeys as Bellonius has made them perform. Some have lately asserted that it only migrates from one province of a country to another. In England, for instance, it flies from the inland counties, to those bordering on the sea, and remains there all the winter. If they are driven out of the stubble-fields or marshes by frost or snow, they retreat to the sea-side, take shelter among the weeds, and live on what the sea casts upon the shore. The time of their appearance upon the coasts of Essex, exactly coincides with their disappearance from the more internal parts of the kingdom. Mr. Pennant says, "They are birds of passage; some entirely quitting our island, and others shifting their quarters." It is therefore probable

bable that the account which Bellonius has given us may be strictly true; and the assertions which others have made that they sometimes only migrate from one province of a country to another, may equally deserve to be credited.

The Quail is not so prolific as the partridge; seldom laying more than six or seven eggs, which are whitish, marked with irregular rust-coloured spots. This bird is easily taken, and may be en-

ticed any where by a call. Quail-fighting, among the Athenians, was a favourite amusement: they abstained from the flesh of this bird, deeming it unwholesome, as it was supposed to feed on hellebore; but they staked sums of money on them, as we do with regard to game-cocks, upon the success of the combat. At present, however, the courage of this bird is disregarded, but its flesh is considered as a very great delicacy.

C H A P. III.

Containing the NATURAL HISTORY of BIRDS of the PIE KIND, viz. the RAVEN, the CROW, the ROOK, the CHOUGH, the JACK-DAW, the MAGPIE, the JAY, the CHATTERER, the BENGAL JAY, the BLUE JAY, the ROLLER, the INDIAN PIE, the RED-BEAKED TOUCAN, the PIE, the WOOD-PECKER, the BIRD of PARADISE, the CUCKOO, the PARROT, and the PIGEON.

IN the class of the Pie kind we shall marshal a numerous irregular tribe, variously armed, with different pursuits, appetites and manners; not formidably formed for war, though generally delighting in mischief; not usefully obedient, and yet without any determined enmity to the rest of their fellow tenants of the air. In short, under this class of birds we may arrange all that noisy, restless, chattering tribe, that, from the size of the raven down to that of the wood-pecker, flutter round our habitations, and, with the spirit of pilferers, make free with the fruits of human industry.

This is the class of birds which contributes the least to furnish out the pleasures, or supply the necessities of man. The falcon hunts for him, the poultry tribe supply his table with delicacies; and the sparrow race delight him with their warblings. The crane kind make a variety in his entertainments; and the tribe of ducks are not only delicate in their flesh, but many of them furnish valuable feathers. But, in the class of birds of the Pie kind, the pigeon is almost the only one that is useful in any respect. Like faithless servants, they are fond of the neighbourhood of men, because they live chiefly by his labour; their business is to plunder in his absence, and their deaths make him no atonement for their depredations.

But though this class is rather noxious than beneficial to man; yet with respect to each other, no class of birds are so well fitted for society: they are the most industrious, the most faithful, the most constant, and the most connubial. The rapacious kinds discard their young before they are able to struggle with adversity; but the Pie kind cherish them to the last. The poultry class are faithless and promiscuous in their amours; but these are perfectly wedded, and preserve their faith inviolate. They live in harmony with each other, and transmit an unpolluted race to posterity. The male assists in the labours of building the nest, and frequently relieves his mate in the time of incubation, by taking her place in the nest while she yields to the earnest solicitations of hunger. When the young of this class are excluded from the egg, the male and female are equally active in providing food for them.

These birds are as remarkable for their instincts, as for their capacity to receive instruction: cunning and archness is observable in the look of the whole tribe; and ravens and crows are taught to fetch and carry with the docility of a spaniel.

In this extensive class, however, it is not to be supposed that the manners are alike. The pigeon is gentle and serviceable to man; others are noxious, capricious, and noisy. But they all agree in

a few general characters; in having hoarse voices, slender active bodies, and a facility of flight that baffles the boldest of the rapacious kinds in the pursuit.

NATURAL HISTORY of the RAVEN.

THE Raven is larger than the carrion crow, or the rook, and is not only distinguished from them by its size, but by its bill being somewhat more hooked than those of the other two. It weighs about three pounds; it is two feet two inches in length, and four in breadth, when its wings are extended. The bill is strong and thick; and the colour of the whole bird is black, finely glossed with deep rich blue; except on the belly, which is dusky.

The Raven is to be found in every region of the world; for, being strong and hardy, it is uninfluenced by the changes of the weather. It bears, with equal indifference, the heat of the line, or the cold of the polar countries. While other birds seem numbed with cold, or pining with famine, the Raven is active and healthy; busily employed in prowling for prey, or sporting in the coldest atmosphere. Though black as a Raven is proverbial, yet it is sometimes found of a pure white; owing perhaps to the rigorous climates of the north. This change is wrought upon the Raven, as upon most other animals in that part of the world, where their robes, especially in winter, assume the colour of the country they inhabit.

The Raven is capable of being taught to perform almost any thing within the compass of any bird's abilities. He may be instructed in the art of fowling like an hawk; and, like a spaniel, he may be taught to fetch and carry. He may indeed be taught to speak like a parrot; and Dr. Goldsmith assures us he can be taught to sing like a man. "I have heard," says he, "a Raven sing the Black-joke with great distinctness, truth, and humour."

Taken as a domestic bird, the Raven has many qualities that render him extremely amusing. Active, curious, and impudent, he goes every where, pries into every thing, runs after the dogs, plays tricks with the poultry, and with great skill and address even gets into the good graces of the cook-maid; truly sensible of her ability to reward him for his attachment to her. By nature a glutton, and, by habit, a thief. Not confined to petty depredations on the pantry or the larder, like a miser he hoards what he can neither exhibit or enjoy. A ring, a tea-spoon, a piece of coin, or any glittering bauble, are always tempting baits to his avarice; these he

will watch an opportunity to pilfer, and carry them to his magazine of curiosities.

The Raven, in its wild state, is a voracious plunderer. He is not delicate in the choice of his food, but, whether his prey be living, or dead and putrid, he greedily falls to; and, after having sufficiently gorged himself, flies to acquaint his companions that they may participate of the spoil. If the carcass should happen to be already in the possession of a fox, a dog, or any animal more powerful than himself, he sits at a little distance, an humble spectator till they are satisfied. If he can discover no carrion, which, from his exquisite scent he can smell at a vast distance, he then contents himself with fruits, insects, and the accidental produce of the dunghill.

Ravens usually build in trees, and lay five or six eggs, which are of a palish green colour, spotted with brown. They are very numerous in the environs of large cities or towns; and are held in the same sort of veneration as the vultures are in Egypt, and for the same reason; for devouring the carcasses and filth, which would otherwise prove a nuisance. But they do not always fix their retreat near towns; they often build in unfrequented places, and drive all other birds from their vicinity. They will not even suffer their young to remain in the same district, but oblige them to depart, as soon as they are able to provide for themselves. Martin assures us, in his description of the Western Isles, that there are three little islands among the number, which are occupied by a pair of Ravens each, that will not suffer any other birds to reside among them.

A vulgar respect is paid to the Raven, as being the bird appointed by heaven to feed the prophet Elijah, when he fled from the rage of Ahab. The Romans, who thought this bird ominous, paid it the most profound veneration, from motives of fear. Linnæus informs us that the Swedes look upon Ravens as sacred birds, and no person attempts to kill them there. In the south part of Sweden, they fly to a great height, when the weather is serene; at which time they have a very singular cry that may be heard at a vast distance.

Pliny informs us that a Raven which had been kept in the temple of Castor, flew down into the shop of a taylor, who was highly pleased with the visits of his new acquaintance. The taylor taught him several tricks, and also to pronounce the name of the emperor Tiberius, and the whole royal family. He was beginning to grow rich from the presents he received of those who came to see this wonderful Raven, till an envious neighbour killed the bird, and deprived the taylor of his future hopes of fortune. The Romans, however, punished the man for thus injuring the taylor; and honoured the Raven with a magnificent funeral.

Of all birds, the Raven is most remarkable for longevity. We cannot easily credit what Hesiod asserts, that a Raven will live nine times as long as a man; but it is certain that some of them have been known to live an hundred years: indeed, if great exercise, and a good appetite is conducive to long life, the Raven enjoys both in a superlative degree.

The Raven was consecrated to Apollo, because it was thought to have a natural instinct to foretel futurity. Ovid says, that the Raven was once whiter than doves or swans; but that, on account of its immoderate loquacity, it was changed to black.

NATURAL HISTORY of the CROW.

THE Crow resembles the raven in the form of its body, its appetites, its laying, and the manner of bringing up its young. It will feed on car-

tion, or any other filth, and when that is not to be obtained, it contents itself with grain and insects. Like the raven, it will pick out the eyes of young lambs when they are just dropped. It only differs from that bird in being less bold, less docile, and less favoured by mankind. England produces more birds of this kind than any other country in Europe. They were grown so numerous, and thought so prejudicial to the farmer, in the time of Henry VIII. that they were considered as an evil worthy of parliamentary redress. An act passed in the twenty-fourth year of his reign for their destruction, in which rooks and choughs were also included. Every hamlet was to provide Crow-nets for ten years; and, during that space, all the inhabitants were obliged to assemble at certain times, to consult the properest method of extirpating them.

Though the Crow abounds in England, yet it is so uncommon in Sweden, that Linnæus mentions it only as a bird that he once knew killed there. It lays about the same number of eggs as the raven; and they are of the same colour. Both of these birds are sometimes found white or pied. The length of the Crow is about eighteen inches, the breadth two feet two inches, and the weight about twenty ounces.

NATURAL HISTORY of the ROOK.

IN its form, the Rook differs but little from the carrion crow, but it is rather larger: the colours in each are the same, the plumage of both being glossed with a rich purple. What principally distinguishes the Rook from the crow, is the bill; which, by being frequently thrust into the ground to fetch out grubs and earth-worms, is bare of feathers as far as the eyes, and appears of a whitish colour. This distinction is the more necessary to be pointed out, as the Rook has but too frequently suffered for its similitude to the crow; and thus an harmless bird, that has no carnivorous appetites, and feeds only upon corn and insects, has been destroyed for another that feeds upon carrion, and frequently makes great havock among young poultry. The Rook, instead of being proscribed, should be treated as the farmer's friend, as it destroys his caterpillars, which would otherwise do incredible damage by eating the roots of the corn.

Rooks are sociable birds, living in vast flocks: they build in woods and forests in the neighbourhood of man, and sometimes make choice of groves in the middle of large towns or cities, for the place of their retreat and security. We had an instance of this even in the metropolis of England: not many years ago they formed a colony in the lofty trees in the Middle-Temple, where they passed as inoffensive a life as the other inhabitants of the Temple of the black robe. In these aerial cities they establish a kind of legal constitution, and exclude all intruders, none being suffered to build among them but acknowledged natives of the place. At the commencement of spring, the Rooks begin to build their nests; one bringing materials, while the other watches the building, lest it should be plundered by its brethren. All the old inhabitants, however, are already provided with nests; that which served them for years before, requires only a little trimming and dressing, to make it answer all the purposes of a new habitation. The young ones indeed are unprovided with a nest, and are obliged to build one as well as they are able. The male and the female, upon this occasion, pass several days in attentively examining the trees of the grove, before they fix upon a branch which seems proper for their purpose. The situation being pitched upon, they begin to gather the materials for their nest; the out-

side

BIRDS.

THE CARRION CROW



THE ROOK



THE TOUCAN



THE LAGOPUS



THE TURTLE DOVE



THE WOOD PIGEON



THE GROUSE

THE CROSS BEAK



THE LESSER BUTCHER BIRD



THE GROSS BEAKE



THE DAKER HEN



THE GREAT PLOVER



MERGANSER



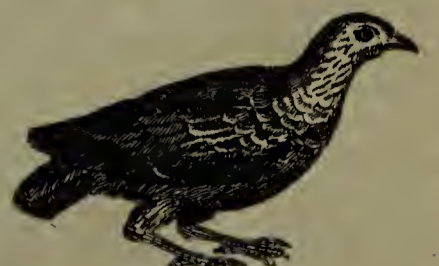
THE COCK OF THE WOOD



THE GREEN WOODPECKER



THE RED LEG PARTRIDGE



THE GARRULUS BOHENISCUS



side consisting chiefly of sticks, and the inside is usually lined with fibrous roots; the whole being regularly and substantially disposed. Sometimes the young couple give offence by making choice of a place too near the mansion of an older pair; a quarrel consequently ensues, and the old ones are always victorious.

Thus expelled, the young couple deliberate and examine as before, and, having taken care to keep their due distance, they again begin to build, and, in the space of three or four days, they usually complete their nest. Though they have frequent skirmishes, all hostilities are at an end as soon as the female begins to lay: not one of the whole grove, that treated her roughly but a little before, will now attempt to molest her. Though native Rooks are sometimes treated with severity by each other; yet, if a foreign Rook should attempt to make himself a denizen of their society, he must expect no favour; the whole grove would immediately be up in arms against him, and drive him from the premises of which they had possessed themselves.

Rooks, in some countries, are considered as a benefit, in others a nuisance; but they are generally supposed to do as much service by destroying noxious insects, as they do injury by consuming the grain of the husbandman. They lay the same number of eggs as the crow, and they are of the same colour, but smaller.

The CALAO, or HORNED INDIAN RAVEN.

This bird exceeds the common Raven, both in size and in its habits of depredation: but it differs from all other birds in its beak, which, by its length and curvature at the end, appears designed for rapine: it has a kind of horn projecting from the top, somewhat resembling a second bill, which gives the bird a very formidable appearance. The horn springs from the forehead, and grows to the upper-part of the bill. Its bulk is considerable, and near the forehead is about four inches broad: it has some resemblance of the horn of the rhinoceros, but is more crooked at the tip. Were the body of this bird proportioned to the head, the calao would exceed the vulture or the eagle in magnitude. The breast and the whole body is black, but the tail is greenish, and the head of a dark yellow, without feathers: below the neck there hangs a kind of a bag, not unlike that of a turkey-cock. These birds, even in the East-Indies, are esteemed a great rarity, and sell for a considerable sum.

The ROYSTON CROW.

The bill of this species agrees in shape with that of the rook, and they both have a similitude in their manners; both flying in flocks, and both feeding on insects. The Royston Crow is a bird of passage in Great-Britain; visiting that country in the beginning of winter, and leaving it with the wood-cocks. It is found in both the inland and maritime parts of our country, and, in the latter they feed on shell-fish: They breed in Sweden, and usually build in alders. They lay, in general, four eggs. Belon, Gesner, and Aldrovandus agree that this is a bird of passage in their respective countries; that it visits high mountains in the breeding season, and descends into the plains on the approach of winter.

The length of these species is about twenty-two inches, the breadth twenty-three inches, and the weight twenty-two ounces. The head, the under-side of the neck, and the wings, are black, finely glossed with blue: the back, breast, belly, and upper-part of the neck, are of a pale ash-colour: the legs are black, and smaller than those of the rook. These are the only sort of Crow which are found in Shetland, though we cannot ascertain whether they breed in any other of the British isles.

NATURAL HISTORY of the CORNISH CHOUGH.

THIS bird is about seventeen inches in length, and thirty-three inches in breadth, when the wings are extended. It weighs twelve or thirteen ounces. It is almost as large as a crow, and nearly of the same shape. The bill, legs, and feet are red, but the feathers all over the body are black. It is remarkable for the unusual softness of its voice, when it applies for meat to those who often feed or care for it; and is equally remarkable for its frightful shriek at the approach of any thing strange. It is commonly kept about the houses in Cornwall, where it becomes tame, like ravens or magpies, and is equally mischievous; delighting in stealing money, or any shining bauble it happens to meet with. In its wild state, it is very apprehensive of danger, and builds its nest upon inaccessible cliffs, and in the middle of the steepest rocks. When tamed it is very amusing, docile, regular, and constant to its hour of meals. It goes early to roost, and generally takes shelter in some unfrequented place in tempestuous weather; but in serene weather, it gets upon the tops of houses, or struts about the ground in a very stately manner. Aldrovandus supposed this bird to be peculiar to the Alps, but it is found in Crete, Ireland, and Wales, as well as in the county of Cornwall in England.

NATURAL HISTORY of the JACK-DAW.

THE length of this bird is thirteen inches, the breadth twenty-eight inches, and the weight nine ounces. The head is large in proportion to its body; which, Mr. Willoughby says, argues him to be ingenious and crafty. The forehead is black, the hind part of the head ash-coloured; the breast and belly of the same colour, but more obscure: the rest of the plumage is black, slightly glossed with blue: the feet and bill are black. He is docile and loquacious. He builds in steeples, old castles, and high rocks, and lays five or six eggs in a season. Jackdaws flock together, and feed on insects, grain, seeds and fruits. They breed in England, and many other countries of Europe.

NATURAL HISTORY of the MAGPIE.

THE marks of this species are so well known, that it would be impertinent to give a particular description. Were its other accomplishments equal to its beauty, few of the feathered tribe could be put into competition with it. Its black, its white, its green, and purple, with the rich and gilded combination of the glosses on its tail, are elegant beyond description; but it is restless, vain, loud, and quarrelsome, and an unwelcome intruder every where; embracing every opportunity of doing mischief.

The bill of the Magpie resembles that of the butcher-bird, having a sharp process near the end of the upper chap. It also resembles it in the shortness of the wings, and the form of the tail, each feather shortening from the two middlemost. It agrees still more in its food, living upon worms, insects, and small birds. It will even destroy young chickens when it finds them separated from the hen. It lays six or seven eggs, which are of a pale green colour spotted with brown.

The Magpie has the insolence to tease the largest animals, when its insults can be offered with security. They are frequently seen perched upon the back of an ox or a sheep, pecking up the insects that are to be found there; chattering and tormenting the poor animal at the same time. They make

diligent search after the nests of birds, and if the parent escapes, his mansion is plundered of the eggs. Scarce any food comes amiss to it. Like the raven, it feeds on carrion; like the rook it delights in grain; and, like the cuckoo, it devours the eggs of birds. It is more provident, however, than most other gluttons; for when satisfied for the present, it treasures up the remainder of the feast for another occasion: even in a tame state, it will conceal its food when it has done eating, and when its appetite returns, it will return to the secret hoard.

The nest of the Magpie is usually placed in the middle of some hawthorn-bush, or on the top of an high tree. The place, however, is always found as inaccessible as possible to men, and the nest is curiously fenced above, to defend it from the various enemies of the air. The kite, the sparrow-hawk, and the crow, are to be guarded against; the Magpie having sometimes plundered their nests, naturally supposes they will embrace the first opportunity to retaliate. To prevent this, it builds a nest with surprising labour and ingenuity. The body of the nest is composed of hawthorn-branches, with the thorns sticking outwards. It is lined with fibrous roots, wool, and grass, and then ingeniously plaistered round with mud or clay. Above the nest, a canopy is raised, composed of the sharpest thorns, so curiously interwoven as to admit of no entrance but at the door: that aperture being just large enough to permit egress and regress to the owners. In this fortified mansion the male and female hatch and bring up their brood with security, sheltered from all attacks but those of the adventurous school-boy; who often pays too dear a price for the eggs, or young birds, by the wounds he receives from the pointed thorns.

In its domestic state, the Magpie is a more cunning, and consequently a more docile bird, than any other usually taken into keeping. Many of those who teach it to speak, have a ridiculous custom of cutting its tongue, which only torments the poor animal, without being of the smallest service. Though its speaking is sometimes very distinct, its sounds are too sharp to be an exact imitation of the human voice. The length of this bird is about eighteen inches, the breadth twenty-four inches, and the weight about nine ounces. There are many of these birds in Sweden, and they are found in many other countries. They began to pair in February, and lay their eggs very early. It is difficult to distinguish the cock Magpie from the hen, the colours are so exactly alike.

NATURAL HISTORY of the J A Y.

THE Jay is one of the most beautiful of the British birds. The bill is strong, thick, and black, and about a quarter of an inch long. The tongue is black, thin, and cloven at the tip. The forehead is white, streaked with black: the head is covered with very long feathers, which it can erect into a crest at pleasure. The neck, back, breast and belly are of a faintish purple, dashed with grey; and the covert feathers of the wings are of the same colour. The greater covert feathers of the wings are most beautifully barred with a lovely blue, black, and white. The tail consists of twelve black feathers, and the feet are of a pale brown. It lays five or six eggs, which are of a dullish white, mottled with a pale brown. Like the magpie, it feeds upon fruits, and in the summer is very injurious to gardens, being a great devourer of pease and cherries. In the autumn and winter they feed on acorns, and, according to Dr. Kramer, they will kill small

birds. Their native note is very disagreeable, but they are very docile, and may be taught to imitate the human voice.

The length of this bird is thirteen inches, the breadth twenty inches and an half, and the weight between six and seven ounces.

NATURAL HISTORY of the CHATTERER.

THE Chatterer is a native of Germany, and is somewhat smaller than the jay. It is variegated with a beautiful mixture of colours; red, ash-colour, brown, chestnut, and yellow; but what distinguishes this from all other birds, are the horny appendages from the tips of seven of the lesser quill feathers, which have the colour and gloss of the best sealing-wax. It lives in the woods, and feeds on juniper and other berries. This bird is also found in North-America.

NATURAL HISTORY of the R O L L E R.

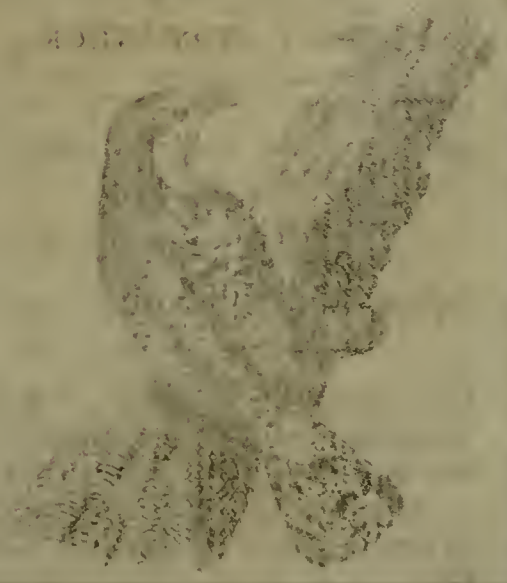
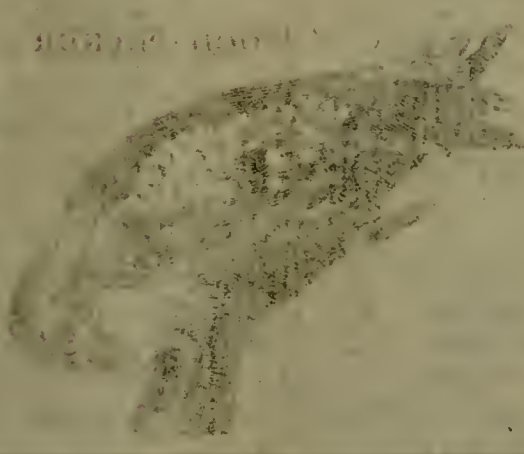
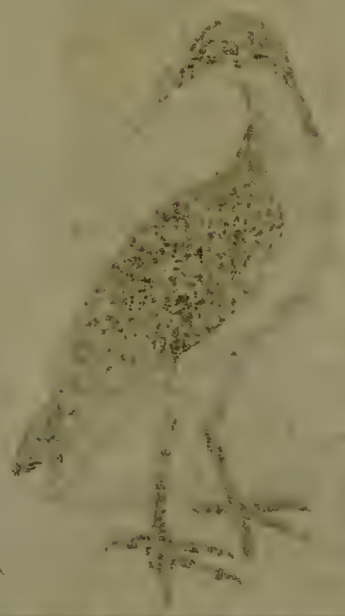
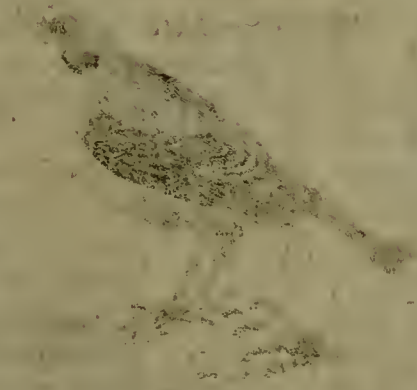
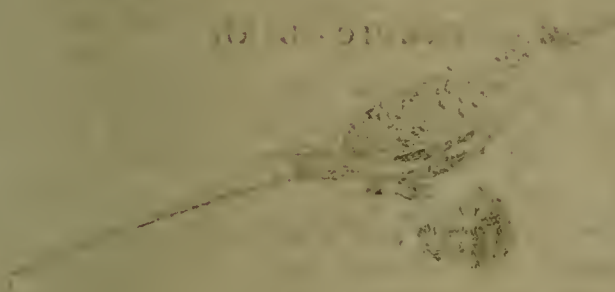
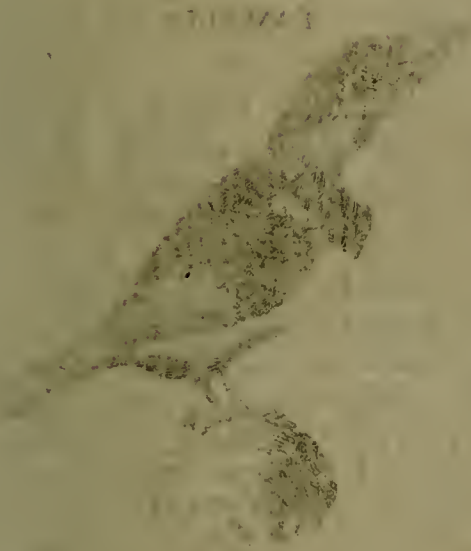
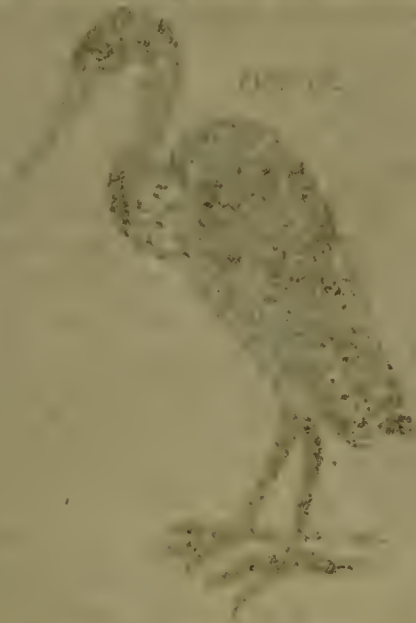
THIS is a very beautiful bird: the head is green, the breast and belly of a whitish blue; and the wings are variegated with black, white, and a delightful blue. But it may be distinguished from all others, by a sort of naked tubercles or warts near the eyes; by the shape of its tail, the outer feathers of which are longer than the rest; and by its toes, which are cloven quite to the bottom.

NATURAL HISTORY of the B L U E J A Y.

THE shape of this bird is not unlike the common European Jay, except that the tail is longer, and the feathers of unequal lengths; those in the middle being the longest. The bill is black; the feathers on the top of the head are long and blue, and can at pleasure be raised into a crest. The sides of the head, and part of the throat are white, surrounded with a black line; and above each eye there is a white spot. The lower part of the neck behind, and the back, are of a blue, inclining to purple; the upper sides of the wings and tail are of a very fine blue, and the lower part of the back and rump are of the same colour. The tail feathers, except the two middlemost, are tipped with white, and barred with three black bars. The rest of the quills next the back, and the first row of the feathers above them, are tipped with white, and elegantly barred with black. The breast is of a brownish red, inclining to a rose colour, which gradually becomes white towards the belly. The legs, feet, and thighs are of a dusky brown. It inhabits Carolina, and has a more harmonious note than our European Jays. The colours of the female are the same as those of the male, except that they are somewhat duller.

NATURAL HISTORY of the B E N G A L J A Y.

THIS is larger than the English Jay, and has an ash-coloured bill. The upper-part of the head is blue, and the neck and breast are a mixture of light brown and red, with a little cast of a lead colour. The back is of a muddy dark green, and the wings, belly, and thighs are blue. That part of the tail next the rump, as well as at the extremity, is of a dark blue; but the middle part is paler and whiter. The legs and feet are of a yellowish brown, with black open claws.



B I R D S

A SPOON - BILL



SOCO



A TOUCAN



TAMATIA



A VULTURE



TROPIC - BIRD



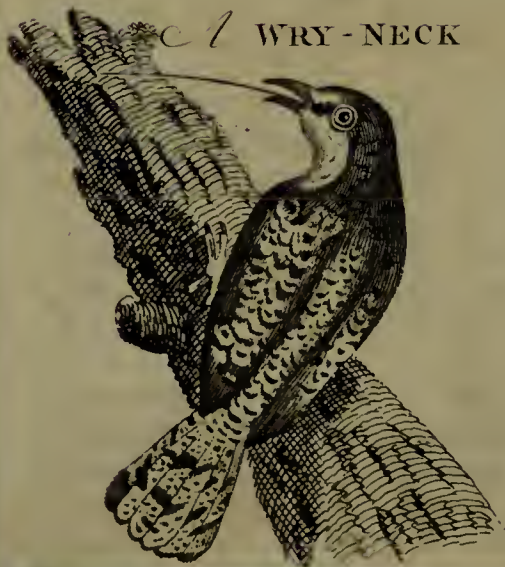
WHEAT - EAR



WIMBREL



A WRY - NECK



A WOOD - PECKER



NATURAL HISTORY of the LITTLE INDIAN PIE.

THE bill of this bird is of a blackish colour towards the point, but the angles at the corner of the mouth are of an orange colour. The head, neck, breast, back, rump, and covert feathers of the wings, are of a deep black, with a shining gloss, changeable from blue to purple. The quill feathers of the wings, and those on the ridge next the breast, are of a dusky brown; but a few of the middle quills are white, as well as the first row of coverts just above. The belly and thighs are white; the middle feathers of the tail are black, and somewhat longer than those on the sides. The legs and feet are of a dark brown, and the toes have strong claws. This is a native of Bengal.

NATURAL HISTORY of the RED-BEAKED TOUCAN.

THE shape of this bird resembles that of the jack-daw, and the size is nearly the same; with a very large head to support its monstrous bill; which from the angles of its mouth to its point, is six inches and an half, and the breadth in the thickest part exceeds two inches. Its thickness near the head is one inch and a quarter; and it is a little arched or rounded along the top of the upper chap, the under side being round also. The whole of the bill is extremely slight, and almost as thin as parchment. The upper chap is of a bright yellow, except on each side, which is of a beautiful red; as is also the lower chap, except at the base, which inclines to a purple. There is a black line of separation all round the base of the bill, between that and the head: the nostrils are placed in the upper part of the bill, and are almost covered with feathers; which has occasioned some writers to say, that the Toucan is without nostrils. Round the eyes, on each side of the head, is a space of bluish skin, destitute of feathers, above which the head is black, except a white spot on each side joining to the base of the upper chap. The hind part of the neck, the back, wings, tail, belly and thighs are black. The under side of the head, the throat, and the upper part of the breast, are white. There are a parcel of red feathers, in the form of a new moon with its horns upwards, between the white on the breast, and the black on the belly. The covert feathers under the tail are red, and those above it yellow. The legs, feet, and claws are ash-coloured, and the toes are disposed like those of parrots, two before, and two behind.

Travellers assure us, that notwithstanding this bird is furnished with so formidable a beak it is very gentle and inoffensive, and so easily tamed, that it will sit and hatch its young in houses. They also say, it feeds principally on pepper, which it devours very greedily, gorging itself in such a manner that it excludes it crude and uncooked. Whatever credit this account may deserve, it is certain that the Toucan lives principally upon a vegetable diet; and, in a domestic state, it is seen to prefer such food to any other. Pozzo, who bred one of these birds tame, says it leaped up and down, moved its tail, and cried with a voice resembling that of a magpie. Any thing upon which parrots fed, seemed to be agreeable to it, but it was particularly fond of grapes; and, if they were plucked off one by one, and thrown into the air, it would catch them with great dexterity before they fell to the ground. Pozzo further informs us that its bill was hollow and extremely light, and consequently it had but little strength in a weapon which appeared so formidable: but its tongue seemed to assist the

No. 17.

efforts of this unwieldy machine. It was long, thin, and flat, and moved up and down; the animal often extending it five or six inches from the bill. It was of a flesh colour, curiously fringed on each side with very small filaments, exactly resembling a feather.

It appears evident that this long tongue is stronger than the thin hollow beak that contains it. Probably the beak is only a kind of sheath for this peculiar instrument, which is used by the Toucan, not only in making itself a nest, but also in obtaining its provision. It is, however, an absolute certainty that it builds its nest in the holes of trees, which have been previously made for that purpose; and it can hardly be supposed that so feeble a bill could penetrate such hard materials.

The Toucan has not only men, birds, and serpents to guard against, but also a numerous tribe of monkeys, still more prying, mischievous, and hungry than all the rest. It therefore scoops out its nest in the hollow of some tree, leaving a hole just large enough to go in and out at. There it sits, guarding the entrance with its great beak; and if the monkey, prompted by curiosity, or from any other motive, ventures to visit it, he usually receives such a welcome from the Toucan, that he is glad to escape with safety. This bird inhabits only the warm climates of South-America, where it is much esteemed for the delicacy of its flesh, and for the beauty of its plumage. The feathers of the breast are particularly admired; and the Indians pluck off the skin of this part, which, when dry, they glue to their cheeks: this they consider as an irresistible addition to their beauty, and every woman is happy in the possession of it.

The use of the extraordinary beak of this bird is for stripping off the pepper, and fruits of a like sort from the stalk; and this all of the kind do with surprizing quickness.

When we contemplate the bird creation, the prodigious variety in their bills, wings, and claws, cannot fail to strike us; nor can we imagine, that all these different forms are no more than the mere play of nature, when we see how exquisitely designed and accommodated is every part of the creation. A nearer and more accurate survey will tend abundantly to convince us, that all these various parts in different creatures are calculated for the accommodations of their wants. They are a set of implements proportioned, by the all-wise and original designer, to the nature of their labours and manner of life. And he who wants to be satisfied of this, will do well only to consider a few instances, which will give him an additional proof of God's care of his creation, and of his consummate wisdom, which planned and which perfected this amazing scheme of things. More striking instances cannot be produced, than this before us, from which let the speculist turn to the little hard-beaked sparrow, and other small birds, which live upon seeds; to the wood-cock, the snipe, the curlew, which extract their aliment from the earth; the wood-pecker, whose horny bill is employed in picking insects from the hard wood; to the heron, the stork, the swan, the goose, and he will be assured, that these too, however minute, proclaim a wise and good Creator.

NATURAL HISTORY of the PIE of the CARIBBEE ISLANDS.

THIS beautiful bird has a kind of a white hood on its head, spotted and striped with black lines, which extend from the bill to the back, where the feathers are tawny as far as the rump, which is quite yellow. It has a blue neck, with a white circle

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cle in the middle. It has a large tail, consisting of eight blue feathers, striped with white, two of which are nine or ten inches longer than the rest. The small feathers on the wings are tawny, striped with black lines; the large are a mixture of green and blue, the belly is entirely white, and the feet are red. These pies are shyer than those of Europe, hardly permitting a man to look at them while they are on the trees.

The Indian chattering Pie is like the common jay, but smaller.

The African Pie, seen near the Cape of Good-Hope, is about the size of the common jay, and has a red bill and red feet. It is entirely black, except a white circle round the neck. It frequents tall trees, and the tops of high rocks, and is particularly fond of wild almonds. It is a docile bird, and may be taught to speak like a parrot.

NATURAL HISTORY of the GREEN WOOD-PECKER.

THERE are many kinds of this bird, and many varieties in each kind. They form large colonies in the forests of almost every part of the world. The wisdom of Providence in the admirable contrivance of the fitness of the parts of animals to their respective nature, cannot be better illustrated than from this genus.

Wood-Peckers feed entirely on insects; and their principal action is that of climbing up and down the bodies or boughs of trees. For the purpose of procuring their food, they are provided with a long slender tongue, armed with a sharp bony end, barbed on each side, which, by the assistance of a curious apparatus of muscles, they can exert at pleasure, darting it to a great length into the clefts of the bark, transfixing and drawing out the insects that lurk there. Such is the instrument with which this bird is provided; and this is the manner in which this instrument is employed. When a Wood-Pecker discovers a rotten hollow tree, where there are worms, ants-eggs, or insects, it instantly prepares for its operations. Resting by its strong claws, and leaning on the thick feathers of its tail, it bores with its sharp strong beak, till it discloses the whole internal habitation. Then, either from its satisfaction at the sight of the prey, or with intent to alarm the insect colony, it sends forth a loud cry, which creates terror and confusion among the whole tribe, and puts them immediately in motion; while the bird luxuriously feasts upon them at leisure, darting its tongue with unerring certainty, and devouring the whole brood.

The depredations of the Wood-Pecker, however, are not confined solely to trees, but it sometimes descends to the ground to try its fortune at an ant-hill; where it is not so secure of prey as in the former case, though the numbers are much greater. They usually lie too deep for the birds to come at them, but they supply by stratagem the defect of their power. The Wood-Pecker pecks at their hills, in order to call them abroad; and, thrusting out its long red tongue, which resembles their usual prey, the ants come in crowds to settle upon it: the bird, watching a favourable opportunity, withdraws its tongue at a jerk, and devours the devourers.

The Wood-Pecker makes cavities in trees to form its nest, and to lay in. This is performed with the bill, though some have erroneously affirmed that the animal uses its tongue, as a gimlet, to bore with. For this purpose, the Wood-Pecker chooses those trees that are decayed, or those which have soft wood, like beech, elm, and poplar. In these it can, with great facility, make holes that are exactly round: but as it is delicate in its choice, it usually

makes several before any one will give it entire satisfaction. When it has made one that it approves of, it nestles and brings up its young in it; and those which it has deserted are taken possession of by other birds, which are not such expert borers, and are less delicate in their choice. The jay and the starling sometimes lay their eggs in those holes; and bats are frequently known to occupy them. School-boys, who have thrust in their hands with certain hopes of plucking out a bird's egg, have sometimes, to their great mortification, had their fingers bitten at the bottom.

The nest of the Wood-Pecker has neither feathers, straw, nor any other lining; its eggs are deposited in the hole, without any thing except the heat of the parent's body to keep them warm. Their number is usually five or six, which are always oblong, and of a semi-transparent white.

The green Wood-Pecker is about thirteen inches long, twenty-one inches broad, and weighs six ounces and an half. The bill is dusky, triangular, and near two inches long: it is exceeding strong and hard, and formed like a wedge at the end. Dr. Derham observes that a neat ridge runs along the top, as if an artist had designed it for strength and beauty. The eyes are surrounded with black, beneath which there is a crimson mark in the males, though not in the females. The back, neck, and lesser coverts of the wings, are green; and the rump is of a pale yellow. The greater quill feathers are dusky, spotted with white on each side. The tail consists of ten stiff feathers, the ends of which are generally broken, as the birds rest on them in climbing: the tips of them are black, and the other parts are alternately barred with dusky and deep green. The whole of the under part of the body is of a very pale green; and the thighs are marked with dusky lines. The legs, which are of a palish green, are short and strong; the thighs are very muscular; two of their toes point forwards, and two backwards.

This bird is also called the Rain Fowl, because it is supposed to foretel rain, when it makes a greater noise than usual. Brisson, however, calls it *Le Pic-verd*.

The GREAT SPOTTED WOOD-PECKER.

This bird is about nine inches in length, sixteen inches in breadth, and weighs two ounces and three quarters. The bill is of a black horn-colour, and the forehead of a pale buff-colour. The crown of the head is of a glossy black, and the hind part is marked with a rich deep crimson spot. The cheeks are white, bounded beneath by a black line, which passes from the corner of the mouth, and surrounds the hind part of the head. The neck is encircled with a black colour; and the throat and breast are of a yellowish white. The back, rump, coverts of the tail, and lesser coverts of the wings, are black. The quill feathers are black, each web being elegantly marked with round white spots. The four middle feathers of the tail are black, the next are tipped with dirty yellow, and the bottoms of the two outermost are black. The legs are of a lead-colour. The colours of the female agree with those of the male, except that the female wants that beautiful crimson spot on the head.

The LESSER SPOTTED WOOD-PECKER:

This resembles the former in colour and shape, but is considerably smaller, and hardly weighs an ounce. Its length from the tip of the bill to the end of the tail, is only six inches, and its breadth, when the wings are extended, is eleven inches. The forehead is of a dirty white: the crown of the head (in the male only) is of a beautiful crimson: the cheeks and sides of the neck are white: the hind part

part of the head and neck, and the coverts of the wings, are black. The back is barred with black and white; the breast and belly are of a dirty white, and the vent feathers of a bright crimson. The crown of the head (in the female) is white, and the feet are of a lead colour: it has all the characters and habits of the larger kind, but is not so frequently seen.

The GUINEA WOOD-PECKER.

A traveller who walks into the forests of Guinea and Brasil, among the first strange objects that excites his curiosity, is struck with the multitude of birds nests hanging at the extremity of the branches of trees. Many birds build in this manner, but the chief of them are of the Wood-pecker kind; and indeed, there is not, in the whole history of nature, a more singular instance of the sagacity of those little animals, in protecting themselves against those enemies from which they apprehend danger. In cultivated countries, the chief caution of the feathered tribe, is to conceal their nests from the invasions of man, considering him as their greatest enemy. But in these remote and solitary forests, where man is seldom seen, he cannot possibly be dreaded. Regardless how much the nest is exposed to general notice, the parent is satisfied if it be out of the reach of those rapacious creatures that live by robbery and surprize. The monkey and the snake are almost the only enemies it has to fear; and, to guard against them, it builds its nest upon the most outward branches of a tall tree, such as the banana, or the plantane. On one of those immense trees are seen the strangest assemblage of creatures that can be imagined. Some particular tribe of monkeys inhabit the top, which drive off all others that attempt to associate with them. About the trunk of the tree are twined great numbers of the larger kind of snakes, waiting till some unwary animal comes within the sphere of their activity; and these extraordinary nests hang in great abundance at the edges of the tree, inhabited by birds of the most delightful plumage.

They usually form the nest in the following manner: when the time of incubation approaches, they fly about in search of a kind of moss peculiar to those countries. It is a fibrous substance resembling hair, which may be easily moulded into any form. This the little Wood-pecker glues, by some viscous substance gathered in the forest, to the extreme branch of a tree; then, adding fresh materials to those already procured, a nest is formed, that hangs like a pouch from the point of the branch. On one side there is a hole to enter at, and all the interior parts are lined with the finer fibres of the same substance.

These hanging nests are made by some other birds with still superior art. A small bird of the grosbeak kind in the Phillippine Islands, forms its nest in such a manner, that there is no opening but from the bottom where the bird enters, and goes up as it were through a funnel, like a chimney, till it comes to the real door of the nest, which lies on one side, and only opens into the funnel. Some glue their nests to the leaf of the banana-tree. But they are built with the same precautions to guard the young against the depredations of monkeys and serpents, which abound in every tree. The nest hangs secure, and these spoilers can only gaze upon them, while the bird flies in and out without danger or molestation.

NATURAL HISTORY of the BIRD of PARADISE.

THERE are of this species nine sorts, according to some naturalists. Our countryman, Mr. Edwards, describes three. The greater Bird of Pa-

radise; the king of the Birds of Paradise; and the golden Bird of Paradise.

That these birds have no feet was believed generally some years since, but it is now well known that they have feet and legs as well as others, and those, says Ray, "not short, small, or feeble ones, but sufficiently great and long, armed with crooked talons, being the members of birds of prey."

The Bird of Paradise, described by Moregrave, is of the size of a swallow, with a small head and eyes, a sharp beak, thick feet, and crooked claws; the feathers about the beak are soft as silk, green and brown above, and black below: the top of the neck is of a gold colour, underneath the neck is a mixture of gold and green: the breast is of a deep brown, and the rest of the body, wings and tail, of a beautiful brownish colour: the long feathers on the sides are of a gold colour near their rise, but in other parts of a whitish yellow.

The king of the Birds of Paradise, mentioned by Clusius, is the least of the species; the wings are much longer than the body; the beak is white, and an inch in length; the lower part is covered with a sort of red silky down, as well as the fore-part of his head: the middle part of the eyes are full of black specks: the feathers on the neck and breast are of a deep black, and have the resemblance of silk: the back, wings, and tail, are all of the same colour, that is, of a dusky yellow: the feathers which cover the belly are white, but near the wings black: the quills are slender and black, and at the end rolled into a sort of ball: on one side of them are long, fine, shaggy hairs: the upper side is of a shining deep green, but they are of a dusky yellow underneath.

Mr. Edwards's king of the Birds of Paradise differs from that of Clusius. The beak and thighs of his are white, though the lower part of the thighs above the knees incline to brown.

The golden Bird of Paradise has a gold coloured neck as well as beak: the feet and toes are yellow: the breast and back of a pale orange colour; and the large feathers of the wing and tail are of a reddish orange.

A Bird of Paradise, different from those which we have described, is found, now and then, in the island of Ceylon, in the East-Indies; but no writer has given a particular description of it.

Linnæus mentions only two of these birds in his system. Not. 1. *Paradisæa*, with two long threads at the tail, which are feathers at the points, and rolled up. 2. *Paradisæa*, with feathers at the sides longer than the body, and two long bristly feathers in the tail.

The reflective reader will note, in every instance produced, the great beauty and variety of the Creator's works, which all unite to attest his power, his goodness and wisdom.

The Bird of Paradise, which is a native of the Molucca Islands, exceeds in beauty all others of the pie kind: they are also found in great plenty in the island of Aro. There, in the delightful and spicy woods of the country, do these beautiful creatures appear in large flocks; so that the groves, which produce the richest spices, produce also the finest birds. The inhabitants are so sensible of the pleasures these afford, that they call them God's birds, as being superior to all birds that he has created. They are called by some the swallows of Ternate; from their rapid flight, and from their being continually on the wing in pursuit of insects, which are their usual prey.

The country, where they are bred, having its tempestuous season, when rain and thunder continually disturb the atmosphere, few of them are then to be seen. At such times it is imagined they fly to other countries, where their food is to be found in greater abundance; for, like swallows, they have their

their stated times of return. In the beginning of August, vast numbers of them are seen flying together; and, as the inhabitants suppose, follow their king, who is distinguished from the rest by the lustre of his plumage, and that respect and homage which is paid him. They perch, in the evening, upon the highest trees in the forest; generally making choice of one which bears a red berry, upon which they sometimes feed when they have scarcity of other food.

The natives, who employ themselves in killing these birds, in order to sell them to the Europeans, usually hide themselves in the trees where they resort; and, having concealed themselves in a kind of bower, which they form of the branches, they shoot at them with reedy arrows; and, if they happen to kill the king, as they call him, they seldom fail of taking the greatest part of the flock.

The PIED BIRD of PARADISE.

This bird has a blackish bill like that of a duck, and at the base of the upper chap there are stiff black hairs. The head and neck are black, with a crest of loose slender feathers bending backwards. The whole of the body is white, except the wings: the prime quills are black, except towards the roots, where they are whitish. The quills next the back are black in the middle, and white on the edges: the lesser covert feathers of the wings are white, with a long dash of black on each feather. The tail is nearly as long as that of a magpie, and the two middle feathers are about ten inches longer than the rest. The tail feathers are white, and the shortest of them are tipped and bordered with a fringe of black. The shafts of the tail feathers are black, except so much of the long feathers as shoot beyond the shorter. The feet resemble those of the king's-fisher. This bird is an inhabitant of the East-Indies.

NATURAL HISTORY of the CUCKOO.

THE note of the Cuckoo is known to all the world, but the history and nature of the bird itself remains still in obscurity. It has been asserted that it devours its parent, and that it changes its nature with the season, and becomes a sparrow-hawk; but these fables are now sufficiently refuted. Still, however, it remains a secret where it resides in winter, or how it provides for its supply during that season.

The claw and bill of the Cuckoo are smaller and much weaker than those of other rapacious birds. This singular bird, which is somewhat less than a pigeon, shaped like a magpie, and of a greyish colour, is distinguished from all other birds, by its round prominent nostrils on the surface of the bill. The lower part of the body is of a yellowish colour, with black transverse lines under the throat, and on the top of the breast. The head, the upper-part of the body, and the wings, are beautifully marked with tawny and black transparent stripes, and there are a few white spots on the top of the head. The ends of the feathers on the rump and the bottom of the back are white, and the inner edge of the outward part of the wings are painted with large transverse white spots. The tail is pretty long, with black and tawny streaks running across it, and white spots on the outward edges of the feathers. It consists of eight feathers, of which two in the middle are much the longest, and those on each side grow regularly shorter. The legs, which are very short, are clothed with feathers down to the feet, which are weak and yellowish, and the claws are nearly of the same colour. It has four toes, two of which are placed before, and two behind; the more inward of these are

shorter than the rest. Its mouth is large, and yellowish on the inside.

Having disappeared all the winter, the Cuckoo discovers itself in our country early in the spring, by its well-known voice. He is indeed silent for some little time after his arrival: his note is a call to love, and is used only by the male, who is usually perched on a dead tree, or a bare bough, repeating his song, which he loses as soon as the amorous season is over. The note of this bird is so uniform, that his name in all languages, seems to have been derived from it; and in all countries it is used in the same reproachful sense.

This reproach probably arose from this bird making use of the nest of another to deposit its eggs in; leaving the care of its young to another of the feathered tribe. A water-wagtail, or hedge-sparrow, generally performs the office of nurse to the young cuckoos; and if they happen to be hatched at the same time with the genuine offspring, they quickly destroy them by over-laying them, as their growth is soon so superior.

From the cheerful voice of the Cuckoo, the farmer may be instructed in the real advancement of the year. Human calendars we know are fallible; but, as the note of this bird depends upon a certain temperature of the air, these feathered guides point out to us the true commencement of the season. The note of the Cuckoo is pleasant, though uniform; and, from an association of ideas, seldom occurs to the memory, without reminding us of the sweets of summer. This bird usually lays one egg, which is speckled, and about the size of a black-bird's.

When the Cuckoo is fledged and fitted for flight, it does not long attend its supposed parent: as its appetites for insect food increases, it cannot expect a supply by imitating its little instructor; it therefore takes a friendly leave, and seldom offers any violence to its nurse. But all the little birds consider the young Cuckoo as an enemy, and revenge the causes of their kind by their repeated insults. All the smaller birds form the train of its pursuers; but the wry-neck is the most active in the chase; and from thence has been considered by many as the provider and attendant of the Cuckoo. But it is well known that it follows with no friendly intention; it only attends as an insulter or a spy, to warn the little warblers of the depredations of the Cuckoo.

Such are the habits of this bird while it continues amongst us; but at the approach of winter it totally disappears, and its passage cannot be traced to any other country. Some imagine it lives concealed in hollow trees, and others that it passes into warmer climates. Which of these opinions is true, is very uncertain, as nothing has been related on either side that can be absolutely relied on. The most probable conjecture is, that as quails and woodcocks shift their habitations in winter, so also does the Cuckoo: but whither it retires, or if any person has ever seen it on its journey, we are at a loss to determine.

It has been doubted whether these birds are carnivorous; but Reaumur, who bred up several, informs us that they would not feed upon bread or corn, flesh and insects being their favourite provision; but insects seemed to afford them the most agreeable repast, and they greedily devoured them. Their voracity indeed is not to be wondered at, their stomach being so capacious, as to reach from the back-bone to the vent. Nevertheless, they are not to be considered as birds of prey, being destitute of the necessary strength and courage. They are naturally weak and timid, as appears by their flying from small birds, by which they are every where pursued.

The length of the Cuckoo is fourteen inches, the breadth twenty-five inches, and the weight about five ounces. The young birds are brown, mixed

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with black, and, in that state, some authors have described them as old ones.

In different parts of the world, there are various kinds of this bird, differing both in size and colour. Brisson enumerates twenty-eight sorts of them. He mentions one of Brasil, as making a most horrible noise in the forests; which must be a very different note from that by which our cuckoo is distinguished. Linnæus informs us that the male and female Cuckoo resemble each other in colour, except that the male has the corners of the mouth yellow, as in young sparrows; and the head, back, and neck, are of an ash colour, without any grey spots; and that the belly is darker. The flesh of Cuckoos is seldom eaten, for it is not easily obtained; and perhaps it may not generally be thought fit for that purpose; but those who have tasted it, affirm that the young Cuckoo is a most delicious morsel. The Italians, in particular, are extravagantly fond of it.

The Cuckoo was consecrated to Jupiter. The fable says, that God, having made the air extremely cold, transformed himself into a Cuckoo, and went to repose himself on the bosom of Juno, who received him willingly: a poetic figure, which intimates the success of an intrigue. Mount Thornax in Peloponnesus, where this adventure happened, was from that time called the mountain of the Cuckoo.

NATURAL HISTORY of the PARROT.

OF all foreign birds, the Parrot is the best known among us, as it unites the greatest beauty with the greatest docility. It imitates the human voice better than any other bird; the raven being too hoarse in its speech, and the jay and magpie too shrill. It is astonishing with what ease the Parrot is taught to speak; we are assured from good authority, that one of these birds was taught to repeat a whole sonnet from Petrarch. Not many years ago, a gentleman in the city of London became possessed of two Parrots, each having received a very different education from the other. One had received his tuition from a cook-maid in a gentleman's kitchen, and the other had obtained his instruction in a very religious family, where the morning and evening services were regularly repeated every day. The former, probably from hearing the cook frequently make use of the same expression, often cried out in a distinct and audible voice, "The d—l take my mistress!" The latter, from attending to the responses which he had heard in the religious family, always made responses to the imprecations of the other in the following words, "We beseech thee to hear us, good L—d!" So that for hours together, the Parrots would thus entertain themselves and their auditors; one crying, "The d—l take my mistress," and the other uttering immediately afterwards, "We beseech thee to hear us, good L—d!"

Birds, as well as men, who talk a great deal, may sometimes happen to drop a pertinent expression, or, as the phrase is, say a good thing. Willoughby relates a story of a Parrot, which will illustrate this observation. Though it has been mentioned by Dr. Goldsmith, and many other authors, we hope we shall stand excused for introducing it here. These are his words, "A Parrot belonging to king Henry the Seventh, who then resided at Westminster, in his palace by the river Thames, had learned to talk many words from the passengers as they happened to take water. One day, sporting on its perch, the poor bird fell into the water, at the same time crying out, as loud as he could, "A boat, twenty pounds for a boat!" A waterman, who happened to

No. 18.

be near, hearing the cry, made to the place where the Parrot was floating, and taking him up restored him to the king. As it seems the bird was a favourite, the man insisted that he ought to have a reward rather equal to his services than his trouble; and as the Parrot had cried twenty pounds, he said the king was bound in honour to grant it. The king at last agreed to leave it to the Parrot's own determination, which the bird hearing, cried out, "Give the knave a groat."

Our naturalists have, in vain, attempted to arrange the various species of this bird. Linnæus makes the number of its varieties amount to forty-seven; and Brisson doubles that number, extending his catalogue to ninety-five. This list might perhaps be increased, were every accidental change of colour to be considered as constituting a new species. Those who usually bring over these birds, seldom make more than three or four distinctions. The large kind, which are about the size of a raven, are called maccaws and cockatoos; the next are simply called Parrots; those which are entirely white are called lories, and the smallest size of all are called parrokeets. Though these are different in size, they are all formed alike, having two toes before, and two behind, for climbing and holding: they have all strong hooked bills for breaking open nuts and other hard substances out of which they feed; and they have loud harsh voices, which make their native woods resound.

The toes of these birds are singularly contrived, which evidently appear when they walk or climb, and when they are eating: for walking or climbing, they stretch two of their toes forward, and two backward; but when they use the foot to convey the meat to their mouths, they dextrously turn the greater hind toe forward so as to take a firmer grasp of what they are going to feed on, standing upon the other leg the whole time. They do not, like other animals, turn their meat inwards to the mouth, but, in a seeming awkward position, turn it outward, and in that manner hold the hardest nuts, till they break the shell with their bills, and extract the kernel.

The bill is of a peculiar kind, for both the upper and lower chaps are moveable. In most other birds the upper chap is connected, and makes one piece with the skull; but in these it is joined to the bone of the head by a strong membrane, placed on each side, that raises and depresses it at pleasure. Thus they are enabled to open their bills the wider; which is extremely convenient, as the upper chap is so hooked, and hangs so much over, that if only the lower chap had motion, they could hardly gape wide enough to receive their nourishment.

The beak and the toes are often employed both together, when the Parrot is exercised in climbing. He cannot, like the other birds, hop from bough to bough, its legs not being adapted for that purpose; it first catches hold with the beak, as if with a hook; then it draws up its legs and fastens them; afterwards it advances the head and the beak again; and thus puts forward the body and the beak alternately, till it attains the height it aspires to.

The tongue of the Parrot resembles the human tongue, on which account some imagine it is so well qualified to imitate the human voice; but the organs, by which these sounds are articulated, lie farther down in the throat, being performed by the great motion of the os hyoides.

Though a common bird in Europe, the Parrot will not breed here; the climate being too cold for its warm constitution. When arrived at maturity, it is able to endure our winter, yet it is in some degree affected by its rigour, its spirit and appetite being impaired during the colder part of that season. This bird, however, lives a considerable time,

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even with us, if properly attended to; and, indeed, it is to be lamented, that too much of the attention of some people is engaged in this business. The best excuse that can be pleaded by those who spend whole hours in teaching their Parrots to speak, is their extreme sagacity and docility; and indeed, on those occasions, the bird seems the wisest animal of the two. In those families where the master or the mistress have the least to do, this bird receives the greatest instruction, and becomes more expert in proportion to the assiduity of its teachers. The French ladies spend a great part of their time in instructing their feathered pupils, and it must be acknowledged that the Parrots in France speak much more distinctly than those in England, in consequence of their continual schooling. But, even the Parrots of France are much inferior to those of the Brasils, where their education is considered as a very serious affair. Clusius assures us that the Parrots of that country are the most sensible and cunning of all animals not endued with reason. There is a large bird of this kind there, called the aicurous, the head of which is red, violet, and yellow; the body green, the ends of the wings red, and the tail long and yellow. This animal is seldom brought into Europe, but it is a prodigy of understanding. "A certain Brasilian woman," says Clusius, "that lived in a village two miles distant from the island on which we resided, had a Parrot of this kind, which was the wonder of the place. It seemed indued with such understanding, as to discern and comprehend whatever she said to it. As we sometimes used to pass by that woman's house, she used to call upon us to stop, promising, if we gave her a comb, or a looking-glass, that she would make her Parrot sing and dance to entertain us. If we agreed to her request, as soon as she had pronounced some words to the bird, it began not only to leap and skip on the perch on which it stood, but also to talk and to whistle, and imitate the shoutings and exclamations of the Brasilians when they prepare for battle. In brief, when it came into the woman's head to bid it sing, it sang; to dance, it danced. But if, contrary to our promise, we refused to give the woman the little present agreed on, the Parrot seemed to sympathize in her resentment, and was silent and immoveable; neither could we, by any means, provoke it to move either foot or tongue."

This sagacity seems also natural to Parrots in their native residence among the woods. They flock together, and mutually assist each other against their enemies. They usually breed in hollow trees, where they make a round hole, and have no lining to their nests. The largest Parrots lay two or three eggs, but it is probable that the smaller kind may lay more; it being an invariable rule in nature, that the smallest animals are the most prolific. In general, however, they have but two eggs, like those of the pigeon, and nearly of the same size; marked with little specks, like those of the partridge. Travellers assure us, that the nests of Parrots are always found in the trunks of the tallest, straightest, and the largest trees. The natives of those countries are very assiduous in spying out the places where they nestle; and, as those birds which are taken young have always the greatest docility, a nest is considered as worth taking some trouble to be possessed of: the usual method, therefore, is to cut down the tree; and though, in the fall, it frequently happens that the young Parrots are killed; yet, if one of them should survive, the spoiler considers himself as sufficiently rewarded.

But, as the natives cannot always supply the demand for young ones, they are contented to take the old; which they shoot in the woods with heavy arrows, headed with cotton, which usually stuns the bird, and brings it to the ground without killing it.

After receiving this blow, some of the Parrots die, and others recover. Those which are restored become talkative by proper tuition, tender usage, and plentiful feeding.

But the savages are not thus industrious to procure these birds merely for their conversation; for, though some of them are ill-tasted, others are very delicate food; particularly those of the small parroquet tribe. Labat assures us that the parroquet kind in Brasil, are the most beautiful in their plumage, and the most talkative birds in nature. They are extremely tame, appear delighted in the company of mankind, and are fond of holding a parley with him: but unhappily for them, they are possessed of another quality which is sufficient to put an end to this association: their flesh is the most delicate that can be imagined, and is highly esteemed by those who had rather indulge their appetites than their ears.

There are indeed many motives for destroying these beautiful birds, notwithstanding which they are in very great plenty; and are considered by the negroes, on the coast of Guinea, as their greatest tormentors. They are persecuted with the incessant screaming of flocks of Parrots, which also devour whatever fruits they attempt to produce by art in their little gardens. They are not indeed quite so numerous and destructive in other places; but there is hardly a country of the tropical climates that has not many of the common kinds, as well as some which are peculiarly its own. Upwards of an hundred different kinds have been enumerated by travellers, on the continent of Africa only; and there is one country in particular, north of the Cape of Good-Hope, which takes its name from the multitude of Parrots that inhabit its woods. White Parrots are seen in the burning regions of Ethiopia; in the East Indians they are of the largest size; they are docile and talkative in South America; they swarm in great variety and abundance in all the islands of the Pacific Sea, and the Indian Ocean, and add to the splendour of those woods which are cloathed in continual verdure.

Though these birds are at present so universally known, and their variety so great, there was only one kind of them known among the ancients. The green parroquet, with a red neck, was the first of this sort that was brought into Europe, and the only one that was known to the ancients from the time of Alexander the Great to the age of Nero. This was brought over from India; and when the Romans became industrious to discover new and unheard-of luxuries, they found others in Gaganda, an island of Ethiopia, which they considered as a discovery of the utmost consequence.

Though Parrots have usually the same disorders with other birds, and some peculiar to their kind, they are generally long-lived; and, if properly attended, will live from twenty-five to thirty years. Condamine observes that the Americans, on the banks of the river Oyapœ, have the art of engrafting feathers of a different colour in the Parrot.

The WHITE-CRESTED PARROT.

The body of this Parrot is intirely white, and it has a red crest on the head. It is about the size of a tame pigeon, and carries its tail lifted up. The feet are yellowish, by which it may be distinguished from all the other Parrots. The tongue is brown, and the eyes of a dirty yellow. The legs and thighs are short, and, after breeding time, these Parrots fly in flocks.

The WHITE-HEADED PARROT.

The bill of this bird, and that part of the head next to it is white: the throat and the edges of the wings are red, and the lower part of the breast is
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of a dark red. The back part of the head, the neck, the back, the wings, and tail, are of a deep green; but the breast and thighs are of a paler green. On account of the various colours, this bird might, with propriety, have been called the variegated Parrot; but green is the most predominant colour.

The GREEN PARROT.

This bird is about the size of a tame pigeon. The upper part of the bill is extremely black; next to that it is bluish, then it is red, and white underneath. It is about fifteen inches in length, and the head is yellowish, but the rest of the body is green. The back and wings are of a deeper colour, and the upper edges of the wings are red. The tail is short, the lower part of the sides are red, the upper part yellowish, and the legs and feet are of an ash-colour. This bird is frequently seen in England; some of them have a circle about the eyes, and a process on each side of the upper part of the bill, opposite to which there is a cavity on the lower part.

The GREEN BLACK-BILLED PARROT.

This bird is of a bluish green-colour on the top of the head, at the root of the bill, and under the throat. The upper part of the body is of a deep green, except that the sides of the wings next the body are of a beautiful scarlet as well as at the extremities. The lower part of the wings is yellow, tinged with green, and the lower part of the tail is scarlet.

The RED and BLUE PARROT of ALDROVANDUS.

The bill of this bird is smaller than that of the preceding, and is blackish. The head, neck, and breast are blue, except that the top of the head is yellow. The parts above the eyes are whitish, the belly green, and the tail yellow. The top of the back is of a pale blue, and the feathers that cover the wings of a faint rose colour. The length of this bird, from the end of the back to the extremity of the tail, is about nine inches.

The SCARLET ORIENTAL PARROT.

This is somewhat larger than a black-bird, and the body is entirely of a scarlet colour. The wings are green, except the prime feathers, which are black above, and crimson below, and the edges of them are yellow. The tail is of a yellowish green on the top, and yellow in the middle: it has a ring of green feathers above the knees. The bill, and the iris of the eyes, are yellow, and the legs are short and black. It is naturally an inhabitant of the East Indies.

The ASH-COLOURED PARROT.

This bird, which is about the size of a tame pigeon, has a black bill. The body is wholly of an ash-colour, the tail is red and very short, hardly extending beyond the points of the wings: the eyes are surrounded with a bare white skin. It is found in many parts of Africa, particularly in Guinea, from whence many of them are brought to England.

The RED and WHITE PARROT.

This bird is about the size of a maccaw, being about seventeen inches in length, and has a very short tail. The body is of a dusky white, and the hind parts of the back, rump, tail, and prime feathers are scarlet. This is one of those which are called Poppin-Jays.

The BLUE-FACED GREEN PARROT.

This bird, which is about the size of a pullet, has an ash-coloured bill, with a spot of orange colour

on each side of the upper chap, which is moderately hooked, and has an angle on each side. The nostrils are placed on a skin which falls a little way over the bill, and the bill is surrounded with blue feathers. The eyes, which are placed in this blue space, are surrounded with a narrow bare skin, of a flesh-colour. The circles round the pupils of the eyes are of an orange colour, and on the throat, below the blue, is a plat of red feathers: the hind part of the head and neck, the back and covert feathers of the wings, and the breast, belly, and thighs, are of a beautiful green, but darker on the back, and lighter on the under side. The larger wing feathers are blue, and those following them are blue at their tips, and red at their bottoms. The tail above is yellow. Some of the inner webs of the outer feathers are red towards the roots, and the legs, feet, and claws, are of a flesh colour.

The GREEN and RED PARROT.

This is a native of China, and is about the size of a common hen: the upper chap of the bill is red at its base, and inclining to yellow at the point, which has an angle on each side, and is pretty much hooked. The lower chap is black, and the nostrils are situated between the feathers of the head and the base of the bill; there being no skin over the base, as there usually is in most of the Parrot kind. It is also singular in having the feathers continued close to the eyes. Round the pupils of the eyes, it has circles of a bright orange colour, and the head, neck, back, and covert feathers of the wings are of a beautiful deep green; as are also the breast, belly, and upper part of the tail. The greater quills of the wings are of a fine blue, and the first row of the covert feathers above them are of the same colour. The border of the wing, which falls on the breast, is also blue. The inside of the quills, and the under side of the tail, are blackish, and the tips of the tail feathers, on the under side, are of a brownish yellow. The thighs and covert feathers beneath the tail, are green, and the legs, feet, and claws, are black. This, according to Mr. Edwards, is an uncommon bird.

The HAWK-HEADED PARROT.

This bird, which is about the size of a small pigeon, is remarkable for having a long tail, in proportion to its body. The bill is of a dusky colour, pretty much hooked, and has sharp angles on the side of the upper chap. The iris of the eyes are hazel, surrounded with a bare skin of a blackish colour. The head is brown, with some light feathers on the middle, and some dark ones on the borders. The neck, breast, and belly are reddish, inclining to purple, fringed with feathers of a very bright blue. The back, rump, and upper sides of the wings, are of a beautiful green; and the tips of the greater quills of a dark blue. The middle of the upper side of the tail is green, and the side feathers are also green, except at the tips, which are of a dark blue. The thighs and covert feathers beneath the tail are of a pale green, and the legs, feet, and claws, of a lead colour. It is an inhabitant of the East Indies, and, when offended, it raises the feathers on the neck like a ruff.

The DIMINUTIVE GREEN PARROT.

This is an Ethiopian bird, and does not exceed the chaffinch in magnitude. The body is wholly green, but lighter on the belly than on the back. Such of the tail feathers as are fixed to the rump, are of a yellowish green, the next are of a bright red, and the next to those are tinged with green. The head, and all the covert feathers of the throat are of a bright shining red; and the bill, which is thick and strong, is of a reddish colour.

lour. The legs are ash-coloured; and the claws long and white.

The DUSKY PARROT.

The colours of this Parrot are not so agreeable as in most others of the kind. It is about the size of a common pigeon: the upper chap is black in the middle, and the skin at the root is of the same colour: the base of the bill is yellow, and gradually becomes red at the point. The top of the head is blackish; the sides, and the hind part of the neck being greenish. The back is dusky, the rump greenish, and the upper side of the tail green; but the outer webs of the two extreme feathers are blue. The throat, a little below the bill, is of a bright blue, and the breast, belly, and thighs, are of a dusky black. The wings are green, the quills next the back having yellow borders. This is a native of New-Spain, in America.

The WHITE-BREASTED PARROT.

This bird is also about the size of a pigeon, and the bill has angles on its edges, with a narrow skin at the base of the upper chap. The whole of the bill is of a dusky flesh-colour; but, lightest at the base; a flesh-coloured bare skin surrounds the eyes, and the crown of the head is black. At each corner of the mouth is a longish green spot; the throat and sides of the head are yellow, but the hind part of the neck gradually becomes orange. The back, rump, and tail are green; and the outer webs of the greater feathers of the wings are blue; but those in the middle are yellowish. The rest of the quills next the back are entirely green, as are all the covert feathers above them. The breast is white, and the lower part of the belly and the thighs are of an orange colour. The legs are ash-coloured, and the claws black. This Parrot is an inhabitant of the West-Indies.

The BLACK CAPPED LORY.

This Parrot, which is about the size of a turtle-dove, has a bill of an orange colour. At the base of the upper chap, it has a dusky flesh-coloured skin, and the eyes have a bright golden iris, being encompassed with spaces of bare skin of an obscure flesh-colour. The crown of the head is covered with black feathers, those on the hinder part having a bluish cast. The other part of the head, the neck, back, rump, the covert feathers above the tail, the breast, and upper parts of the thighs, are of a bright scarlet, except a space behind, between the neck and the back, which has a small mixture of red, and another on the lower part of the breast, also mixed with red. The belly, the lower part of the thighs, and the coverts beneath the tail, are of a fine blue. The upper part of the tail is also blue, though the middle feathers have something of a blackish shade. The inner webs of the tail feathers are yellowish; the upper sides of the wings are green, and some of the middle quills are yellow on the borders of their webs. The inner webs of the quills are of a beautiful yellow, except at the tips, where they are dusky, and the covert feathers on the inside of the wings are red; the ridge of them being somewhat yellowish. This is an inhabitant of the East-Indies.

The SCARLET LORY.

This is about the size of the blue dove-house pigeon, and is red at the crown of the head; the upper chap hangs over the other, and is yellow. The irides are of a beautiful orange-colour, and are encompassed by a bare ash-coloured skin. The head, neck, and body, and the coverts of the tail, are of a shining scarlet, except the feathers on the lower part of the neck behind, which are tipped with yellow. The upper part of the thighs is red, and the lower part

green. The greater quills of the wings are of a dark green, with a bluish cast; and those which fall over them are of a lighter green. The ridge of the wings below the joint is blue, and the inner webs of the first ten quills are red, except at the tips, which are blackish. The upper part of the tail is of a fine blue, except that the middle feathers are a little tinged with green. The inner webs of the tail feathers are red at their bottoms, and yellowish at the tips, and the legs and feet are bluish, inclining to black.

The LONG-TAILED SCARLET LORY.

This is smaller than the former, and has a longer tail, which is somewhat pointed; the middle feathers being almost two inches longer than those of the sides. The bill is strong, and of an orange-colour; and the nostrils are placed almost close together in a dusky skin, at the base of the upper part of the bill. It has a bare skin, of a dusky colour round the eyes, and the head, neck, and body, are of a fine scarlet; the sides under the wings, the thighs, and covert feathers of the tail, being also of the same colour; the fore part of the neck and breast is somewhat lighter, with a little yellow on the edges of the feathers. The greater and middle quills of the wings are red tipped with green; but those next the back are of a beautiful blue. The first row of the coverts of the wings are red, tipped with green, and the lesser are entirely red, except that part of the wing next the joint, which is green. The feathers on the tail are of a duller red than those on the body: the two outer feathers, and the tips of the others, have a little tincture of green, and the legs and feet are blackish. This description is taken from a bird that was brought from the island of Borneo, in the East-Indies.

The BLUE and YELLOW MACCAW.

This bird is equal in magnitude to a well-fed capon, and is three feet long, from the tip of the bill to the end of the tail: the bill is black, and very much hooked, forming almost a semi-circle, and is three inches in length; the thickness at the base being about two inches and an half. The length of the tail is eighteen inches; the legs are very short, and of a dusky colour; the feet are of the same colour, and the claws are black. The top of the head is flat, and of a green colour, and the skin round the eyes is ornamented with black feathers. A kind of black ring surrounds the neck; the upper part of the body is of a beautiful blue, and the lower part is yellowish.

The GREAT MACCAW.

This is about the size of that which next precedes it. The bill is shorter, the upper mandible is white, and the lower black. The space about the eyes and temples is whitish; the whole body, part of the wings, and all the tail, are of a beautiful red: the inner part of the prime feathers of the wings are of the same colour. The outer parts of the wings are of a deep blue, as well as the lower part of the tail. The second row of the quill feathers are yellow, edged with red, with a kind of bluish eye at the point. The legs are short, and the feet of a dark brown.

The arraracanga of Marcgrave, differs but little from this bird, except that the feathers on the wings are green half-way, and that half which is towards the extremity is blue.

The BRASILIAN MACCAW.

The bill of this bird is black, and the eyes are of a sky-blue, with a black pupil: the skin which surrounds the eyes, is spotted with black and white, and the legs and feet are brown. It has a kind of cap on the fore-part of the head, consisting of green feathers; and a circle of black feathers under the throat. The sides of the neck, the whole of the breast,

breast, and the lower part of the belly, are covered with yellow feathers. The hind part of the head, the neck, back and wings, are cloathed with blue feathers; except that those at the extremities of the wings are mixed with yellow; and the tail consists of long blue and yellow feathers.

The COCKATOO.

Of these there are two kinds: the greater Cockatoo is about the size of a raven, and has a large strong bill, with a skin over the base of the upper chap, where the nostrils are placed. Both the skin and bill are of a blueish black; and in proportion to the body, the head is large. The eyes are of a dark colour, surrounded with a bare ash-coloured skin; and the feathers of the head are very long and loose, but those at the top of the head are longest, which the bird can raise at pleasure. This is the method it takes to express its resentment when it is offended. The plumage, in general, is white, though tinged with other colours in many parts. The tail is short, and consists of feathers of an equal length. The legs and feet are of a lead-colour, and the toes resemble those of other Parrots. It is an East-Indian bird, and is frequently heard to cry cockatoo very distinctly.

There is a lesser Cockatoo, which resembles the other in every particular, except in magnitude.

The paragua is a black Parrot, with a red breast, back, and belly: the circle round the eyes is red, and the bill and feet are of a dusky ash-colour.

The tarabe is a Parrot with a red head and breast. It is also red at the beginning of the wings, but green in every other part. The bill and feet are of a dusky ash-colour.

The LITTLE PARROT of BONTIUS.

This bird is about the size of a lark, with a grey bill and throat. The circle round the pupil of the eyes is of a pure white; and it can raise the feathers, like a crest, at the top of the head. The head, neck, and tail, and the lower part of the belly, are of a bright red: the breast, and lower feathers of the tail, are of a pale rose colour, terminating in a beautiful mixture of green and white. The wings are principally green, though intermixed with a few red feathers, the middle parts of which are variegated with rose colour and yellow.

The LORY PARROKEET.

The length of this bird is eight inches, and the bill is of a bright orange-colour; but the circle round the eyes is reddish, inclining to orange; which is surrounded by a bare ash-coloured skin. The crown of the head is covered with feathers of a dark blue colour, behind which there is a crescent of scarlet, with the horns pointing towards the eyes. The ears are covered with dark blue feathers, behind which they are yellow. Below the eyes, on each side of the head, is a fine scarlet; and the throat and breast are of the same colour; except that the feathers on the breast are tipped with a blackish green. The back part of the neck, the back, wings, and lower sides of the body are green, a little tinged with yellow. The feathers on the middle of the back, and on the sides of the belly, are also tipped with yellow. Some of the quills are bordered with yellow, as well as those of the bastard wing: the rest of the wing is entirely green, as are also the upper part of the tail, and its coverts. The feathers are long in the middle, and shorten gradually towards the sides. The legs, feet, and claws of this bird are of a dark ash-colour. It is an inhabitant of the East-Indies.

The RED-BREASTED PARROKEET.

The bill of this bird is white, inclining to yellow, with a very narrow skin on the upper-part, in which

the nostrils are situated. The upper-part of the mandible is not so hooked as in most of the Parrot kind, and the edges on the sides are waved. It has blue feathers round the bill, which extend a little way over the crown. The head is green behind, and on each side. A yellow ring encompasses the hind part of the neck, below which it is green all round. The back, rump, and upper-sides of the wings and tail are of a fine green colour. The breast is reddish, inclining to yellow: the belly, and the under-sides of the wings, are of a dark green, with a little mixture of red. The thighs, and the covert feathers under the tail, are yellow, interspersed with green. The legs, feet, and claws, are of a dusky colour. This bird is an inhabitant of the East-Indies.

The LONG-TAILED GREEN PARROKEET.

This bird is about the size of a thrush, and, in proportion to its bulk, has a longer tail than most of the Parrot tribe. The bill is of a flesh-colour, and the iris of the eyes of an ash-colour next the pupil, but reddish outwardly. A bare flesh-coloured skin surrounds the eyes, and the whole plumage is green, except a variety of shades inclining to other colours. It inhabits the West-Indies.

The GOLDEN-CROWNED PARROKEET.

The bill of this bird is black, and the upper chap is hooked at the point, having angles on the sides. At the base of the upper chap is a narrow skin of a bluish flesh colour, in which are placed the nostrils. A bare skin, of the same colour, surrounds the eyes, and the irides are of a bright orange colour. The rest of the head, the neck, back, the upper sides of the wings and tail are of a darkish green. The throat is of a yellowish green, tinged with a reddish brown; the breast, belly, and the covert feathers under the tail, are of a light yellowish green. Some of the quills between the shortest and the longest next the body, are blue on the outside; and those on the first row of the covert feathers; which fall on these, are also blue, and together form a bar of blue down the wings. The inside of the wings, and the lower side of the tail, are of an olive colour: the legs and feet are of a palish red. This Parroquet is about the size of a black-bird, and the tail alone is three inches and an half long. It is a native of Brasil.

The ROSE-HEADED RING PARROKEET.

The length of this bird is ten inches, from the bill to the end of the tail, of which the tail is five inches and an half. The upper chap of the bill is of a pale yellow, hooked at the point, and angled at the sides: the lower chap is of a dusky colour. The fore part of the head is of a reddish rose colour, which gradually becomes blue on the back part of the head. Below the bill, the feathers are black for the space of an inch; from which a black line extends backwards on each side, and, going round the neck, divides the head from the body. The body is entirely green, but darker on the upper side, and the belly has a yellowish cast. Some of the smaller covert feathers, on the upper part of the wing, are of a dusky red colour, and form a large spot. The inner coverts of the wings are of a yellowish green, and the quills are dusky on the inside. Some of the outer webs of the quills are of a yellowish green, and the tail consists of blue feathers, ending in points. The legs, feet and claws are of an ash-colour. This bird is an inhabitant of Bengal, in the East-Indies.

The LITTLE RED-HEADED PARROKEET.

This bird, which is also called the Guinea sparrow, is about five inches in length; having a short tail, with feathers of an equal length. The bill is of an orange colour, and the upper chap is hooked at the point; but there are no angles at the edges. The

nostrils are between the bill and the feathers of the forehead: the bill is encompassed with bright scarlet feathers, which extend almost to the eyes: narrow spaces of ash-coloured skin surround the edges, which are black. The back part of the head, the neck, back, and upper parts of the wings, are of a beautiful green; the throat, breast, belly, and covert feathers under the tail, are of a lighter green, with a yellowish cast. The quills of the wings are of a dark ash-colour within side. The lesser covert feathers within the wing are black, and the ridge of the wing is blue about the joint. The covert feathers on the upper side of the tail are green, and the rump is covered with fine blue feathers. The two middle feathers of the tail are green; and the rest, which consist of five on each side, are green near the bottom or roots, which is succeeded with a transverse bar of a scarlet colour; after that a narrower black bar; and the tips of the feathers are green. The covert feathers of the tail are so long, that the colours of the tail cannot be seen, except it be a little spread. The legs, feet, and claws, are of a dusky colour. This is an inhabitant of Guinea.

The LITTLE GREEN and BLUE PARROKEET.

The length of this bird is about three inches and an half. The bill, and the skin at the base of it, are of a gold colour, and the upper chap is hooked, and waved on the edges: the skin round the eyes, the legs, feet, and claws, are of an orange colour: the head, neck, back, and belly, are of a deep green, except the first row of the covert feathers above the quills, which is of a fine deep blue. The outer edges of the quills are of a yellowish green; the lower part of the back, and the covert feathers of the upper part of the tail, are of a sky-blue: the tail is of a bright green above, but somewhat paler underneath.

NATURAL HISTORY of the COMMON PIGEON.

THIS is the Pigeon domestique of Brisson. The tame Pigeon, and all its beautiful varieties, derive their origin from one species, the stock-dove; the name implying its being the stock or stem from whence the other domestic kinds have proceeded. This bird, in its natural state, is of a deep bluish ash colour; the breast is dashed with a fine changeable green and purple; the sides of the neck with a shining copper colour: the wings are marked with two black bars, one on the quill feathers, and the other on the coverts: the back is white, and the tail is barred near the end with black. These are the colours of the Pigeon in a state of nature; and from these simple tints the art of man has propagated a variety, that words cannot describe, nor even fancy suggest. Nature, however, preserves her great out-line, and though the form and colour of these birds may be altered by art, yet their natural habits and inclinations continue still the same.

This species of Pigeon is easily brought to build in artificial cavities, and, from the temptation of a ready provision, becomes domesticated without much difficulty. The drakes of the tame duck, though they vary greatly in colour, ever retain the mark of their origin from our English mallard, by the two curled feathers of the tail; and the tame goose is known to be descended from the wild kind, by the invariable whiteness of its rump, which, in both states, they always retain.

From the domestic Pigeon, many elegant varieties are produced, which are distinguished by names expressive of their several properties; such as tumblers, carriers, jacobines, croppers, pouters, runts, turbits, owls, nuns, &c. but it would be a vain attempt to

mention them all; so much is the figure and the colour of this bird under human controul, that Pigeon-fanciers, by coupling a male and female of different sorts, can breed them to a feather, as they express it.

The dove-house Pigeon breeds every month; but, when the weather is severe, or the fields are covered with snow, it is necessary to supply it with food. At other times, it may be left to provide for itself, and the owner is sufficiently repaid for affording it protection. It lays two white eggs, which usually produce young ones of different sexes. After the eggs are laid, the female continues to sit about fifteen days, relieved at intervals by the male. The turns are generally regulated with great exactness. The female continues to sit from about four in the evening till nine the next day; at which time she is relieved by the male, who supplies her place till three, while she is seeking provision abroad. Thus they alternately sit till the young are excluded. If, during this term, the female should neglect her duty, the male pursues her, and drives her to the nest: and if the male delays to return at the expected time, the female retaliates with equal severity. When the young are hatched, they require no food for the first three days, but they must be kept warm during that time, which is a duty the female takes upon herself to perform, and never leaves them, except for a few minutes to take a little food. After this they are fed for eight or ten days, with what the old ones have gathered in the fields, and treasured up in their crops, from whence they discharge it into the mouths of their young, who receive it very greedily. This method of feeding the young from the crop, in birds of the Pigeon kind, is different from all others. Pigeons, it is well known, live entirely upon grain and water: these are mixed together in the crop, and are digested in proportion as the bird lays in its provision. But when they are to feed their young, which are very voracious, they lay in a more plentiful supply, to give the food a kind of half maceration, to adapt it to their tender appetites. Nature has, for this purpose, provided a very large crop for birds of the Pigeon tribe; and some of them, which are called croppers, distend it in such a manner, that the breast of the bird seems larger than the body. The necessity for this peculiar mechanism in these animals is very obvious. The young, with open mouths, receive from the crop this tribute of affection, and are thus fed about three times a day. The male usually supplies the young female with food, and the female performs the same office for the young male. In the beginning, the young are supplied with food that is considerably macerated; but, as they grow older, the parents gradually give it less preparation, and at length send them out to shift for themselves. When they have plenty of provision, however, they do not wait for the total dismissal of their young: it is no uncommon thing to see young ones almost fit for flight, and eggs hatching, at the same time, and in the same nest.

Though the fidelity of the turtle-dove is proverbial, yet the Pigeon of the dove-house cannot boast of that constancy, having received licentiousness from man among its other domestic habits. Two males are frequently seen quarrelling for the same mistress; and sometimes two males, being displeased with their respective mates, have been known to make an exchange, and have lived with their new companions in perfect harmony.

The produce of this bird, in its domestic state, is so very extraordinary, that from a single pair, near fifteen thousand may be produced in the space of four years. The stock-dove, however, seldom breeds above twice a year; for during the winter months, they are so fully employed in providing for their own preservation, that they neglect transmitting a posterity.

posterity. But they have a stronger attachment to their young than those which often breed; owing perhaps to their affections being less divided by the multiplicity of claims.

Pigeons have a very piercing sight, and can hear at a vast distance. They are also very swift in flight, especially when they are pursued by the hawk or kite. The nature of Pigeons is to be gregarious, to bill in their courtship, and to have a mournful or plaintive note.

Any lord of a manor may build a Pigeon-house upon his land, but a tenant cannot do it without the lord's licence. When persons shoot at or kill Pigeons within a certain distance of the Pigeon-house, they are liable to pay a forfeiture.

In order to erect a Pigeon-house to advantage, it will be necessary, in the first place, to pitch upon a convenient situation, of which none is more proper than the middle of a spacious court-yard, because Pigeons are naturally of a timorous disposition, and are frightened at the least noise they hear. With regard to the size of the Pigeon-house, it must depend entirely on the number of birds intended to be kept; but it is better to have it too large than too little; and as to its form, the round should be preferred to the square ones; because rats cannot so easily come at them in the former as in the latter. It is also much more commodious; because you may, by means of a ladder turning upon an axis, visit all the nests in the house without the least difficulty; which cannot so easily be done in a square house.

In order to hinder rats from climbing up the outside of the Pigeon-house, the wall should be covered with tin plates to a certain height, about a foot and a half will be sufficient; but they should project out three or four inches at the top, to prevent their clambering any higher.

The Pigeon-house should be placed at no great distance from water, that the Pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholesome in cold weather.

The boards that cover the pigeon-house should be well joined together, so that no rain may penetrate through them. And the whole building should be covered with hard plaister, and white-washed within and without; white being the most pleasing colour to Pigeons. There must be no window, or other aperture, in the pigeon house to the eastward: these should always face the south, for Pigeons are very fond of the sun, especially in winter.

The nests or covers in a Pigeon-house, should consist of square holes made in the walls, of a size sufficient to admit the cock and hen to stand in them. The first range of these nests should not be less than four feet from the ground, that the wall underneath being smooth, the rats may not be able to reach them. These nests should be placed in quincunx order, and not directly over one another. Nor must they be continued any higher than within three feet of the top of the wall; and the upper-row should be covered with a board projecting a considerable distance from the wall, for fear the rats should find means to climb the outside of the house.

M. Duhamel thinks that Pigeons neither feed upon the green corn, nor have bills strong enough to search for its seeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the sun. "From the time of the sprouting of the corn," says he, "Pigeons live chiefly upon the seeds of wild uncultivated plants, and therefore lessen considerably the quantity of weeds that would otherwise spring up; as will appear from a just estimate of the quantity of grain necessary to feed

all the Pigeons of a well-stocked dove-house." But Mr. Worlidge and Mr. Lisle alledge facts in support of the contrary opinion. The latter relates, that a farmer in his neighbourhood assured him he had known an acre sowed with peas, and rain coming on so that they could not be harrowed in, every pea was taken away in half a day's time by Pigeons: and the former says, "It is to be observed, that where the flight of Pigeons falls, there they fill themselves and away, and return again where they first rose, and so proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have seen them lie so much upon a piece of about two or three acres sown with peas, that they devoured at least three parts in four of the seed, which, I am sure, could not be all above the surface of the ground. That their smelling is their principal director, I have observed; having sown a small plat of peas in my garden, near a pigeon-house, and covered them so well that not a pea appeared above ground. In a few days, a parcel of Pigeons were busy in discovering this hidden treasure; and, in a few days more, I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithstanding they were hoed in, and well covered. Their smelling alone directed them, as I supposed, because they followed the ranges exactly. The injury they do at harvest on the peas, vetches, &c. is such, that we may rank them among the greatest enemies the poor husbandman meets withal; and the greater; because he may not erect a pigeon-house, whereby to have a share of his own spoils; none but the rich being allowed this privilege, and so severe a law being also made to protect these winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy against them, but to affright them away by noises, or such like. You may, indeed, shoot at them; but you must not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houses, they cannot bolt or fly out of the tops of them, but by the strength of their tails, after the thus weakening of which, they remain prisoners at home."

Mr. Worlidge, who talks of impounding the Pigeons, reminds us of a humorous story of a gentleman, who, upon a neighbouring farmer's complaining to him that his Pigeons were a great nuisance to his land; and did great mischief to his corn, replied jocularly; "Pound them, if you catch them trespassing." The farmer, improving the hint, steeped a parcel of peas in an infusion of coculus Indicus; or some other intoxicating drug, and strewed them upon his grounds. The Pigeons swallowed them, and soon remained motionless on the field: upon which the farmer threw a net over them, inclosed them in it; and carried them to an empty barn, from whence he sent the gentleman word that he had followed his directions with regard to the pounding of his Pigeons, and desired him to come and release them.

By the 2 Geo. III. c. 29. any person who shall shoot at; or by any means kill or take, with a wilful intent to destroy any Pigeon, he shall, on conviction thereof, by confession, or oath of one witness, before one justice, forfeit twenty shillings to the prosecutor; and if not immediately paid, such justice shall commit him to the goal or house of correction, for any term not exceeding three months, nor less than one; unless the penalty be sooner paid.

The Pigeon was the favourite bird of Venus. Pigeons, says Homer, took care to provide for the nourishment of Jupiter; a fable founded on the same

same word signifying, in the Phœnician language, either a priest or a Pigeon: for it is said that the Curetes, or priests of Cybele, took care of the nourishment of Jupiter. The inhabitants of Ascalon had a sovereign respect for Pigeons: they durst not kill and eat them, for fear of feeding on their gods themselves; they brought up with great care all those that were produced in their city. Pigeons were also consecrated by the Assyrians; because they believed that the soul of their famous queen Semiramis had fled to heaven in the shape of a dove.

Silius Italicus says, that two Pigeons formerly rested on Thebes, and that one flew to Dodona, where it gave an oak the virtue of delivering oracles; the other, which was white, passed over the sea, and flew to Libya, where it settled on the head of a ram, between the two horns, and gave oracles to the people of Marmarica. The Pigeon of Dodona also delivered oracles: it was of gold, says Philostratus, settled on an oak, and surrounded by people who went thither, some to sacrifice, others to consult the oracle. There were always priests and priestesses there, who gained a good livelihood by the offerings. Sophocles says, that Pigeons of the forest of Dodona had given Hercules an oracle which determined the end of his life.

The CARRIER.

The Carrier, from the superior attachment it shews to its native place, is employed in many places as a most expeditious courier. These Pigeons are distinguished from all others by their eyes, which are surrounded with a broad circle of naked white skin, and by being of a dark blue or blackish colour. The upper-chap of the bill is also covered with the same kind of skin, which reaches from the base to below the middle. These birds are first brought from the place where they were bred, whither it is intended to send them back with information. The letter is tied under the wing, and the little animal is let loose to return. It no sooner finds itself at liberty, than its passion for its native spot directs all its motions. Upon these occasions it flies directly into the clouds to an amazing height; and then with the greatest certainty and exactness, directs itself by some surprizing instinct towards home, which is sometimes at a vast distance, bringing its advices to the persons to whom they are directed. How they discover the place, or by what chart they are guided in the right way, is utterly unknown to us; it is, however, certain, that in the space of an hour and an half they can perform a journey of forty miles; which the fleetest quadruped would be, at least, three times as long in performing. This practice of conveying dispatches was much in vogue in the East, and at Scanderoon, till very lately; Dr. Ruffel having assured us that the practice is now left off. It was used there on the arrival of a ship, to give the merchants at Aleppo a more expeditious notice than could be done by any other means. Anciently these birds were brought up with extraordinary care, in order to be sent from governors in a besieged city, to generals that were coming to relieve it; from princes to their subjects, with the tidings of some fortunate events; or from lovers to their mistresses with a billet-doux.

In the East they had relays of Pigeons, ready to spread intelligence to all parts of the country. When the commandant of Damietta received information of the death of Orillo, he let loose a Pigeon, under whose wing he had tied a letter; this fled to Cairo, from whence another was dispatched, as is usual; by which means, in the space of a few hours, all Egypt was acquainted with the death of Orillo. Anacreon also informs us, that he conveyed his billet-doux to his beautiful Bathyllus, by

a dove. Taurosthanes, by means of a Pigeon, which he had decked with purple, sent advice to his father, who lived in the isle of Ægina, of his victory in the Olympic games, on the very day he had obtained it. At the siege of Modena, Brutus, who was within the walls, kept a constant correspondence with Hirtius without, by the assistance of Pigeons; baffling every stratagem of the besieger, Antony, to intercept their couriers. These birds were frequently employed in the times of the crusades. Joinville relates one during the crusade of St. Louis, and Tasso another, during the siege of Jerusalem. The Carriers are about the size of a common Pigeon.

The RING-DOVE.

Attempts have been made to domesticate this species, by hatching their eggs under the common pigeon in Dove-houses, but as soon as they could fly, they betook themselves to the woods, where they were originally produced. The Ring-Dove is considerably larger than the former, and makes its nest of a few dry sticks in the boughs of trees. In the beginning of winter, these birds assemble in the woods in great flocks, and leave off cooing; nor do they resume this note of courtship till the beginning of March, which they continue to practise till the approach of winter. The Ring-Dove is the largest of the pigeon tribe, and may immediately be distinguished from all others by its size. It is eighteen inches in length, thirty in breadth, and weighs about twenty ounces. The head, back, and coverts of the wings are of a bluish ash-colour: the lower-part of the neck and the breast are purple inclining to red, and dashed with ash-colour. On the hind-part of the head is a semi-circular line of white, above and below which the feathers are glossy, and of changeable colours, as opposed to the light. The belly is of a yellowish white; the greater quill feathers are dusky, and the rest are ash-coloured. There is a white stroke pointing downwards, beneath the bastard wing.

The TURTLE-DOVE.

The Turtle-Dove is a much shyer bird than any of the former. It may readily be distinguished from the rest by the iris of the eye, which is of a fine yellow, and a beautiful crimson-circle, which encompasses the eye-lids. The fore-head is whitish; the top of the head ash-coloured, mixed with olive. On each side of the neck is a spot of black feathers, beautifully tipped with white: the back is ash-coloured, bordered with olive brown: the scapulars and coverts are of a reddish brown, spotted with black: the quill feathers are of a dusky brown; the breast of a light purplish red, the verge of each feather being yellow: the belly is white, and the sides, and inner-coverts of the wings bluish. The tail, which is three inches and a half long, has two feathers in the middle, of a dusky brown; the others being black, tipped with white. The head and exterior sides of the outward feathers are entirely white.

The fidelity of these birds is proverbial; and a pair being put in a cage, if one dies, the other will not long survive it. The Turtle-Dove is a bird of passage, and few or none remain in our northern climates in winter, unless they are kept in aviaries or cages. They fly in large flocks when they come to breed here in summer, and delight in open, mountainous, sandy countries. They build their nests, however, in the midst of woods, and select the most retired situations for incubation. They feed upon all sorts of grain, but are particularly fond of millet-feed. The Turtle-Dove is about twelve inches in length, from the tip of the bill to the end of the tail; and the breadth, when the wings are extended, is twenty-two inches. We are told by some naturalists,

ralists, that this bird lays its eggs twice a year; and if this assertion is true, it must be once with us, and once in hotter climates, for it certainly breeds here in summer.

The Turtle-Dove is the symbol of fidelity amongst friends, between husband and wife, and even of subjects towards their princes, and of armies to their generals. On the reverse of a medal of Helio-gabalus, a woman is seen sitting, holding in one hand a Turtle-Dove with this inscription, *Fides exercitûs*. This symbol is founded on the male and female usually flying together, and her seeming to moan when she has lost her mate.

The BARBARY PIGEON.

This bird is of a dark colour, inclining to black; the bill, legs, and feet, are black; and it has a small fleshy circle round the eyes, which are of a very lively colour. There is also a tuft of feathers rising from the back part of the neck, over the top of the head. Some of this kind are also feathered on the legs and feet, but others are not. They likewise differ in colour; but those that are blackish are the most esteemed.

The JACOBINE PIGEON.

This bird is also called a Capper, because it has a tuft of feathers on the back-part of the head, which turns towards the neck, like the cap or cowl of a monk. The bill is short, and the iris of the eyes of a pearl colour.

The BROAD-TAILED SHAKERS.

A bird of the pigeon kind is thus called from having its head and neck continually in motion. The number of its tail feathers is twenty-six, and when it walks, it carries its tail upright like that of a hen. There is also a sort called narrow-tailed shakers.

The RUNT.

This is the greater domestic pigeon, and varies in its feathers like the common sort. It is almost as large as a pullet, and flies very slowly.

The TUMBLER.

Of this species there are variety of colours. When they fly, they have very extraordinary motions, frequently turning themselves in the air like a ball that is thrown up.

The pigeon called a Helmet, has the head, tail, and prime feathers of the wings of a distinct colour from the rest of the body.

The PICUI PINIMA.

This is about the size of a lark, and is an inhabitant of Brasil. It has a brown bill, and shaped like that of a common pigeon: the eyes are black, surrounded with a bright yellow iris: the head, the top of the neck, the back, sides, and the wing feathers are all very long, and of an ash-colour. The tail is of a brownish ash-colour; but in some they are white, and black about the middle. Those on the belly are white, with brown edges, and the legs and feet are of the same colour. The flesh of this bird is esteemed very delicate.

Mr. Ray supposes the small Barbadoes turtle to be the same with the Picui Pinima of Marcgrave; or the wild pigeon of Brasil.

The INDIAN TURTLE.

This bird is also called Cocolzin; it is somewhat larger than a sparrow; the upper-part of the body is covered with brown feathers edged with black. The fore-parts of the wings are partly black, and the rest is of a dusky colour. The end of the tail

No. 19.

is promiscuously tinged with white and brown and the feathers on the lower-part of the body are white, ending in black lines. The head is small, and the bill is black: the legs and feet are whitish. They make a noise when flying; and frequent mountainous places. They grow very fat, and are thought delicate food, their flesh in a great degree resembling that of the quail.

There is another Indian Turtle, called the Turtle of Aldrovandus. The female is entirely white, except the bill and the feet, the former of which is black, and the latter red. The male is of the size of a common pigeon, and of a light red colour: the iris of the eyes is of a saffron colour, with a reddish cast, and a narrow black ring surrounds the neck.

The MEXICAN PIGEON.

This bird is covered with dusky feathers, except on the breast, and the extremities of the wings, where they are of a dirty white. The iris of the eyes is red.

The RING-TIALED PIGEON of JAMAICA.

The length of this bird is fifteen inches, and the breadth twenty inches: the length of the bill is three quarters of an inch, and it has a double protuberance at the base about the nostrils. The iris of the eyes is red, and the length of the tail is about five inches. The head, neck, and breast, are covered with feathers of a purple colour, and the belly with those that are white. The upper part of the neck is a greenish purple, shining, and changeable. The back and tail are of a palish blue, and the wings are of a dusky colour.

There is another bird of this kind, that is an inhabitant of Jamaica. It is called the Bald Pate Pigeon of Jamaica, and is eleven inches in length, and eighteen in breadth: the bill is half an inch in length, red at the base, and protuberant, but white below the nostrils. In the old birds, the top of the head is white, from whence their name is derived. The body is wholly of a darkish blue, except the upper-part of the neck is of a changeable blue and green.

The GREENLAND PIGEON.

The eyes of this bird are black, with a yellow iris, and, on the covert feathers of each wing, it has a white spot, but is black in every other part. It has twenty-seven feathers on each wing, and its legs and feet are of a bright red.

The CHINESE PIGEON.

This bird, which is about the size of an Indian turtle, has a bluish ash-coloured bill, and the iris of the eyes of a fine white. The sides of the head are yellow; but the top, and the space round the eyes are of an ash-colour. The extremities of the feathers on each side of the head and neck are red, and there are blue feathers about the rise of the wings. The hind-part of the neck and back are brown, and the extremities of the feathers black: those on the shoulders are lighter, and variegated at the ends with black and white. The first and last covert feathers are black, with their external edges white; the long feathers of the wings are black, with white edges; and the breast and belly are of a beautiful pale rose-colour. The tail, which consists of twelve feathers, is a mixture of dusky and bright. The legs and feet are red, and the claws black.

To this might be added a long catalogue of foreign pigeons, of which we know little more than the plumage and the names: among these are the mawmets, the spots, the wild pigeon of the island of St. Thomas, the ocoztintzcan of Mexico, the great mountain Mexican pigeon, the Portuguese pigeon, and two pigeons of Carolina, mentioned by Catesby.

C H A P. IV.

Containing the NATURAL HISTORY of BIRDS of the SPARROW KIND, viz. the THRUSH, the BLACK-BIRD, the FIELD-FARE, the THROSTLE, the RED-WING, the STARLING, the MOCK-BIRD, the OUZEL, the NIGHTINGALE, the ROBIN-RED-BREAST, the RED-START, the SKY-LARK and its Varieties, the CANARY-BIRD, the SWALLOW, the PETTY-CHAPS, the FLY-CATCHER, the HEDGE-SPARROW, the WREN, the WHEAT-EAR, the WHIN-CHAT, the STONE-CHATTER, the WHITE-THROAT, the WATER-WAGTAIL, the GROSSBEAK, the CROSS-BILL, the BULL-FINCH, the SPARROW, the GREEN-FINCH, the GOLD-FINCH, the CHAF-FINCH, the BRAMBLING, the SISKIN, the LINNET, the BUNTING, the YELLOW-HAMMER, the REED-SPARROW, the TIT-MOUSE, the HUMMING-BIRD, and its Varieties.

DESCENDING from the larger to the smaller, we come to birds of the Sparrow kind: those which compose this class live chiefly in the neighbourhood of man, and are his greatest favourites. The turkey, and other birds of the poultry kind, are more useful; but those he considers as his servants, not his friends: they are animals reclaimed merely to supply him with some of the conveniences of life; but the little painted songsters possess his esteem, which they have obtained by their melody and beauty. It is this warbling class that fills his groves with harmony, and elevates his heart to sympathize with their raptures. All other birds are either mute or screaming; and it is only this diminutive tribe that have voices equal to their beauty. All the great birds dread the vicinity of man, keep within the thickest forest, or on the brow of the most craggy precipice; but these are usually near the edges of the wood, in the neighbourhood of cultivated fields, in hedge-rows, or mixing with the poultry in the farmer's yard.

It is not indeed from affection that they approach the residence of man, they prefer inhabited grounds, because their provision is to be found there in greater abundance. In the desert or the forest, there is no grain to be picked up; and even insects, that make so great a part of their food, are not to be found in plenty; their natures not being suited to the moisture of the place. The deeper we enter into uncultivated woods, the silence becomes more profound; an awful stillness reigns throughout: there are none of those warblings that waken attention and delight the ear; nothing of that confused but pleasing buz, formed by the united though distant voices of quadrupeds and birds; but all is profoundly dead and solemn. Indeed the traveller may sometimes be roused from this lethargy of life, by the cry of an heron, or the scream of an eagle; but his little warblers have forsaken him entirely.

Another reason why these little birds avoid the depths of the forest, is, that their most formidable enemies usually reside there.

Birds in general seem contented with a certain district to provide food and center in. Though fitted by nature for the most wandering life, these little animals seldom make such distant excursions as the stag or the leveret. Food appears to be the principal object that puts them in motion, and they never wander when that is provided for them in sufficient plenty. But, as that is seldom permanent throughout the year, birds in general are obliged to change their abode. Birds of passage are usually understood to be those that are obliged to take long journies for this purpose; but, strictly speaking, almost every bird is a bird of passage, though they may not emigrate to places so remote. Small birds, in general, emigrate at some particular season of the year, either from one country or district to another, or towards the shore from the more inland provinces.

Many persons obtain a livelihood, by watching the seasons when our small birds begin to emigrate from one county to another, by taking them with nets in their passage. Autumn is the principal season when the bird-catcher employs his art to take these wanderers. His net is an ingenious piece of mechanism, and so contrived, as, from a flat position to rise on each side, and clap over the birds that are decoyed between them. Birds, in their passage, are always observed to fly against the wind; therefore, if it is westerly, the bird catcher, who lays his nets most to the east, is certain of the greatest sport. His call-birds generally consist of five or six linnets, two green-finches, two gold-finches, a bull-finch, a wood-lark, a red-poll, a tit-lark, and a yellow-hammer. These are placed, in little cages, at a small distance from the nets. He has also what are called flur-birds, placed upon a moveable perch, which he can raise at pleasure by means of a string; which he lifts gently up and down as the wild bird approaches. But this is not sufficient to allure the wild bird down; it must be called by one of the call-birds in the cages. It is remarkable that these call-birds delight in bringing the wild ones into the same state of captivity. The allurements of their call is so great, that the wild bird is stopped in its most rapid flight on hearing it; and, if unacquainted with the nets, boldly lights within twenty or thirty yards of the bird-catcher; who immediately embraces the opportunity, pulls a string, the nets instantly rise on each side, and clap directly down upon the unfortunate visitant. Such a fascinating power have the call-birds, that sometimes, if half the flock only are caught, the remaining half will unsuspecting light between the nets, and become captives with their companions.

It is difficult to account for the nature of this call; whether it be an invitation to food, a prelude to courtship, or a challenge to combat. Whatever is the motive, when taken, the males are made captives for singing, and the females are killed to be served up to the tables of the delicate, or the rich.

However contemptible these little creatures are to larger animals, they are frequently too formidable to each other: they are remarkably brave, and sometimes fight till one of them yields up his life with the victory. At other times their contentions are of a gentler nature. Two male birds striving in song, after a long struggle, the loudest shall silence the other entirely. The female sits an attentive silent auditor on these occasions, and, if disengaged, enters into the connubial knot with the loudest songster.

Among birds, singing is the prerogative of the male; the heaviest cares of life fall to the lot of the female. Hers is the fatigue of incubation, and to her devolves the principal labour of pursuing the helpless brood. Nature has given the song to the male, to support her under these fatigues, and to alleviate them: By that he first attracts her affections, and delights her during the time of incubation: it is

also a note of security, to acquaint her that no danger threatens to molest her.

Little birds build a more delicate nest than those of the larger kind. As their bodies are smaller, the materials of which they compose their nests are usually warmer. Small things, we may easily conceive, cannot retain heat so long as those which are larger: the eggs of small birds therefore require a place of more constant warmth than those of large ones, as being sooner liable to cool. Accordingly their nests are made warmer and deeper, lined with softer substances in the inside, and are guarded with a better covering above. Sometimes the little architects are disturbed in their operations, and they have not time to erect another in so elegant a manner as they could wish. When the nest has several times been robbed of its eggs, it builds the last nest in a very slovenly manner, well knowing by natural instinct, that from the near approach of winter; it cannot afford time to make her habitation so commodious as it could wish. When the nest is finished, both the male and female employ great cunning to conceal it. If the little mansion is built in bushes, the pliant branches are dexterously disposed to hide it from the view; if situated among moss, nothing externally appears to shew that there is an habitation within.

All birds of the Sparrow Kind are first fed upon worms and insects. Even the gold-finch and the Sparrow, that when adult feed only upon grain, have been fed upon insects while they continued in the nest. The young require no food for some time after their exclusion from the shell; but the parent discovers, by their chirping and gaping, when they begin to feel the approaches of hunger, and flies to provide them a plentiful supply. During her absence, they preserve a perfect silence, and she announces her return by a chirrup, which they perfectly understand, and to which they immediately answer, each petitioning for its portion; and the parent distributes a supply to each by turns. The wren has been observed to feed sixteen or seventeen so regularly as not to omit a single one.

Addison is of opinion that birds observe a strict chastity of manners, which he has expressed in some beautiful Latin lines inserted in the Spectator.

Chaste are their instincts, faithful is their fire,
No foreign beauty tempts to false desire:
The snow white vesture, and the glittering crown,
The simple plumage, or the glossy down,
Prompt not their love. The patriot bird pursues
His well-acquainted suits, and kindred hues.
Hence through their tribes no mix'd polluted flame,
No monster breeds to mark the groves with shame:
But the chaste black-bird, to its partner true,
Thinks black alone is beauty's favourite hue;
The nightingale, with mutual passion blest,
Sings to its mate, and nightly charms the nest:
While the dark owl, to court his partner flies,
And owns his offspring in their yellow eyes.

Naturalists, indeed, differ in opinion with the poet with regard to this fidelity among the smaller tenants of the grove: they are less true to their species than the large birds. Of the ostrich, the cassowary, and the eagle, there are but few species, and, it is probable, they could not be induced to mix with each other by all the art of man.

It is otherwise, however, with regard to small birds: very little trouble is required to make a species between a gold-finch and a canary-bird, or between a linnet and a lark. They often breed together, and produce a motley mixture, as fruitful as their parents. But though this connection may be produced by art, it probably seldom happens in a state of nature.

Such of the smaller birds as live chiefly upon insects, have slender bills; and such as feed princi-

pally upon fruits or grain, have short strong bills. Among the former are the black-bird, the thrush, the field-fare, the lark, the starling, the nightingale, the tit-mouse, the water-wagtail, the robin-red-breast, the red-start; the beccafigo, the gold-finch, the stone-chatter, the winchat, the white-throat, the hedge-sparrow, the wren, the golden crowned wren, the pettichaps, the humming-bird, and several others, which are strangers to this island.

As these birds feed principally on insects, they are of particular benefit to mankind. They clear his grounds of the pernicious swarms of vermin that devour the budding leaves and flowers, and attack even the root itself before the vegetable can come to maturity. These friendly birds also destroy the eggs of insects which would otherwise propagate in such numbers that they could not be extirpated by the arts of man. Nature directs them where to seek for them, and while they are satisfying their own appetites, they render man the most essential services. In this tribe we have also the sweetest songsters of the grove: their notes are softer, and their manner more musically soothing than the hard-billed birds. The best vocal performers of this musical tribe are the nightingale, the thrush, the black-bird, the lark, the red-breast, the black-cap, and the wren.

Birds of the Sparrow kind, with short thick bills, are the gros-beak, the bull-finch, the green-finch, the cross-bill, the house-sparrow, the gold-finch, the chaffinch, the linnet, the brambling, the yellow-hammer, the ortolan, the siskin, the bunting, the wheat-ear, and several foreign birds. These feed principally upon fruits, grain, and corn; and, as they are a numerous tribe, are often injurious to man: the harvest suffers from their depredations; and, if they are driven off from one end of the field, they immediately fly round, and come in at the other. But even these afford us pleasure to atone for the injuries we receive from them: there are some agreeable songsters in this tribe; they have a loud piercing pipe, with great modulation, variety, and perseverance. The warblers of this class, are the canary-bird, the linnet, the gold-finch, the chaffinch, the green-finch, the bull-finch, the brambling, the yellow-hammer, and the siskin.

Like the greater classes of birds, this has its wanderers, that emigrate for a season, and then return to propagate, to sing, or to embellish our fields and groves. Some disappear in one place, and are seen elsewhere, that never leave the kingdom; but others take longer flights, and go to a warmer or colder region, as it suits their constitutions: the field-fare, and the red-wing, which pass their summers in Norway, and other cold countries, are invited hither by our mild winters, and the berries which are then found in great plenty with us, and of which their food principally consists. The cross-bill, and the hawfinch have no stated times of emigration. Swallows of all kinds always disappear at the approach of winter. The nightingale, the fly-catcher, the black-cap, the wheat-ear, the willow-wren, the stone-chatter, and the winchat, depart before the approach of winter: but it is only when our winters are uncommonly severe that the siskin and the linnet forsake us. The rest of the smaller tribe reside wholly in this country, and endure the severest rigours of the climate.

The manners of our little birds do not, however, prevail in all other countries. Those kinds which are birds of passage in England, have a fixed residence in some countries all the year round; and some birds, which with us are faithful residents, in other climates, put on the nature of birds of passage, and disappear for a season.

In Upper-Egypt, and in the island of Java, the swallow breeds, and continues the whole year. Larks, which

which continue with us the whole year, are birds of passage in Sweden; forsaking that climate in winter, to return with the returning spring. The chaffinch, that resides wholly with us, appears in Carolina and Virginia during the winter; but goes in summer to breed in the more northern regions. The change of country with all this little tribe, is indeed a pilgrimage, rather than a journey; an emigration less from choice than necessity.

NATURAL HISTORY of the THRUSH.

THE Thrush and its affinities are the largest of the sparrow kind, and are distinguished from all others of this class, not only by their size, but by their bills, which are a little bending at the point; by a small notch near the end of the upper-chap; and by the outer toe adhering as far as the first joint of the middle toe.

The missel Thrush is much larger than any of the kind: it is eleven inches in length, sixteen in breadth, and weighs about five ounces. It differs but little from that well-known bird, the thrortle. The spots on the breast indeed are somewhat larger; and the inner coverts of the wings, which are white in the missel Thrush, are yellow in the thrortle. The missel Thrush builds its nest in a bush, or on the side of a tree, sometimes in a thick hedge near the ground; and lays four or five eggs in a season. Its song is very fine, which it begins in spring, sitting on the summit of a high tree: but its note of fear or anger, is between a chatter and a shriek, and is extremely harsh and dissonant. Of all the feathered tribe, this is the largest that has music in its voice: those of greater magnitude can only chatter, scream, or croak. Its food are insects, holly, and the berries of misseltoe.

Thompson allows the imperfection of voice in the larger birds, but introduces them as the base in chorus, though unpleasing by itself. Thus sings that excellent poet:

The jay, the rook, the daw,
And each harsh pipe (discordant heard alone)
Aid the full concert: while the stock-dove breathes
A melancholy murmur through the whole.

The outside of the Thrush's nest consists of fine soft moss, interwoven with grass, hay, &c. The inside is very curiously plastered with cow-dung. In this the black-bird differs from the Thrush, as he always lines his nest with mud or clay: the black-bird lays a covering of soft stuff on the inside, to lay her eggs upon; the Thrush deposits hers upon the bare inside or plastering. The eggs are of a bluish colour, tinged with green, speckled with small black spots, chiefly at the largest end. The depth of the nest is about two inches and an half; the diameter of the inside, at the top, four inches. In making the nest, the bird stands within, making her own body the rule of her dimensions in building.

The young may be taken at twelve or fourteen days old, or sooner, if the weather be mild: they must be kept clean and warm, and fed with raw meat, bread, and hemp-seed bruised: the meat must be cut small, and the bread a little moistened, before they are mixed together. It is necessary that they should be fed once in about two hours.

NATURAL HISTORY of the BLACK-BIRD.

THE Black-bird is one of the first that proclaims the welcome spring, by his shrill harmonious voice, as if he were the harbinger of nature, to awaken the rest of the feathered tribe to prepare for the approaching season. This bird is of

a very retired and solitary nature, and frequents hedges and thickets. It breeds very early in the year, and frequently has young ones by the end of March. They build a very ingenious nest: the outside consists of moss, slender twigs, fibres of roots, all very strongly cemented with clay, the inside being plastered with clay, and lined with straw, hair, or other soft materials. It lays four or five eggs, of a bluish green colour, marked with irregular dusky spots. The Black-bird usually builds in a hedge near the ground, and before there are many leaves upon the bushes; and the nest, on account of its magnitude, may be easily discovered. The young may be taken when they are about twelve days old.

The Black-bird is the deepest toned warbler of the woods, but it is so loud in a cage as to be rather unpleasant. It begins to sing early in the spring, and continues its music part of the summer; but desists in the moulting season. It however re-assumes it for some time in the first winter months.

When the male has attained its full age, the colour is of a fine deep black, the bill of a bright yellow, and the edges of the eye-lids of the same colour. When young, the bill is dusky, and the plumage of a rusty black; but they attain their proper colour at the age of one year. In cold countries, and particularly upon the Alps, this bird is sometimes seen all over white, and is a beautiful and canorous bird, whistling during the whole spring and summer, with a note, which, at a distance, is the most pleasing of all the grove.

The blue-bird, described by Bellonius is, however, far superior to the Black-bird in every respect. This beautiful animal entirely resembles a Black-bird in form: it lives in the highest parts of the Alps, and chooses the most craggy rocks, and the most frightful precipices for its residence. Being seldom caught, it is in high estimation even in the countries where it breeds, but still more valuable when carried into other countries. It not only whistles in a most enchanting manner, but speaks with a distinct articulate voice. It is a very docile and diligent bird. About the beginning of winter, its colour from the blue becomes black, which changes to its original hue on the approach of spring.

Black-birds, among us, are about eleven inches in length, from the tip of the bill to the end of the tail; of which the bill is one inch, and the tail four inches: Black-birds are not taken old and tamed, but always brought up from the nest.

NATURAL HISTORY of the FIELD-FARE.

FLOCKS of Field-fares visit our islands about Michaelmas, and leave us about the beginning of March. It is imagined that those which come here, have taken the flight from Norway, and the adjacent countries, forced away by the excessive rigour of the season in those cold regions: those in the more moderate climates, as Prussia, and Austria, not only breed, but winter in those countries. With us they are insipid tuneless birds, and extremely vigilant to preserve the general safety: but in the more northern countries they sing most delightfully. They build their nests in hedges, and lay five or six bluish green eggs, spotted with black. The weight of this bird is about four ounces; the length is ten inches, and the breadth seventeen. The head is ash-coloured, inclining to olive, and spotted with black; the back, and greater coverts of the wings, are of a fine deep chestnut: the rump is ash-coloured, and the tail is black; except the lower parts of the two middle feathers, and the interior upper-sides of the outer feathers; the first being ash-coloured, and the latter white. The legs are black, and the talons are very strong. The flesh of the Field-fare is reckoned exceeding good.

NATURAL HISTORY of the THROSTLE.

THIS bird is also called the Song-Thrush, or Mavis. It is the finest of our singing birds, not only for the sweetness and variety of its notes, but for the long continuance of its harmony; as it entertains us with its song for almost three parts of the year. Like the missel-bird, it chooses to deliver its music from the top of a high-tree, but descends to some low bush or thicket to form its nest; which is composed of earth, moss, and straw, and the inside is curiously plaistered with clay. It lays five or six eggs, of a pale bluish green, marked with dusky spots. The length of this species is about nine inches, the breadth thirteen inches and an half, and the weight three ounces. It breeds early in the spring, the young being frequently hatched in the beginning of April. In Silësia, these birds build their nests in April and May, on the branches of trees and shrubs in forests; and usually lay four eggs. Sometimes they repair thither from distant countries, and are so numerous in the forests and on the mountains, that they not only afford present food for the inhabitants; but they roast them, and afterwards pickle them in vinegar, in order to preserve them for future repasts: they are taken with snares made of white horse-hair, baited with berries of the white forbet-tree.

NATURAL HISTORY of the RED-WING.

THE Red-Wing greatly resembles the throistle, but is considerably smaller, weighing only two ounces and a quarter. The colours of both are nearly the same, except that the side, under the wings and the inner coverts are of a reddish orange in this bird, and yellow in the throistle. Above each eye a line of yellowish white passes from the bill to the hind part of the head. The vent feathers are white. The Red-Wing appears in Great-Britain a few days before the field-fare, and comes from the same countries in very large flocks. They have a disagreeable piping note with us, but in Sweden, they perch on the top of some tree, and sing most agreeably during the spring. They build their nests in hedges, and lay five or six bluish green eggs, spotted with black. This bird is sometimes called the swine-pipe, or wind-thrush.

NATURAL HISTORY of the STARE or STARLING.

THE Starling may be distinguished from the rest of this tribe, by the glossy green of its feathers in some lights, and the purple in others. The weight of the male species is above three ounces, and that of the female somewhat less. The length is eight inches and an half, and the breadth fourteen inches and an half. The feathers on the head, neck, and upper-part of the back are black, varied with a most beautiful green and purple as opposed to different lights. The tips of the feathers on the head are of a yellowish brown, and those on the neck are white: they are of a singular form, being long, narrow, and pointed. The lower part of the back, the rump, the coverts of the wings, and the lower part of the breast are black, glossed with green. The tips of the feathers on the breast are white, those of all the rest being yellowish; and the belly is glossed over with a deep purple. The tail is short, and the wings, when closed, reach within half an inch of the end. The legs and feet are black, tinged with red.

The Starling breeds in hollow trees, eaves of houses, towers, ruins, cliffs, and frequently in high rocks over the sea. It lays four or five eggs, of a

No. 19.

pale greenish ash colour; and makes its nest of straw, small fibres of roots, and moss. It has a rougher voice than the rest of its kind, but the deficiency in the melody of its notes, is compensated by the facility with which it is taught to speak. These birds assemble in vast flocks in winter, and feed upon worms and insects. At the approach of spring, they assemble in fields, as if in consultation together, and seem to take no nourishment for several days: the majority of them leave the country, and the rest breed here. The flesh of the Starling is so remarkably bitter as to be hardly eatable.

This bird has naturally a wild screaming, uncouth note, but it is much esteemed for its aptness in imitating the human voice, speaking articulately, and learning to whistle a variety of tunes. A Starling, educated under a judicious master, becomes so accomplished as to be sometimes sold for five or six guineas.

Starlings may be taken at about ten days old, and may be fed in the same manner as young black-birds. The person who feeds them should, while they are eating, frequently repeat such words as he would choose to have them learn, and he will find them very apt scholars. Many persons slit their tongues, imagining it will enable them to talk more articulately, but it is a most ridiculous practice, and only tortures the poor animal without being of the least service.

Though naturally a hardy bird, it is subject to the cramp and fits, when confined in a cage. Sometimes it is so suddenly seized, that it will fall from its perch and beat itself to death in a few moments; a spider or meal-worms are a good remedy against those complaints, and should be administered twice or thrice a week; each dose to consist of about three.

The BLACK and WHITE INDIAN STARLING.

This bird has a sharp pointed bill, thickish at the base, bowed a little downward, and of a yellowish orange: the forehead next the base of the bill above is white; but the top of the head, the throat, and neck are black, with a greenish gloss. The back, rump, the upper-part of the wings, and the tail are blackish; but the ridge of the wings next the breast is whitish, and the outer edges of the great quills are of a lighter brown than the other parts. The tips of the row of covert feathers next above the quills are white; and the breast, belly, thighs, and covert feathers under the tail are white. A line, of a palish brown colour, runs on the sides of the upper-part of the breast, forming a ring round the lower-part of the neck behind, and the legs and feet are of a reddish brown. This is an inhabitant of Bengal.

The YELLOW INDIAN STARLING.

The bill of this bird is shaped like that of the common Starling, of a reddish brown at the base, becoming gradually more dusky towards the point. The iris of the eyes is of a hazel colour, encircled with yellow, and the pupils are black. The forehead, from the bill to the eyes, is of a bright yellow, and the eyes are surrounded with dusky feathers: the top and sides of the head are black. The throat is whitish, the breast of a light yellow; the belly, thighs, and coverts are of a deeper yellow; and the throat and breast have long dusky spots down the shafts of the feathers. The upper part of the neck, back, rump, and coverts on the upper part of the tail are of a bright yellow: the greater quills of the wings are dusky, edged with yellow on their outer webs: all the covert feathers on the upper side are yellow, with dusky spots in the middle of each. The middle feathers of the tail are dusky, tinged with yellow, having yellow tips; and the legs and feet

feet are dusky. This bird inhabits Bengal in the East Indies.

NATURAL HISTORY of the AMERICAN MOCK-BIRD.

THIS is the favourite songster of a region, where the birds excel rather in the beauty of their plumage, than the sweetness of their notes. It is much inferior in beauty to most of the feathered inhabitants of that country, but it has qualifications that render it more amiable. It is about the size of a thrush, has a reddish bill, and the colours of its feathers are white and grey. Exclusive of its own natural notes, which are very musical and solemn, it can assume the tone of every other animal in the forest, whether quadruped or bird. It seems to delight in leading them astray. Sometimes it allures the smaller birds with the call of their males, and when they come near, it terrifies them with the screams of the eagle. It can mimic any of the feathered tribe to the greatest exactness, and there is none that has not at times been deceived by its call. Such birds, however, as we usually see famed for mimicking with us, have no peculiar merit of their own, but the Mock-Bird is ever most sure to please when it is most itself. At those times it frequently visits the houses of the American planters, and passes the whole night on the chimney-top, pouring forth the sweetest variety of notes of any of the feathered creation. So extravagant are some naturalists in their encomiums upon this bird, that the deficiency of other song birds in that country seems amply atoned for by this animal alone. It builds its nest in the fruit trees near houses, feeds upon fruits and berries, and is easily domesticated.

NATURAL HISTORY of the RING-OUZEL.

THIS is an inhabitant of the mountainous parts of these islands, where they appear in companies of five or six. They are somewhat larger than a black-bird. In some of them the bill is wholly black, in others the upper half is yellow: there are a few bristles on each side of the mouth. The feathers on the head, and the upper part of the body, are dusky, edged with pale brown: the quill feathers, and the tail are black. The coverts of the wings, the upper part of the breast, and the belly, are dusky, slightly edged with ash colour. The breast is adorned with a white crescent in the middle, with the horns pointing to the hind part of the neck. This crescent is of a pure white in some, and of a dusky hue in others. Neither the females nor any of the young birds are possessed of this mark, which has occasioned some naturalists to form two species of them. This bird is found in Derbyshire, Yorkshire, and other places in the north of England. It is eleven inches in length, and seventeen in breadth.

The WATER-OUZEL.

This bird is also called the Water-Crake. It frequents small brooks, particularly those that run through a rocky country. It is of a very retired nature, and is never seen but single, or with its mate. It makes its nest in holes in the banks, and lays five white eggs, adorned with a fine blush of red. It feeds on small fish and insects; and, though it is not web-footed, and the whole form of the body denotes it to be a land-fowl, yet it will dart itself quite under the water after fish. The nest is curiously constructed of hay and the fibres of roots, and lined with oak leaves; to which it has a grand entrance made of moss. This bird is frequently seen

in the northern counties, and particularly in Wales. It is seven inches in length, and eleven in breadth, and weighs about two ounces and an half. The bill is narrow, the eye-lids are white; the head, cheeks, and hind-parts of the head, are dusky: the back, the coverts of the wings, and the coverts of the tail are also dusky, bordered with bluish ash colour: the throat and breast are white, and the belly of an iron colour. The legs are of a pale blue before, and black behind. When it is fitting, it often flirts up its tail, which is short and black.

The INDIAN OUZEL.

In shape and size this bird resembles the jack-daw. The breast is red, and the upper part of the body entirely black, except that the feathers near the rump are edged with white. The bill is like that of the black-bird, and the tail also resembles that of the black-bird.

The BRASILIAN OUZEL.

This bird is of a deep red all over the body, except the tail, which is blackish. The bill is short, like that of a sparrow; the tail is long, and the feet and legs black.

The party-coloured Ouzel is principally of two colours, namely blackish, and a yellowish red. There is another, with a red line near the bill, which in other respects resembles the former.

NATURAL HISTORY of the NIGHTINGALE.

“**T**HE Nightingale,” says Pliny, “that for fifteen days and nights hid in the thickest shades, continues her note without intermission, deserves our attention and wonder. How surprising that so great a voice can reside in so small a body! Such perseverance in so minute an animal! With what a musical propriety are the sounds it produces modulated! the note at one time drawn out with a long breath, now stealing off into a different cadence, now interrupted by a break, then changing into a new note by an unexpected transition, now seeming to renew the same strain, then deceiving expectation! she sometimes seems to murmur within herself; full, deep, sharp, swift, drawling, trembling; now at the top, the middle, and the bottom of the scale! In short, in that little bill seems to reside all the melody which man has vainly laboured to bring from a variety of musical instruments. Some even seem to be possessed of a different song from the rest, and contend with each other with great ardour. The bird overcome is then seen only to discontinue its song with its life.”

The Nightingale takes its name from night, and the Saxon word galan, to sing; expressive of the time of its harmony. It is about the size of the red-start, but slenderer, longer bodied, and more elegantly formed. The head and back are of a pale tawny, dashed with olive: the throat, breast, and upper part of the belly are of a light glossy ash colour, and the lower belly almost white. The exterior webs of the quill feathers are of a dull reddish brown: the tail is of a deep tawny red. The legs and feet are of a deep ash colour. The irides are hazel, and the eyes remarkably large and piercing.

This bird, the most celebrated of the feathered tribe, for the variety, length, and sweetness of its notes, visits England in the beginning of April, and leaves it in August. It is found only in some of the southern parts of the country; being totally unknown in Scotland, Ireland, or North Wales. With us they frequent thick hedges, and low coppices; usually keeping in the middle of the bush, and consequently are but seldom seen. They begin their
I
song

BIRDS.



Rose Colour'd OUZELL



Horn OWL



Lesser Reed SPARROW



Bird of PARADISE



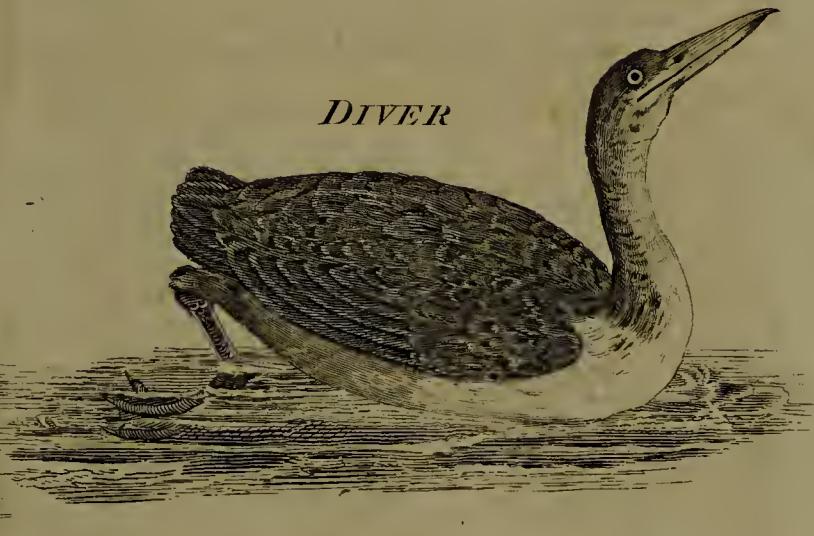
PASSER Indicus



CHARADRIUS



PENGUIN



DIVER



CURVIROSTRA



BRENT GOOSE



CLANGULA DUCK



RED SHANK



ROLLER



ROLLER or CHATTERER



song in the evening, and generally continue it the whole night. For weeks together, if undisturbed, they sit upon the same tree; and Shakespear rightly describes the Nightingale sitting nightly in the same place. The Nightingale was the favourite bird of Milton, who often introduces it, and usually expresses its love of solitude and night. He thus describes the approach of evening, and the retiring of all animals to their repose.

Silence accompanied; for beast and bird,
They to their grassy couch, these to their nests
Were flunk, all but the wakeful *nightingale*;
She all night long her amorous descant sung.

Eve, in the night preceding her fall, dreams she is reproached in the following terms, with losing the beauties of the night, by indulging too long a repose:

Why sleep'st thou, Eve? Now is the pleasant time,
The cool, the silent, save where silence yields
To the *night-warbling* bird, that now awake
Tunes sweetest his love-labour'd song.

Nightingales sing the nuptial song of Adam and Eve, in the following rapturous lines.

The earth
Gave signs of gratulation, and each hill;
Joyous the birds; fresh gales and gentle airs
Whisper'd it to the woods, and from their wings
Flung rose, flung odors from the spicy shrub,
Disporting, till the amorous bird of night
Sung spousal, and bid haste the evening star
On his hill-top to light the bridal lamp.
These lull'd by *nightingales*, embracing slept;
And on their naked limbs the flowery roof
Shower'd roses, which the morn repair'd.

From Pliny's description of the Nightingale, it might be imagined that it was possessed of a persevering strain: this indeed is the fact with regard to the Nightingale in Italy; but in our hedges in England, the little songstress is by no means so liberal of her music. Her note is soft, various, and interrupted. She so frequently pauses, that the pausing song would be the proper epithet for this bird's music with us; which is more pleasing than the warbling of any other bird, because it is heard at a time when all the rest are silent.

The Nightingale builds its nest about the beginning of May: it is composed of straw, moss, and the leaves of trees; and its situation is usually near the bottom of hedges, where the bushes are thickest and best covered. It is indeed so cunningly secreted, that it generally escapes the penetrating eye of the school-boy. The Nightingale lays four or five eggs, which are of a brown nutmeg colour; but, in our cold climate, the whole number is seldom hatched.

The sweetness of this bird's music has induced many to abridge its liberty to be secured of its song. Its notes, however, in captivity are less alluring. Gesner indeed allows it to be the most agreeable songster in a cage, and assures us that it is possessed of a most admirable faculty of talking. He even relates a long dialogue which passed between two Nightingales at an inn in Ratisbon, in which not only the human voice was most admirably imitated, but great sagacity and strength of argument were displayed on both sides. Thus it is when we have high reputation for any one quality, the world is then ready enough to give us fame for others to which we have very small pretensions.

The Nightingale seldom sings near its nest, lest it should be discovered by that means. It frequents cool and shady places, among small groves and bushes; but it delights in no high trees, except the oak. Young Nightingales should not be taken

from the nest, till they are almost as well fledged as the old ones; and though, when they are old, they are apt to be sullen, and refuse their meat, yet their mouths are easily opened; and when they are thus forcibly fed for a few days, they begin to be reconciled to their situation, and voluntarily take their food.

NATURAL HISTORY of the ROBIN RED-BREAST.

THE song of the Red-Breast is remarkably fine and soft; and the more to be valued, as we enjoy it the greatest part of the winter, and early in the spring. The note of other birds is louder, and their inflections more capricious: but the voice of this bird is tender, delicate, and well supported. During the spring, the Red-Breast haunts the grove, the garden, and the wood. In winter, when there is a scarcity of provision, it will even enter houses to seek its food; and is remarkably sociable with mankind, though so extremely petulant as to be at constant war with its own tribe.

The nightingale, the swallow, the tit-mouse, and most of the soft-billed birds, leave us in the winter, when there ceases to be a plentiful supply of insect food; but the Red-Breast remains continually with us, and endeavours to support the famine of winter, by chirping round the warm habitations of mankind, by coming into those shelters where the rigour of the season is artificially expelled, and where some few insects are to be found, attracted by the same cause.

In some countries, the Red-Breast builds in the crevice of some mossy bank, or at the foot of an hawthorn in hedge-rows: in others it chooses the thickest coverts, and conceals its nest with oak leaves. The nest is composed of coarse materials: the outside consists of dry green moss, intermixed with coarse wool, small dry sticks, straws, dry leaves, and peelings from young trees; with a few horse-hairs within side. It usually lays five or six eggs, which are of a cream colour, sprinkled all over with fine reddish spots; which are so numerous at the blunt end that they almost appear as one.

The bill of the Red-Breast is dusky; the forehead, chin, throat, and breast, are of a deep orange colour. The head, the hind part of the neck, the back, and tail, are of a deep ash colour, tinged with green. The wings are rather darker, with the edges of a yellowish hue. The legs and feet are dusky.

In a confined state, these birds are subject to the cramp and giddiness, for the cure of which meal-worms are effectual. There are many kinds of insects which birds will greedily devour, and which would probably relieve them under their maladies, could they be at all times conveniently procured: such as young smooth caterpillars, for a Red-Breast will not touch one that is hairy, and some sorts of spiders, ants, &c. but no insect is more innocent, or agrees better with birds in general than the meal-worm, which may at all times be procured at the meal-shops. A little liquorice, or saffron in their water, will make them long-winded, and assist them in their song. A young Red-Breast, brought up from the nest, may be taught to pipe or whistle delightfully; but an old bird is apt to be sullen, though he may be induced by degrees to exert his powers.

NATURAL HISTORY of the RED-START.

THIS bird appears among us only in the spring and summer, and visits us almost at the same time with the nightingale. It makes its nest in hollow

hollow trees, holes in walls, and other buildings; it is formed of moss on the outside, and lined with hair and feathers. The Red-Start lays four or five eggs, which resemble those of the hedge-sparrow, but are smaller, and of a paler blue. It is so remarkably shy, that it will forsake its nest if the eggs are only touched; and if the young ones are touched, it will either starve them, or throw them out of the nest. It has a delicate soft note; but, being a fullen bird, it is difficult to keep it alive in confinement. It will sing by night as well as by day, and will learn to whistle, and imitate other birds.

These birds breed in May, and their young are generally fit to be taken about the middle of that month. When taken young, they should be kept warm, and managed like the nightingale.

The bill and legs of the male Red-Start are black, and the forehead white. The crown of the head, the back part of the neck, and the back, are of a deep blue grey: the cheeks and throat are black; the breast, rump, and sides are red; the wings are brown, the two middle feathers of the tail are brown, and the others red. The top of the head and back of the female are of a deep ash colour; the rump and tail of a duller red than those of the male, and the breast of a paler red.

Gesner mentions three sorts of Red-Starts, one of which is the same with that which we have described above; the second has a red tail; and the third, which is seen about Strasburgh, is blue at the upper part of the breast, and of a yellowish red at the bottom: the belly is of an ash colour, and the legs brown.

The INDIAN RED-START.

The bill of this bird is dusky at the base, and black at the point. The top of the head is covered with long, soft, black feathers, hanging over behind in the form of a crest; and under each eye is a scarlet spot. The throat, breast, belly, and thighs are white; but the sides of the neck and breast are black. The hind part of the neck, the wings, and tail are of a dark brown; and the ridge of the wing next the breast is whitish: the feathers about the vents, and the coverts beneath the tail are of a fine red colour; but the legs and feet are black. It is a native of Bengal.

NATURAL HISTORY of the SKY-LARK, and its Varieties.

THE music of any bird in captivity produces no very pleasing sensations: it is but the mirth of a little animal, insensible of its unfortunate situation. It is the landscape, the grove, the contest upon the hawthorn, the fluttering from branch to branch, the soaring in the air, and the answering of its young, that gives a true relish to the song of a bird. These united, improve each other, and raise the mind to a state of the highest and most innocent exultation. How delightful to behold the Lark warbling upon the wing! raising its notes as it soars, till it seems lost in the immense heights above us; the note continuing, though the bird has disappeared! To see it afterwards descending, with a swell as it comes from the clouds, yet sinking gradually as it approaches its nest, the spot where all its affections are centered, is pleasing beyond expression.

The Sky-Lark and the Wood-Lark are the only birds that sing as they fly: the former begins its song before the earliest dawn. Milton, in his allegro, beautifully expresses this circumstance.

To hear the lark begin his flight,
And singing startle the dull night,

From his watch tower in the skies
'Till the dappled dawn doth rise.

The Lark builds its nest upon the ground, beneath some turf that serves to hide and shelter it: sometimes in corn-fields, or in pasture of any kind. It lays four or five brown eggs, thickly streaked with spots of a darker brown. It generally has young ones about the beginning of May: while the female is sitting, the male usually entertains her with his singing; and while he rises to an imperceptible height, he never once loses sight, either of his loved partner or the nest, while he is ascending or descending. This harmony continues several months, beginning early in the spring on pairing. In winter, when their song forsakes them, they assemble in vast flocks, grow very fat, and are taken in great numbers by the bird-catchers.

The Sky-Lark is about seven inches in length, and twelve and a half in breadth, and the weight is about one ounce and an half. The bill is slender, the upper-chap being dusky, and the lower yellow: there is a yellow spot above the edges: the crown of the head is of a reddish brown, spotted with black; and the hind part of the head is of an ash colour. It has the faculty of erecting the feathers of the head. The feathers on the back, and coverts of the wings, are dusky, edged with a reddish brown. The upper part of the breast is yellow, spotted with black; and the lower part of the body of a pale yellow. The legs are dusky, the soles of the feet yellow, and the hind-claw very long and straight. The male is distinguished from the female by being browner, and more particularly by the length of the heel or hind-claw; for Gesner affirms he has seen them above two inches long.

The young of these birds should be taken when they are about ten days old, or sooner, for they quit their nests very early.

The WOOD-LARK.

This bird is six inches and an half in length, from the tip of the bill to the end of the tail; and twelve inches and an half in breadth, when the wings are extended. Its weight is about an ounce and a quarter. It is inferior in size to the Sky-Lark, and of a shorter and thicker form; the colours are paler, and its note less sonorous, though not less sweet. By these and the following characters, it may be easily distinguished from the common kind: it perches on trees, and whistles like the black-bird; but the Sky-Lark always sits upon the ground. The crown of the head, and the back, are marked with large black spots; edged with pale reddish brown: a whitish coronet of feathers surrounds the head, extending from eye to eye: the throat is of a yellowish white, spotted with black; the breast tinged with red, and the belly white: the coverts of the wings are brown, edged with a dullish white: the quill feathers are dusky; the first three being white at the exterior edges, and the others yellow. In the common Lark, the first and second feathers of the wing are nearly of an equal length; but, in the Wood-Lark, the first feather of the wing is shorter than the second: the tail is black, the legs are of a cream-colour, and the hind claw is very long. Like the common Lark, the Wood-Lark will sing as it flies, and will also exert its singing faculties in the night. It builds on the ground in the same manner as the common Lark, but the species is not so numerous. The male is distinguished from the female by its superior size.

The Wood-Lark generally lays four eggs, and produces about four young ones, which are very tender birds, and difficult to be reared; and therefore should not be taken till they are well feathered: they should be kept clean and warm. Some prefer the

the finging of the Wood-Lark to the nightingale, and in the months of May, June, and July, it is often mistaken for that bird, especially in hot weather, when the sky is serene, but principally when the females are performing the duty of incubation.

This bird in its wild state feeds upon beetles, caterpillars, and other insects. Apparently sensible of its own melodious song, it will never imitate the note of another bird, unless it be brought up from the nest; then indeed it sometimes submits to learn the song of another.

The WHITE LARK.

This bird inhabits the mountains of Lapland, but goes into Sweden in winter. It has a short body and white wings; but the first outward feathers are black, as well as the tail, and the sides are of a pure white. Like the common sky-lark, it never perches upon trees.

The TIT-LARK.

The Tit-Lark frequents low marshy grounds, and, like other Larks, builds its nest among the grass, laying five or six eggs, which are of a dark brown colour; and its young are fit to take about the beginning of May. Like the wood-lark, it sits on trees, and has a remarkable fine note, greatly resembling that of the canary-bird. It is a bird of an elegant and slender shape; five inches and an half in length, and nine in breadth. The bill is black; the back and head are of a greenish brown, spotted with black; the throat, and lower part of the belly, are white; the breast is yellow, spotted with black; the tail is dusky; the claw on the hind toe is very long, and the feet are of a pale yellow. The cock is yellower than the hen, especially under the throat, on the breast, and legs.

This bird comes with the nightingale about the end of March, and goes about the beginning of September. Like the nightingale, it grows fat before it goes away. If properly attended, it is a hardy long-lived bird.

The CRESTED LARK.

This differs from the common Lark in being longer in the crest, in being less beautiful, in its not rising so high in the air, and in its not remaining so long there; in its not flying in flocks, and its frequenting the banks of lakes and rivers. The crest consists of about seven, eight, or nine feathers; which it can erect, spread, or contract at pleasure. The outer parts of some of the pinion feathers are of a dusky white, or cream-colour; but the throat is beautifully spotted: the breast and belly are of a yellowish white; and the tail is about two inches long, some of the outer feathers having white borders, others red, and other black.

The LESSER CRESTED LARK.

Mr. Ray, in his history of English birds, says this species is to be found in Yorkshire; but gives only the following brief description of it from Aldrovandus: it is like the greater crested Lark, except that it is smaller, and not so brown. For the smallness of its body, it has a considerable tuft on its head, and its legs are red. Mr. Bolton, in his list of Yorkshire birds, says this species are very numerous in that county.

The LESSER FIELD LARK.

This is larger than the tit-lark; the head and hind part of the neck are of a pale brown, spotted with dusky lines, which appear but faintly on the neck. The back and rump are of a dirty green; the middle of each feather of the former being marked with black, and those of the latter plain.

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The coverts of the wings are dusky, edged with white. The throat and breast are yellow; the latter being marked with large black spots. The belly is white, and the tail is dusky. The legs are of a very pale brown; and it is strongly distinguished from the tit-lark, by the claw on the hind toe, which is extremely short for one of the lark kind.

The RED LARK.

This bird, which was discovered by Mr. Edwards in the neighbourhood of London, is about the size of the lesser field Lark. The head, the hind part of the neck, and the back, are of a dusky brown. A blackish line passes through each eye, and above that a clay-coloured one. The wings are of a dark brown; and the tail is of the same colour, except that the interior feathers are wholly white. The under side, from the bill to the tail, is of a reddish brown, marked with dusky spots: the legs are of a dark brown, and the hind claw is shorter than that of the common lark. When the wings are gathered up, the third quill feather from the body reaches to its tip, like that of the water-wagtail genus.

The BLACK LARK.

The bill of this bird is of a dusky yellow, and the iris of the eye is yellow. It is entirely of a dusky brown, inclining to black, with a reddish cast, except on the back part of the head, where there are feathers of a dusky yellow; and on the belly, where some of the feathers are edged with white. The legs, feet and claws are of a dirty yellow. This bird is not often seen in England.

The GRASSHOPPER LARK.

This is the bird which Mr. Ray describes as having the note of the Grasshopper, though louder and shriller. When it sings it sits on the highest branch of a bush, with its mouth open and strait up, and its wings disheveled. It is considerably smaller than the tit-lark. The bill, which is slender, is of a dusky colour: the head and the upper part of the body is of a greenish brown, spotted with black. The quill feathers are dusky, edged with an olive brown: the tail, which is very long, is composed of twelve sharp-pointed feathers; the two longest being in the middle, and the others on each side growing gradually shorter. The breast and belly are of a yellowish white; and the hind claw is shorter and more crooked than is usual among the Lark kind.

The WILLOW LARK.

This bird is inferior in size to the grasshopper Lark; but it has exactly the same note and actions. It is annually seen in some willow hedges in Flintshire, where it continues the whole summer. The head, back, and coverts of the wings are of a yellowish brown, marked with dusky spots: the quill feathers are dusky, except that their exterior edges are of a dirty yellow. The throat is white, and the whole under side of the body is of a yellowish white: the tail is of a dark brown; the legs are of a yellowish brown, and the hind claw is short and crooked.

The PETIT LARK.

This is smaller than any of the former, and has a slender sharp-pointed bill of a dusky colour. The head, the neck, the upper part of the body, and the wings, are of a dusky olive-green; but the latter are shaded with black, and have a dusky white border on the two first rows of the covert feathers: the breast, and lower parts of the body, are of a pale brown, with faintish large spots of black. The tail is about two inches long, and the outermost feathers are white about half way, with dusky edges; but the others are browner, with yellow edges. The feet are of a pale brown, and the claws are long.

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NATURAL HISTORY of the CANARY BIRD.

BY the name it appears that these birds came originally from the Canary Islands, but we have them only from Germany, where they are bred in great numbers, and sold into different parts of Europe. When they were first brought into Europe, is not certainly known; but it is certain that about a century ago they were sold at very high prices, and kept only for the amusement of the great. They have since been greatly multiplied, and their price is diminished in proportion.

This bird was originally peculiar to those isles, to which it owes its name; the same that were known to the ancients by the addition of the Fortunate. The happy temperature of the air, the spontaneous productions of the ground in the varieties of fruits; the sprightly and chearful disposition of the inhabitants; and the harmony arising from the number of birds found there, procured them that romantic distinction. On the same spot these charming songsters are still to be found; but they are now so plenty among us, that we are under no necessity of crossing the ocean for them.

In its native regions, the Canary Bird is of a dusky grey colour, and so different from those usually seen in Europe, that doubts have arisen whether it be of the same species. With us they have that variety of colouring usual in all domestic fowls; some being white, others mottled, and others beautifully shaded with green; but in this country they are more esteemed for their note than their beauty, having a high piercing pipe, continuing for some time in one breath without intermission, then gradually raising it higher and higher, with infinite variety. It is certainly one of the finch tribe.

Next to the nightingale, the Canary Bird is considered as the most celebrated songster; it is also reared with less difficulty than any of the soft billed birds, and continues its song throughout the year; consequently it is rather the most common in our houses.

In choosing the Canary Bird, those are the best in health that appear lively and bold, standing upright upon the perch like a sparrow-hawk, without being intimidated at every thing that stirs. In observing him he should not be approached too near, lest a motion of the hand should disturb him; which, for a short time, will make him appear sprightly and in health; but if he is observed at a proper distance, it may soon be discovered whether it is the effect of fear, or the natural spirit of the bird. If he stands up boldly, without crouching or shrinking his feathers, and his eyes look chearful, and not drowsy, there is little doubt of his being a healthy bird; but if, on the contrary, he is apt to put his head under his wing, and stand all of an heap, he is certainly disordered.

In choosing a Canary Bird, the melody of the song should also be attended to: some of them will open with the notes of the nightingale, running through a variety of that bird's modulations, and with the song of the tit-lark. Others begin like the sky-lark, and, by a soft melodious turn, fall into the notes of the nightingale. These, however, are lessons taught the Canary Bird in its domestic state; but its natural note is loud, shrill, and piercing. Each of these songs have their admirers, but the second is most generally esteemed.

Though they sometimes breed all the year round, they most usually begin to pair in April, and to breed in June and August. The best breed is said to be produced between the English and French birds. Towards the latter end of March, a cock and hen should be put together in a small cage: though they disagree a little at first, they will soon become thoroughly reconciled. The situation of the room where

they are kept, must not deprive them of the benefit of the morning sun; and the windows should not be of glass, but where they may perfectly enjoy the benefit of the free air. The floor of the room should be kept clean, and sometimes gravel or sifted sand should be strewed over it. There should be two windows, one at each end of the room; and several perches at proper distances for the birds to settle on, as they occasionally fly backwards and forwards. Some place a tree in the middle of the room, which diverts the birds, and some of them choose to build their nests in it. But care must be taken to secure those nests from falling through; and, if they appear to be in any danger, to tie the tree closer to prevent it.

While the birds are pairing, they are usually fed with soft meat, such as bread, maw-feed, a little scalded rape-feed, and about a third part of an egg, observing to grate the bread and rape-feed very fine. Materials for making their nests, such as hay, wool, cotton, and hair, should be placed in their apartment, in so loose a manner that the birds may have no difficulty in collecting what is necessary for their purpose. The male assists the female in building the nest, and takes his turn with her in sitting upon the eggs, and feeding the young. They are usually about two or three days in making their nest, and the female generally lays five eggs, which are hatched at the end of about fourteen days. These birds are sometimes so extremely prolific, that the female will be ready to hatch a second brood, before the first are able to desert the nest. On these occasions she quits the nest and her young, in order to provide herself with another to lodge her new brood in. In the mean time, the faithful male nurses the young which are left behind, and fits them for a state of independence.

When the young are produced, the parents should be supplied with a sufficiency of soft food every day; and also with cabbage, lettuce, and chick-weed; in June, shepherd's-purse, and in July and August, plantain. They should have no groundfil after the young are excluded. With these delicacies the old ones will carefully feed their young; but when they are able to feed themselves, they are usually taken from the nest, and put into cages. Their food then is the yolk of an egg boiled hard, with an equal quantity of grated bread, and a little scalded rape-feed, bruised till it becomes fine: it may also be mixed with a little maw-feed; after which all may be blended together. They should have a fresh supply of this food every day.

These birds will produce with the gold-finch and linnet, and the offspring is called a mule-bird, because, like that animal, it proves barren.

NATURAL HISTORY of the SWALLOW.

THE Swallow-tribe are all known by their very large mouths, which are always kept open when they fly; they are equally remarkable for their short slender feet, which appear as if they were hardly able to support the weight of their bodies; their wings are immoderately long for their bulk; their plumage is glossed with a rich purple, and their note is a slight twittering, which they seldom exert but upon the wing.

The peculiar conformation of this tribe seems attended with a similar peculiarity of manners. Insects are their food, which they always pursue flying. In fine weather, therefore, when the insects are most likely to be abroad, Swallows are continually upon the wing, and pursue their prey with amazing swiftness and agility. The smaller animals in general find safety by winding and turning, when they endeavour to avoid the greater: the lark thus evades
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the pursuit of the hawk, and man the crocodile. Insects upon the wing endeavour, in this manner, to avoid the Swallow; but nature has admirably fitted this bird to pursue them through the shortest turnings. Besides the uncommon length of wing, it is provided with a long tail, which, like a rudder, instantly turns it in its most rapid motions. It is also possessed of the greatest swiftness, and the most extreme agility.

When the spring begins to rouse the insect tribe from their annual state of torpidity; when the gnat and the beetle put off their earthly robes and venture into air, the Swallow returns from its long migration beyond the ocean. At first it appears but seldom, and flies heavily and feebly; but, as the weather grows warmer, and the number of insects increases, it gathers activity and strength. A rainy season indeed, by repelling the insects, stints the Swallow in its food; it is then seen slowly skimming along the surface of the ground, and frequently resting after a flight of a few minutes. In general, however, it keeps upon the wing, and moving with amazing rapidity. When fair weather appears, the insect tribe feel the genial influence, and make bolder flights; the Swallow following them in their aerial journeys, and often rising to imperceptible heights in the pursuit. At the approach of foul weather, the insects have immediate intelligence, and from the Swallows pursuing them near the earth, we are often apprized of the change that will speedily ensue.

Among naturalists, there are three opinions concerning the manner the Swallow tribes dispose of themselves, after they have fled from the countries in which they make their summer residence. Herodotus mentions one species that resides in Egypt the whole year: Prosper Alpinus asserts the same; and Mr. Loten, late Governor of Ceylon, declares that those of Java never remove. All of the kind which we have heard of, except these, observe a periodical migration or retreat. The Swallows of Norway, North-America, Kamtschatka, the temperate parts of Europe, of Aleppo, and Jamaica, all agree in this one point.

A defect of insect food on the approach of winter in cold countries, appears a sufficient reason for the Swallows quitting them; but since it is probable that the same cause does not subsist in the warm climates, recourse should be had to some other reason for their vanishing.

The first of the three opinions has the utmost appearance of probability; which is, that they remove nearer the sun, where they can find a continual supply of their natural food, and a temperature of air adapted to their constitutions. M. Adanson has proved beyond contradiction, that this is the case with some species of European Swallows. We often observe them assembled in vast flocks, on churches, rocks, and trees, previous to their departure hence; and Mr. Collinson, and many others have proved that they return in equal numbers. Sir Charles Wager gives the following account of what happened to him in one of his voyages. "Returning home," says Sir Charles, "in the spring of the year, as I came into founding in our channel, a great flock of Swallows came and settled on all my rigging; every rope was covered; they hung on one another like a swarm of bees; the decks and carving were filled with them. They seemed almost famished and spent, and were only feathers and bones; but being recruited with a night's rest, took their flight in the morning." This very great fatigue evidently proves that their journey must have been very long, considering the amazing swiftness of these birds: it is probable they had crossed the Atlantic ocean, and were returning from the shores of Senegal, or other parts of Africa.

The second opinion is supported by great anti-

quity. Aristotle and Pliny are of opinion that Swallows do not remove to any great distance from their summer habitation, but winter in the hollows of rocks, and lose their feathers during that period. Many ingenious men have adopted the former part of their opinion; and several proofs have lately been produced, that some species, at least, have been discovered in a torpid state. The honourable Mr. Dains Barrington, a few years ago, communicated the following fact to Mr. Pennant, on the authority of the late Lord Belhaven, that numbers of Swallows have been found in old dry walls, and in sand-hills near his lordship's seat in East-Lothian; not once only, but from year to year. The following account of some Swallows on the Rhine, was communicated to Mr. Peter Collinson, by Mr. Achard, and was read before the Royal Society the twenty-first of April, 1763.

"In the latter end of March," says Mr. Achard, "I took my passage down the Rhine, to Rotterdam. A little below Basil, the south bank of the river was very high and steep, of a sandy soil, sixty or eighty feet above the water.

"I was surprized at seeing, near the top of the cliff, some boys, tied to ropes, hanging down, doing something. The singularity of these adventurous boys, and the business they so daringly attempted, made us stop our navigation, to enquire into the meaning of it. The watermen told us, they were searching the holes in the cliff for Swallows or martens, which took refuge in them, and lodged there all the winter, until warm weather, and then they came abroad again.

"The boys, being let down by their comrades, to the holes, put in a long rammer, with a screw at the end, such as is used to unload guns; and, twisting it about, drew out the birds. For a trifle I procured some of them. When I first had them, they seemed stiff and lifeless. I put one of them in my bosom, between my skin and shirt, and laid another on a board, the sun shining full and warm upon it; and one or two of my companions did the like.

"That in my bosom revived in about a quarter of an hour: feeling it move, I took it out to look at it, and saw it stretch itself upon my hand; but perceiving it not sufficiently come to itself, I put it in again: in about another quarter, feeling it flutter pretty briskly, I took it out and admired it. Being now perfectly recovered, before I was aware, it took flight; the covering of the boat prevented my seeing where it went. The bird on the board, though exposed to a full sun, yet I presume, from a chillness of the air, did not revive so as to be able to fly."

Such is Mr. Achard's account, on which the following observations were made by Mr. Collinson.

"What I collect from this gentleman's relation, is, That it was the practice of the boys, annually to take these birds, by their apparatus and ready method of doing it; and the frequency of it was no remarkable thing to the watermen. Next, it confirmed my former sentiments, that some of this Swallow-tribe go away, and some stay behind, in these dormitories, all the winter. If my friend had been particular, as to the species, it would have settled that point."

We cannot but assent to the above circumstances, though seemingly contradictory to the common course of nature in regard to other birds. We must therefore divide our belief respecting these two very different opinions, and conclude, that one part of the Swallow-tribe emigrate, and that others have their winter quarters at home.

The third notion is too amazing and unnatural to merit the least attention. The first who broached the opinion of Swallows passing the winter immersed under ice, at the bottom of lakes, or beneath the water of the sea, was Olaus Magnus, archbishop of Upsal,

Upfal, who very gravely informs us that they are frequently found in clustered masses at the bottom of the northern lakes, mouth to mouth, wing to wing, foot to foot; and that they creep down the reeds in autumn to their subaqueous retreats. That when old fishermen discover such a mass, they throw it again into the water; but when young inexperienced ones take it, they will, by thawing the birds at a fire, bring them indeed to the use of their wings, which will continue but a very short time, being owing to a premature and forced revival.

Credit has been given to the submersion of Swallows by some of our own countrymen; and Klein strongly patronizes this doctrine. He relates the following history of their manner of retiring, which he received from some countrymen and others. They asserted that sometimes the Swallows assembled in numbers on a reed, till it broke and sunk with them to the bottom; and before their immersion they had a dirge of a quarter of an hour's length. That others would unite in laying hold of a straw with their bills, and so plunge down in society. Others again would form a large mass by clinging together with their feet, and in that manner commit themselves to the deep.

When the summer is fairly begun, and more than a sufficient supply of food presents itself, the Swallow then begins to think of forming a progeny. The nest is built with great industry and art, particularly by the common Swallow, which builds it on the tops of chimneys. The martin fixes it to the eaves of houses, or against the sides of lofty door-posts. The goat-sucker, it is said, builds it on the bare ground. The nest is built with mud, well tempered with the bill, moistened with water for the better adhesion; and strengthened by grass and fibres: within it is lined, with a door to enter at on one side, not far from the bottom; but the Swallow leaves her nest quite open.

The Swallow lays five or six white eggs, speckled with red, and sometimes breeds twice a year. This happens when the parents come early, when the season is peculiarly mild, and when they begin to pair soon. Sometimes they find a difficulty in rearing even a single nest, especially when the weather has been severe, or the nests have been destroyed before they were finished.

The house, or common Swallow, is distinguished from all others, by the extreme forkyness of its tail, and by the red spot on the forehead and under the chin. The crown of the head, the upper part of the body, and the coverts of the wings are black, glossed with a rich purplish blue. The breast and belly are white tinged with red: the tail is black, and the two middle feathers plain: the others being marked transversely with a white spot near their ends. The tongue is short, broad, and of a yellowish colour, as well as the palate; but the other parts of the mouth are blackish. The eyes are pretty large, and the iris is of a hazel colour.

When Swallows have returned at their usual time, after a severe winter, many of them have perished for want of food, because there were no insects to be found flying in the air. Reaumur assures us, that the Swallows which appeared first after the long and severe frost in 1740, all died of hunger. Hence it is evident they always frequent places where they expect plenty of food; and therefore they leave us when the insects that fly the air begin to fail.

The MARTIN.

The Martin is smaller than the former, and its tail is much less forked. The head, and upper part of the body, except the rump, is black, glossed with blue: the breast, belly, and rump are white; and the feet are covered with a short white down.

This is the second of the swallow kind that appears among us. It builds, as we have already observed, under the eaves of houses, and its nest consists of the same materials as that of the common swallow, but is not open above like that, having only a small hole at the side for admittance. This species sometimes builds against the sides of high cliffs over the sea. It is a later breeder than the common swallow. This bird is about six inches in length, and ten and an half in breadth, when the wings are extended.

The SAND MARTIN.

This is the least of the swallow kind, being only five inches and a quarter in length. The head, and all the upper part of the body, is mouse-coloured: the throat is white, encircled with a mouse-coloured ring: the belly is white, and the feet are smooth and black. It builds in holes in sand-pits, and in the banks of rivers, making its nest of hay, straw, and feathers; and lays five or six white eggs.

The SWIFT or BLACK MARTIN.

This species is the largest of the swallow kind; but its weight is exceeding small in proportion to its extent of wing: for it only weighs one ounce, and the extent of its wings is eighteen inches: the length of the bird is about eight inches. The feet are so exceeding small, that the action of walking and rising from the ground is vastly difficult: nature, however, has made it sufficient amends, by furnishing it with ample means for an easy and continued flight. It is more on the wing than any other swallow, and its flight is more rapid. It breeds under the eaves of houses, in steeples, and other lofty buildings. It is entirely of a sooty colour with a greenish cast, except that the chin is marked with a white spot. The legs are not only very short and small, but of a very singular structure. The toes, which are four in number, are all placed forward, and the least has only one bone, but the rest have three; in which they differ from those of all other birds. The head is large, the mouth extremely wide, and the bill is very small and weak. It is with difficulty that this bird can raise itself from the ground, on account of the length of its wings, and the shortness of its feet; for which reason it generally rests by climbing against some wall or other building, from which it can easily disengage itself.

The Swift makes its appearance in this country about fourteen days after the sand-martin; but differs greatly in the time of its departure, always retiring about the middle of August, it being the first of the genus that leaves us.

The CHINESE SWALLOW.

This bird resembles the common swallow in shape, and, in breeding time, quits the inland parts and goes to the sea side; where it builds an extraordinary nest, which is reckoned delicious eating in China. These nests are sometimes preserved as a sweetmeat, and sent over to Europe as a great curiosity. They are composed of a certain clammy glutinous substance, collected from the surface of the sea; and in these the Swallow lays its eggs and produces its young. We have no particular description of this bird, but the Chinese carry on a considerable trade in their nests, and sell them in many parts of the East Indies. They are about the size of a goose-egg, and of a substance resembling isinglass. It is customary to dissolve one of these nests in broth, and then it is thought preferable to any fauce that can be produced.

The AMERICAN SWALLOW.

This bird, according to Catesby, has the top of
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the throat of a brownish black, and the extremities of the feathers of the tail are pointed. They quit Virginia and Carolina, and return about the same time of the year as the English swallows. Catesby supposes they pass to the southern parts in the winter, and that they are properly the Brasil swallow.

The GOAT SUCKER.

This bird is, with great propriety, placed by Klein, among the swallow tribe; who calls it a Swallow with an undivided tail. It has most of the characters of this genus, such as a very large mouth, a very small bill, and very small legs. It is also a bird of passage, agrees with the swallow tribe in its food, and the manner of taking it: but it differs in the hours of its preying, the Goat-Sucker flying by night. It feeds on moths, gnats, and chaffers. This bird does not continue long with us; it never makes its appearance here till about the latter end of May, and retires about the middle of August. These birds are often seen in the woody and mountainous parts of Great Britain; they begin their flight towards the evening, and make a loud and singular noise while they are on the wing. When perched, it has no other note than a small squeak repeated four or five times together. It usually lays two eggs, and sometimes three, on the bare ground: they are long, slender, and whitish, marbled with reddish brown.

Though the colours of these birds are plain, they have a beautiful effect from the elegance of their disposition, consisting of black, brown, grey, white, and iron colour, disposed in streaks, spots, and bars. The male is distinguished from the female, by an oval white spot near the end of each of the three first quill feathers; and another on the two outermost feathers of the tail.

The weight of the Goat-Sucker is two ounces and an half, the length ten inches and an half, and the breadth twenty-two inches. The irides are hazel: the bill is about one third of an inch long; the gape of the bill, when opened, is near two inches from tip to tip: the tongue is very small, and placed low in the mouth: the legs are small, scaly, and feathered below the knees. The middle toe is connected to those on each side, by a small membrane reaching to the first joint; the claw of the middle toe is broad and thin.

The BLACK CAP.

This is one of the smallest of the tribe, and does not weigh above half an ounce. The male is black on the crown of the head, and the hind part of the neck is of a light ash colour. The back and coverts of the wings are of a greyish green: the quill feathers and the tail are dusky, edged with a dull green: the breast and the upper part of the belly are of a pale ash colour, and the legs are of a lead colour. The female is distinguished from the male by the spot on the head, which in that of a dull rust colour. This is a bird of passage, leaving us before winter. It sings so finely, that in Norfolk it is called the mock-nightingale. It lays about five eggs of a pale reddish brown, mottled with a deeper shade, and sprinkled with a few dark spots.

NATURAL HISTORY of the PETTY CHAPS.

THIS bird is not quite so large as the linnet: the bill is black; the head, neck, back, wings, and tail are ash coloured inclining to green: the quill feathers are of a mouse colour, edged with green. The inner coverts of the wings are yellow. The lower parts are all white, or of a silver colour; except the breast, which is darker, and has a yellowish cast. The inside of the mouth is red, and the legs are of a lead colour. This bird is found princi-

pally in Yorkshire, and Italy; and among the Italians it is called the Beccafigo.

NATURAL HISTORY of the FLY-CATCHER.

THE weight of this bird is about twelve drams: it has an oblong bill, of a reddish tawny colour: its head is of a deep brown, mixed with ash colour, and the cheeks are marked with oblong spots of a dirty-white. The back and coverts of the wings are dusky, edged with reddish brown. The quill feathers and the tail are dusky: the rump is brown, tinged with green: the throat and the breast are of a dull ash colour; the belly is of a dirty white; and the sides, thighs, and vent feathers are of a pale tawny brown. The legs and feet are of a dark flesh colour. This bird frequents low hedges, particularly in gardens. It builds its nest in a small bush, and lays four or five eggs of a fine pale blue colour. The male has a short, and very sweet note, but only during a few months in the spring.

The BLUE FLY-CATCHER.

The bill of this bird is black; the crown of the head, the back part of the neck, the back, rump, and covert feathers of the wings are blue, inclining to slate colour; the tail, and quill feathers of the wings are dusky, but the outer quills are white at the bottom: the throat, and sides of the head, are black, and the same colour extends from each side of the neck to the wings: the covert feathers under the tail are entirely white, and the legs and feet are of a dusky brown colour. It is a native of America, and probably a bird of passage.

NATURAL HISTORY of the HEDGE-SPARROW.

THE weight of this bird is about twelve drams: its head is of a deep brown, mixed with ash colour, and the cheeks are marked with oblong spots of dirty white; the back and coverts of the wings are dusky, edged with reddish brown; the quill feathers and the tail are dusky; and the rump is brown, tinged with green. The throat and breast are of a dull ash colour, and the belly is of a dirty white. The sides, thighs, and vent feathers are of a pale tawny brown. The legs are of a dull flesh colour. This bird is as well known as any of our small birds, and it builds so conspicuously in small bushes, that any boy who searches the hedges, can give an account of its nest, eggs, &c. It lays four or five eggs, of a fine pale blue colour. The male has a short, but very sweet note during a very small space in the spring. Linnæus seems to have been unacquainted with this species: the bird which he supposes to be our Hedge-Sparrow, and describes under the title of motacilla curruca, differs in colours of plumage as well as eggs. The Hedge-Sparrow ought to be more esteemed, as he has a variety of agreeable notes: many persons, who have kept them in cages, have been much delighted with their singing; but these birds are less valued on account of their being so exceeding plenty, as we perceive by daily experience, with regard to many other articles of convenience or pleasure. The hen is known from the cock by a fainter breast, and by being of a brighter colour on the back. The nest of the Hedge-Sparrow consists of fine green moss, plaited with a little wool and hair. The female has young ones at the end of April or the beginning of May. The young should be taken at nine or ten days old, and fed with bread and flesh-meat chopped very fine, mixed together, and made moist. If the cock Hedge-Sparrow is brought up under some fine song bird, he will take his song, and give great satisfaction: this bird has a long slender black bill,

with a horny cloven tongue, and black at the tip. The iris of the eyes is hazel, and the ears are wide.

NATURAL HISTORY of the WREN.

THE Wren weighs about three drams, and is four inches and an half in length from the tip of the bill to the end of the tail. The head and upper part of the body is of a deep reddish brown; and above each eye is a stroke of white: the back, the coverts of the wings, and the tail, are marked with slender transverse black lines; and the quill feathers with bars of black and red. The throat is of a yellowish white. The belly and sides are crossed with dusky and pale reddish brown lines. The tail is crossed with dusky bars. The Wren may be placed amongst the finest of our singing birds, though its note continues only during the breeding season. It makes a curious nest of an oval shape, very deep, and with a small hole in the middle for egress and regress: the external part consists chiefly of moss, but it is lined with hair and feathers: this bird lays a great number of eggs, generally from twelve to eighteen; they are white, sprinkled all over with pale reddish spots. Mr. Ray observes, that it is one of those daily miracles which we take no notice of, that a Wren should produce so many young, and feed them all without passing over a single one, and that too in total darkness. The Wren breeds twice a year, namely in April and June, and the young should be fed and reared like young nightingales.

The Wren usually creeps about hedges and holes, making but short flights, and, if it be driven from the hedges, may be easily tired and run down.

The WILLOW-WREN.

The weight of the Willow-Wren is about two drams: the upper part of the body is of a dusky green: the wings and tail are brown, edged with yellowish green. There is a yellowish stroke above each eye: the breast, belly, and thighs vary in their colour in different birds; they are of a bright yellow in some, and almost white in others. It builds in hollows in the sides of ditches, and makes its nest in the form of an egg, with a large hole at the top as an entrance: the outside consists of moss and hay, and the inside is lined with soft feathers. It usually lays seven eggs, which are white marked with rust coloured spots. It has a low plaintive note, and is perpetually creeping up and down the bodies and boughs of trees. It frequents large moist woods, and those places where willow trees abound.

The GOLDEN CRESTED WREN.

This is the smallest of all the British birds, not weighing above twenty-six grains. It is about three inches and an half in length, and five inches in breadth: it is distinguishable from all other birds, not only by its size, but by the beautiful scarlet mark on the head, bounded by a fine yellow line on each side. The bill is dusky; the feathers of the forehead are green; and a narrow white line extends from the bill to the eyes: the hind part of the neck and the back are of a dullish green: the coverts of the wings are dusky, edged with green, and tipped with white. The quill feathers and the tail are dusky, edged with pale green. The throat and belly are white, ringed with green: the legs are of a dull yellow, and the claws are very long. It frequents woods, and is usually seen in oak trees. Though so very small a bird, it endures our winters. The note of this Wren, does not differ greatly from that of the common Wren.

The RUBY-CROWNED WREN.

This is a native of North America, particularly of Pennsylvania. The bill is black: the head, back part of the neck, back, and rump are of a darkish olive green; but deeper on the head, and lighter on the rump. It has a spot of exceeding fine red, or ruby colour, on the top of the head, from whence this bird has its name: the breast and belly are of a lightish yellow, or cream colour. The covert feathers of the wings are of an olive colour with cream coloured tips, forming two lines across each wing: the three quills next the back are dusky, edged with cream colour; the remainder of the quills are also dusky, with narrow greenish yellow edges. The feathers of the tail are blackish, edged with yellowish green, but they are of an ash colour beneath. The legs, feet, and claws are dusky.

The CARIBBEE WREN.

This is a native of the Caribbee islands in America, where, on account of its delightful note, it is called a Nightingale. It is larger than the common Wren, and is the more remarkable for having a fine song in a country where the birds in general have very disagreeable notes.

NATURAL HISTORY of the WHEAT-EAR.

THE head and back of the male Wheat-Ear, are of a light grey, tinged with red; and over each eye passes a white line; beneath which a broad black stroke passes each eye to the hind part of the head: the rump, and lower half of the tail are white, and the upper half is black; the breast and belly are white, tinged with yellow: the quill feathers are black, edged with reddish brown. The colours of the female are duller, and she wants the black stroke across the eyes. The Wheat-Ear disappears in September. This bird has its name, in Suffex, from its frequenting the downs in that county in the time of harvest.

These birds begin to visit us about the middle of March, and continue coming till the beginning of May; it being very remarkable that the females arrive about a fortnight before the males. They frequent warrens, downs, and the edges of hills, especially those that are fenced with stone walls. They breed in cliffs, in old rabbit burroughs, and sometimes under old timber; making their nest of dried grass and horse-hair; and laying from six to eight eggs of a light blue colour. They grow very fat in autumn, and are thought so great a delicacy as to be little inferior to an ortolan. They are taken in great quantities by the shepherds about East Bourne, in Suffex; for which purpose they make snares of horse-hair, and place them under a turf. Wheat-Ears are such very timid birds, that the motion of a cloud, or the appearance of a hawk, will drive them into those traps for shelter, by which means they are taken. The reason that these birds frequent the neighbourhood of East Bourne, is because it abounds with a certain fly which are very numerous about the adjacent hills; drawn thither by the wild tyme with which they are covered, which is not only a favourite food of that insect, but the plant on which it deposits its eggs.

Wheat-Ears abound in many other parts of Suffex, as well as in the neighbourhood of East-Bourne. In the downs not far distant from Brightelmstone, Shoreham, and Arundel, they are found in great numbers; and, during the watering season at Brightelmstone, the ladies and gentlemen, in their perambulations, frequently find birds in snares that have been laid by the shepherds; which they always take, and deposit a penny in the hole for every bird,

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as a valuable consideration. This indeed is the settled price; between the shepherds and the nobility and gentry who frequent Brighthelmstone.

NATURAL HISTORY of the WHIN CHAT.

THE head and back of this bird are of a pale reddish brown, regularly spotted with black: it has a narrow white streak over each eye, and beneath that a broad bed of black, which extends from the bill to the hind part of the head: the breast is of a reddish yellow; the belly is whitish, with a reddish tincture, and there are two remarkable white spots on each wing: the lower part of the tail is white, the two middle feathers excepted, which are wholly black; and the upper part of the others are of the same colour. The colours of the female are not so agreeable. Instead of the white and black marks on the cheeks, she has one broad pale brown one, and she has less white in the wings than the male. The bill, feet, and claws of the Whin Chat are black. This is a bird of passage, but it is not certain whether it quits this island.

NATURAL HISTORY of the STONE CHATTER.

THIS is also a bird of passage; but it is doubted whether it quits this island: naturalists in general suppose it only shifts its quarters, and does not entirely leave this country. It is a restless noisy bird, and frequently perches upon some bush, chattering incessantly. The head, neck, and throat are black; but the latter has a white bar on each side, and seems, at first sight, to be encircled with white: the feathers on the back are black, edged with tawny; but the sides just above the rump are white: the breast is of a deep reddish yellow, and the belly somewhat lighter: the quill feathers are dusky, edged with a dull red. The head of the female is of an iron colour spotted with black; and the colours in general are less vivid. The legs in both sexes are black.

NATURAL HISTORY of the WHITE THROAT.

THIS bird is about the size of a linnet, but the body is somewhat longer. The upper part of the bill is blackish, the lower whitish, and the inside of the mouth is yellow. The head is of a brownish ash-colour, and the throat white: the breast and belly of the male are white, tinged with red; those of the female wholly white. The back and coverts of the wings of both are of an iron-colour; the quill feathers and the tail are dusky, edged with reddish brown. The legs are of a yellowish brown.

The White Throat frequents our gardens in summer, and leaves us when winter approaches. It builds near the ground in low bushes; the external part of its nest consists of tender stalks of herbs and dry straw; the middle part of fine bents and soft grass; and the inside of hair. It lays about five eggs, which are of a whitish green colour, sprinkled with black spots.

NATURAL HISTORY of the WHITE WATER WAGTAIL.

ALL the birds of this kind have a very long tail, which is always in motion; on which account they have obtained the name. The White Water Wagtail weighs about six drams, and is in

length from the tip of the bill to the end of the tail eight inches; but the breadth, when the wings are extended, is eleven inches. The head, back, and neck, as far as the breast, are black: in some the chin is white, and the throat marked with a black crescent. The breast and belly are white; the quill feathers are dusky; and the coverts are black, tipped and edged with white. The tail is very long, and continually in motion. The exterior feather on each side is white, the lower part of the inner web excepted, which is dusky; the others are black. The bill, the inside of the mouth, and the legs are black. The back claw is remarkably long.

The White Water Wagtail frequents the sides of ponds and small streams, feeding on insects and worms like the rest of this genus. This bird shifts its quarters in the winter, directing its course from the north to the south of England, during that season. In spring and autumn this bird is a constant attendant of the plough, in pursuit of the worms thrown up by that instrument. In some places they build their nests under the eaves of houses, and in holes of the walls of buildings, and lay four or five eggs.

The YELLOW WATER WAGTAIL.

This bird has a strait sharp-pointed black bill, except at the base of the lower chap, which inclines to a flesh colour. The iris of the eyes is hazel. The top of the head, the upper part of the neck, and the back, are ash-coloured, slightly edged with yellowish green. The male is a bird of great beauty, the breast, belly, and thighs being of a most vivid and beautiful yellow: the throat is marked with some large black spots. It has a bright yellow line above the eye, and another beneath that of a dusky hue, from the bill across the eye; and beneath the eye it has a third of the same colour. The head, the upper part of the neck, and the back, is of an olive green, which brightens in the coverts of the tail. The colours of the female are more obscure than those of the male, and it wants those black spots on the throat. The legs and feet are of a dusky colour, and the claw of the hind toe is pretty long. It makes its nest upon the ground among corn, bents, and stalks of herbs; the inside of which is lined with hair. This bird lays four or five eggs, variegated with dusky spots, and lines irregularly drawn.

The GREY WATER WAGTAIL.

It has a slender strait bill, of a dusky colour, and ending in a point. The top of the head, the upper part of the neck, and the back, are ash-coloured: the space round each eye is ash-coloured; beneath and above which is a line of white. In the male the chin and throat are black; the feathers incumbent on the tail are yellow; and the tail is longer in proportion to its size than that of any other kind. The breast, and the whole under side of the body are yellow: the quill feathers are dusky, those next the back being edged with yellow. In the female, the black spot on the throat is wanting, and the colours in general are more obscure than in the male. The legs, feet, and claws of this bird are of a dusky colour: it frequents stony rivers, and feeds upon insects.

The JAMAICA WATER WAGTAIL.

It has a small head, and a strait black bill, with a bluish cast towards the base: the head, and lower part of the neck is black, but the upper part is yellow. The whole of the back, breast, and lower part of the belly are also yellow. The wings are black, with a white spot in the middle; the tail also is black, and the feet are brown. The tail of this bird is about four inches long, which, together with the colour of the feathers, occasioned Mr. Ray to place it

among the Wagtails; but Maregrave says it neither feeds nor wags its tail like the birds of this kind beforementioned.

NATURAL HISTORY of the GROSSBEAK.

THIS bird is also called a hawfinch; it is seven inches in length, and thirteen in breadth, and weighs almost two ounces: the bill is in shape like a funnel, strong, thick, and of a dull pale pink colour; at the base of which are some orange-coloured feathers; the irides are grey; and the cheeks, and the crown of the head are of a fine deep bay: a black line extends from the bill to the eyes; the breast and belly are of a dirty flesh-colour. The neck is ash-coloured, and the back and coverts of the wings of a deep brown; those of the tail being of a yellowish bay: the great quill feathers are black, spotted with white on their inner webs. The tail is short, having white spots on the inner sides, and the legs are of a flesh-colour. The great peculiarity of this bird, is the form of the ends of the middle quill feathers; which resembles, as Mr. Edwards properly observes, the figure of some of the ancient battle-axes. These feathers are glossed over with a rich blue; but are less conspicuous in the female; her head being of a dull olive colour, tinged with brown.

The Grosbeak is not regularly migrant, visiting us only in hard winters: they feed on berries, and even on the kernels of the strongest stones, such as those of cherries and almonds, which they crack with the utmost ease; their bills, from their strength and thickness, being well adapted to that work. We are told by Mr. Willoughby, that these birds are common in Italy and Germany, where they live in the woods in summer, and breed in hollow trees, laying five or six eggs; but that they come down into the plains in winter. Their legs and feet are of a pale flesh-colour, and the claws are pretty strong and large.

The GAMBIA GROSSBEAK.

This bird is about the size of the hawfinch: the bill is large, and broad at the base, ending in a sharp point, and resembling the figure of a cone. The mouth, which is large, is of an ash-colour in the inside. The pupils of the eyes are black, surrounded with a white iris; the head, and the greatest part of the neck are black, ending in a circular black point on the fore part of the breast. The rest of the body, and the wings and tail, are of a beautiful yellow, shaded with a bright green. The legs and feet are of an ash-colour, with a bluish gloss. These birds abound on the coast of Guinea, in Africa, near the river Gambia.

The PURPLE GROSSBEAK.

This is about the size of a sparrow: it has streaks of red over the eyes, on the throat, and near the vent under the tail: all the rest of the body is of a deep purple. The hen has the same red streaks, but the body is brown. This is a native of the Bahama Islands.

NATURAL HISTORY of the CROSS-BILL.

THE Cross-Bill is an inconstant visitant of this island. Gesner informs us, that in Germany and Switzerland, it inhabits the pine-forests, and breeds in the pine-trees so early as the months of January and February. These birds feed on the seeds of the cones of pines and firs, and are very dextrous in scaling them; for which purpose the cross structure of the lower mandible of their bill is admirably adapted. They also feed on hemp-seed, and the

kernels of apples, and are said to divide an apple with one stroke of the bill, to get at the contents: it is certain that these birds change their colours, or rather the shades of their colours: the males which are red, varying at certain seasons to deep red, to orange, or to a kind of a yellow. The females, which are green, alter to different varieties of the same colour. There are two varieties of this bird, one being considerably smaller than the other: the lesser kind are the most common.

NATURAL HISTORY of the BULL-FINCH.

BULL-FINCHES are so called from their heads, which are black, and, in proportion to their bodies, large. In some parts of England they are called popes, in others thick-bills, and in others hoops. They are very docile birds, the hen learning after the pipe or whistle as well as the cock; but its own wild note is not in the least musical. They excel most birds, however, in what is taught them, and they are remarkable for not forgetting what they have once learned, though they should be placed among several other singing-birds, in the same room. Some have been taught to speak several words at command, with great propriety of articulation. They are deservedly esteemed, both for their song, and the beauty of their figure. In the latter they equal any male birds; and in the former, if properly instructed, they excel them. A gentleman in Lancashire had one that could whistle several tunes; and was so well disciplined, that it would obey its master's call, and perch on his shoulders; and, when commanded, go through a difficult musical lesson. Many which are taught to speak, are annually brought from Frankfort on the Maine to London, in order to be sold to the best advantage.

The male is distinguished from the female, by the superior blackness of its crown, and by the rich crimson that adorns the cheeks, breast, belly, and throat; those of the female being of a dirty buff colour: the bill is short, black, and strong; the eyes are of a hazel colour, and the head (as already observed) is large in proportion to the size of the body. Part of the neck, shoulders, and back, are of a bluish ash-colour, shaded with red, and the belly and rump are white. Some of the quill feathers have their outward webs red, and the inner of a fine glossy black: others are black, with dusky edges, and of a bluish gloss; and others have their outward edges white, forming a sort of white line, or cross-bar upon each wing. The tail is of a shining black, and about two inches long; the legs are of a dusky colour, and the claws are black.

Among young Bull-Finches it is difficult to discover the cock from the hen: the most certain method to come at a discovery, is to pull off a few feathers from their breasts when they are about three weeks old, and in about ten or twelve days after, fresh feathers will appear where you have pulled off the others: if they are of a curious red, it is a cock; but if they are of a palish brown, it is a hen.

In the spring these birds frequent our gardens, and feed upon the tender buds of fruit-trees, such as the apple, pear, peach, and other garden-trees. They breed about the latter end of May, or the beginning of June, at which time they are seldom seen near the houses; always choosing some retired place to breed in. Their nests, which are usually built in forests, woods, or parks, are very difficult to be found; and, when they are seen, they are of so wretched a fabric, that they would not be taken for nests, except by those who are connoisseurs in the nestling of birds. They are composed of a few small sticks placed across each other in a very slovenly manner, and lined with a few fibrous roots. The female lays four

four or five eggs of a bluish colour, spotted at the largest end with large dark brown, and faint reddish spots.

Young Bull-Finches should not be taken till they are pretty well feathered; that is, when they are twelve or fourteen days old. They should be kept warm and clean, and fed every two hours from morning till night; but they must have but little at a time. Their food should be rape-feed, soaked in water eight or ten hours, and then scalded and bruised: this should be mixed with an equal quantity of white bread soaked in water, strained, and afterwards boiled thick with milk. It should be fresh every day; for if it is sour, it will do the birds an injury.

The Bull-Finch is about the size of the common sparrow. It is so pernicious to fruit-trees, by destroying their tender buds, that in some parts of England a reward is given by the church-wardens for every one that is killed. This may be assigned as one reason of their scarcity; for they are certainly less common than most other singing-birds that breed among us.

NATURAL HISTORY of the SPARROW.

THIS is usually called the house-sparrow. It has a very thick strong bill, about half an inch in length, and the eyes are of a hazel-colour. The crown of the head is grey, and under each eye is a black spot; and above the corner of each is a broad bright bay mark, which furrounds the hind part of the head. The cheeks are white, the chin and under side of the neck are black, the latter being edged with white; and the belly is of a dirty white: the back is spotted with red and black, and the tail is dusky. The lower mandible of the bill of the female is white. But this bird is so universally known, that it would be impertinent to give any farther description. It is six inches and an half in length, from the tip of the bill to the end of the tail, and weighs somewhat more than an ounce. It feeds upon grain, and does considerable mischief in the corn-fields.

Sparrows, which are very numerous in this country, are proverbially salacious, and consequently very short-lived birds. They breed early in the spring, making their nests under the eaves of houses, in thatches, in holes of walls, and frequently in the nests of the martin, after expelling the owner. Linnæus tells us (upon the authority of Albertus Magnus) that the martin does not suffer this insult to pass unrevenged; the injured bird assembles its companions, who assist him in plaistering up the entrance with dirt; after which they fly away twittering in triumph, leaving the intruder to perish in his muddy prison.

The BLACK SPARROW.

This is about the size of a lark, and has a thick short beak. The iris of the eyes are red. The head, neck, breast, back, and tail are black, but the wing-feathers are edged with white. The breast and belly are white in the middle, on the sides, and lower-parts: the upper part of the wings are of a dark red; and the legs are brown.

The AMERICAN SPARROW.

The back of this bird is of a curious black, the belly white, the head and breast of a fine blue, and the wings and tail of a shining black, with a purple cast. The rump is of a deep green. One of these was sent here from the island of Barbadoes.

The GOOD-HOPE SPARROW.

This is a native of the Cape of Good-Hope, and has a bill of a palish brown, which is not so strong

as in other birds of this kind: the iris of the eyes is of a pale yellowish white; and the upper-part of the body, the head, and neck are black; which colour terminates in a point upon the belly; the lower-part of which, as well as the thighs, and the fore-part of the wings being white. The sides of the wings are of a light brown, and some of the quill feathers are black. The colour of the tail is the same as that of the wings, and the legs and feet are of a dusky brown.

There is also a bird called the White Lapland Sparrow of Linnæus, which is of the size of a lark, and generally weighs about an ounce. Its bill is sharp, conical, and black, though of an ash-colour towards the base; but it is principally remarkable for having teeth on each side of the palate, at the orifice of the throat.

The Chinese Sparrow is less than the house-sparrow, but has no remarkable distinction.

The Little Bahama Sparrow is of the size of a Canary-bird, and the head, neck, and breast are black; all the other parts being of a dirty green.

The Mountain Sparrow is of the size of the common Sparrow, but somewhat longer. It is found in mountainous woody places, but is rather an uncommon bird.

The Wood Sparrow is of a rusty iron-colour on the crown of the head, and has a white space about the eyes. It has also blackish transverse lines running along the chin, and the lower part of the neck.

NATURAL HISTORY of the GREEN-FINCH.

THE Green-finch is somewhat larger than the common sparrow: the head and back are of a yellowish green. The upper chap of the bill is of a dusky colour, and the lower whitish. The rump is of a fine yellow, but the breast is paler, and shaded with green: the belly is white. The edges of the outmost quill feathers are yellow, the next green, and the farthest grey. The tail is about two inches long, and a little forked: the two middle feathers are dusky; and the exterior webs of the four outmost feathers on both sides the tail are yellow. The colours of the female are much less vivid than in the male.

These birds are very common in this country. They have young ones about the middle of May: they make their nests in hedges, which are very large considering the size of the inhabitants; the outside of which consists of hay, stubble, and grass; the middle part of moss, and the inside of feathers, wool, and hair. The female lays five or six eggs, of a pale green colour, sprinkled with small reddish spots, which are more numerous at the large end. The Green-finch, from the end of the bill to the extremity of the tail, is about six inches and an half, the bill is half an inch in length, and the weight of the bird is sixteen drams.

Though Green-finches are frequently kept in cages, they are not much esteemed for their singing: yet some of them, if brought up from the nest, will learn to pipe and whistle, and to imitate the song of most other birds. They are valued by some for their facility in learning to ring the bells in a cage contrived for that purpose. At the beginning of winter, and in hard weather, they assemble in flocks, and may be caught with the clap-nets in great numbers. The young are fit to be taken at ten days old. The Green-finch is very easily tamed.

NATURAL HISTORY of the GOLD-FINCH.

THE Gold finch is a little less than the house-sparrow, weighing about half an ounce; and its length, from the tip of the bill to the end of the tail,

tail, is five inches and an half: the breadth, when the wings are extended, is nine inches. It is one of the most beautiful of the hard-billed small birds, whether we consider its colours, the elegance of its form, or the music of its note. The bill is white, tipped with black, the base being surrounded with a ring of rich scarlet feathers: a black line extends from the corners of the mouth to the eyes: the cheeks are white, and from the top of the head a broad black line passes on each side almost to the neck. The hind part of the head is white: the back, rump, and breast are of a fine pale tawny brown, rather lighter on the two latter. The belly is white, and the wings and tail black, but the points of the chief feathers are white in both: a beautiful yellow stripe runs across the wings. The tail is about two inches long, and of a black colour; but often the feathers are marked with a white spot near their ends. The legs are white.

The cock is distinguished from the hen by the feathers on the ridges of the wings, which are of a deep black, and those of the hen are of a dusky brown: the black and yellow in the wings of the female are also less brilliant than in those of the male. The young bird, before it moults, is grey on the head, and is therefore termed a grey-pate by the bird-catchers.

The Gold-finch begins to build in April, when the fruit-trees are in blossom. As they excel the other small birds in beauty of feathers, so do they likewise in ingenuity: their nest is small, but extremely beautiful: the outside consists of very fine moss, curiously interwoven with other materials, and the inside is lined with fine down, which has the appearance of cotton. The Gold-finch lays five or six white eggs, marked with deep purple spots on the upper end. This bird is fond of orchards, and frequently builds its nest in an apple or pear-tree.

Gold-finches are of a mild and gentle nature, and almost as soon as they are taken are easily prevailed on to eat and drink; nor are they so much affrighted at the presence of man as birds are in general. They are also soon reconciled to their imprisonment in a cage; and after they have remained there a considerable time, they become so fond of it, that if the door of the cage is opened they will not fly away, but usually fly to the cage for shelter if any thing should terrify them.

In some parts of England they are called draw-waters, from their facility in learning to draw their water when they are inclined to drink; for which purpose they are sometimes furnished with a little ivory bucket, fastened to a small chain. It is entertaining to see with what dexterity these little creatures pull up their bucket, drink, and return it. They are much delighted with viewing themselves in a looking-glass, which is sometimes fixed to the back of their bucket-board. They will sit upon their perch, pruning and dressing themselves with the greatest care imaginable, looking incessantly in the glass, to see that every feather is placed in the nicest order.

The Gold-finch is a long-lived bird, and sometimes reaches the age of twenty years: Mr. Willoughby mentions one that lived twenty-three years. Towards winter these birds assemble in flocks, and feed on seeds of different kinds, particularly those of the thistle. Their note is very sweet, and they are much esteemed on that account, as well as for their beauty, and their great docility.

The young are tender, and therefore should not be taken out of their nests till they are pretty well feathered. If a young Gold-finch is brought up under a Canary-bird, a wood-lark, or any other singing-bird, he will readily take their song. A cock Gold-finch, bred from the nest, will couple with a

hen Canary bird, and their eggs will produce birds between both kinds; partaking of the song and colours of both; but the young will be barren.

There is an American bird called the American Gold-finch, by Catesby: it is black on the forehead, and about the eyes; the wings are of an earthy colour, edged with straw colour, and fringed. The tail is black, with a yellowish cast, and the other parts are yellow.

NATURAL HISTORY of the CHAFFINCH.

THE Chaffinch is a hardy well known bird, and about the size of the bull-finch. It entertains us agreeably with its song very early in the year; but, towards the latter end of summer, assumes a chirping note. Its nest is almost as elegantly constructed as that of the gold-finch, and nearly of the same materials, except that the inside is lined with feathers and hair instead of down. It lays four or five eggs of a whitish colour, tinged and spotted with deep purple.

This bird is lavish in its song, and when brought up from the nest, will sing six or seven months in the year; but in its wild state, not above three months.

It has a strong bill of a pale blue colour, and black at the tip, as well as at the upper part: the crown of the head, the hind part and the sides of the neck are of a bluish grey; the breast is red; the sides and belly are white, tinged with red; the upper-part of the back is of a deep tawny colour; the lower part, and rump, are green. The colours are much stronger, and more lively in the male than in the female; and some of the quill feathers have white webs, with green edges, shaded with yellow: the small feathers on the ridges of the wings are blue, spotted with white. The tail is black, except the outmost feather, which is marked obliquely with a white line from top to bottom; and the next, which has a white spot on the end of the inner web. The legs are dusky. The female wants the red on the breast and other parts; the head and upper part of her body are of a dirty green; and the belly and breast of a dirty white.

The young of the Chaffinch may be taken at about ten days old; for as they are hardy birds they are easily brought up. Some bird-catchers, not satisfied with depriving the little innocent creatures of their liberty, exercise the cruelty of putting out the eyes of the Chaffinch, because they say he is then more attentive, and learns more expeditiously: this wicked experiment is done with a wire made almost red hot. It is however affirmed, that this cruel operation answers no other purpose than that of rendering the operator detestable, for rewarding the bird's endeavours to please him, with temporary torture, and perpetual blindness.

It is very singular that in Sweden, the female Chaffinches quit that country in September, migrating in flocks into Holland, and leaving their mates behind.

NATURAL HISTORY of the BRAMBLING.

THIS is a common bird in this country, but is chiefly found in the woody parts: it is larger than the chaffinch; the top of the head is of a glossy black, edged with a yellowish brown; the feathers on the back are of the same colour, but the edges are more deeply bordered with brown; the chin, throat, and breast, are of an orange-colour: the lesser coverts of the wings are of the same colour; but those on the quill feathers are barred with black, and tipped with orange. The tail is a little forked, and the exterior web of the outer feather white: the others

others are black, except the two middle ones, which are edged and tipped with ash-colour.

NATURAL HISTORY of the SISKIN.

THE head of this bird is black, and the upper-part of the body green, except that the shafts of the feathers on the back are blackish. The rump is of a yellowish green, but the throat and breast are paler. The belly is white, and the feathers under the tail are yellowish, with oblong brown spots: the wings are marked with a transverse spot of a yellowish colour. The two middle feathers of the tail are black; the rest above half-way are of a most beautiful yellow with black tips. The colours of the female are paler; her throat and sides are white spotted with brown; and her head and back are of a greenish ash colour, marked also with brown.

We are told by Mr. Willoughby, that this is a song bird, and that in Suffex it is called the barley-bird, because it visits them in the barley-feed time. The Siskin does not breed in these islands, but comes hither in autumn and departs in the spring. It feeds in the same manner as gold-finches and linnets, and is frequently seen upon elder trees. It is to be met with in the bird shops in London, and being rather a scarce bird, sells at a higher price than the merit of its song deserves.

NATURAL HISTORY of the LINNET.

THE length of this bird, including bill and tail, is five inches and an half; of which the former is half an inch, and the latter two inches and a quarter. It weighs about ten drams. The bill is dusky, but in spring it assumes a bluish cast: it is thick, strong, and about half an inch in length: the head is variegated, with ash-colour and black, and the back is of a blackish red; the bottom of the breast is of a fine red, and the lower part of the belly yellowish. The lower part of the throat is of a beautiful red, and the edges of its feathers of a yellowish red: the tail is a little forked, and of a brown colour, edged with white, the two middle feathers excepted, which are bordered with a dullish red. These birds are much esteemed for their song; they feed on seeds of different kinds, which they peel before they eat: the seed of the linum, or flax, is their favourite; from whence arose the name of the linnet tribe.

They usually build in a thick bush or hedge, particularly among white thorn or furze. The outside of their nests is composed of moss, bents, and dry weeds; the inside of fine soft wool or cotton, mixed with a kind of down, gathered from dried plants, and a few horse hairs. They lay four or five whitish eggs, spotted like those of the gold-finch. The young ones are hatched about the latter end of April, or the beginning of May, which may be taken when they are about ten days old. They must be kept very warm, and fed every two hours, from six in the morning till six or seven in the evening.

The cock may be known from the hen by the feathers on his back, which are much browner than those of the hen; and by the white of his wing; to examine which, when the wing feathers are grown, one of the wings must be stretched out, while the body of the bird is held fast with the other hand; and then the white must be observed upon three or four feathers: if it appears bright and clear, and extends to the wings, it is a certain sign of its being a cock; the white in the wing of the hen being much less and fainter.

The Linnet may be taught to pipe or whistle, and

is easily instructed in the song of any other fine bird; but as its own note is so very fine, that trouble is unnecessary; the natural note of any fine singing-bird being always to be preferred.

Linnets may be taken with clap-nets in the months of June, July, and August; but flight birds are the most plentiful about the beginning of October. The nets should be placed near the spot where they are accustomed to eat or drink.

The GREATER RED-HEADED LINNET, or REDPOLE.

This bird is smaller than the former, and has a bill like that of a chaffinch: the head is ash-colour, except that it has a blood-coloured spot on the forehead. The breast is tinged with a fine rose-colour. The neck is of an ash-colour: the back, scapular feathers, and coverts of the wings are of a bright reddish brown; the sides are yellow, and the middle of the belly white. The tail, like that of the former, is forked, and of a dusky colour, edged on both sides with white. The head of the female is ash-colour, spotted with black: the back and scapulars are of a dull brownish red; and the breast and sides of a dirty yellow, streaked with dusky lines.

This is a familiar bird, and is as chearful five minutes after it is caught, as a French prisoner is said to be after the same short captivity. It has a pretty chattering kind of song, and is often kept in cages. It should be fed with the same sort of feeds as the common linnet or chaffinch. These birds are frequent on our sea-coasts, and, in flight time, are often taken near London.

The LESSER RED-HEADED LINNET.

This is the least of the Linnets, not exceeding half the size of the preceding. These are also distinguished from the last species by the bill being smaller and sharper; by both sexes having the spot on the head; by the legs and feet being dusky; and by their assembling in flocks, which the others do not. Mr. Pennant mentions his having seen the nest of this species on an alder stump near a brook, between two and three feet from the ground. The outside consisted of dried stalks of grass and other plants, mixed with a small quantity of wool; and the lining was composed of hair and feathers: the bird was sitting on four eggs of a pale bluish green, thickly sprinkled near the blunt end with small reddish spots. The bird, continues he, was so tenacious of her nest, as to suffer us to take her off with our hand, and we found, that, after we had released her, she would not forsake it.

The TWITE, or MOUNTAIN LINNET.

This is rather inferior in size to the common Linnet, and is therefore called by Brisson *La petite linnette*, or little Linnet. In shape and colour, however, it does not materially differ from the common Linnet. Its bill is short and yellow, and above and below each eye there is a pale brown spot. The male has a curious red spot on the rump, which the female has not. This bird takes its name from its note, which has very little music in it: it is a familiar bird, and more easily tamed than the common Linnet. This bird is taken in the flight season near London, with the Linnets, and is there called a Twite. It does not breed in England, but comes there in the winter: it will feed on rape and Canary-feed, but gives the preference to the latter. It is common in some parts of France, where it lays eggs resembling those of a Linnet, but smaller.

NATURAL HISTORY of the BUNTING.

THIS bird is larger than the common lark, but not very different in colour. It weighs an ounce and an half, and is about seven inches and an half,

half, from the tip of the bill to the end of the claws. The bill of this bird, and the other species of this genus, is singularly constructed; the sides of the upper chap form a sharp angle, bending inwards towards the lower; and in the roof of the former is a hard knob, fitted for bruising corn or other hard feeds. This bird is somewhat more of a brick colour than the lark, and its chin, breast, and belly, are of a yellowish white. The throat is marked with oblong black spots, and the tail is about three inches long, and of a dusky red. The legs and claws are of a dusky colour.

NATURAL HISTORY of the YELLOW-HAMMER.

THE Yellow-hammer is about the size of a chaffinch, or rather larger. It is six inches and an half in length, from the tip of the bill to the end of the tail, and weighs about ten drams. The bill is of a dusky hue, and the crown of the head of a pale yellow; spotted with brown in some, and plain in others: the hind part of the neck is tinged with green; the chin and throat are yellow; and the breast is marked with an orange red: the belly is yellow, and the lesser coverts of the wings are green; the others are dusky, edged with rust colour: and the back is of the same colours. The quill feathers of the wings are dusky, some of which are edged with green, and others with a dirty white. The tail, which is about three inches long, is a little forked at the end; the edges of some of the feathers being green, and some marked with white spots near the tips. The feet are of a light brown, and the claws are black.

It makes a flat nest on the ground on the sides of banks or hedges, and generally under a bush; but sometimes near a river or brook. Its nest is composed of moss, dried roots of grass, weeds, and horse-hair intermixed. It lays six or seven white eggs, veined with a dark purple. The young ones are usually fit to be taken by the beginning of May, but they should remain in the nest till they are ten or twelve days old. This is a very common species, and in the winter frequents farm yards with other small birds.

The male, in a wild state, sings very prettily; and though it is seldom kept in a cage, yet makes no contemptible figure there; for, exclusive of its song, his fine feathers are some recommendation.

The female is of a duller colour all over the body than the male, and those parts which are of a fine yellow in the latter, are of a dirty green in the former.

NATURAL HISTORY of the REED SPARROW.

THIS bird is about the size of a chaffinch; the length is six inches and an half, and the breadth ten inches: it has a short black bill, the edges of which are turned a little inwards; so that the tongue lies buried in a small hollow like a funnel. The head, chin, and throat of the male are black; and at each corner of the mouth a white ring commences, which encircles the head. The back, covert feathers of the wings, and the scapular feathers, are black, deeply bordered with red. The belly is white; the two middle feathers of the tail are black, bordered with red, and the three next are wholly black. The exterior web, and part of the interior of the outermost feather is white. The head of the female is rust colour, spotted with black, and she wants the white ring round the neck.

This bird frequents the sides of rivers and marshy places, and delights in being among reeds, from

whence it takes its name. The situation of its nest is remarkably contrived: it is fastened to four reeds, and suspended like a hammock about three feet above the water; the materials of which the nest consists are decayed rushes, fine bents, and hairs. The Reed Sparrow lays four eggs of a pale blue, marked with irregular purplish veins, especially on the larger end. It is much admired for its song, and, like the nightingale, sings in the night. These birds are not, however, very common in cages, but when we are walking in summer by the sides of a river, they present us with an agreeable harmony.

NATURAL HISTORY of the GREAT TIT-MOUSE.

THIS bird is also called the ox-eye: it is six inches in length, nine inches in breadth, and weighs about an ounce. The bill is straight, black, and half an inch in length: the tongue is broad, ending in four filaments; the head and throat are black; the cheeks white; the back and coverts of the wings green. The belly is of a yellowish green, divided in the center, by a line of black, extending to the vent: the rump is of a bluish grey; and the quill feathers are dusky, tipped with blue and white. The lesser coverts are blue, and the greater are tipped with white. The tail is about two inches and an half long, and of a black colour, except on the outward edges, which are blue.

Though our gardens are sometimes visited by this bird, it chiefly inhabits woods; where it makes its nest in hollow trees, and lays nine or ten eggs. This, and the whole tribe of Tit-Mice, feed on insects which they find in the bark of trees; but, in the spring, they do considerable mischief in fruit gardens, by destroying the tender buds. Like woodpeckers, they are perpetually running up and down the trunks of trees in pursuit of food.

The BLUE TIT-MOUSE.

This is a very beautiful bird, but, like the preceding, does great injury to fruit-trees: it breeds in holes of walls, and lays about twelve or fourteen eggs. It has a short dusky bill, and the crown of the head is of a fine blue colour: the forehead and cheeks are white; and a black line extends from the bill to the eyes. The back is of a yellowish green, and the lower side of the body yellow: the wings are blue, marked transversely with a white bar; the tail is blue, and the legs are of a lead colour.

The COLE-MOUSE, or BLACK TIT-MOUSE.

The length of this bird is five inches, and the breadth seven. It is distinguished from all other Tit-Mice by its smallness. It has a black head with a white spot on the hind part; the back is of a greenish ash colour, and the rump is of a deeper green. The outer edges of the prime wing feathers are also green.

The LONG-TAILED TIT-MOUSE.

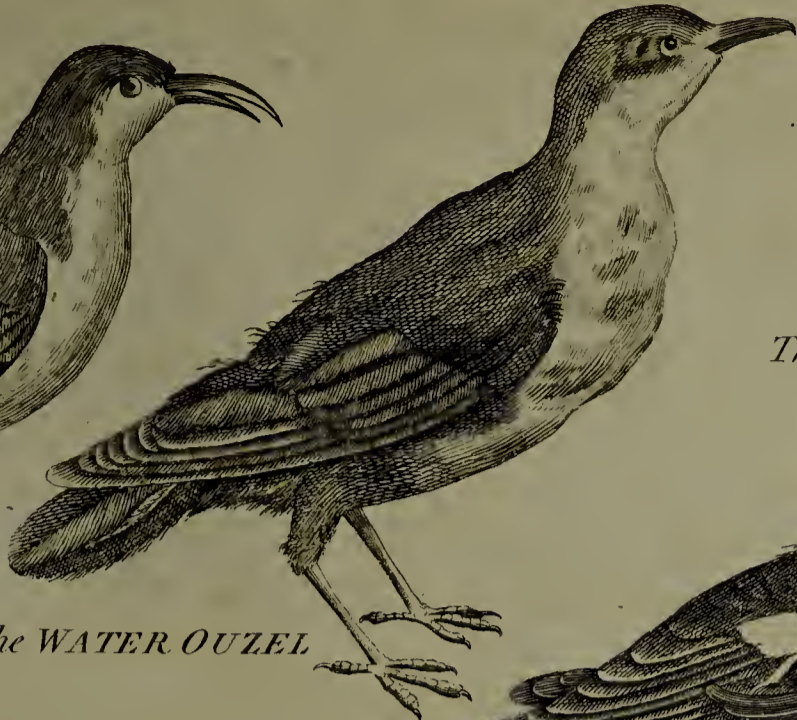
This bird is five inches and a quarter in length, and seven inches in breadth. The bill is black, short, thick, and very convex, differing from all the rest of the Tit-Mouse kind; the base is beset with small bristles, and the irides are of a hazel colour. The top of the head is white, surrounded with a broad stroke of black, which rises on each side of the upper chap, passes over each eye, and unites at the hind part of the head; continuing along the middle of the back to the rump. On each side of this black stroke, the feathers are of a purplish red, as well as those immediately incumbent on the tail. The covert feathers of the wings are black; the secondary and quill feathers are dusky. The tail is

three

The OXEYE CREEPER



The STONE CHATTER



The WATER OUZEL



The WHITE WAGTAIL



The WREN

*The REGULUS
without a CREST*



The BLUE TITMOUSE

The CRESTED TITMOUSE



The LONGTAIL'D TITMOUSE



The COLE-MOUSE

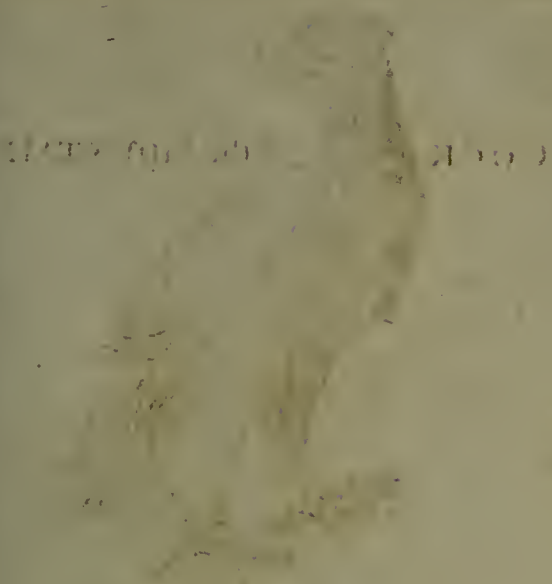


The BANK-MARTIN



The BLACK-MARTIN

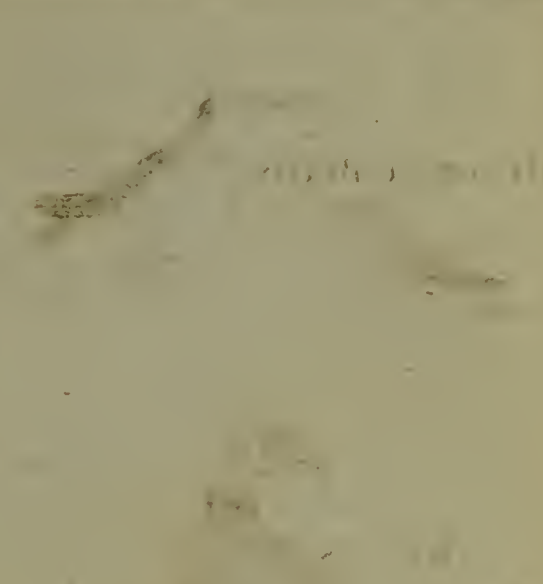




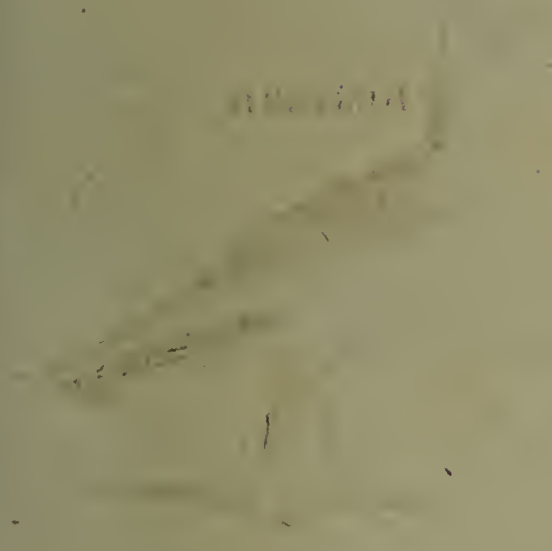
SPARROW



WING



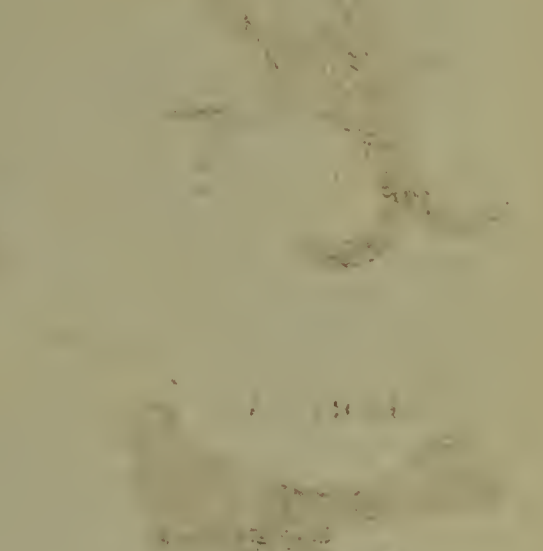
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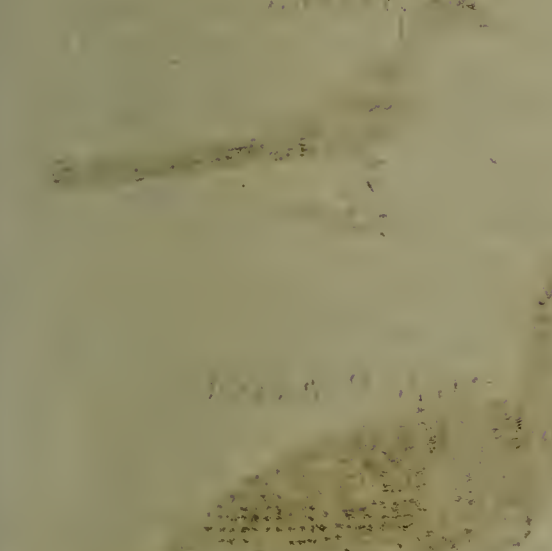
TAIL



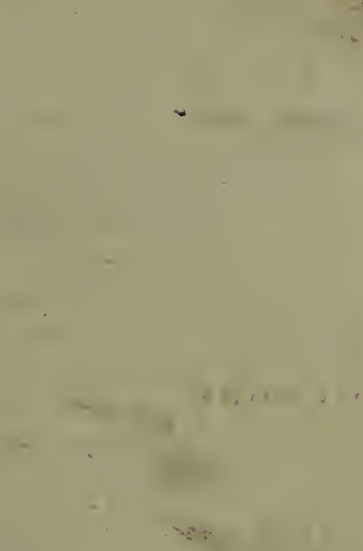
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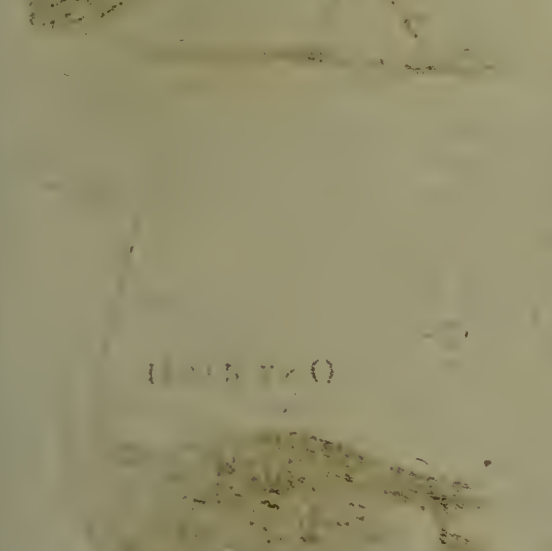
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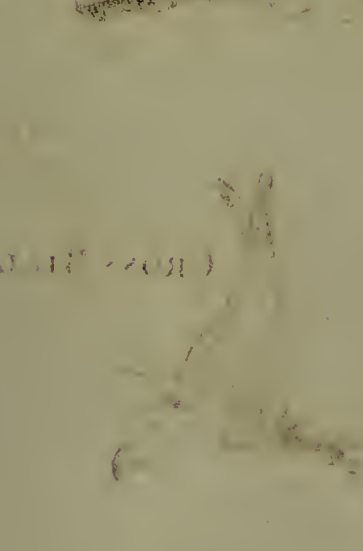
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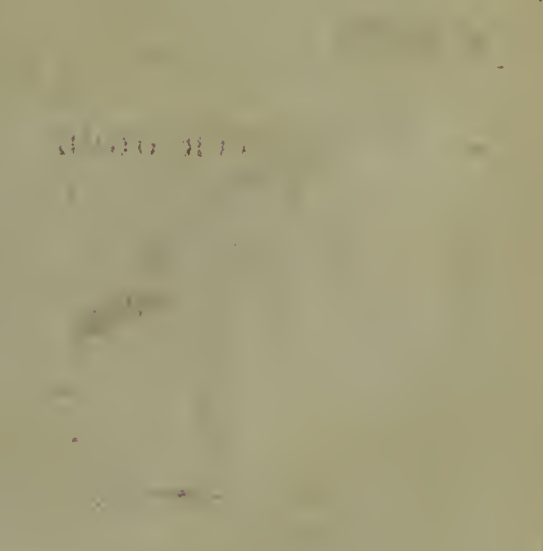
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BIRDS.

HUMMING BIRDS



JAY

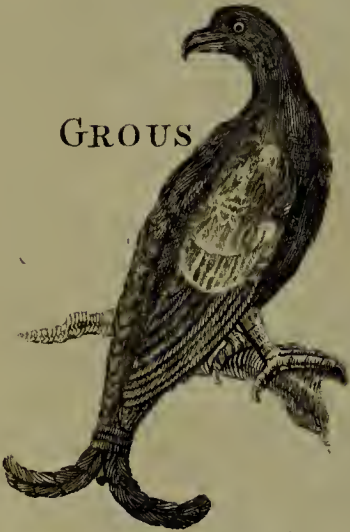


COCK

of the MOUNTAIN



GROUS



KING FISHER



BUSTARD



MERULA



RING OUZELL



ATINGA



MERLIN



MEROPS



MITU PORANGU



SCURVOGEL



CROSS BILL



OSTRICH



SERINUS



ORIOIUS



three inches long, and formed like that of a magpie, consisting of twelve feathers of unequal lengths: the cheeks and throat are white; the breast and belly are white, tinged with red: the legs and feet are black.

The nest is elegantly built of an oval shape, and about six inches deep; it is composed of moss, wool, feathers, and down. This bird lays from twelve to sixteen eggs, and the young follow the parents the whole winter.

There is another bird called the Marsh-Titmouse, from its frequenting wet places, which is about four inches and an half in length, and three inches in breadth. The head is black, the cheeks white, the back greenish, and the feet of a lead colour.

The Bahama Tit-Mouse of Catesby, has a longish black bill, somewhat crooked: the head, back, and wings are brown, a white streak extending from the corner of the bill to the back-part of the head. The breast, and the upper-part of the wings are yellow. It has a long tail, brown above, and cream-coloured below.

The Crested Tit-Mouse is about five inches in length, and eight inches in breadth: the feathers on the top of the head are black, with white edges. It is distinguished from other birds of this kind by the crest, which is about an inch in height.

NATURAL HISTORY of the HUMMING-BIRD, and its Varieties.

THOUGH this species is the least, it is certainly the most beautiful of all others. In quadrupeds the smallest animals are noxious, disagreeable, and loathsome; but the smallest of birds are the most beautiful, innocent, and sportive. Of all those that flutter in the garden, or paint the landscape, the Humming-Bird is not only the most inoffensive, but the most delightful to behold.

Of this charming creature there are six or seven varieties, from the magnitude of a wren down to that of an humble-bee. It appears astonishing to an European that there should be a bird existing so extremely small, and yet completely furnished out with bill, feathers, wings, and intestines, being an exact resemblance in miniature of those of the largest kind: but these are daily seen in infinite numbers, like butterflies in a warm summer's day, sporting in the fields of America, from flower to flower, and extracting their sweets.

The smallest of this class is about the size of an hazel-nut: the feathers on the wings and tail are black: those on the body, and under the wings, are a mixture of green and brown, glossed with a beautiful red cast: the head is adorned with a crest, which is green at the bottom, and of a bright yellow, or gold-colour at the top. The bill is black, straight and slender.

The larger Humming-Bird is without a crest on its head, and is about half the size of a common wren: from the throat, half way down the belly, it is covered with changeable crimson-coloured feathers, which, in different lights, appear in a variety of different colours. The heads of both these birds are small, studded with very little sparkling black eyes.

As soon as the sun is risen, variety of Humming-Birds are seen fluttering about the flowers, without ever lighting upon them. The rapidity of the motion of their wings is so great, that it is impossible to discern their colours, except by their glittering: they are perpetually on the wing, visiting flower after flower, and extracting its honey. For this purpose, nature has furnished them with a forked-tongue that enters the cup of the flower, and procures the nectar upon which alone they subsist. They have the name of Humming-Birds from the sound occasioned by the rapid motion of their wings.

The nest of the Humming-Bird is also worthy of admiration: it is suspended in the air, at the point of the twigs of an orange, a citron, or a pomegranate-tree. The male furnishes materials, and the female is the architect: the nest consists of moss, the fibres of vegetables, and cotton; it is admirably contrived, and about the size of half an hen's egg. In this the female lays two eggs, about the size of small peas, which are of a pure white, with a few yellowish spots. During the time of incubation, she seldom quits the nest, except a few minutes in the morning and evening, when the dew is upon the flowers and their honey is in perfection. In her absence the male supplies her place; the eggs being so very small that there would be danger in exposing it to the weather for ever so short a time. The time of incubation continues twelve days, at which time the young ones are excluded, and are about the size of a blue-bottle-fly. At first they are bare, afterwards they become cloathed with down, which is at length succeeded by feathers.

On the continent of America, these birds continue to flutter the year round; for in those warm latitudes, where they have always plenty of flowers, there can be no deficiency of food. But it is otherwise in the islands of the Antilles, where, when the winter-season approaches, they retire, and, as some imagine, continue in a torpid state during the severity of that season. At Jamaica, and Surinam, where they have plenty of flowers the whole year, the Humming-Bird never disappears.

Besides the humming noise produced by their wings, travellers assure us that these birds have a little interrupted chirrup; and Labat asserts that they have a most pleasing melancholy melody in their voices, though small and proportioned to the organs that produce it.

This pretty little animal's plumage was formerly used by the Indians in adorning the head-dresses and belts; at present, however, they take the bird rather for the purpose of selling it as a curiosity to the Europeans, than that of ornament for themselves: the taste of savage finery is now wearing out even among the Americans.

The different sizes and varieties of this class of birds are usually distinguished by the following appellations: the larger Humming-Bird, the Long-Tailed Black-Capped Humming-Bird, the Lesser Humming-Bird, the Little Humming-Bird with a crooked Bill, the Humming-Bird with a black Bill, the Green Humming-Bird, and the Ash-Coloured Humming-Bird.

C H A P. V.

Containing the NATURAL HISTORY of BIRDS of the CRANE KIND, viz. the CRANE, the STORK, the HERON, the BITTERN, the SPOON-BILL or SHOVELLER, the FLAMINGO, the CURLEW, the AVOSETTA or SCOOPER, the WOODCOCK, the GODWIT, the SNIPE, the WATER HEN, the COOT, and the GREBE.

NATURE has peopled the woods and the fields with a variety of the most beautiful birds; and, that no part of her extensive territories might remain untenanted, she has also stocked the water with feathered inhabitants. She has as carefully provided for the wants of her animals in this element, as she has for those that inhabit the air: she has defended their feathers with a natural oil to give them security, and united their toes by a webbed membrane to facilitate their motion. But she has formed a numerous tribe of birds that seem to partake of a middle nature, between the classes of land-birds that avoid the water, and of water-fowls that are peculiarly adapted for swimming and living in it: these have divided toes, and, on that account, seem fitted to live upon land; but they are furnished with appetites that attach them chiefly to the waters: they provide all their sustenance from watery places, but they are unqualified to seek it in those depths where it is usually found in the greatest plenty. They live indeed among the waters, but they are incapable of swimming in them; they have in general long legs, fitted for wading in shallow waters, or long bills proper for groping in them in pursuit of their prey.

Birds of this kind, habituated to marshy places, may be known either by the length of their legs, or the scaly surface of them. Birds of this kind too are generally bare of feathers half way up the thigh, and all of them above the knee at least; so that there is a surprizing difference between the leg of a Crane, which is naked almost up to the body, and the falcon, which is clothed almost to the toes.

In most birds of this class the bill is also very distinguishable. It is, in general, longer than that of other birds, and at the point is possessed of extreme sensibility, and furnished with nerves for the better feeling their food at the bottom of marshes, where it cannot be seen. Some of these birds are furnished with every convenience, having long legs for wading, long necks for stooping, and long bills for searching. It is generally observed if the legs of a bird are long, the neck is also long in proportion: there would otherwise be a defect in its conformation; as it would be lifted upon stilts above its food, without being furnished with an instrument to reach it.

If we take a comparative view of this class of birds, they seem inferior to those of every other tribe. Their nests are more simple than those of the sparrow, and their methods of obtaining food less ingenious than those of the falcon: in cunning they are exceeded by the pie, and they want the fecundity of the poultry tribe. None of this kind therefore are taken under the protection of man; they are neither caged like the nightingale, nor kept tame like the turkey; but lead a life of precarious liberty in fens and marshes, or on the borders of the seas or lakes. They all live upon fish or insects, one or two only excepted: and even those which are called mud-suckers, such as the snipe and woodcock, perhaps grope the bottom of marshy places only for such insects as are deposited there by their kind.

Such of this class of birds as feed upon insects are fit to be eaten; but those which live entirely

upon fish, acquire in their flesh the rancidity of their diet, and are, in general, improper for our tables. To sailors on a long voyage, indeed, every thing that has life seems good to be eaten: their accounts, therefore, of the flesh of these birds are not to be depended upon; and when they mention the heron or the stork of other countries as luxurious food, we should always attend to the state of their appetites.

NATURAL HISTORY of the CRANE.

VARIOUS are the accounts given of this bird's size and dimensions. According to Willoughby and Pennant, the Crane is from five to six feet long, from the tip to the tail. Other accounts say, it is above five feet high; and others that it is about the height of a man. Brisson, however, seems to give this bird its real dimensions, when he describes it as something less than the brown stork, about three feet high, and about four from the tip to the tail. Still, however, the numerous testimonies of its superior size are not entirely to be rejected; and, perhaps, that from which Brisson took his dimensions, was one of the smallest of the kind.

According to Brisson, the Crane is exactly three feet four inches from the tip to the tail, and four feet from the head to the toe. It is a tall, slender bird, with a long neck and long legs. The top of the head is covered with black bristles, and the back of it is bald and red, which is sufficient to distinguish this bird from the stork, to which it is nearly allied in size and figure. The plumage is ash-coloured; and two large tufts of feathers spring from the pinnion of each wing. These resemble hair, and are finely curled at the ends, which the bird has a power of erecting and depressing at pleasure. Gesner informs us, that in his time, these feathers were often set in gold, and worn as ornaments in caps.

The Crane is a bird with which all the ancient writers are familiar; and, in describing it, they have not failed to mix imagination with history. From the policy of the Cranes, they say, we are to look for an idea of the most perfect republic amongst ourselves; from their tenderness to their decrepid parents, we are to learn lessons of filial piety; but particularly from their conduct in fighting with the pigmies of Ethiopia, we are to receive our maxims in the art of war. In early times, the history of nature fell to the lot of poets only, and certainly none could so well describe it; but it is a part of their province to embellish also; and when this agreeable science was claimed by a more sober class of people, they were obliged to take the accounts of things as they found them; thus fable ran down, blended with truth, to posterity.

There is doubtless some foundation of truth in these relations; but much more has been added by fancy. Cranes are certainly very social birds, and they are seldom seen alone. Their usual method of flying or sitting, is in flocks of fifty or sixty together; and while some of them feed, others stand like centinels upon duty. The fable of their supporting their aged parents, may have arisen from their strict connubial affection; as for their fighting

with

with the pigmies, it may not be improbable but that they have boldly withstood the invasions of monkeys coming to rob their nests.

The Crane is a wandering, sociable bird, that subsists chiefly upon vegetables; and is known in every country of Europe, except our own. There is no part of the world, says Belonius, where the fields are cultivated, that the Crane does not come in with the husbandman for a share of the harvest. As birds of passage, they are seen to depart and return regularly at those seasons when their provision invites or repels them. They usually quit Europe about the latter end of autumn, and return in the spring. In the inland parts of the continent, they are seen crossing the country, in large flocks, making from the northern regions towards the south. In these migrations, however, they are not so resolutely bent upon expedition, but that if a field of corn presents itself in their way, they will stop for a time to regale upon it: on such occasions they do incredible damage, chiefly in the night; and when the husbandman rises in the morning he beholds his fields laid entirely waste by an enemy, whose swiftness his vengeance cannot overtake.

They were formerly known in this island, and held in great estimation, for the delicacy of their flesh: there was even a penalty upon such as destroyed their eggs; but, at present, this country is too populous and too well cultivated: though our fields may offer them a greater plenty, yet it is so guarded, that these birds find the venture greater than the enjoyment. We are indeed much better off by their absence than their company; for whatever their flesh might once have been, when, as Plutarch tells us, Cranes were blinded and kept in coops, to be fattened for the tables of the great in Rome; or, as they were brought up, stuffed with mint and rue, to the tables of our nobles at home; they are now considered all over Europe as wretched eating.

The Crane's favourite abode is the cold Arctic region. They come down into the more southern parts of Europe, rather as visitants than inhabitants: yet it is not well known how they portion out their time to the different parts of the world. The migrations of the field-fare, or thrush, are obvious, and well known; they go northward or southward, in one simple track; when their food fails them here, they have but one region to go to. But the Crane changes place like a wanderer. Gesner assures us, that the Cranes usually began to quit Germany from about the 11th of September to the 17th of October; from thence they were seen flying southward by thousands; and Redi tells us, they arrive in Tuscany a short time after. There they tear up the fields, newly sown, for the grain just committed to the ground, and do incredible mischief. In the severity of winter, it is probable they go southward, still nearer the line. They again appear in the fields of Pisa, regularly about the twentieth of February, to anticipate the spring.

It is amazing to conceive the heights to which they ascend, when they take these journeys. Their note is remarkably loud; and is often heard in the clouds, when the bird itself is invisible. As it is light in proportion to its size, and spreads a large expanse of wing, it is capable of floating at the greatest height, where the air is lightest; and thus secures its safety, by being entirely out of the reach of man.

Though unseen themselves in these aerial journeys, they have a distinct vision of every object below them. They govern and direct their flight by their cries; and exhort each other to proceed, or to descend, when opportunities for depredation present themselves. Their voice is the loudest of all the feathered tribe; and its peculiar clangor arises from the very extraordinary length and contortion of the

wind-pipe. In quadrupeds, the wind-pipe is short, and the glottis, or cartilages that form the voice are at that end next the mouth: in water-fowl the wind-pipe is longer, but the cartilages that form the voice are at the other end, which lies down in their belly. They have therefore much louder voices, in proportion to their size, than any other animals; for the note, when formed below, is reverberated through all the rings of the wind-pipe, till it reaches the air.

As these birds rise but heavily, they are extremely shy, and seldom suffer mankind to approach them. Their depredations are usually made in the darkest nights, when they sometimes visit a field of corn, and trample it down as if a thousand oxen had crossed over it. If, upon these occasions, they are invaded on any side, the bird that first perceives the danger is sure to sound the alarm, and all are speedily upon the wing. Sometimes they choose an extensive solitary marsh, where they range themselves all day; and not having that grain which is most agreeable to them, they wade for insects and other food, which they can procure without danger.

But though corn is the favourite food of this bird, there is hardly any thing that comes amiss to it. It is peaceful, both in its own society, and with respect to those of the forest. Though so large in appearance, it is sometimes pursued and disabled by a little falcon. It is an animal easily tamed, and, according to Albertus Magnus, has a particular affection for man. The female, which is easily distinguished from the male, by not being bald behind, lays no more than two eggs at a time, which are like those of a goose in size, but of a bluish colour. As soon as the young ones are capable of flying, the parents forsake them to shift for themselves; after first leading them to the places where their food is most easily found. As they grow old, their plumage becomes darker. It is not certainly known how long a Crane will live, but as a proof of its longevity, Aldrovandus assures us, that a friend of his kept one tame for above forty years. The common people of every country bear the Crane a compassionate regard to this day; the ancient prejudices in its favour perhaps still continue to operate. In some countries it is considered as an heinous offence to kill a Crane, and though the laws may not punish the offender, the people do not fail to resent the injury.

The BALEARIC CRANE.

This is nearly of the same shape and size as the ordinary Crane, with a long neck and long legs like others of the kind; but the bill is shorter, and the feathers are of a dark greenish grey: the most striking parts of this bird's figure are the head and throat. On the head appears a thick round crest, made of bristles, spreading on every side, and resembling rays standing out in different directions. The longest of these rays are about three inches and an half; and they are all topped with a kind of black tassels, which render them extremely beautiful. The sides of the head are bare, whitish, and edged with red; and a kind of bag or wattle hangs beneath the throat, resembling that of a cock, but is not divided into two. The eyes of this bird are large and staring; the pupils are black, with a gold-coloured iris; and, upon the whole, it has a very singular appearance.

This bird is a native of the coast of Africa, and the Cape de Verd islands, and feeds upon grass and seeds. As it runs it extends its wings, and moves very swiftly; otherwise its usual motion is very slow. In their domestic state they mingle with other poultry, and suffer themselves to be approached by every spectator. When they are disposed to go to rest, they generally make choice of some high wall, on which they perch in the manner of a peacock,

The

The NUMIDIAN CRANE.

This is vulgarly called by our sailors the buffoon bird, and by the French demoiselle, or lady; because it is supposed to imitate the gestures and dances of the Bohemian ladies. It does not follow people for what it can get, as animals in general do, but in order to be taken notice of; and when they perceive that they are observed, they immediately begin dancing. The French, who are skilled in the arts of elegant gesticulation, consider all its motions as lady-like, and graceful. Our English sailors, however, who are less competent judges of the dancing art, think this bird cuts a very ridiculous figure while it is thus in motion. It stoops, then rises, raises one wing, and then another. After that it turns round, sails forward, and then back again. Some are of opinion that these contortions are but the awkward expression of the poor animal's fears, and not of its pleasures.

It has appendages at the head which are three inches and an half in length, composed of white feathers, consisting of fine long fibres. The rest of the plumage is of a leaden grey colour, except some large feathers on the wings, which are darker, and a few feathers about the head and neck. Some have plumes of feathers erected like a crest on the top of the head. From the corner of each eye a streak of white feathers passes under the appendages, which form the great feathered ears. The fore part of the neck is adorned with black feathers, composed of very fine soft and long fibres, hanging down upon the stomach, and give the bird a very graceful appearance.

The length of this bird, from the tip of the bill to the end of the claws, is three feet and an half. The neck is fourteen inches; and it is ten inches from the thigh-bone to the extremity of the great toe. The fore side of the legs are covered with large scales: the sole of the foot has the appearance of shagreen leather, and the claws are black. It is an inhabitant of Numidia.

The HOOPING CRANE.

The length of this bird, from the tip of the bill to the end of the claws, is five feet seven inches; the bone that extends from the knee to the foot is eleven inches; and the thigh is bare five inches above the knee: the middle toe is five inches long without the claw; and the bill, which is toothed at the point, is six inches long. The nostrils are placed in the channels in each side, at about a third part of the length from the head. The chaps are of a yellowish brown at the ends, and a little dusky in the middle. The top of the head is covered with a reddish skin; behind which there is a triangular spot, with one of the points backwards: the sides of the head, throat, neck, body, and tail, are white; but the nine outermost quills of the wings are black; and the tenth black and white; the rest being entirely white. The outer and middle toes are united by a web as far as the first joint, and the legs and feet are covered with black scales. This is thought to be a bird of passage: it is however seen in the spring about the mouths of rivers in Florida.

The JABIRU.

This is one of the Crane kind, and a native of Brasil: the bill is black, and eleven inches long; and the body exceeds the size of the swan. It is covered with white feathers, the head and neck excepted, which are quite naked.

The JABIRU GUACU.

This is also a native of Brasil. It has a red bill, which is thirteen inches long; though its body is not above the size of a common stork. This also

is covered with white feathers, except on the head and neck, which are entirely bare. The lower chap of this bird is broad and bends upwards.

There is another Brasilian bird of this kind, called the Anhima. It is a water fowl of the rapacious kind, and larger than a swan. The bill is black, and does not exceed two inches in length; but the most distinguishing mark is a horn growing from the forehead as long as the bill, and bending forward like that of the fabulous unicorn of the ancients. This horn is about the thickness of a crow-quill, perfectly round and regular, and of an ivory colour. This formidable bird seems to be armed at all points; for two strait triangular spurs, about as thick as a man's little finger, spring from the forepart of each wing; the claws are also long and sharp. These birds are never found alone, but always in pairs. The cock and hen wander together, and so great is their fidelity, that, when one dies, it is said the other never departs from the body, but refuses sustenance, and dies at the side of its companion.

NATURAL HISTORY of the STORK.

AT a transient view the Stork might be confounded with the crane. It is of the same size, and has the same formation as to the bill, neck, legs and body, but it is rather more corpulent. The colour of the crane is ash and black; that of the Stork is white and brown: the nails of the toes of the Stork are also very peculiar; not being clawed like those of other birds, but flat like the nails of a man. The crane has a loud piercing voice; the Stork is silent, and produces no other noise than the clacking of its under chap against the upper.

It has often been remarked, that the social affections are found to be stronger in their descent than their ascent; that the love of parents to their children, for instance, is commonly more ardent than that of children for their parents; though, from the state of things, and from the obligations which children owe their parents, one might reasonably expect it to be otherwise. However, there is a visible good design in this wise destination; we see in it, as in every object we seriously contemplate, the determination of high wisdom. The offspring both of the human and the animal race, come into the world feeble and helpless; and if the parental affection were not exceedingly forcible, they must perish in their weak and forlorn condition; and the creation would thus speedily be brought to an end. There is not the same reason for the return of affection in the offspring, and therefore we rarely find it in the animal world: soon as the young is able to provide for itself, a mutual forgetfulness generally ensues, and the parent grows as regardless of its offspring as the offspring of its parent.

There is however one creature, which contradicts this almost general rule in the animal world; and which is as remarkable for its love to its parents, as other creatures are for their love to their young: this is the Stork, whose very name in the Hebrew language (*chesidab*) signifies mercy or piety, and whose name in the English seems to be taken, if not directly, yet secondarily through the Saxon, from the Greek word *storge*, which is often used in our language for natural affection.

The Stork is a bird of passage, and is spoken of as such in scripture: "The Stork knoweth her appointed time, &c." Jer. viii. 7. Some say, that when they go away, the Stork which comes last to the place of rendezvous, is killed on the spot. They go away in the night to the southern countries. Thompson, in his Seasons, gives the following fine description of the passage of the Storks:

Where

THE BLACK STORK



THE HERON



THE STORK



THE LITTLE HERON



THE OSPREY



THE BALEARIC CRANE



THE CRANE



THE BITTERN



THE CURLEW



THE HAZEL HEN



THE WOODCOCK



THE SNIPE



THE LAPWING



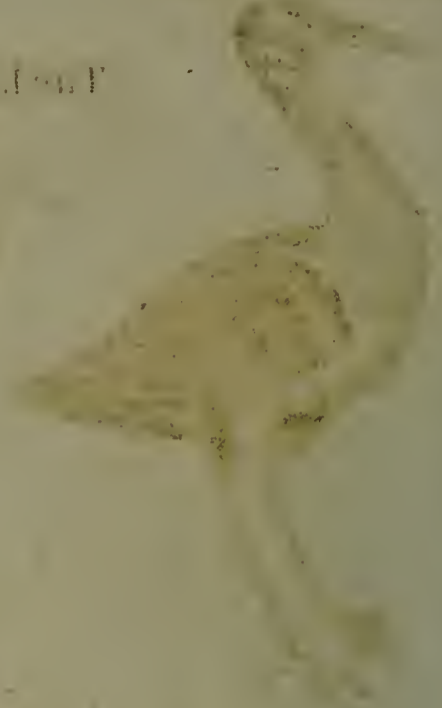
THE LESSER TRINGA



THE RUFF



The Moorcock



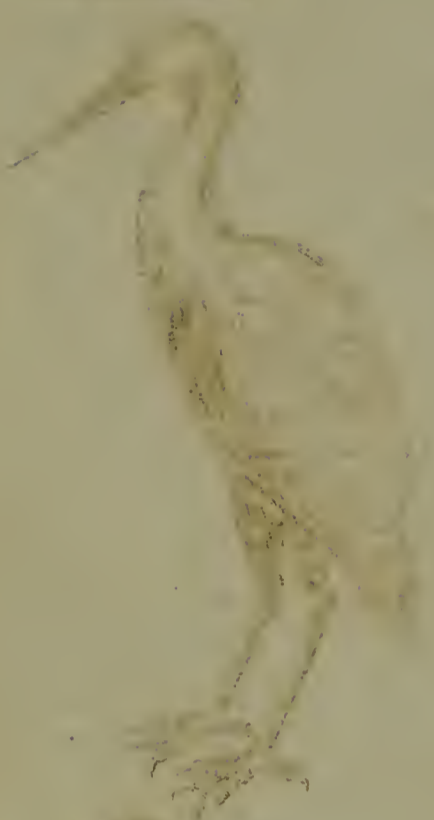
The Partridge



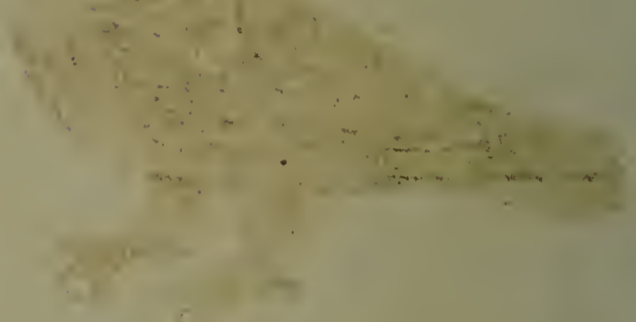
The Pheasant



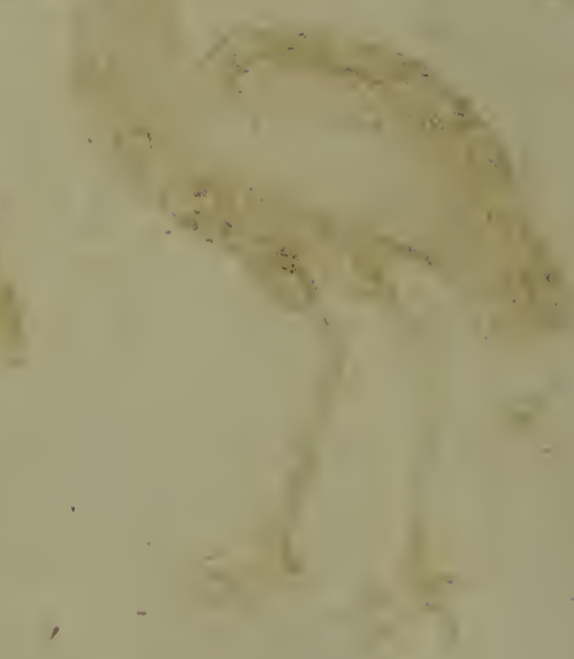
The Crane



The Quail



The Grouse



The Plover



The Snipe



The Woodcock



The Lark



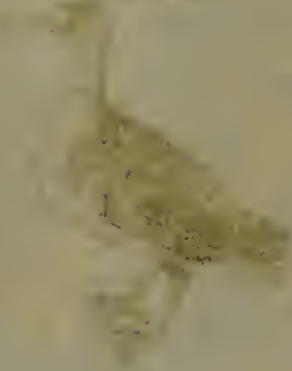
The Thrush



The Tit



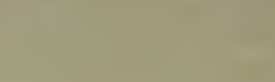
The Sparrow



The Finch



The Wren



Where the Rhine loses his majestic force
 In Belgian plains, won from the raging deep,
 By diligence amazing, and the strong
 Unconquerable hand of liberty,
 The Stork-assembly meets: for many a day
 Consulting deep and various, ere they take
 Their arduous voyage thro' the liquid sky.
 And now their rout design'd, their leaders chose,
 Their tribes adjusted, clean'd their vigorous wings,
 And many a circle, many a short essay
 Wheel'd round and round, in congregation full
 The figur'd flight ascends; and riding high
 Th' aerial billows, mixes with the clouds.

AUTUMN, l. 859.

The Stork has a very long beak, and long red legs. It feeds upon serpents, frogs, and insects: as it seeks for these in watery places, nature has provided it with long legs; and as it flies away, as well as the crane and heron, to its nest with its prey; therefore the bill is strong and jagged, the sharp hooks of which enable it to detain its prey, which it might otherwise be difficult to hold. The abbe La Pluche says, "a friend of mine, who has an estate at Abeville, bounded by a river plentifully stored with eels, saw a heron one day carry off one of the largest of those creatures into his hernery, in spite of the efforts and undulations of the eel to oppose his flight." Thus we see the wise provider has not given those creatures such bills for nought: the Storks dig with theirs into the earth for serpents and adders, which, however large, they convey to their young, to whom the poison of those animals is perfectly inoffensive. The plumage of the Stork would be quite white, if it was not that the extremity of its wings are black, and also some small part of its head and thighs. It lays but four eggs, and sits for the space of thirty days.

But that which renders it the most remarkable is, its love to its parents, whom it never forsakes, but tenderly feeds and defends, even to death. The very learned and judicious Bochart, has collected a variety of passages from the ancients, wherein they testify this curious particular; that the Stork is eminent for its performance of what St. Paul enjoins, "Children's requiting their parents," 1 Tim. v. 4. This caused one of the seven wise men to reply to Cræsus, when he asked, "which of the animals was the most happy? The Stork; because it performs what is just and right by nature, without any compelling law." And hence one of our poets speaks thus finely of the Stork:

The Stork's the emblem of true piety:
 Because when age has seiz'd, and made his dam
 Unfit for flight, the grateful young one takes
 His mother on his back, provides her food;
 Repaying thus her tender care of him
 Ere he was fit to fly, by bearing her.—*Beaumont.*

The Dutch are very solicitous for the preservation of the Stork in every part of their republic. This bird seems to have taken refuge among their towns; and builds on the tops of their houses without any molestation. There it is seen resting familiarly in their streets, and protected as well by the laws as by the affections of the people. They are even of opinion that it will not live but in a republic.

NATURAL HISTORY of the HERON.

THOUGH the crane, the stork, and the Heron bear a strong affinity to each other, the Heron may be distinguished from them, not only by its size, which is much less, but its bill, which in proportion is much longer; but particularly by the

middle claw on each foot, which is toothed like a saw, for the better seizing and securing its slippery prey. There is also an anatomical distinction, in which Herons differ from all other birds; they having but one cœcum, though all other birds have two.

Briffon has enumerated no less than forty-seven sorts of this tribe, all differing in figure, size, and plumage; but they all seem possessed of the same manners, and have one general character of cowardice, rapacity and indolence, yet insatiable hunger. Other birds grow fat by an abundant supply of food; but these, though excessively voracious and destructive, are ever found to be lean and hungry.

In proportion to its bulk, the common Heron is remarkably light, and seldom exceeds three pounds and an half in weight; though its length is three feet, and its breadth upwards of five feet. Its body is very small, and its skin remarkably thin: the bill is five inches long, from the point to the base: the claws are sharp and long; and the middlemost is toothed like a saw. But, notwithstanding it is thus formidably armed, it is so cowardly as to fly at the approach of a sparrow-hawk. It must be capable of enduring a long abstinence, as its food, which is fish and frogs, cannot be readily procured at all times. It however commits great devastation in our ponds; for, though nature has not furnished it with webs to swim, she has given it very long legs to wade after its prey: the smaller fry are his chief subsistence, and as these are pursued by their larger fellows of the deep, they are obliged to take refuge in shallow waters, where they find the Heron a still more formidable enemy.

The Heron wades as far as he can go into the water, where he impatiently waits the approach of his prey; which he darts upon with unerring aim, as soon as it appears in sight. In this manner he is said to destroy more in one week, than an otter in three months. And Mr. Willoughby assures us, it sometimes seizes fish of a tolerable size: "I have seen an Heron, says he, that had been shot, that had seventeen carps in his belly at once, which he will digest in six or seven hours, and then to fishing again. I have seen a carp taken out of a Heron's belly, nine inches and an half long. Several gentlemen who kept tame Herons, to try what quantity one of them would eat in a day, have put several small roach and dace in a tub, and they have found him eat fifty in a day, one day with another. In this manner a single Heron will destroy fifteen thousand carp in a single half year."

Though the Heron lives chiefly among pools and marshes, it builds on the tops of the highest trees, and sometimes on cliffs hanging over the sea. The nest is composed of sticks, lined with wool; and the female lays four large eggs of a pale green colour. Such, however, is the indolence of the nature of this bird, that it never takes the trouble of building a nest for itself, if it can procure one deserted by the owl or crow. Indeed it usually enlarges it, and lines it within; and, if the original possessor happens to renew his claim, the usurper treats him very roughly, and drives him away for his impertinence.

The Heron was formerly much esteemed as food, and made a favourite dish at the table of the great, but now it is thought detestable eating. It is said to be very long lived; and Mr. Keyser says, sixty years is no very uncommon age.

The CRESTED HERON.

The bill of this elegant species is about six inches long; very strong and sharp pointed; the colour dusky above, and yellow beneath: the space round the eyes, between them and the bill, are covered with a bare greenish skin: the forehead and crown of

the head are white; the hind-part being adorned with a beautiful pendant crest of black feathers. The hind-part of the neck, and the coverts of the wings are grey: the back is clad with down, and covered with the scapular feathers: the fore-part of the neck is white, elegantly spotted with a double row of black. The feathers, which are long and narrow, fall loose over the breast; the scapulars are grey, streaked with white. The ridge of the wing, and the breast, belly, and thighs are white; the latter dashed with yellow. The tail, which consists of twelve feathers, is ash-coloured; and the legs are of a dirty green.

The GREAT WHITE HERON or EGRET.

The length of this bird, from the tip of the bill to the end of the claws, is four feet and an half; and to the end of the tail three feet and a quarter: the breadth, with extended wings, is five feet and an half; and the weight about two pounds and an half. This bird is entirely white, by which it may be distinguished from the common Heron; it may also be distinguished by its size, which is smaller; by the length of its tail; and by its having no crest. This Heron is not often seen in England.

There is a bird of this kind, called the Lesser White Heron, which only differs from the preceding in size, and in having a crest.

The Little White Heron of Catesby, has a crooked red bill, with a yellow iris of the eyes: the body is white, and the feet are green.

The YELLOW and GREEN HERON of MARSEILLES.

The bill of this bird is black above, yellow below, and about three inches in length. The irides are white, as well as that part of the neck next the chin; but the rest of the neck, the top of the head, the breast and belly, are variegated with brown lines. The back is black; the wings are yellowish, spotted with black; and the tail is short; the feathers of which are short, and greatly resemble hair. The thighs are ash-colour, the feet black, and the claws yellow.

NATURAL HISTORY of the BITTERN.

THE Bittern is less than the heron, and has a weaker bill, which is not above four inches in length: but it principally differs from the heron in its colour, which is usually of a palish yellow, spotted, and barred with black. It has two kinds of notes; the one croaking, when it is disturbed; the other bellowing, which it commences in the spring, and ends in autumn. The latter is indeed like the roaring of a bull, but hollower and louder, and is heard at the distance of a mile. From the loudness and solemnity of this note, many have imagined that the bird made use of external instruments to produce it, and that so small a body could never eject such a quantity of note. The common people are of opinion that it thrusts its bill into a reed; which, like a pipe, assists in swelling the note above its natural pitch. Thompson the poet, and many others, suppose the Bittern puts its head under water, and then violently blowing, produces that noise. The fact is, its wind-pipe is fitted to produce the sound for which it is remarkable; the lower-part of it dividing into the lungs, is supplied with a thin loose membrane, which can be filled with a large body of air, and exploded at pleasure. It is certain that the Bittern is frequently heard where there are neither reeds nor waters to assist its sonorous invitations.

This is a very retired bird, concealing itself in the midst of reeds and rushes in marshy places.

Though it is of the heron kind, it is neither so destructive nor so voracious; and though it so nearly resembles the heron in figure, it differs from it greatly in its manners and its appetites. The food of the Bittern is chiefly frogs; it builds its nest with the leaves of water-plants; and lays six or seven eggs of an ash-green colour. The heron feeds its young for several days; the Bittern conducts its little ones to their food in about three days. The flesh of the Bittern has much the same flavour as that of the hare, and is free from the fishyness of that of the heron: it is therefore eagerly sought after by the fowler, and as it is with difficulty provoked to flight, and has a dull and flagging pace when on the wing, it does not often escape him. Towards the end of autumn, however, it seems to have shook off its wonted indolence, and is seen rising in a spiral ascent till it is quite lost from the view, making at the same time a very singular noise. Thus it often happens that the same animal assumes different desires at different times; and tho' the Bittern has acquired the name of the star-reaching-bird among the Latins, the Greeks have thought it merited the epithet of lazy.

This bird is called the mire-drum in the north of England.

The NORTH-AMERICAN BITTERN.

This is smaller than the English Bittern; the wing, when closed, not exceeding twelve inches in length. It resembles ours with regard to the colour and figure, but may be distinguished from it by carefully comparing them together.

The SMALL BITTERN.

This bird is fourteen inches in length, and twenty in breadth. The bill is two inches long, and sharp at the point; the upper-chap being black, and the lower yellow. The base of the bill is surrounded with a yellow naked membrane, extending as far as the nostrils. The tail is not above an inch long; and the feathers on the top of the head are brown, rising a little in the manner of a tuft. The upper-part of the neck, the back, wings, and tail are also brown, a few whitish and tawny spots excepted. The lower-part of the neck, the breast, and belly are of a light brown, mixed with white and flesh-colour.

The LITTLE BITTERN of BRASIL.

This bird is smaller than the common pigeon, but the length of its neck is about seven inches. The skin at the base of the bill is yellowish. The upper-part of the head is of the colour of steel, interspersed with palish brown feathers. The neck, breast, and belly are whitish; but the back is a mixture of black and brown. The long feathers of the wings are greenish, with a white spot at the extremity of each. The other parts are beautifully variegated with black, brown, and ash-colour; and the feet are of a blossom-colour. The bill is long, straight, and sharp, and black at the point; the iris of the eyes is of a gold-colour; and the tail does not extend beyond the wings.

NATURAL HISTORY of the SPOON-BILL, or SHOVELER.

AS we proceed in our description of the crane kind, birds of peculiar forms offer, not entirely like the crane, and yet not so far different as to rank more properly with any other class. Where the long neck and stilt-like legs of the crane are found, they make too striking a resemblance; not to admit such birds of the number; and though the bill or even the toes should entirely differ, yet the outlines





THE SPOON BILL

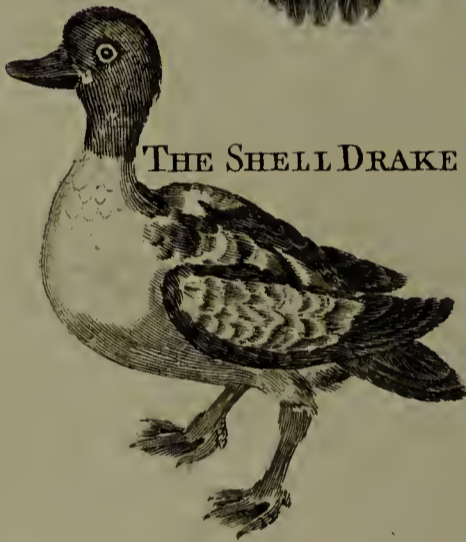
THE VULTURE



THE SWAN GOOSE



THE GADWALL



THE SHELL DRAKE



THE SHOVELER



THE CORMORANT



THE WILD GOOSE



THE SHAGE



THE GOLDEN EYE



THE PELICAN

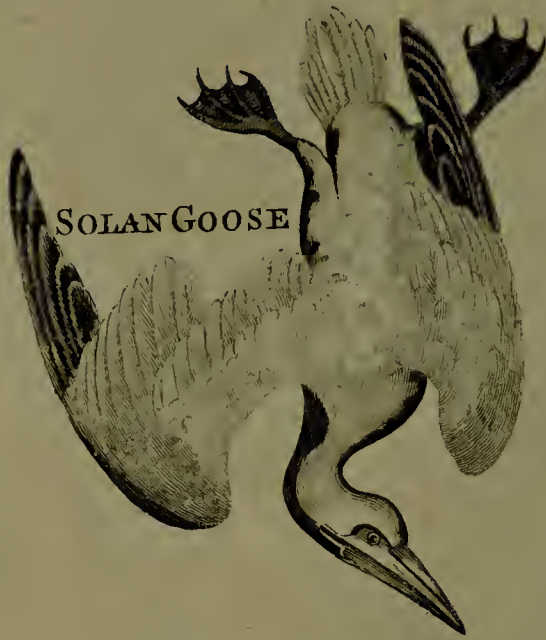


THE SEA PHEASANT

B I R D S .



FLAMINGO



SOLAN GOOSE



DEMOISELLE



RING DOVE



ARACARI



TIPPET GREBE



CRESTED GREBE



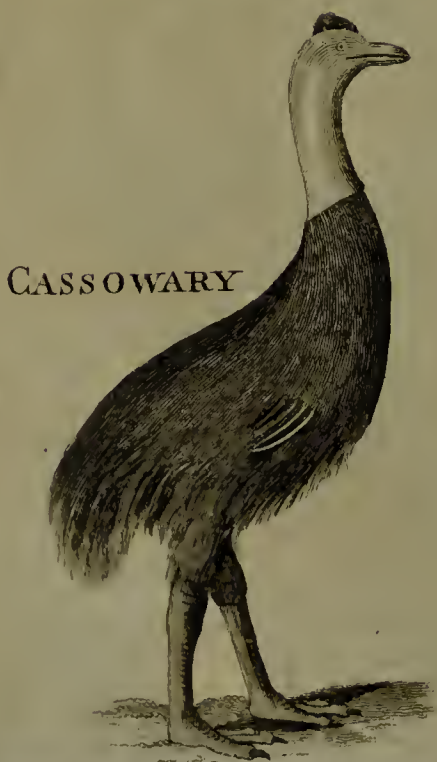
HIMANTOPUS



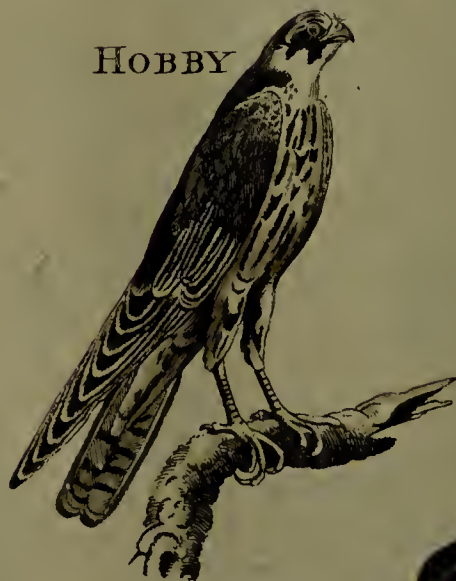
GRUS



HERON



CASSOWARY



HOBBY



HOPOE

outlines of the figure, and the natural habits and dispositions being the same, these are sufficient to mark their place in the general group of nature.

The Spoonbill is one of those birds which differs a good deal from the crane, yet approaches this class more than any other. The body is more bulky for its height, and the bill is very differently formed from that of any other bird whatever. Yet still it is a comparatively tall bird; it feeds among waters; its toes are divided; and it seems to possess the natural dispositions of the crane. The European Spoonbill is of about the bulk of a crane; but as the one is above four feet high, the other is not more than three feet three inches. The common colour of those of Europe, is a dirty white; but those of America are of a beautiful rose colour, or a delightful crimson. Beauty of plumage seems to be the prerogative of all the birds of that continent; and we here see the most splendid tints bestowed on a bird, whose figure is sufficient to destroy the effects of its colouring; for its bill is so oddly fashioned, and its eyes so stupidly staring, that its fine feathers only tend to add splendour to deformity. The bill, which in this bird is so very particular, is about seven inches long, and running out broad at the end, as its name justly serves to denote; it is there about an inch and a half wide. This strangely fashioned instrument, in some is black; in others of a light grey; and in those of America, it is of a red colour, like the rest of the body. All round the upper chap there runs a kind of rim, with which it covers that beneath; and as for the rest, its cheeks, and its throat, are without feathers, and covered with a black skin.

A bird so oddly fashioned, might be expected to possess some very peculiar appetites; but the Spoonbill seems to lead a life entirely resembling all those of the crane kind; and nature, when she made the bill of this bird so very broad, seems rather to have sported with its form, than to aim at any final cause for which to adapt it. In fact, it is but a poor philosophy to ascribe every capricious variety in nature to some salutary purpose: in such solutions we only impose upon each other; and often wilfully contradict our own belief. There must be imperfections in every being, as well as capacities of enjoyment. Between both, the animal leads a life of moderate felicity; in part making use of its many natural advantages, and in part necessarily conforming to the imperfections of its figure.

The Shoveler chiefly feeds upon frogs, toads, and serpents; of which, particularly at the Cape of Good Hope, they destroy great numbers. The inhabitants of that country hold them in as much esteem as the ancient Egyptians did their bird ibis: the Shoveler runs tamely about their houses; and they are content with its society, as an useful though an homely companion. They are never killed; and indeed they are good for nothing when they are dead, for the flesh is unfit to be eaten.

This bird breeds in Europe, in company with the heron, in high trees; and in a nest formed of the same materials. Willoughby tells us, that in a certain grove, at a village called Seven Huys, near Leyden, they build and breed yearly in great numbers. In this grove, also, the heron, the bittern, the cormorant, and the shag, have taken up their residence, and annually bring forth their young together. Here the crane kind seem to have formed their general rendezvous; and, as the inhabitants say, every sort of bird has its several quarter, where none but their own tribe are permitted to reside. Of this grove the peasants of the country make good profit. When the young ones are ripe, those that farm the grove, with a hook at the end of a long pole, catch hold of the bough on which the nest is built, and shake out the young ones; but sometimes the nest and all tumble down together.

The Shoveler lays from three to five eggs; white, and powdered with a few sanguine or pale spots. We sometimes see, in the cabinets of the curious, the bills of American Shovelers, twice as big and as long as those of the common kind among us; but these birds have not yet made their way into Europe.

The FLAMINGO.

The Flamingo has the justest right to be placed among cranes; and though it happens to be web-footed, like birds of the goose kind, yet its height, figure, and appetites entirely remove it from that groveling class of animals. With a longer neck and legs than any other of the crane kind, it seeks its food by wading among waters; and only differs from all of this tribe in the manner of seizing its prey; for as the heron makes use of its claws, the Flamingo uses only its bill, which is strong and thick for the purpose, the claws being useless, as they are feeble, and webbed like those of water-fowl.

The Flamingo is the most remarkable of all the crane kind, the tallest, bulkiest, and the most beautiful. The body, which is of a beautiful scarlet, is no bigger than that of a swan; but its legs and neck are of such an extraordinary length, that when it stands erect, it is six feet six inches high. Its wings, extended, are five feet six inches from tip to tip; and it is four feet eight inches from tip to tail. The head is round and small, with a large bill, seven inches long, partly red, partly black, and crooked like a bow. The legs and thighs, which are not much thicker than a man's finger, are about two feet eight inches high; and its neck near three feet long. The feet are not furnished with sharp claws, as in others of the crane kind; but feeble and united by membranes, as in those of the goose. Of what use these membranes are, does not appear, as the bird is never seen swimming, its legs and thighs being sufficient for bearing it into those depths where it seeks for prey.

This extraordinary bird is now chiefly found in America, but was once known on all the coasts of Europe. Its beauty, its size, and the peculiar delicacy of its flesh, have been such temptations to destroy or take it, that it has long since deserted the shores frequented by man, and taken refuge in countries that are as yet but thinly peopled. In those desert regions, the Flamingos live in a state of society, and under a better polity than any other of the feathered creation.

When the Europeans first came to America, and coasted down along the African shores, they found the Flamingos on several shores on either continent, gentle, and no way distrustful of mankind. They had long been used to security, in the extensive solitudes they had chosen; and knew no enemies, but those they could very well evade or oppose. The negroes, and the native Americans, were possessed but of few destructive arts for killing them at a distance; and when the bird perceived the arrow, it well knew how to avoid it. But it was otherwise when the Europeans first came among them: the sailors, not considering that the dread of fire-arms was totally unknown in that part of the world, gave the Flamingo the character of a foolish bird, that suffered itself to be approached and shot at. When the fowler had killed one, the rest of the flock, far from attempting to fly, only regarded the fall of their companion in a kind of fixed astonishment: another and another shot was discharged; and thus the fowler often levelled the whole flock, before one of them began to think of escaping.

But at present it is very different in that part of the world; and the Flamingo is not only one of the scarcest, but of the shyest birds in the world, and the most difficult of approach. They chiefly keep near

near the most deserted and inhospitable shores; near salt-water lakes and swampy islands. They come down to the banks of rivers by day; and often retire to the inland, mountainous parts of the country, at the approach of night. When seen by mariners in the day, they always appear drawn up in a long close line of two or three hundred together; and, as Dampier tells us, present, at the distance of half a mile, the exact representation of a long brick wall. Their rank, however, is broken when they seek for food; but they always appoint one of the number as a watch, whose only employment is to observe and give notice of danger, while the rest are feeding. As soon as this trusty sentinel perceives the remotest appearance of danger, he gives a loud scream, with a voice as shrill as a trumpet, and instantly the whole cohort are upon the wing. They feed in silence; but, upon this occasion, all the flock are in one chorus, and fill the air with intolerable screamings.

From this it appears that the Flamingos are very difficult to be approached at present, and that they avoid mankind with the most cautious timidity: however, it is not from any antipathy to man that they shun his society, for in some villages, as we are assured by Labat, along the coast of Africa, the Flamingos come in great numbers to make their residence among the natives. There they assemble by thousands, perched on the trees, within and about the village; and are so very clamorous, that the sound is heard at near a mile distance. The negroes are fond of their company; and consider their society as a gift of Heaven, as a protection from accidental evils. The French, who are admitted to this part of the coast, cannot, without some degree of discontent, see such a quantity of game untouched, and rendered useless by the superstition of the natives: they now and then privately shoot some of them, when at a convenient distance from the village, and hide them in the long grass, if they perceive any of the negroes approaching; for they would probably stand a chance of being ill treated, if the blacks discovered their sacred birds were thus unmercifully treated.

Sometimes, in their wild state, they are shot by mariners; and their young, which run excessively fast, are often taken. Labat has frequently taken them with nets, properly extended round the places they breed in. When their long legs are entangled in the meshes, they are then unqualified to make their escape: but they still continue to combat with their destroyer; and the old ones, though seized by the head, will scratch with their claws; and these, though seemingly inoffensive, very often do mischief. When they are fairly disengaged from the net, they nevertheless preserve their natural ferocity; they refuse all nourishment; they peck and combat with their claws at every opportunity. The fowler is therefore under a necessity of destroying them, when taken; as they would only pine and die, if left to themselves in captivity. "The flesh of an old Flamingo," says Dampier, "is black and hard, though well tasted; but that of a young one is still better. But, of all other delicacies, the Flamingos' tongue is the most celebrated. A dish of Flamingos' tongues," continues he, "is a feast for an emperor." In fact, the Roman emperors considered them as the highest luxury; and we have an account of one of them, who procured fifteen hundred Flamingos' tongues to be served up in a single dish. The tongue of this bird, which is so much sought after, is a good deal larger than that of any other bird whatever. The bill of the Flamingo is like a large black box, of an irregular figure, and filled with a tongue which is black and gristly; but what peculiar flavour it may possess, we leave to be determined by such as understand good eating better than we do. It is probable, that the beauty and scarcity of the bird,

might be the first inducements to studious gluttony to fix upon its tongue as meat for the table. What Dampier says of the goodness of its flesh, cannot so well be relied on; for Dampier was often hungry, and thought any thing good that could be eaten: he avers, indeed, with Labat, that the flesh is black, tough, and fishy; so that we can hardly give him credit, when he asserts, that its flesh can be formed into a luxurious entertainment.

These birds, as was said, always go in flocks together; and they move in rank, in the manner of cranes. They are sometimes seen, at the break of day, flying down in great numbers from the mountains; and conducting each other with a trumpet cry, that sounds like the word *Tococo*, from whence the savages of Canada have given them the name. In their flight they appear to great advantage; for they then seem of as bright a red as a burning coal. When they dispose themselves to feed, their cry ceases; and then they disperse over a whole marsh, in silence and assiduity. Their manner of feeding is very singular: the bird thrusts down its head, so that the upper convex side of the bill shall only touch the ground; and in this position the animal appears, as it were, standing upon its head. In this manner it paddles and moves the bill about, and seizes whatever fish or insect happens to offer. For this purpose the upper chap is notched at the edges, so as to hold its prey with the greater security. Catesby, however, gives a different account of their feeding. According to him, they thus place the upper chap undermost, and so work about, in order to pick up a seed from the bottom of the water, that resembles millet: but as in picking up this, they necessarily also suck in a great quantity of mud, their bill is toothed at the edges, in such a manner as to let out the mud, while they swallow the grain.

Their time of breeding is according to the climate in which they reside: in North America they breed in our summer; on the other side the line they take the most favourable season of the year. They build their nests in extensive marshes, and where they are in no danger of a surprize. The nest is not less curious than the animal that builds it: it is raised from the surface of the pool about a foot and a half, formed of mud, scraped up together, and hardened by the sun, or the heat of the bird's body: it resembles a truncated cone, or one of the pots which we see placed on chimnies; on the top it is hollowed out to the shape of the bird, and in that cavity the female lays her eggs, without any lining but the well cemented mud that forms the sides of the building. She always lays two eggs, and no more; and, as her legs are immoderately long, she straddles on the nest, while her legs hang down, one on each side, into the water.

The young ones are a long while before they are able to fly; but they run with amazing swiftness. They are sometimes caught; and, very different from the old ones, suffer themselves to be carried home, and are tamed very easily. In five or six days they become familiar, eat out of the hand, and drink a surprising quantity of sea-water. But though they are easily rendered domestic, they are not reared without the greatest difficulty; for they generally pine away, for want of their natural supplies, and die in a short time. While they are yet young, their colours are very different from those lively tints they acquire with age. In their first year they are covered with plumage of a white colour, mixed with grey; in the second year the whole body is white, with here and there a slight tint of scarlet; and the great covert feathers of the wings are black; the third year the bird acquires all its beauty; the plumage of the whole body is scarlet, except some of the feathers in the wings, that still retain their sable hue.

Of these beautiful plumes, the savages make various ornaments: and the bird is sometimes skinned by the Europeans to make muffs. But these have diminished in their price, since we have obtained the art of dying feathers of the brightest scarlet.

NATURAL HISTORY of the AVOSETTA, or SCOOPER.

THE Avosetta may be distinguished from all other birds by the singular form of its bill, which turns up like a hook, in an opposite direction to that of the hawk or parrot: this extraordinary bill is about three inches and a half long, slender, compressed very thin, flexible, and of a substance like whalebone. The tongue is short: the head is black, as well as half the hind-part of the neck; all the under side of the body is of a pure white; the back, the coverts on the ridge of the wings, and some of the lesser quill-feathers, are of the same colour; the other coverts and the exterior sides and ends of the greater quill feathers are black: the tail consists of twelve white feathers: the legs which are very long, are of a fine blue colour, and naked higher than the knees; the webs are dusky, and deeply indented.

It feeds on worms and insects, which it scoops out of the sand with its bill. It lays two eggs about the size of those of the pigeon, which are white tinged with green, and spotted with black. These birds are often seen in winter on the eastern shores of this kingdom: in Gloucestershire, at the Severn's mouth; and sometimes on the lakes of Shropshire. It has a chirping pert note, and frequently wades in the waters.

NATURAL HISTORY of the CURLEW.

THE weight of the Curlew is about twenty-seven ounces; the length, from the top of the bill to the end of the claws, twenty-nine inches; and the breadth, when the wings are extended, three feet four inches. The bill of this bird, which is near six inches long, is narrow, a little crooked, and of a dark brown colour. The legs are long, bare, and of a dusky blue, having a thick membrane, which reaches to the first joint. This bird is of a greyish colour, and its flesh is very rank and fishy, notwithstanding an old English proverb in its favour. In the winter time, these birds frequent our sea coasts in large flocks, walking on the open sands; feeding on crabs and other marine insects. In the summer they retire to the mountainous part of the country, where they pair and breed. Their legs are of a pale olive colour, marked with irregular brown spots.

The lesser Curlew, called also the Wimbrell, greatly resembles the other, its size only excepted, for it weighs no more than twelve ounces.

NATURAL HISTORY of the WOODCOCK.

THE Woodcock is smaller than the partridge, and usually weighs about twelve ounces: it is fourteen inches in length, and twenty-six in breadth. The bill is straight, and three inches long; the upper-part falling a little over the under at the tip: it is dusky towards the end, and reddish at the base: a black line extends from the bill to the eyes, and the forehead is of a reddish ash colour. The head, neck, back, and coverts of the wings are irregularly barred with a kind of red, black, grey, and ash colour; but on the head the black predominates: the

quill feathers are dusky, indented with red marks: the lower-part of the body is of a dirty white, with numerous transverse lines of a dusky colour. The tail, which consists of twelve feathers, is dusky on one web, and has a red mark on the other: the tips are ash coloured above, and white below. Their legs and feet are of a dusky pale colour, and the claws are divided to their origin. Their eggs are long, and of a pale red, with spots and clouds of a deeper colour.

During summer these birds are inhabitants of the Alps of Norway, Sweden, and the northern parts of Europe. When the frost commences there, they go into milder climates, where the ground is open, and adapted to their manner of feeding: they leave England about the latter end of February, or the beginning of March; though they have been sometimes known to continue here. They separate soon after their arrival here, but they pair again before they return to their native haunts.

They quit France, Germany, and Italy in the same manner; making the cold northern situations their general summer rendezvous. In the winter great numbers of them are seen as far south as Smyrna and Aleppo; and in the same season in Barbary. It has been said that some of them have appeared as far south as Egypt. Those which resort into the countries of the Levant perhaps come from the deserts of Siberia or Tartary, or the cold mountains of Armenia. It is said that Woodcocks are unknown in North-America, and Mr. Banks asserts that they are not to be met with in Newfoundland. The flesh of the Woodcock is esteemed a great delicacy.

NATURAL HISTORY of the GODWIT.

THIS is not much unlike the woodcock, though it is much larger: it is sixteen inches in length, and twenty-seven in breadth: the bill is four inches long, black at the end, and of a pale purple at the base: the feathers of the head, neck, and back, are of a light reddish brown, marked in the middle with a dusky spot. The rump is remarkable for having a white ring. These birds are taken in the fens, in the same season, and in the same manner with the ruffs and reeves, and when fattened are esteemed a great delicacy. In September they appear on our coasts in small flocks, and remain with us the whole winter. Like the curlew, they walk on the open sands, and feed on insects.

The Red Godwit, which is not a very common species in England, is highly marked with red on the breast, and is more particularly distinguished by its bill, which is not quite straight, but a little reflected upwards.

Mr. Ray mentions a bird that he calls the Lesser Godwit, which weighs about nine ounces.

The GREAT AMERICAN GODWIT.

The bill of this bird is about four inches long, straight, and slender; and is of a bright yellow half way next the head, growing gradually dusky till it becomes black at the point. The eyes are more distant from the bill than in other birds. The head and upper-parts of the body are mottled with black and dark brown, except that the rump is brighter, with cross bars. The quills of the wings next the great ones are of an orange colour marked with small black spots. The belly and thighs are of a brownish white; the thighs are naked far above the knees; and the legs and feet are covered with dusky scales.

The White North-American Godwit is wholly white, except the tail, the greater quills, and the small feathers on the ridge of each wing, which are

of a dirty white. Its bill turns up towards the point, like that of the avofetta.

NATURAL HISTORY of the GREEN SHANK.

THESE birds appear in winter, in small flocks, on our coasts and wet grounds: the bill is two inches and an half; the upper-chap straight, and the lower reflecting a little upwards: the head and upper-part of the neck are ash coloured, marked with small dusky lines: the coverts of the wings, the scapulars, and the upper-part of the back are of a brownish ash colour; the quill feathers are dusky, their inner-webs being speckled with white: the breast, belly, thighs and tail are white; the latter being marked with undulated dusky bars. The legs, which are yellow, are long, slender, and bare above two inches higher than the knees. The exterior toe is united to the middle toe as far as the second joint, by a strong membrane, which borders their sides to the very end. It is a bird of an elegant shape, but small, not exceeding six ounces in weight.

The Spotted Red Shank is equal to the preceding in size, and is principally distinguished by the colour of its legs, which is a very bright red.

NATURAL HISTORY of the SNIPE.

THE Snipe weighs about four ounces; and is in length, from the tip of the bill to the end of the tail, about twelve inches; in breadth it is fourteen inches. The bill is three inches long, straight, and of a dusky colour. The head is divided lengthways with four black and three red lines: the chin is white, and the neck is varied with brown and red: the scapulars are beautifully striped with black and yellow. The quill feathers are dusky, but the edge of the first, and the tips of the secondary feathers are white: the breast and belly are white: the tail is dusky, marked with rust colour, and tipped with white; the legs are of a palish green, and the claws are black.

The young of these birds are so often found in England, that it is doubtful whether they entirely leave this island; it is, however, certain that some of them continue with us all the summer, making their nests as well on the highest mountains, as in our low moors and marshes, and laying four or five eggs of a dirty olive colour, marked with dusky spots. Their food is like that of the woodcock, and their flesh is esteemed, as being tender, sweet, and delicate.

The JACK-SNIPE, or JUDCOCK.

This is not above half the size of a snipe, its weight not exceeding two ounces. The crown of the head is black, tinged with rust colour; and the neck is varied with white, brown, and a pale red: the scapular feathers are brown, bordered with yellow; the rump is of a glossy bluish purple; the belly white; the greater quill feathers dusky; the tail feathers brown, edged with tawny; and the legs of an ash coloured green. The haunts and food of this species are the same as those of the Snipe. It is much less frequent among us, and very difficult to be found.

In this groupe of small birds of the crane kind a great many more might be added. We have enumerated those with the long bill; and shall just mention those which have shorter bills, under a collar of feathers round the neck of the male; namely, the ruff, the knot, the sand-piper, the sanderling, the dunlin, the purre, and the stint.

After these follow the lap-wing, the green plover,

the grey plover, the dottrel, the turnstone, and the sea-lark; which have all very short bills.

These birds of the crane kind, which have short bills, are not, however, without proper provision for their subsistence. They run with surprizing rapidity along the surface of the marsh, or the sea-shore, quartering their ground with great dexterity, and leaving nothing of the insect kind that happens to lie on the surface.

In their seasons of courtship they pair like other birds; but not without violent contests between the males for the choice of the females. A little bird of this tribe, called the ruff, has got the epithet of the fighter, merely from its great perseverance and animosity on these occasions.

These birds usually breed in some island surrounded with fedy moors, where men seldom resort. The eggs of all these birds are highly valued by the luxurious; though there is not much culinary art exercised upon them, for they are only boiled hard, and served up without any further preparation. The young of this class being soon hatched, they arrive at maturity soon after their exclusion. As the flesh of almost all these birds is in high estimation, variety of methods are used for taking them; and in particular the ruff and the reeve are greatly sought after, particularly in Lincolnshire and the isle of Ely. These are reckoned a very great delicacy, and it may not be amiss to observe, that the name of the male is the ruff, and that of the female the reeve.

NATURAL HISTORY of the WATER-HEN and the COOT.

THERE are two or three birds which seem to form the shade between water-fowls, properly so called, and those of the crane kind. They, in some degree, partake of the form of a crane; and, though furnished with long legs and necks, rather swim than wade. They cannot, with propriety, be called web-footed, though they are not entirely divested of membranes, with which their toes are fringed on each side, and which enable them to swim.

The Water-Hen and the Coot fall under this class, and they have too near an affinity, not to be ranked in the same description. They resemble each other in shape, they both have long legs, and thighs which are partly naked: their wings are short, their bills short and weak, their foreheads are bald and destitute of feathers, their colour is black, and their habits are the same. In size they are different; the Water-Hen weighing about fifteen ounces, and the Coot twenty-four. In the Coot, the bald part of the forehead is black; in the Water-Hen it is of a beautiful pink colour; the toes of the Coot are edged with a scolloped membrane; those of the Water-Hen are straight and narrower.

In their manner of living there is less difference than in their figures; the history of one will therefore serve for both. Birds of the crane kind are furnished with long wings, and can easily change place; the Water-Hen, whose wings are short, never deserts the pond or river in which it seeks for provision, and the grassy banks which form the margin of those waters. Whether its food consists of pond-weed, or water insects, is not absolutely certain; but pond-weed has been found in their stomachs. She makes her nest upon low trees and shrubs by the water side; it consists of sticks and fibres. The female lays twice or thrice in a summer: her eggs are white with a tincture of green, and spotted with red. As soon as the young are excluded the egg, they swim in company with the parent,

parent, and imitate all their manners; but when they are able to provide for themselves she drives them off to seek their fortune.

The Coot, being a larger bird, is generally seen in larger streams, and more remote from mankind. The Water-Hen prefers inhabited situations, delighting in ponds, motes, and pools of water near gentlemen's houses; but the Coot continues in rivers, and among rushy margined lakes; where it makes a nest of the weeds which are supplied by the stream, laying them among the reeds, floating on the surface, and rising and falling with the water. It is supported by the reeds among which it is built, so that it is seldom washed into the middle of the stream: but when this accident happens, which is sometimes the case, the bird sits in her nest, like a mariner in his boat, and with her legs, steers her cargo into the nearest harbour.

To these birds, with long legs and finny toes, may be added one species more, with short legs and finny toes: the bird we mean is the grebe. It is much larger than the former, and its plumage is black and white: its legs are calculated entirely for swimming, and not for walking; from the knee upwards they are indeed hid in the belly of the bird, and consequently have very little motion. It is on this account that they seldom leave the water, and usually frequent those shallow pools where their faculty of swimming can be turned to the greatest advantage, in fishing and pursuing their prey. They chiefly frequent the meres of Shropshire and Cheshire, where they breed in a floating nest among reeds and flags, which are kept steady by the reeds of the margin. The grebe preys upon fish, and is almost perpetually diving. Even in swimming, it shews little more than the head above water, and is extremely difficult to be shot, as it darts down on the least appearance of danger. It never appears on land, and, though frequently disturbed, will never desert that lake, where, by diving and swimming, it can find food and security.

These birds are principally valued for the skin of their breast, the plumage of which is of a most beautiful white, and as glossy as fatten. This part is made into tippets; but the skins lose their shining colour about February; and their breasts are entirely bare in breeding-time.

NATURAL HISTORY of the LESSER CRESTED GREBE.

THIS species is smaller than a teal: the head and neck are black; the throat spotted with white; the whole upper-side of a blackish brown, except the ridge of the wing above the first joint, and the tips of the middle quill feathers, which are white; the breast, belly, and inner coverts of the wings are white. A tuft of long loose feathers hang backwards on each side behind the eyes. The irides are red, and the legs of a dirty green. A bare stripe of red extends from the bill to the eyes.

The WHITE and DUSKY GREBE.

This is about the size of a teal, and the bill is somewhat more than an inch long. The crown of the head is dusky, as well as the whole upper part of the body: the inner-coverts, the ridge of the wing, and the middle quill feathers are white; all the rest of the wing being dusky: the bill is joined to the eye by a bare skin of a fine red colour: the belly and the thighs are white, except a few black spots on the latter. In some birds the whole neck is ash-coloured.

This bird is frequently seen in Lincolnshire, where it breeds.

The LITTLE GREBE.

The length of this bird is ten inches, the breadth sixteen inches, and the weight about six or seven ounces. The head is thick set with feathers, which on the cheeks of old birds are of a bright bay. The top of the head, the neck, breast, and the whole upper-side of the body are of a deep brown, tinged with red: the greater quill feathers are dusky; the belly is ash-coloured, mixed with a silvery white; and the legs are of a dirty green. These birds dive with great swiftness, and remain a long time under water: their food is fish and water-plants. They frequent rivers, and form their nests in the water near the banks, which, not being fastened, rise and fall with the water. The female lays five or six white eggs, which she always covers when she quits the nest. How they are hatched appears astonishing, as the water rises through the nest, and always keeps them wet. The nest is about a foot thick, consisting of an amazing quantity of grass, and water-plants.

C H A P. VI.

Containing the NATURAL HISTORY of WATER FOWL in GENERAL, viz. the PELICAN, the ALBATROSS, the CORMORANT, the GANNET, the GULL and PETREL, the PENGUIN and its Kind, the SWAN, the GOOSE, the DUCK, the GOLDEN-EYE, the SHIELDRAKE, the POCHARD, the GOOSANDER, the SCOTER, the WIGEON, the GADWELL, the GARGANEY, the TEAL, the TRINGA, the FULMAR, the WATER-RAIL, the KING-FISHER, and the BEE-EATER.

THE first great distinction of Water-Fowl appears in the toes, which are webbed together for swimming. Those who have observed the feet or toes of a duck, will easily conceive how admirably they are formed for moving in the water. Men, when they swim, do not open the fingers, so as to let the fluid pass through them; but closing them together, present one broad surface to beat back the water, and thus push their bodies along. What man performs by art, nature has supplied to Water-Fowl; and has webbed their toes together, so that they expand two broad oars to the water; and thus, moving them alternately with the greatest ease, paddle along. We must observe also,

that the toes are so contrived, that as they strike backward, their broadest hollow surface beats the water; but as they gather them in again, for a second blow, their front surface contracts, and does not impede the bird's progressive motion.

The toes are not only webbed in their most convenient manner, but their legs are also fitted for swift progression in the water. The legs of all are short, except the flamingo, the avosetta, and the corrija: all which, for that reason, we have ranked among the crane kind, as they make little use of their toes in swimming. Except these, all web-footed birds have very short legs; and these strike while they swim with greater facility. Were the leg long,

it would act like a lever whose prop is placed to a disadvantage; its motions would be slow, and the labour of moving it considerable. For this reason, the very few birds whose webbed feet are long, never make use of them in swimming; the web at the bottom seems only of service as a broad base, to prevent them from sinking while they walk in the mud; but it otherwise rather retards than advances their motion.

In the web-footed kinds, the shortness of their legs renders them as unfit for walking upon land, as it qualifies them for swimming in their natural element. Their stay, therefore, upon land, is but short and transitory; and they seldom breed far from the sides of those waters where they usually remain. In their breeding seasons, their young are brought up by the water side; and they are covered with a warm down, to fit them for the coldness of their situation. The old ones also have a closer, warmer plumage, than birds of any other class. Our beds are composed of their feathers; as they neither mat nor imbibe humidity, but are furnished with an animal oil, that glazes their surface, and keeps each separate. In some, however, this animal oil is in too great abundance; and is as offensive from its smell, as it is serviceable for the purposes of household œconomy. The feathers, therefore, of all the penguin kind, are totally useless for domestic purposes; as neither boiling nor bleaching can divest them of their oily rancidity. Indeed, the rancidity of all new feathers, of whatever Water-Fowl they be, is so disgusting, that our upholsterers give near double the price for old feathers that they afford for new.

The skin of Water-Fowl is also generally lined with fat; so that, with the warmth of the feathers externally, and this natural lining more internally, they are better defended against the changes or the inclemencies of the weather, than any other class whatever.

As, among land-birds, so also among these, there are tribes of plunderers, that prey not only upon fish, but sometimes upon Water-Fowl themselves. There are likewise more inoffensive tribes, that live upon insects and vegetables only. Some Water-Fowls subsist by making sudden swoops from above, to seize whatever fish come near the surface; others again, not furnished with wings long enough to fit them for flight, take their prey by diving after it.

All Water-Fowl naturally fall into three distinctions. Those of the gull-kind, that, with long legs and round bills, fly along the surface to seize their prey. Those of the penguin-kind, that, with round bills, legs hid in the abdomen, and short wings, dive after their prey: and, thirdly, those of the goose-kind, with flat broad bills, that lead harmless lives, and chiefly subsist upon vegetables and insects.

The gull-kind are active and rapacious; constantly, except when they breed, keeping upon the wing; fitted for a life of rapine, with sharp straight bills for piercing, or hooked at the end for holding their fishy prey. In this class we may rank the albatross, the cormorant, the gannet or Soland goose, the shag, the frigate-bird, the great brown gull, and all the lesser tribe of gulls and sea-swallows.

The penguin-kind, with appetites as voracious, bills as sharp, and equally eager for prey, are yet unqualified to obtain it by flight. Their wings are short, and their bodies large and heavy, so that they can neither run nor fly. But they are formed for diving in a very peculiar manner. To this class we may refer the penguin, the auk, the skout, the sea-turtle, the bottle-nose, and the loon.

The goose-kind are easily distinguishable, by their flat broad bills, covered with a skin; and their manner of feeding, which is chiefly upon vegetables. In this class we may place the swan, the goose, the

duck, the teal, the widgeon, and all their numerous varieties.

NATURAL HISTORY of the PELICAN.

MANY writers, lovers of the marvellous, have related strange things of this bird, which have been credulously received by others, and drawn into example; especially the tales they have told respecting the bird's remarkable regard for its young. Separate from fable, there is sufficient in the Pelican to attract our most serious notice, and to claim our best reflections.

The beak of the Pelican is peculiar and uncommon; as we shall soon shew: for the rest, it is in almost all respects like a swan; the body is as large, the neck is nearly as long; the legs are as short as in that bird, and the feet are black, very broad, and webbed in the same manner. The bird is also throughout of a whitish colour, though not of the pure white of the swan, except that the tips of some of the feathers near the beak and wings are black. The bird is so bulky and unwieldy, that it is fit only for the waters, though its feet being not placed so backward as in the swan, and some others, it walks better. Its note is very loud and strange for a bird: its voice, say some, resembles the braying of an ass; while others rejoin, that there requires some fancy to make out the resemblance. Bochart remarks, that as the Psalmist in Psal. cii. 6. compares himself to two birds, with respect to his moaning and lamentation, there must be something querulous and lamentable in the notes of these birds: and the Pelican, adds this great man, is a bird of horrid voice, which very much resembles the lamentation of a man grievously complaining. "By reason of the voice of my groaning—my bones, &c:—I am like a Pelican of the wilderness: I am like an owl of the desert."

The beak of the Pelican is very large and long: it is above a foot in length, and of the thickness of a child's arm at the bottom: the colour is bluish and yellowish, and the point is very sharp. The upper chap of it is formed, as in all other birds; but the lower is unlike every thing in nature: it is not composed of one solid piece, as in all other birds; but is made of two long and flat ribs, with a tough membrane connected to one and to the other: this is also extended to the throat, and is not tight, but very broad and loose, so that it can contain a vast quantity of any kind of provision.

The bird frequents the waters both fresh and salt, and feeds voraciously on fishes and water insects: but though it frequents those places, its favourite residence is in remote uncultivated forests and wildernesses, where it can remain quite undisturbed: its wings are long, and it easily flies backward and forward. In these places it builds, and there it breeds up its young, so that the Pelican of the wilderness or desert, is no improper phrase: though some small dabblers in natural knowledge have thought so, and on that account objected to the sacred Scriptures. Now the Pelican is to carry food for a numerous brood, as ravenous as herself, to these remote places: and this vast bag which nature hath given her at the throat, is the contrivance for the carrying of it. Who can refuse to see in this the wisdom and goodness of the all-wise Creator! In this bag she stores what she has caught, and flying away to the distant place of her residence, this anxious and laborious parent feeds her young from that repository. If some person in early time, quite unacquainted with the history of the bird, saw her alight in the midst of a desert, among a brood of ravenous young ones, and feed them from this bag, it would not be unnatural for him to suppose, however strange

strange the thing must be in itself, that it was with her own blood she fed them. Thus arose, from a mistake, the story of this wonder, which faithful ignorance has propagated through so many ages; and which moralists and poets have from the earliest times drawn into an emblem of paternal affection. Though certainly, without any reference to things false and marvellous, there is sufficient instruction for parents, from the labour, diligence, and amazing storge which God had planted in this Pelican of the wilderness!

In the year 1745, there was a Pelican shewn in London, brought by captain Pe ly from the Cape of Good Hope, where they are larger than any where else; and of which we find the following account in Edwards's History of Birds. "From the point of the bill to the angle of the mouth is twenty inches of our English measure, which is six inches more than any natural historian has found it: the academy of Paris having measured one which was about fourteen inches, Paris measure I suppose; and our countryman Willoughby measured one, brought from Russia, which he makes fourteen inches English. I thought it something incredible in Willoughby's description, that a man should put his head into the pouch under the bill, till I saw it performed in this bird by its keeper, and am sure a second man's head might have been put in with it at the same time." He also observes, that the skin round the eye is bare of feathers, and the pouch, when dry, appears of the consistence and colour of a blown dry ox's bladder, having fibres running its whole length, and blood-vessels crossing them, and proceeding from the sides of the lower-part of the bill, which opens into this pouch its whole length. It is thought to be a very long-lived bird; some writers say, it lives to sixty or seventy years. It seems to inhabit the greatest part of the old world, it being found in many climates both north and south, as well as the intermediate latitudes: it being pretty common in Russia, and abounding in Egypt.

Father Morollá, in his voyage to Congo, informs us, that in his journey to Singa, he observed certain large white birds, with long beaks, necks and feet, which whenever they heard the least sound of an instrument, began to dance and leap about the rivers, where they always reside, and of which they are great lovers: this, he said, he took a great pleasure to contemplate, and continued often upon the banks of the rivers to observe!

Let the atheist, then, who doubts or disbelieves the being of God or the creation of this world by omnipotent wisdom, let him only turn his eyes upon this extraordinary bird, and ask his own heart, whether he can really believe such a creature the work of chance! Let the parent contemplate the Pelican, and from its admirable regard to its young, and the surprizing provision made by Providence for their support, learn the power and the excellence of parental storge; and blush to be exceeded by an irrational creature! And from the view, let the christian learn dependence upon his God, who having so wisely, and wonderfully provided for the nourishment and preservation of the animal world, will undoubtedly take due care of their temporal as well as eternal welfare, who with the humility, cheerfulness, love and submission of children, submit themselves to the will of their Father and God.

The flesh of this bird however smells very rancid, and tastes worse than it smells. The native Americans kill vast numbers: not to eat for, they are not even fit for the banquet of a savage; but to convert their large bags into purses and tobacco-pouches. They also dress the skin with salt and ashes, rubbing it well with oil, and then forming it to their purpose. It thus becomes so soft and pliant, that the Spanish

women sometimes adorn it with gold, and convert it into work-bags.

NATURAL HISTORY of the ALBATROSS.

THIS may be said to be one of the first of the gull-kind: it is one of the largest and most formidable birds of Africa and America. Its body is larger than that of the pelican, and its wings, when extended, measure ten feet from tip to tip. The bill, which is yellowish, is six inches long, and terminates in a crooked point: the top of the head is of a lightish brown; the back is of a dark brown, spotted with black; and the belly is white. The toes are webbed, and of a flesh colour.

This bird inhabits the tropical climates, and is also seen as far as the streights of Magellan in the South-Sea. It is one of the most formidable of the aquatic tribe; not only living upon fish, but also upon water-fowl. Like all the gull kind, it preys upon the wing; and chiefly pursues the flying-fish, that are forced from the ocean by the dolphins. Our seas appear to be forsaken by every class of animated nature: but in the tropical seas, and the southern latitudes beyond them, various species of the gull kind are seen hovering on the wing, at a thousand miles distance from the shore. The flying fish are continually rising to escape from their pursuers of the deep, only to encounter equal dangers in the air.

If we may credit Wiquefort, these birds are often seen sleeping in the air, entirely remote from land, with their head under one wing, and the other employed in beating the air. We will not presume to vouch for Mr. Wiquefort's veracity, but it is certain that few birds float upon the air with more ease than the Albatross; or support themselves a longer time in that element.

The Albatross has a peculiar affection for the penguin, and a pleasure in its society. Captain Hunt, who for some time commanded at our settlement upon Falkland islands, says he was often amazed at the union preserved between these two birds, and the regularity with which they built together. In that desolate spot, where the birds never dreaded the encroachments of men, they were seen to build with an amazing degree of uniformity; their nests covering fields by thousands, and resembling a regular plantation: but since they have been disturbed by men, the society is broken up, and the nests are totally destroyed.

NATURAL HISTORY of the CORMORANT.

THE Cormorant may be distinguished from all other birds of this kind, by its four toes being united together by membranes; and the middle toe being notched like a saw, to assist it in holding its fishy prey. This species weighs about four pounds: it is thirty-two inches in length, and almost four feet in breadth. The bill, which is three inches and an half long, is dusky, and destitute of nostrils: the base of the lower chap is covered with a naked yellowish skin, that extends under the chin, forming a kind of pouch. The head and neck of this bird are of a sooty blackness, and the body thick and heavy; more resembling the figure of a goose than that of a gull.

These birds occupy the highest parts of the cliffs impending over the sea; their nests are composed of sticks, sea-tang, grass, &c. in which they lay six or seven eggs, which are white, and of an oblong form. At the approach of winter, they are seen dispersed along the sea-shore, and ascending up the

mouths of fresh-water rivers, carrying destruction to all the finny tribe. They are remarkably voracious, having almost sudden digestion: their appetite is for ever craving, and never satisfied; and this hunger is promoted by the vast quantity of small worms that fill their intestines.

With the grossest appetites, this bird has the rankest and most disagreeable smell of any bird, even when alive. Its form is disagreeable; its voice hoarse and croaking, and its qualities obscene. Milton, with great propriety, has made Satan personate this bird, to survey, undelighted, the beauties of Paradise, and sit on the Tree of Life devising Death.

This bird seems to be of a multiform nature, and, wherever fish are to be found, watches their migrations: it pursues its prey in fresh water lakes, as well as in the depths of the ocean; and preys by night as well as in the day-time. It is seldom seen in the air, except where there are fish below, and they must be near the surface, before it will venture to souse upon them. It seldom makes an unsuccessful dip, and often rises with a larger fish than it can readily devour.

NATURAL HISTORY of the GANNET, or SOLAND GOOSE.

THE Gannet weighs about four pounds, and a quarter: it is three feet one inch in length, and six feet two inches in breadth. It is indeed about the size of a tame goose, but its wings are longer. The bill is six inches long, straight almost to the point, where it inclines down, and the sides are irregularly jagged, that it may hold its prey with greater security. It differs from the cormorant in size, being larger; in its colour, which is chiefly white; and having no nostrils, but in their stead a long furrow, extending almost to the end of the bill. The eyes, which are full of vivacity, are surrounded with a naked skin of a fine blue. A narrow slip of black bare skin, extends from the corner of the mouth to the hind part of the head; beneath the chin is another, that can be dilated like the pouch of the pelican, and is capable of containing five or six herrings. The neck is very long, the body flat, and very full of feathers.

Each bird, if left undisturbed, would only lay one egg in the year; but if that be taken away it will lay another; if robbed of that, then a third. A wise provision of nature to prevent the extinction of the species by accidents, and to supply food for the inhabitants of the places where they breed. The egg is white, and smaller than that of the common goose; the nest is large, and composed of grass, sea-plants, shavings, &c.

As these birds subsist entirely upon fish, they frequent those uninhabited islands where their food is found in plenty, and where they are undisturbed by mankind. The isle of Ailsa, in the firth of Clyde; the rocks adjacent to St. Kilda, a small isle near the Orkneys, the Skelig islands off the coasts of Kerry, in Ireland; and the Bass isle, in the firth of Edinburgh. In the last mentioned island, Dr. Harvey affirms that the surface is almost wholly covered, during the months of May and June, with nests, eggs, and young birds; so that it is scarcely possible to walk without treading on them. The rocks of St. Kilda seem to be as much resorted to by these birds, and the inhabitants of that small island are principally supported by them and their eggs throughout the year.

The Gannet is a bird of passage: its first appearance in those islands is in March; and it quits them in August or September; according as the inhabitants take or leave the first eggs. Its motions may

probably be determined by the migrations of the immense shoals of herrings, that come pouring down at that season through the British channel, and supply all Europe as well as this bird with their spoil. The Gannet assiduously attends the shoal in their passage, accompanies them in their whole circuit round our island, and shares with our fishermen this exhaustless banquet. Whenever the Gannet is seen it is sure to announce to the fishermen the arrival of the finny tribe.

These birds are well known on most of our coasts, but not by the name of the Soland goose. They are called Gannets in Cornwall and Ireland, and even in Wales. Gannets are sometimes taken at sea by the following deception: the fishermen fasten a pilchard to a board, and leave it floating, which alluring bait decoys the unwary Gannet to its own destruction.

NATURAL HISTORY of the GULL and PETREL.

THE larger Gulls live at the most remote distance from man; the smaller reside wherever they can take their prey; and visit the most populous places, when solitude can no longer grant them a supply. In this class the Gull, properly so called, may be placed; of which there are upwards of twenty different kinds; the Petrel, of which there are three; and the Sea-swallow, of which there are about the same number. Gulls are to be distinguished by an angular knob, on the lower chap; Petrels by being destitute of this knob; and Sea-swallows by their bills, which are sharp-pointed, straight, and slender. In their appetites and places of abode they all perfectly agree.

The Gull, and all its varieties, is seen with a slow-sailing flight hovering over rivers to prey upon the smaller kinds of fish; it follows the ploughman in fallow-fields to pick up insects; and, when living animal food is not to be obtained, it has no objection to carrion, or any thing of the kind that offers. But it is chiefly round our boldest rockiest shores that they are seen in the greatest abundance. It is on such shores that the rocks offer them a retreat for their young, and the sea is a sufficient supply. In the cavities of these rocks, of which the shore is composed, infinite variety of sea-fowls retire to breed in safety. The waves beneath, beating continually at the base, often wear the shore into an impending boldness; so that it appears to jut over the water; while the raging of the sea makes the place inaccessible from below.

Like all birds of the rapacious kind, the Gull lays but few eggs; sometimes one, sometimes two, but never more than three; it builds on the ledges of a rock, and its nest consists of long grass and sea-weed. Most of the kind have a fishy taste, with black stringy flesh; but the young are better food; and of these the poor inhabitants of our Northern islands, make their wretched banquets. They are almost strangers to any other food, and even salted Gull may be relished by those who know no better.

NATURAL HISTORY of the PENGUIN KIND.

THESE birds are not long-winged and swift flyers like those of the gull kind: they are indeed but indifferently formed for flight, and still less for walking. The duck is not half so unweildy an animal as the whole tribe of the Penguin kind. The largest of them, which have a thick heavy body to raise, are totally unable to fly; their wings only serving them as paddles to help them forward, when they

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The DOBCHICK



The GODWIT



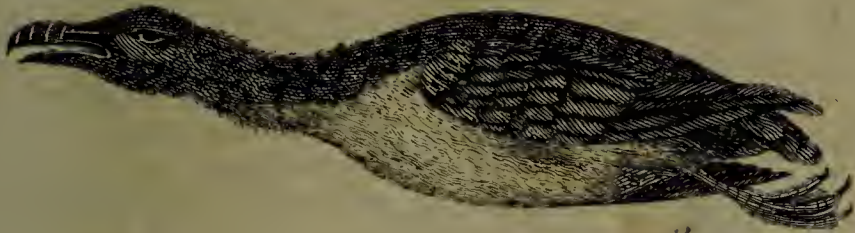
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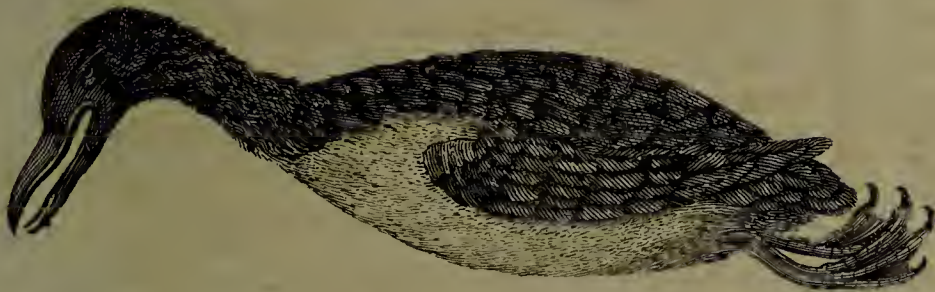
The RAZOR BILL



The SEA TURTLE



The GUILLEMOT



The SCARE CROW



The CEPPHUS



The GREAT GREY GULL



The BLACKISH GREY GULL



The GREATER SEA SWALLOW



The LESSER SEA SWALLOW





they attempt to move swiftly. Even the smaller kinds seldom fly by choice; they laboriously flutter their wings without making much progress, and, though they have but a small weight of body to sustain, they are unwilling to quit the water, which affords them both food and protection.

The legs of this whole tribe are still more awkwardly adapted for walking. All above the knee seems hid within the belly, and nothing appears but two short legs, as if they were stuck under the rump, and upon which the animal is very indifferently supported. Their short legs drive the body in progression from side to side; and, without the assistance of the wings, they could not move much faster than a tortoise: but this awkward position of the legs, suits them admirably for a residence in water. In that element, the legs being placed behind the body, pushes it forward with greater velocity.

They are also well qualified for diving: by inclining their bodies forward, they lose their center of gravity; and every stroke from their feet only tends to sink them the faster. They can either dive at once to the bottom, or swim between two waters; where they continue in pursuit of their prey for some minutes, and then ascending to catch breath, plunge in again to renew their operations. Hence it is that birds of the Penguin kind, which are so defenceless, and so easily taken by land, are impregnable by water. When they are pursued, they immediately sink, and shew nothing more than their bills, till the enemy is withdrawn.

They never visit land, except when they come to breed: that part of them which is continually in the water is white, but the back and wings are of different colours, according to the different species. They have a warmer covering of feathers than any other bird; so that the sea appears to be their natural element; and were it not for the necessary duties of propagating the species, we should have no opportunity of seeing them, and should be utterly unacquainted with them.

The MAGELLANIC PENGUIN.

The Magellanic Penguin is the largest and most remarkable of the kind: it is not much inferior in size to the tame goose. It cannot fly, its wings being very short, covered with stiff hard feathers, always expanded and hanging uselessly down at the sides of the bird. The upper part of the head, the back, and the rump are covered with stiff black feathers; but the belly and back are of a snowy whiteness, except a line of black which crosses the crop: that half of the bill, which is towards the base, is black and covered with wrinkles, but is marked crosswise with a stripe of yellow.

These birds walk erect with their heads on high, their fin-like wings hanging down like arms. Fish is their only food, and they seldom come ashore but in the breeding season: they dive with great rapidity, and are extremely voracious. In consequence of this gluttonous appetite, their flesh is rank and fishy: though our sailors admit it to be tolerable good eating.

They are birds of society, and, when they come on shore, are seen drawn up in rank and file, upon the ledge of a rock, standing together with the albatross, as if in consultation. This is previous to their laying, which in that part of the world usually begins in the month of November; a small depression in the earth, without any materials, constitutes their nest. The progress of incubation is carried on very rapidly by the heat of their bodies and the warmth of their feathers.

The manner of this bird's nestling is different in other countries: in some places, instead of being satisfied with a superficial depression in the ground, it burrows two or three yards deep; in

others it forsakes the level to clamber up the ledge of the rock, where it lays its single egg and hatches. Sometimes three or four take possession of one hole, and hatch their young together, in the holes of the rocks, where nature has made them a retreat. Linnæus assures us that several of this tribe are seen together. There the female lays her egg (for she never lays more than one) in a common nest; while one is placed as a sentinel to give warning of approaching danger. The egg of this Penguin is very large for the size of the bird, and generally exceeds that of a goose in magnitude. But as there are many varieties of the Penguin, and as they differ in size, from that of a Muscovy duck to a swan, the size of their eggs are proportionally different.

The black-footed Penguin, mentioned by Edwards, has four toes, and its wings are destitute of quill feathers.

The AUK, the PUFFIN, and other BIRDS of the PENGUIN Kind.

There is a numerous tribe of birds of nearly the same form, manners, and appetites as the Penguin, though far inferior in size. They live upon the water, in which they are continually seen diving; and seldom venture upon land, except for the purpose of breeding.

The Great Northern Diver is the first of this smaller tribe, and is nearly of the size of a goose. It differs from the penguin, in being much slenderer and more elegantly formed, and is all over beautifully variegated with stripes.

The Grey Speckled Diver is not larger than the Muscovy duck, and resembles the great northern diver in every particular except size.

The Auk, which breeds on the island of St. Kilda, chiefly differs from the penguin in size and colour. It is not so large as a duck; and the whole of the breast and belly is white.

The Guillemot is nearly of the same size as the auk, but has a longer, a slenderer, and a straighter bill.

The bill of the Puffin is different from that of any other bird: it is flat, with its edge upwards, of a triangular figure, and ending in a sharp point: the upper part is bent a little downward, where it is joined to the head; and the base is encircled with a certain callous substance, like that of parrots. It is ash-coloured near the base, and red towards the point. The eyes, which are grey, are surrounded with a protuberant skin of a vivid colour. The legs of this bird are formed like those of the rest of the tribe; it is therefore with difficulty that it rises, and it frequently falls before it gets upon the wing; but as it is a small bird (not exceeding a pigeon in size) when it once rises, it can continue its flight with great facility.

These and all the smaller birds of the Penguin kind, make no kind of nest, but lay their eggs either in the crevices of rocks, or in holes under ground near the shore. The latter situation is generally made choice of, because the auk, the puffin, the guillemot, and many others, cannot easily rise to the nest when it is in a lofty situation. Sometimes indeed by rendering them inaccessible to mankind, they make them almost inaccessible to themselves; and are frequently seen making several efforts before they can arrive at the place of incubation. On this account the auk and guillemot, when they have once laid their egg, seldom forsake it till it is excluded. During this period the male, which is better furnished for flight, feeds the female: and the place where she sits is so bare, that, were not the egg supported by the body of the bird, it would frequently roll down from the rock.

These birds are absent all the winter, visiting regions

gions too remote for discovery. A few of them, which come as spies, are seen about the latter end of March, which, after staying two or three days, depart, and return again in the beginning of May, with the whole army of their companions. But if the season happens to be stormy and tempestuous, they are found in vast quantities cast away upon the shores, lean and perished with famine. It is imagined, therefore, that this voyage is performed more on the water than in the air; and, as they cannot seize their prey in stormy weather, their strength is exhausted before they arrive at their destined port.

Near the isle of Anglesea in an islet, called Priefholm, their flocks are so large as to be compared to swarms of bees. In another islet, called the Calf of Man, birds of this kind, though of a different species, are seen in great abundance. Numbers of rabbits breed in both these places; and the puffin, not choosing to be at the trouble of making a hole, when there is one already made, dispossesses the rabbit, and probably destroys the young. In these unjustly acquired retreats, the young puffins are found in great abundance, and become a valuable acquisition to the natives of the place. Though their flesh is very rank, yet, when pickled and preserved with spices, they are admired by those who are fond of high eating.

This whole tribe is seen to take leave of their summer residence in August. The coldest countries seem to be their most favourite retreats; and the number of water-fowl is much greater in those colder climates, than in the warmer regions near the line.

NATURAL HISTORY of the WILD SWAN.

THESSE birds frequent our coasts in large flocks when the winters are severe; but we cannot learn that they ever breed in Great-Britain. We are informed by Martin, that they come in October in great numbers to Lingay, one of the Western isles; where they continue till March, and then retire more northward to breed. These, like most other water-fowl, prefer for that purpose those places that are least frequented by mankind: the lakes and forests of the distant Lapland are therefore filled, during summer, with myriads of water-fowl; and swans, geese, the duck tribe, divers, &c. pass that season there; but in autumn return to us, and to other more hospitable shores.

The Wild Swan is less than the tame by almost a fourth; the former weighing but sixteen pounds and three quarters, and the latter twenty pounds. The tame Swan is entirely white; but the wild bird is of an ash-colour along the back, and on the tips of the wings: the eye-lids are bare and yellow, and the legs are dusky. The cry of the Wild Swan is very loud, and may be heard at a great distance; it is therefore sometimes called the hooper.

The TAME SWAN.

The Swan was considered as a high delicacy among the ancients, and the goose was abstained from as totally indigestible. Modern manners have inverted tastes; the goose is now become the favourite, and the Swan is seldom brought to table, except for the purposes of ostentation.

The Swan is the largest of the British birds: it is distinguished from the wild Swan by its size, which is much larger, and by the bill, which in the tame bird is red, and the tip and side black: a black callous knob projects over the base of the upper chap. In old birds, the whole plumage is white, and, in

young ones, ash coloured. The legs are dusky. The Swan lays seven or eight white eggs, which she is near two months in hatching. Its chief food is herbs growing in the water, roots and seeds growing near the margin, and insects. No bird perhaps makes so inelegant a figure out of the water, or has the command of such beautiful attitudes in that element as the Swan. Almost every celebrated poet has taken notice of it, and Milton thus describes it.

—The Swan with arched neck
Between her white wings mantling, proudly rows
Her state with oary feet.

There is not a more beautiful figure in all nature: in the exhibition of its form, there are no broken or harsh lines, no constrained motions; but the roundest contours, and the easiest transitions.

It is extremely difficult to reconcile the accounts of the ancients with the experience of the moderns, concerning the vocal powers of this bird. The Tame Swan is one of the most silent of animals, and the wild one has a loud and very disagreeable note: there is not the smallest degree of melody in either, and yet it was the general opinion of antiquity that the Swan was a most melodious bird. But while Plato, Aristotle, and Diodorus Siculus believed the vocality of the Swan, Pliny and Virgil seem to doubt that received opinion. The ancients had perhaps some mythological meaning in ascribing melody to Swans; for, when Virgil speaks of them figuratively, he ascribes to them melody, or the power of music; but when he talks of them as birds, he lays aside fiction, and, like a true naturalist, gives them their real note.

The ancients held a still more singular opinion, imagining that the Swan foretold its own death: this is doubtless a poetical flight; and, as to their being supposed to sing more sweetly at the approach of death, the cause is beautifully explained by Plato, who attributes that unusual melody to the same sort of extacy that good men are sometimes said to enjoy at that awful hour, foreseeing the joys that are preparing for them on putting off mortality.

All the stages of the Swan's approach to maturity are slow, and seem expressive of its longevity. Pliny observes, that those animals which are the longest in the womb are the longest lived; the Swan is the longest in the shell of any bird we know, and it is a year in growing to its proper size. It is said a Swan will live three hundred years; and Willoughby, who cannot be accused of easy credulity, is inclined to believe the report. A goose, as he justly observes, has been known to live an hundred years; and the Swan, being a larger bird, and its flesh of a firmer texture, may be supposed to live much longer.

Swans were formerly so much esteemed in England, that by an act of Henry IV. c. 6. no one, except the king's son, was permitted to keep a Swan, unpossessed of a freehold of five marks a year. And by stat. 2. Henry VII. the punishment for taking their eggs, was imprisonment for a year and a day, and a fine at the king's pleasure. At present they are less valued for the delicacy of their flesh, but great numbers of them are still preserved for their beauty. They are in great abundance on the Thames and the Trent, and particularly on the salt water inlet of the sea, near Abbotsbury, in Dorsetshire.

By the ancients the Swan was consecrated to Apollo and the muses. It was also consecrated to Venus, probably on account of its extreme whiteness: the car of that goddess is sometimes drawn by Swans.

NATURAL HISTORY of the GOOSE.

THE Goose, in its wild state, always retains the same marks: the whole upper part is ash coloured; the breast and belly are of a dirty white; the quill feathers and the tail are dusky, the latter being edged with white; the bill is narrow, black at the base and tip, and red in the middle; the legs are of a saffron colour, and the claws are black. In its domestic state the goose, as well as other animals, vary almost infinitely in their colours.

The wild Goose is supposed to breed in the retired parts of the north of Europe; and, at the approach of winter, to descend into more temperate regions. These birds are often seen in flocks from fifty to an hundred, flying at very great heights, and preserving great regularity in their motion; sometimes forming a strait line; at other times assuming the shape of a wedge, which facilitates their progress. Their cry is frequently heard when they are at an imperceptible distance above us. It is probable that this is a note of mutual encouragement, as they seldom exert it when they alight in those journeys. When they descend to the ground, they range themselves in a line, like cranes; and seem rather to have come down for rest, than for any other refreshment. When they have continued in this situation for an hour or two, one of them has been heard to sound a kind of charge, with a loud note, which has been punctually attended to by the others, and they have immediately pursued their journey with renewed alacrity.

The wild Goose, and many other varieties, agree in one common character of feeding upon vegetables, and being remarkable for their fecundity; but the tame Goose is the most fruitful of the kind. Having very few enemies, it leads a safer and more plentiful life, and its prolific powers increase in proportion to its ease: it is frequently known to lay upwards of twenty eggs, but the wild Goose seldom exceeds eight. The tame female is very assiduous in hatching her eggs, during which time she receives two or three visits in the day from the gander; who sometimes drives her from the nest to take her place, which he fills with great state and composure.

When the young are excluded, the pride of the gander is inconceivable: considering himself as a champion to defend his young, and to keep off even the suspicion of danger, he pursues dogs and men that never attempt to molest him; and when he has attempted to attack a mastiff, or any other animal, to whose contempt alone he is indebted for his safety, he returns in triumph to his female and her brood, screaming and clapping his wings, as if conscious of having obtained a victory.

The flesh of a young Goose is certainly very good eating; but the value of this bird is greatly increased by its feathers. Not to mention the quills, which are so easily converted into pens, and thereby become essentially useful to the scholar, the lawyer, and the trader, the feathers are highly valuable in another capacity, as the warmest and softest beds are made of them.

Most of our beds in Europe are composed of goose-feathers; though the use of them is utterly unknown in the countries bordering upon the Levant, and in all Asia. They have mattresses, stuffed with wool; camel's-hair, or cotton; the warmth of their climate rendering a softer bed unnecessary. It is however surprizing, that feather beds were not in use among the ancients: Pliny indeed informs us, that they made bolsters of feathers to lay their heads on; but this is an additional proof that they were not used for the body to repose on.

Vast quantities of tame Geese are kept in the fens in Lincolnshire, which are plucked about the neck,

breast, and back once, if not twice a year. These feathers are a considerable article of commerce; but those of Somersetshire are most esteemed by the trade; as those of Ireland are reckoned the worst. Hudson's Bay furnishes very fine feathers, supposed to be of the Goose kind. The down of the swan is imported from Dantzick, from whence we also receive a great quantity of the feathers of the cock and the hen.

Eider down is brought from Denmark; the ducks which furnish it being inhabitants of Hudson's Bay, Greenland, Iceland, and Norway.

Feathers are cured by laying them in a room in an open exposure to the sun, and, when dried, putting them in bags, and beating them well with poles to get the dirt off. Nothing, however, but time, will prevent the smell which arises from the putrefaction of the oil contained in every feather: laying upon them is the only remedy; old feathers are therefore much more valuable than new.

Geese are very profitable to the farmer for their flesh, their feathers, and their grease. They will live upon commons or any sort of pastures, and need very little care or attendance; only they should have plenty of water. The largest Geese are reckoned the best: but there is a sort of Spanish Geese that is a much better layer and breeder than the English, especially if the eggs are hatched under an English Goose.

Geese should lay in the spring, the earlier the better; because of their price, and their having a second brood. They usually lay twelve or sixteen eggs. You may know when they will lay, by their carrying straw in their mouth; and when they will sit, by their continuing on their nests after they have laid. A Goose sits thirty days; but if the weather be fair and warm, they will hatch three or four days sooner. After the goslings are excluded, some keep them in the house ten or twelve days, and feed them with curds, barley-meal, bran, &c. and when they have acquired some strength, let them out four or five hours a day, taking them in again, till they are large enough to defend themselves from vermin. Others put them out at first, and perhaps succeed as well as the former. One gander is sufficient for five Geese.

If you would fat green Geese, you must shut them up when they are about a month old, and they will be fat in about a month more. Be sure to let them have always by them, in a small rack, some fine hay, which will greatly hasten their fattening. But for fattening of older Geese, it is commonly done when they are about six months old, in or soon after harvest, when they have been in stubble fields, from which food some kill them. But those who are desirous of having them very fat, should shut them up for a fortnight or three weeks, and feed them with oats, split beans, barley-meal, or ground malt mixed with milk; but the best thing to fatten them with is malt mixed with beer. You must however observe in fattening all sorts of water-fowl, that they usually sit with their bills upon their rumps, where they suck out the greatest part of their moisture and fatness, at a small bunch of feathers; which you will find standing upright on their rumps, and always moist, with which they trim their feathers, which renders them more oily and slippery than the feathers of other fowls, and causes the water to slip off them. If therefore these upright feathers are cut away close, they will become fat in less time, and with less meat than otherwise. Geese will likewise feed on, and fatten well with carrots cut small and given them; or if you give them rye before, or about Midsummer, it will strengthen them, and keep them in health, that being commonly their sickly time.

The WHITE-FOOTED WILD GOOSE.

This bird is frequently seen in winter in the marshes of Cheshire, and in all the northern world as far as Hudson's-Bay. It is twenty-eight inches in length, and four feet and a half in breadth, and weighs about five pounds: the bill is much thicker and larger than that of the common wild goose, and is of a reddish yellow: the forehead white, the head brown, and the upper part of the breast of a light ash colour, clouded with a deeper. The belly is white, spotted with black; the coverts of the wings are grey, edged with brown. The tail is black, edged with white: the legs are orange colour, and the claws of a pale flesh colour.

The BARNACLE.

The length of this bird is about two feet and one inch; the breadth four feet five inches, and the weight about five pounds; the bill is black and not quite two inches long: the head is small, and the forehead and cheeks white; and a black line extends from the bill to the eyes: the neck, the hind-part of the head, and the upper-part of the breast and back are of a deep black: the belly and the coverts of the tail are white; the back, scapulars, and coverts of the wings, are beautifully barred with grey, black, and white: the tail and legs are black.

During winter, these birds appear in vast flocks, on the north-west coasts of this kingdom. They are naturally very wild and shy; but, when taken, grow as familiar as our tame geese in a very few days. They quit our shores in February, and go to breed in Lapland, Greenland, and Spitsbergen. A ridiculous error has been propagated of this bird's being bred from a shell that is often found sticking at the bottoms of ships: but it is now well known to be hatched from an egg in the ordinary manner, and to differ in very few particulars from all the rest of its kind.

The BRENT GOOSE.

This is smaller than the barnacle; its bill is black, and one inch and an half long. The head, neck, and upper-part of the breast are black; but about the middle of the neck, on each side, is a spot of white: the lower-part of the breast, the scapulars, and the coverts of the wings are ash-coloured, clouded with a deeper shade; the tail, the quill feathers, and the legs are black. These birds are common on our coasts in winter. In Ireland they are called Barnacles, and appear in great numbers in August, leaving it in March. Their principal food is a kind of long grass growing in the water: they prefer the root and that part next above it, which they dive for, bite off, and leave the upper-part to drive on shore. Near London-Derry, Belfast, and Wexford, they are extremely numerous, and are taken in the night-time in nets placed across the rivers. They are much esteemed for their delicacy; Linnæus erroneously mentions the Barnacle and the Brent as synonymous, and describes the true Barnacle as the female of the white-fronted wild goose; but Mr. Willoughby, Mr. Ray, and Mr. Brisson very properly describe them as different species.

The CANADA GOOSE.

The shape of this bird is like that of our common tame goose, but a little longer; the back is of a brownish ash-colour, and the rump black: the lowest part of the tail is whitish, and the remaining feathers black: the lesser and covert feathers are of a brownish ash-colour, and the feet are black.

The BLUE-WINGED GOOSE of NORTH-AMERICA.

This is smaller than the common tame goose, and has a red bill. The head, and greatest part of the neck is white. The back, the breast, and lower part of the neck, are of a dark brown. The tail is of a brownish ash colour, and the belly and thighs are white. The legs are bare of feathers just above the knee, and the three forward toes are webbed. The legs and feet are red, and the toes are black, that which is backwards being very small. This is a native of Hudson's-Bay.

The MUSCOVY GOOSE.

This is a curious large fowl, and is three feet in length from the tip of the bill to the end of the tail; and, when the wings are extended, near five feet in breadth. It weighs about fourteen pounds: the bill is of an orange colour, with a large tubercle or knob of the same colour on the base of the upper-jaw. The pupil of the eye is black, with a fine gold coloured iris, and a large bag hangs beneath the bill. The top of the head and the sides of the neck are of a dark brown: the upper-part of the back is of the same colour, except that the outer edges of the feathers are of a lighter colour. The wings and the rest of the body are white, except a few dark feathers on the upper-part of the tail: the legs and feet are of a fine orange colour, and the claws are black. This is the description of the male, which the female greatly resembles, except that the knob is not so large.

The mountain Goose of the Cape of Good Hope is larger than any of the European kind: the feathers on the top of the head and the wings are of a very beautiful shining green. It frequently comes into the valleys, where it feeds on grass and herbs.

The Water-Goose of the Cape of Good Hope is like the common goose with respect to colour, but has a brownish stripe, mixed with green on the back. The flesh of both of these is said to be very good.

NATURAL HISTORY of the TAME DUCK.

THIS is the most easily reared of any of our domestic animals. The very instincts of the young ones direct them to their favourite element; and, though they are hatched and conducted by the hen, they despise the admonitions of their leader. All birds have their manners rather from nature than education; and those of the duck kind, in particular, follow their appetites, not their tutor, and attain their various perfections without a guide. The arts of man indeed are the result of accumulated experience, those of inferior animals are in general self-taught, and not acquired by imitation.

It is customary to lay Duck eggs under a hen, because she hatches them better than the parent would have done. The Duck is a careless inattentive mother, frequently leaving her eggs till they spoil, and seeming almost to forget that she is entrusted with the charge: she shews but very little more attention to the young, when they are produced: she leads them to the pond, and supposes she has sufficiently provided for her offspring when she has shewn them the water. The hen, on the contrary, is a most indefatigable nurse; she broods with the utmost assiduity, and usually brings forth a young one for every egg committed to her charge. She does not indeed lead them to the water, but she carefully guards them when they are there, by standing on the brink. She can afford them protection, if the weasel or the rat attempt to seize them: when

weary

weary of paddling, she conducts them to the house, and rears the suppositious brood, without suspecting that they are not her own.

Of the Tame Duck there are not less than ten different varieties, and Brisson reckons upwards of twenty of the wild. The most obvious distinction, however, between wild and tame Ducks is in the colour of their feet; those of the tame Duck being black, and those of the wild Duck yellow.

The common tame species of Ducks take their origin from the mallard, and may be traced to it by unerring characters. The drakes, however they vary in colours, always retain the curled feathers of the tail; and both sexes the form of the bill of the wild kind.

Nature, for a wise and useful end, sports in the colours of all domestic animals, that mankind may the more readily distinguish and claim their respective property.

The mallard is usually about twenty-three inches in length, thirty-five inches in breadth, and weighs about two pounds and an half: the bill is greenish-inclining to yellow; and the head and neck are of a deep shining green. Almost a circle of white extends round the lower part of the neck; but the circle wants about a fourth of being complete. The upper part of the breast is of a purplish red, and the beginning of the back is of the same colour: the breast and belly are grey, marked with transverse speckled lines of a dusky hue. The scapulars are white, elegantly barred with brown. The spot on the wing is of a rich purple; and the tail consists of twenty-four feathers. The male of this species is distinguished by four middle feathers, which are black and strongly curled upwards; but the females have not this mark. Their plumage is of a pale reddish brown, spotted with black; and the legs are of a saffron colour.

“Ducks,” says Mr. Mortimer, in his Husbandry, “require no charge in keeping, for they live on lost corn, snails, &c. for which reason they are very proper for gardens. Once in the year they lay a great number of eggs, especially a sort of Duck which turns up its bill more than the common kind. When they sit they require no attendance, except they have a little barley or offall corn near them, that they may not straggle far from their nests to chill their eggs. They are reckoned to be better hatched under a hen than a Duck; because while they are young, the hen will not lead them so often into the water. Some think it very proper to cut off the feathers from their rumps; because, when their tails are wet, it often occasions their drowning. As to the fattening of them, it may be done in three weeks time, by giving them any kind of corn or grain, and plenty of water. Ground malt, wet either with milk or water, is best.”

The EIDER DUCK.

This useful species is found in the western isles of Scotland; but in great abundance in Norway, Iceland, and Greenland; from whence is imported a vast quantity of the down, known by the name of Eider, which is furnished by these birds. Its remarkably light, elastic, and warm qualities, make it highly esteemed as a stuffing for coverlets, by such whom infirmities render unable to support the weight of common blankets.

This bird, which resides in the colder climates, as we have already observed, lays from six to eight eggs, making her nest among the rocks or plants on the sea shore. There is nothing very singular in the external materials of the nest; but the inside lining, on which the eggs are deposited, is the warmest, softest, and lightest substance that can be imagined. This is no other than the down produced from the breast of the bird in the breeding

season, which the female plucks off with her bill, and furnishes her nest with a more valuable lining than the most skilful artists can produce. The natives are industrious in finding out the nest, and after suffering the bird to lay, rob her of both the eggs and the nest. Not discouraged by the first disappointment, the Duck builds and lays a second time in the same nest. The second mansion, with its valuable furniture, is also taken away by the natives. She ventures, however, to build a third time, but the down for the lining of this nest is supplied from the breast of the drake. If this is stolen from them, they both forsake the place and breed there no more. This down is separated from the dust and moss by the natives; and, though they require a warm covering themselves, their necessities oblige them to exchange it for brandy and tobacco, with the more indolent and luxurious inhabitants of the south.

The WILD DUCK.

The difference between wild Ducks, arises principally from their size, and the nature of the place they feed in. Sea-Ducks, which frequent the salt-water, and often dive, have a broad bill pointing upwards, a large hind-toe, and a long blunt tail. Pond-Ducks have a straight and narrow bill, a small hind-toe, and a sharp-pointed tail. Our decoy-men give the former the appellation of foreign Ducks; the latter are supposed to be natives of England.

All the varieties of wild Ducks live in the manner of our domestic Ducks, keeping together in flocks in the winter, and flying in pairs in summer, rearing their young by the water side, and leading them to their food as soon as they escape the shell. They usually build their nests among heath or rushes, at no great distance from the water; and lay twelve, fourteen, or more eggs before they sit. But, though this is their general method, their dangerous situation on the ground sometimes obliges them to change their manner of living; and their aukward nests are frequently seen exalted on the tops of trees. This must be attended with great difficulty; as the bill of a Duck is but ill-formed for building a nest, or furnishing it with such materials as to give it sufficient stability to stand the weather. The nest thus elevated generally consists of long grass, mixed with heath, and lined with the bird's own feathers. But, in proportion as the climate is colder, the nest is more artificially made, and has a warmer lining. In the Arctic regions, all the birds of this kind take incredible pains to protect their eggs from the severity of the weather. The gull and the penguin tribe seems to disregard the most intense cold in those regions, but the Duck forms itself a hole to lay in, shelters the approach, lines it with a layer of grass and clay, another of moss within that, and then a warm coat of down or feathers.

As these birds possess the faculties of flying and swimming, they are principally birds of passage, and probably perform their journies across the ocean as well on the water as in the air. Those which visit this country on the approach of winter, are neither so fat nor so well tasted as those that remain with us the whole year: their flesh is often lean, and generally fishy. This flavour it has perhaps contracted in the journey; their food in the lakes of Lapland, from whence they descend, being generally of the insect kind.

When they arrive among us, they fly about in flocks in search of a proper residence for the winter. In the choice of this they have two objects in view; to be near their food, though remote from interruption. They prefer a lake in the neighbourhood of a marsh, where there is also a cover of woods, and where insects are the most plentiful. Lakes which have

have a marsh on one side, and a wood on the other, generally abound with wild fowl.

Wild Ducks, when flying in the air, are often lured down from their heights by the loud voice of the mallard from below: all the stragglers attend to this call; and, in the course of ten or fifteen days, a lake that was quite naked before, becomes black with water fowl; having deserted their Lapland retreats, to visit these Ducks which reside continually among us.

They usually make choice of that part of the lake, where they are inaccessible to the approach of the fowler, in which they all appear huddled together, and are extremely loud and busy. Where they sit and cabal thus, there is no food for them, as they generally chuse the middle of the lake, and what can employ them all the day it is not easy to conjecture. They frequently go off privately by night to feed in the adjacent meadows and ditches, which they are afraid to approach by day. In these nocturnal adventures they are often taken; for though timorous, they are easily deceived, and many of them are caught in springes. The greatest quantities, however, are taken in decoys, which are well known in the neighbourhood of London, though very little used in the remoter parts of the country.

The general season for catching fowl in decoys, is from the latter end of October to the beginning of February. By an act of George the Second, a penalty of five shillings is incurred for every bird destroyed at any other season.

The decoys in Lincolnshire are usually let at a certain annual rent, from five pounds to thirty pounds a year. By these the markets of London are principally supplied with wild fowl. Upwards of thirty thousand of ducks, widgeon, and teal, have been sent up in one season, from ten decoys in the neighbourhood of Wainfleet.

The VELVET DUCK.

The male of this species is larger than the tame Duck. The bill is broad and short, yellow on the sides, black in the middle, and the hook red: the head, and part of the neck is black, tinged with green: behind each ear is a white spot; and in each wing is a white feather; the rest of the plumage is of a fine black, and of the soft and delicate appearance of velvet: the legs and feet are red; the webs black: the female is entirely of a deep brown colour, the marks behind each ear and on the wings excepted: the bill is like that of the male, except that it wants the protuberance at the base.

The TUFTED DUCK.

This bird does not weigh above two pounds; the length is about fifteen inches and a half; the bill is of a bluish grey, except the hook, which is black. The head is adorned with a short thick pendant crest. The belly and under coverts of the wings are of a pure white; the rest of the plumage is black, varied about the head with purple; the tail is short, consisting of fourteen feathers: the legs are of a bluish grey, and the webs black. The female has no crest. When young she is of a deep brown, and the sides of the head next the bill of a pale yellow, but she preserves the other marks of the old Duck.

The SCAUP DUCK.

This is smaller than the common Duck. The bill broad, flat, and of a greyish blue colour: the head and neck 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 greater quill feathers are dusky; the lesser white,

tip with black: the belly is white: the tail and feathers, both above and below are black; the thighs barred with dusky and white strokes: the legs dusky.

These birds differ infinitely in colours; so that in a flock of forty or fifty, there are not two alike.

The PINTAIL DUCK.

This bird is of a slender form, and has a long neck: its length is twenty-eight inches; its breadth about three feet two inches; and its weight twenty-four ounces. The bill is black in the middle, and blue on the sides: the head is of an iron colour, tinged behind the ears with purple, a white line extends from the ears a considerable way down the neck; this line is bounded by black: the hind part of the neck, the back and sides are elegantly marked with white and dusky waved lines: the fore part of the neck and belly are white; the scapulars striped with black and white; the coverts of the wings are ash coloured; the lowest tip with dull orange: the middle quill feathers barred on their outmost webs with green, black and white: the exterior feathers of the tail are ash coloured; the two middle black, and three inches longer than the others: the feet are of a lead colour. The female is of a light brown colour; spotted with black. These birds are found in great abundance in Connaught, in Ireland, in the month of February only: they are much esteemed for their delicacy.

The GREY-HEADED DUCK.

We are indebted to Mr. Bolton for an account of this bird, which he suspects to be the Glaucian of authors. It agrees in all respects with Belon's description of that bird, the head and neck excepted, which in that of the French ornithologist are of a reddish brown.

It is the size of a common duck; the bill large, broad, and serrated round the edges, and of a yellowish brown colour; the head large and round; the irides of the colour of gold; the head and upper part of the neck are of a deep grey; at the extremity of the grey passes a collar of white, half an inch broad, surrounding the neck. The breast is of a silvery grey: the belly quite white; the back and wings black; the latter, when expanded, shew a few white feathers; the tail is short and black; the legs are of a yellowish brown colour; the hind toe small.

The WHITE-BELLIED DUCK of JAMAICA.

This bird is about twenty inches long, and the breadth is thirty inches. The bill is black, near two inches long, and the holes of the nostrils are round. The tail is three inches long, and the feathers on the head are mottled with light and dark brown. The upper part of the neck, the sides under the wings, and part of the belly, are covered with brown feathers crossed with whitish lines. The back is more brown, and the tail and wings are of a light brown; but some of the shorter prime feathers are painted with green, orange, and white. The breast and part of the belly is white, and the legs and feet are of a greenish brown.

The BARBARY DUCK.

The Barbary Duck is of the size between a goose and a Duck, but the legs are short, and the male is larger than the female. The colour is not always the same; some being white, others black, and others of different colours; but it is generally black, variegated with other colours. The bill of this bird is short, broad, and crooked at the end; and it has a crest or red tubercle between the eyes as large as a cherry, and a red skin about the eyes, which

which has the appearance of red leather. The flesh has a taste between a goose and a duck.

The MADAGASCAR DUCK.

This bird is larger than the tame duck, its bill is of a yellowish brown, and the iris of the eyes of a fine red. The neck and head are of a dusky green, and the back of a deep purple mixed with blue; the edges of the feathers are red, and the breast of a deep brown, with the edges of the outer-feathers red; but the feathers on the shoulders are green, some of which have red edges. The first row of the covert feathers is of the same colour, and the second is green. The long feathers of the wings have red edges, and the legs and feet are of an orange-colour.

The BAHAMA DUCK.

This bird is smaller than a tame duck; the head near the upper-jaw is of a triangular shape, and of a gold colour. The inside of the bill, and the lower-part of the neck are white; the hind-part of the head, the breast and belly are of a yellowish ash colour, and the wings brown; but the middle is green surrounded with yellow, and the extremities are black.

The GOOSANDER.

THIS bird frequents our rivers, and other fresh waters, especially in severe winters; they are excellent divers, and live on fish. The length of the male is about two feet four inches; the breadth three feet two inches, and the weight four pounds. The bill is three inches long, narrow, and finely toothed: the colour of that and the irides is red. The head is large, and the feathers on the hind-part long and loose: the colour black, beautifully glossed with green; the upper-part of the neck is the same: the lower-part and the belly is of a fine pale yellow: the upper-part of the back, and the inner scapulars are black: the lower-part of the back, and the tail are ash coloured: the tail consists of eighteen feathers: the greater quill feathers are black, the lesser white, and some of them are edged with black: the coverts at the setting on of the wing are black, the rest white; and the legs are of a deep orange colour.

The female, which is sometimes called the Dun-Diver, is less than the male: the head, and the upper-part of the neck are of an iron colour; the throat white: the feathers on the hind-part are long, and form a pendent crest: the back, the coverts of the wings, and the tail are of a deeper ash colour; the greater quill feathers are black, the lesser white: the breast and belly are white, tinged with yellow.

NATURAL HISTORY of the SCOTER.

THE Scoter weighs two pounds nine ounces: the length is twenty-two inches; and the breadth thirty-four inches: the middle of the bill is of a fine yellow, the rest is black: both male and female want the hook at the end; but on the base of the bill of the former is a large knob, divided by a fissure in the middle. The tail consists of sixteen sharp-pointed feathers, of which the middle are the longest. The colour of the whole plumage is black; that of the head and neck glossed over with purple; the legs are black. This bird is allowed in the Romish church to be eaten in Lent. It is a great diver, said to live almost constantly at sea; and to be taken in nets placed under water.

No. 23.

NATURAL HISTORY of the GOLDEN EYE.

THE length of this species is nineteen inches; the breadth thirty-one inches, and the weight about two pounds. The bill is black, short, and broad at the base: the head, which is large, is of a deep black, glossed with green: at each corner of the mouth is a large white spot. The irides are of a bright yellow: the upper-part of the neck is of the same colour with that of the head: the breast and belly are white: the scapulars are black and white: the back, tail, and the coverts on the ridge of the wings are black: the fourteen first quill-feathers, and the four last are black; the seven middlemost are white, as are the coverts immediately above them: the legs are of an orange colour. The head of the female is of a deep brown, tinged with red: the neck grey: the breast and belly are white: the coverts and scapulars dusky and ash coloured: the middle quill-feathers white; the others, together with the tail, are black; the legs dusky. These birds frequent fresh water, as well as the sea; and are found during winter on the Shropshire meres.

NATURAL HISTORY of the SHIELDRAKE.

THE length of the male of this elegant species is two feet; the breadth three feet and a half; and the weight two pounds ten ounces. The bill is of a bright red, swelling at the base into a knob, which is most conspicuous in the Spring; the head and upper-part of the neck is of a fine blackish green; the lower-part of the neck is white; the breast, and the upper-part of the back is surrounded with a broad band of bright orange-bay; the coverts of the wings, and the middle of the back are white; the nearest scapulars black, the others white; the greater quill-feathers are black; the exterior webs of the next are a fine green, and those of the three succeeding orange; the coverts of the tail are white; the tail itself of the same colour, and except the two outermost feathers tipped with black; the belly is white, divided lengthways by a black line; the legs of a pale flesh colour.

These birds frequent the sea-coasts, and breed in rabbit-holes. If any one attempts to take their young, the old birds shew great address in diverting his attention from the brood; they fly along the ground as if they were wounded, until the young are got into a place of security, and then return and collect them together. The Shieldrake lays fifteen or sixteen eggs, which are white, and of a rounded shape. In winter they assemble in great flocks. Their flesh is very rank and disagreeable.

NATURAL HISTORY of the POCHARD.

THE length of this bird is about nineteen inches; its breadth two feet and an half; and its weight twenty-eight ounces. The bill is of a deep lead-colour; the head and neck are of a bright bay colour; the breast, and part of the back where it joins the neck are black; the coverts of the wings, the scapulars, back, and sides under the wings are of a pale grey, elegantly marked with narrow lines of black: the quill-feathers dusky; the belly is ash coloured and brown; the tail, which consists of twelve short feathers, is of a deep grey-colour; the legs lead-coloured: the irides of a bright yellow, tinged with red. The head of the female is of a pale reddish brown; the breast is rather of a deeper colour; the covers of the wings a pale ash colour; the belly ash coloured. These birds frequent both fresh and salt water; and are very delicate eating. They are known in the London markets by the name of Dun birds.

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NATURAL HISTORY of the WIGEON.

THE length of the Wigeon is twenty inches; the breadth two feet three inches; and the weight about twenty-three ounces. The bill is lead coloured, and black at the end; the head, and upper-part of the neck is of a bright light bay; the forehead somewhat paler, and in some almost white; the plumage of the back and sides are elegantly marked with narrow, black, and white undulated lines; the breast is of a purplish hue, and is sometimes marked with round black spots; the belly is white. In some the coverts of the wings are almost wholly white; in others of a pale brown, edged with white; the greater quill-feathers are dusky; the outmost webs of the middle feathers are of a fine green, with black tips. The two middle feathers of the tail, which are longer than the others, are black and sharp-pointed; the rest are ash coloured: the legs dusky. The head of the female is of a rusty brown, spotted with black; the back is of a deep brown edged with a paler; and the belly white.

NATURAL HISTORY of the GADWALL.

THE Gadwall is rather smaller than the wigeon. The bill, which is two inches long, is black, and flat; the head, and the upper-part of the neck, are of a reddish brown, spotted with black; the lower-part, the breast, the upper-part of the back, and the scapulars, are beautifully marked with black and white lines; the belly is of a dirty white; the rump above and below is black; the tail ash coloured, edged with white; the coverts on the ridge of the wing are of a pale reddish brown; the greater quill feathers are dusky; the inner web of three of the lesser quill feathers is white; which forms a conspicuous spot; the legs are orange coloured. The breast of the female is of a reddish brown, spotted with black; and the back of the same colour; the wings, though they have the same marks, are not so bright as those of the male.

NATURAL HISTORY of the GARGANEY.

THIS bird is of a size between the wigeon and the teal. The bill is of a deep lead colour; the crown of the head is dusky, marked with oblong streaks; on the chin is a large black spot; from the corner of each eye is a long white line, pointing to the back of the neck: the cheeks, and upper-part of the neck, are of a pale purple, marked with minute oblong lines of white, pointing downwards; the breast is of a light brown, marked with semi-circular bars of black: the belly is white; the coverts of the wings are grey; but the lowest are tipped with white; the first quill feathers are ash coloured; the exterior webs of those in the middle are green; the scapulars are long and narrow, and elegantly striped with white, ash colour, and black; the tail is dusky; and the legs of a lead colour. The female has an obscure white mark over the eye; the rest of the plumage is of a brownish ash colour.

NATURAL HISTORY of the TEAL.

THE Teal weighs about twelve ounces; the length of the Teal is about fifteen inches, and the breadth twenty-eight inches. The bill is black; the head and the upper-part of the neck are of a deep bay; from the bill to the hind-part of the head extends a broad bar of glossy changeable green, bounded on the lower-side by a narrow

white line; the lower-part of the neck, the beginning of the back, and the sides under the wings, are elegantly marked with waved lines of black and white; the breast and belly are of a dirty white; the tail is sharp-pointed, and dusky; the coverts of the wings are brown; the greater quill-feathers are dusky; the exterior webs of the lesser are marked with a glossy green spot, above that another of black, and the tips white; the irides are whitish; and the legs dusky. The female is of a brownish ash colour, spotted with black; and, like the male, has a green spot on the wings.

The summer Teal, it is imagined, differs not in the species from the common kind, only in sex. Linnæus hath placed it among the birds of his country; but does not mention its place of residence, and hath evidently copied Mr. Willoughby's imperfect description of it: and to confirm our opinion of its being the same species, a bird which was sent us from the Baltic-sea, under the title of *anas circia*, the summer Teal of Linnæus, was no other than the female of our Teal.

The FRENCH TEAL.

This is much smaller than a duck; it appears only in the autumn and the winter: they are all of the same colour, only the females are grey about the neck, and yellowish under the belly: the colour is brown on the back, upon the wings, and under the rump. Like ducks they have a shining spot upon each wing, and a white line underneath, which proceeds from the extremity of the wings; the twelve prime feathers are of the same colour; but the next following are white at the extremities, and make another white line; the other feathers are black above, forming a black spot on each side.

The INDIAN TEAL.

The Indian Teal is smaller than a duck, and the upper-part of the bill is longer than the lower. The bill and feet are of a beautiful red; the top of the head, the upper-part of the neck, and almost the whole of the back, are yellow; as well as the rump, which is spotted with large spots in the shape of an half-moon. The under-part of the neck, the breast, and the belly are white; but the wings have a great variety of colours, in which the beauty of this bird principally consists; for the first feathers on the shoulders are of a faint rose colour, marked with black spots in the shape of a half-moon; those that follow them are partly white and partly green; and the longest are all adorned with a beautiful shining blue. The tail is a mixture of green and blue, and the toes are destitute of membranes.

The CHINESE TEAL.

The Chinese Teal has a green tuft, and the feathers are of a purple colour. It is beautifully variegated, and the feathers near the rump are placed in a very singular manner.

NATURAL HISTORY of the COOT-FOOTED TRINGA.

THE bill is black, slender, and terminates in a point. The upper-chap is longer than the lower, and bent a little downwards. A blackish line runs from the nostril through the eye; but the under side of the head and throat is white. An orange coloured line runs behind each eye, and down each side of the neck, joining on the fore-part to the middle of the neck beneath the white throat. On the top of the head, the hind-part of the neck, all round the lower-part of the neck, back, and coverts of the wings, the feathers are of an ash colour; but the greater quills are black, and the middle are black

with white tips; the other parts of the back are of a dusky brown. Between the back and the wings, there are a few long feathers edged with orange, and the rump is dusky, and white mixed with transverse lines. The tail is dusky, and the breast, belly, and thighs are white. The legs are bare above the knees, and the legs, feet, and claws, are of a lead colour.

NATURAL HISTORY of the FULMAR.

THIS is generally an inhabitant of the isle of St. Kilda, where it makes its appearance in November, and continues the whole year, except September and October; it lays a large white egg; and the young are hatched about the middle of June. This bird is of great use to the islanders; it supplies them with oil for their lamps, down for their beds, a delicacy for their tables, a balsam for their wounds, and a medicine for their diseases. It is also a certain prognosticator of the change of the wind; if it comes to land, no west wind is expected for some time; and the contrary when it returns and keeps at sea.

The Fulmar, like all the petrels, has a peculiar faculty of spouting from its bill, to a considerable distance, a large quantity of pure oil; which it does by way of defence, into the face of any one that attempts to take it: so that they are, for the sake of this panacea, seized by surprise; and this oil is subservient to the above-mentioned medicinal uses. Martin informs us that it has been used with success in London and Edinburgh in rheumatic cases. In the General Advertiser, June, 1761, is the following remarkable account from the isle of Mull. "A gentleman of the name of Campbell, being fowling among the rocks, and having mounted a ladder to take some birds out of their holes, was so surprised, by one of this species spurting a quantity of oil in his face, that he quitted his hold, fell down, and perished."

This bird is larger than the common gull; the bill is very strong, yellow, and hooked at the end. The nostrils are composed of two large tubes, lodged in one sheath; the head, neck, belly, and tail, are white; and the back and coverts of the wings ash coloured: the quill feathers are dusky; the legs yellowish. Instead of a back toe, it has only a sort of straight spur. The Fulmar feeds on the blubber or fat of whales, &c. which, being soon convertible into oil, supplies them constantly with means of defence, as well as provision for their young, which they cast up into their mouths. They are likewise said to feed on sorrel, which they use to qualify the unctuous diet on which they subsist.

Frederic Martens, who saw vast numbers of these birds at Spitzbergen, observes, that they are very bold, and hover round the whale-fishers in great flocks; and that when a whale is taken, in spite of all endeavours, they will light on it and pick out large lumps of fat, when the animal is alive. Whales are often discovered at sea by the multitudes of these birds flying; and when a whale is wounded, prodigious multitudes immediately follow its bloody track. It is a voracious bird, eating till it is obliged to disgorge its food.

NATURAL HISTORY of the WATER-RAIL.

THE body of this bird is long and slender, with short concave wings. It is less fond of flying than running; which it does very swiftly along the edges of brooks covered with bushes; and as it runs, frequently flirts up its tail; in flying it hangs down its legs.

Its weight is four ounces and a half. The length of this bird to the end of the tail is twelve inches; the breadth sixteen inches, and the weight four ounces. The bill is slender, slightly incurvated, and one inch three quarters in length; the upper-chap is black, edged with red; the lower orange coloured; and the irides red: the head, the hind-part of the neck, the back, and coverts of the wings and tail are black, edged with an olive brown; the base of the wing is white; the throat, breast, and belly, are ash coloured; the sides under the wings are finely varied with black and white bars. The tail, which is very short, consists of twelve black feathers; and the ends of the two middle ones are tipped with rust colour. The legs are of a dusky flesh colour, placed far behind. The toes are very long.

NATURAL HISTORY of the KING-FISHER.

THE King-Fisher seems to unite in itself somewhat of every class preceding. It has appetites for prey like the rapacious kinds, and an attachment to water like the birds of that element. It possesses the beautiful plumage of the peacock, the delicate shadings of the humming bird, the short legs of the swallow, and the bill of the crane.

This bird is somewhat larger than the swallow, and its shape is clumsy: the legs are very small, and the bill disproportionably long, being two inches from the base to the tip: the upper-chap is black, and the lower-chap yellow. The inelegant form of this bird is fully atoned for by the beauty of its colours. The top 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 resplendent azure: the belly is orange coloured, and a broad mark of the same colour extends from the bill to beyond the eyes, near which there is a large white spot. The tail, which is short, consists of twelve feathers of a rich deep blue, and the feet are of a reddish yellow.

This is one of the most rapacious little animals that skims the deep: it is continually in action, and feeds on fish, which it takes in surprizing quantities, considering its clumsy form and diminutive size. It chiefly frequents the banks of rivers, and, like the osprey, takes its prey by balancing itself at a certain distance above the water for considerable space, and then, darting into the deep, seizes the fish with inevitable certainty. In a bright day, the plumage exhibits a beautiful variety of brilliant colours, while the bird remains suspended in the air. This extraordinary beauty has probably given rise to fable, for fancy is always willing to increase the wonder, wherever there is any thing uncommon.

This species is the mute *balcyon* of Aristotle, which he describes with unusual precision. After describing the bird, he gives a description of the nest, which appears as fabulous and extravagant as any of the stories which the most inventive of the ancients have delivered. He says it appeared like those concretions that are formed by the sea-water; that it resembled the long-necked gourd, was hollow within, with a very narrow entrance, and that if it overset, the water could not enter; that it resisted any violence from iron, but could be broke with a blow of the hand; and that it was composed of the bones of the sea-needle.

Part of this description, however, appears to be founded on truth. With regard to the form of the nest, his account exactly agrees with that which count Zinanni has favoured us with. Nor are the materials which Aristotle says it was composed of entirely of his own invention; any one who has seen the nest of the King-Fisher, must have observed that it was strewed with the bones and scales

of fish; the fragments of the food of the owner and its young: and those who will not admit it to be a bird that frequents the sea, must not confine their ideas to our northern shores; but consider that those birds which inhabit a sheltered place in the more rigorous latitudes, may endure exposed ones in a milder climate. Aristotle's observations were made in the East; and he admits that the *halcyon* sometimes ascended rivers. It is probable that this was in order to breed; for Zinanni informs us, that in his soft climate, Italy, it breeds in May, in the banks of streams that are near the sea; and after the first hatch is reared, returns to lay a second time in the same place.

As this bird has been said to build her nest upon the sea, that she might not be interrupted in this task, she has been said to be possessed of a charm to allay the fury of the waves; and the poets, indulging the powers of imagination, have dressed the story in all the robes of romance. The following is Mr. Fawkes's translation of what Theocritus has said upon the subject.

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.

Both Aristotle and Pliny informs us, that this bird is most common in the seas of Sicily: that it sits only a few days, and those in the depth of winter; and that, during that period, the mariner may sail in full security: they were therefore stiled *halcyon* days; and, in after times, those words expressed any season of prosperity.

The ancient poets are full of fables relative to this bird, nor are their historians exempt from them. Cicero has written a long poem in praise of the *halcyon*, of which only two lines are now remaining. These fables have even been adopted by St. Ambrose, one of the earliest fathers of the church. "Behold," says he, "the little bird, which in the midst of the winter lays her eggs on the sand by the shore. From that moment the winds are hushed; the sea becomes smooth; and the calm continues for fourteen days. This is the time she requires; seven days to hatch, and seven days to foster her young. Their Creator has taught these little animals to make their nest in the midst of the most stormy season, only to manifest his kindness by granting them a lasting calm. The seamen are not ignorant of this blessing; they call this interval of fair weather their *halcyon* days; and they are particularly careful to seize the opportunity, as they need fear no interruption."

Innumerable instances might be produced of the credulity of mankind with respect to this bird; but the King-fisher, with which we are now acquainted, has none of those powers of allaying the storm, or building upon the waves: it is contented to make its nest on the banks of rivers, in such situations as not to be affected by the rising of the stream. When it has fixed upon a proper place, it makes with its bill a hole about a yard deep: sometimes it finds the deserted hole of a rat, or one caused by the root of a tree decaying, of which it takes quiet possession. It enlarges the hole towards the bottom, lines it with the down of the willow, and without any farther preparation, deposits its eggs there.

The nest of the King-fisher is very different from that described by the ancients, by whom it is said to be made in the shape of a long-necked gourd of the bones of the sea-needle. Plenty of bones, and the scales of fishes are indeed found there; but these are only the remains of the bird's food, and not brought there either for the purposes of warmth or convenience. The King-fisher, as Bellonius ob-

erves, feeds upon fish, yet cannot digest their bones or scales, but throws them up again as eagles and owls are seen to do a part of their prey.

In these holes the female King-fisher is often found with from five eggs to nine; and if the nest be robbed, she will again return and lay there. "I have had," says Reaumur, "one of those females brought me, which was taken from her nest about three leagues from my house. After admiring the beauty of her colours, I let her fly again, when the fond creature was instantly seen to return back to the nest where she had just before been made a captive. There, joining the male, she again begins to lay, though it was for the third time, and though the season was very far advanced. At each time she had seven eggs. The older the nest is, the greater quantity of fish-bones and scales does it contain: these are disposed without any order; and sometimes take up a good deal of room."

The King-fisher begins to lay early in the season, and produces her first brood about the beginning of April: the fidelity of the male exceeds even that of the turtle; and while the female is thus employed, he supplies her with large quantities of fish. At that season the hen, contrary to most other birds, is found plump and in good condition.

The modern vulgar have their fables concerning this bird as well as the ancients. It is an opinion generally received among them, that the flesh of the King-fisher will not corrupt; and that vermin will not approach it. With equal foundation it is said, that when this bird is hung up dead, its breast is always pointing to the north. It is certain, however, that the flesh of this bird is utterly unfit to be eaten, though its beautiful plumage preserves its lustre longer than that of any other bird we know.

The AMERICAN KING-FISHER.

With regard to the general form, this bird resembles the European King-fisher, as well as in the bill and feet; but its tail is longer in proportion. The bill is strong and blackish, except towards the base, where it is of a reddish flesh-colour. The head is of a lead-colour, inclining to blue; on the top of which there is a kind of crest, formed of long loose pointed feathers. On each side of the head are two white spots; and the throat and under side of the neck are white. The breast is of a lead-colour. Six or seven of the prime quills are blackish, with small white spots on the outer webs, which altogether form transverse lines of white. The rest of the quills have white tips, and the inner covert feathers of the wings are white, with a little mixture of orange-colour. The tail is of a pale lead-colour, the feathers of which are tipped and transversely marked with narrow bars of white. The belly, the thighs, and the covert feathers under the tail are white: the legs and feet are of a reddish brown, and the claws dusky.

The LITTLE GREEN and ORANGE-COLOURED KING-FISHER.

The length of this bird is about five inches from the tip of the bill to the end of the tail, which is longer in proportion than the common King-fisher. The bill is of a dusky colour, except that the lower chap is reddish towards the base. The throat is of an orange colour, and a mark of the same colour runs on each side from the base of the bill over the eyes. The head, the hind part of the neck, the back, the tail and covert feathers of the wings are of a fine green; and a bar of the same colour runs across the breast; but the sides of the belly are of a bright reddish orange colour. The lower part of the belly, the thighs, and the covert feathers under the tail are white. The tail consists of twelve feathers, the two middle ones being a little longer than the

the rest; and the inner webs are all spotted with white. The inner coverts and ridges of the wings are of a light orange, and the quills are dusky, spotted with a light clay colour on the outer and inner webs, except a few of the outer quills. The legs and feet are small; and the toes, which are of a flesh colour, are connected like those of all other King-fishers.

The KING-FISHER of CATESBY.

This is about the size of a thrush, and is the largest of all those with short tails. The head is large in proportion, and full of feathers, forming an irregular tuft, and of a blue colour. It has a white line under the eyes, and a white spot on the forehead. The breast is white, variegated with streaks of red and blue. The quill feathers of the wings are black tipped with white. The lower part of the belly is white, and the tail blue. It has three toes before, and one behind.

The SMYRNA KING-FISHER.

This bird, which is three times as large as the common King-fisher, has a very long bill of a red colour, thick at the base, and sharp at the point. The iris of the eyes is white; the top of the head, the neck, the lower part of the belly, and the thighs are brown. A broad white stripe runs across the breast into the scapular feathers of the wings. The back, wings, and tail, are of a fine deep green; and the legs and feet are of a beautiful red.

The KING-FISHER of the RIVER GAMBIA.

This bird is almost as large as a thrush, it has a long tail, and its wings are of a sea-green colour. The covert feathers are purple and blue, and the large feathers of the wings are of a dusky brown. The bill is red.

The KING-FISHER of BENGAL.

This is but little inferior to the thrush in size, and its bill is three inches long, of a fine scarlet colour, thick at the base, and sharp at the end. The iris of the eyes is of a fine yellow: the head, the upper part of the neck, and the back are brown; the breast, the throat, and part of the belly are white, having five large brown spots on each side. The lower part of the back, the wings, and the tail are of a fine bluish green, except the covert feathers of the wings, which are brown. The legs and toes are of an orange colour, and very short.

The King-fisher of Surinam is principally distinguished by its forky tail, of which two feathers are longer than the rest.

The SMALL KING-FISHER of BENGAL.

This is about the size of the common King-fisher, and has a fine scarlet bill, pretty thick at the base. It has a yellow spot on the forehead, and a white spot under the throat. A broad black line runs from the bill quite round the eyes. It has a tuft on the head of a dirty reddish colour, and beneath is a dark blue line, separated from the back by a broad white stripe. The back and wings are of a dark blue, and the upper part of the tail is red; but the belly, thighs, and the lower part of the tail are of a beautiful yellow. The legs and feet are reddish.

The QUURBATOS, or FISHER.

This bird is not larger than a sparrow, and its plumage is finely variegated. The bill, which is as long as the whole body, is very strong and sharp, and on the inside is armed with small teeth, resembling those of a saw. These birds skim with great rapidity in the air and on the surface of the water; and they are so numerous on each side of the river

Senegal, that they sometimes amount to several millions. Their nests are composed of earth, mixed with moss and feathers, and are of such curious workmanship, that they are proof against the rains. We are informed by Le Maire, that these nests are made on palm-trees, and at the extremity of the most slender branches; where they hang by a reed or straw of about eighteen inches long, and the bottoms hang like balls in the air.

NATURAL HISTORY of the BEE-EATER.

THE form of this bird is like that of the king-fisher, and the size exceeds that of a black-bird. The bill resembles that of a king-fisher, except that it bends a little more downwards. The feet also are exactly like those of the king-fisher. The tongue is slender, rough towards the end, and jagged as if it had been torn. Some have eyes of a hazel colour, and others of a beautiful red. The head is large in proportion to the body, and the feathers at the base of the upper chap are white, shaded with green and yellow. In some the back part of the head is of a deep red, and in others there is a mixture of green and red. A streak of black passes from the corners of the bill along each side of the head, and extends beyond the eyes. On the upper part of the head the feathers are of a pale yellow: the belly, neck, and breast are of a bluish green, and in some the feathers of the shoulders are blue on the under side, and in others green, with a mixture of red. The large green feathers are of an orange colour, with black tips, intermixed with some that are green. The tail, which is about three inches long, consists of twelve feathers; of which, two in the middle are considerably longer than the rest, and end in sharp points. The colour of the tail is blue in some, and green in others.

The BEE-EATER of BENGAL.

This is about the size of a black-bird. The bill is black, thick at the base, bending downward, and near two inches in length. The eyes are of a beautiful red; and on each side of the head a black streak extends from the corners of the bill to beyond the eyes; and near it, on the under part of the head, the feathers are of a pale yellow. The feathers on the belly; neck, and breast, are of a bluish green, and those on the shoulders in some are blue on the under side, and in others a mixture of red and green. The large wing feathers are approaching to an orange colour, with black and green tips intermixed. The tail, which is upwards of three inches long, consists of twelve feathers, the two middlemost of which are considerably longer than the rest. The colour of the tail is blue in some, and green in others.

Of the EMIGRATION of WATER-FOWL.

OF the vast variety of Water-fowl that frequent this island, it is astonishing to reflect how few are known to breed here: the desire of a secure retreat urges them to leave this country more than the want of food. The bulk of those birds are too timid and shy for so populous a place; but those that breed in the almost inaccessible rocks that impend over the British seas, still continue to build and lay there in vast numbers, having little to fear from the approach of mankind.

The Heron.

The crested Heron and the white Heron only visit us at uncertain seasons; but the common Heron and the Bittern never leave us.

The Curlew.

The Curlew sometimes breeds on our mountains, but the greater part retire to other countries.

The Woodcock.

Woodcocks breed in the moist woods of Sweden, and other cold countries.

The Snipe.

Snipes breed here sometimes, but the greatest part of them, and every other species of this genus, retire elsewhere.

The Lapwing.

The Lapwing continues the whole winter in this island; the Ruff breeds here, but retires in winter. The Red-Shank and Sand-Piper breed and reside here.

The Plover.

The green Plover, the long-legged Plover, and the Sanderling visit us only in winter. The Dot-trel appears in spring and autumn, but does not breed here. The Sea-Lark and the Norfolk Plover breed in England.

The Water-Rail.

The Water-Rail, the Water-Hen, and every species of these two genera, continue with us the whole year.

The Coot.

The Coot is a constant inhabitant of Great Britain.

The Grebe.

The great crested Grebe, the black and white Grebe, and the little Grebe, breed in this island, and never migrate; the others breed in Lapland, and only visit us occasionally.

The Avosetta.

The Avosetta breeds in Jutland, and only visits our shores in the winter time.

The Penguin.

The Penguin or great Auk sometimes breeds in St. Kilda. During Summer, the Auk, the Guillemot, and Pullin inhabit our maritime cliffs in great numbers. The black Guillemot breeds in St. Kilda, in the Bass isle, and in Llandidno rocks.

The Diver.

The Divers breed chiefly in the lakes of Sweden and Lapland.

The Gull.

Every species of the Gull breeds in the British isles, except the Skina and black toed Gull, which inhabit the Ferroe isles, Norway, and Iceland, and only visit our country occasionally.

The Fulmar.

The Fulmar breeds in the isle of St. Kilda, where it continues the whole year, except September and part of October.

The Duck.

Of the numerous species of the Duck kind, we know of no more than five that breed here, viz. the tame Swan, and tame Goose, the Shield-Duck, the Eider-Duck, and a very small portion of the wild Ducks. The rest contribute to form that amazing multitude of water fowl that annually visit the woods and lakes of Lapland, Norway, Sweden, &c.

The Cormorant.

The Cormorant and Shag breed on our high rocks, and remain on our shores the whole year. The Gannet breeds in some of the Scotch isles, and visits our seas in pursuit of the herring and pilchard.

Of the MIGRATION of other BRITISH BIRDS.

IT is to be lamented that none, except two northern naturalists, Mr. Klein and Mr. Eckmark, have professedly treated on the migration of birds. We cannot, however, omit our acknowledgments to two eminent pens who have treated this subject as far as it related to rural œconomy; and in such a manner as to do honour to their respective countries: Mr. Alex. Mal. Berger, and Mr. Stillingsfleet are the gentlemen we mean.

We wish we could induce others of our countrymen to follow their example: the matter can never be exhausted, as every country will furnish new observations; each of which, when compared, will serve to strengthen and confirm the other.

Of the Hawk.

All the ignoble species of this genus breed in Great Britain: of the Falcons, we only know that which is called the Peregrine, which annually builds its nest in the rocks of Llandidno, Caernarvonshire.

Of the Owl.

Every species breeds in this country, except the short-eared Owl, and the little Owl, and it is not certainly known that those do not. Hawks and Owls being birds of prey, have the means of living here at all times, and therefore are not obliged to change their place of abode.

The Butcher-Bird.

The red-backed Butcher-Bird breeds with us; but it is probable the others migrate, as we have not heard of them.

The Crow.

The Royston Crow migrates regularly with the woodcock. It breeds in Sweden and Austria; but it appears very extraordinary that a bird should leave us, whose food is such that it may be found at all seasons in this country.

The Woodpecker.

Woodpeckers continue with us the whole year, their food being to be obtained at all times in the bark of trees.

The Wryneck.

This bird disappears before winter, and revisits us in the spring, a little earlier than the cuckoo. If it feeds only on ants, as several have asserted, the cause of its migration is very evident.

The Cuckoo.

This bird disappears early in autumn; its retreat is entirely unknown to us.

The Nuthatch.

This bird continues in Great Britain the whole year.

The Chough.

As the diet of this bird is corn and insects, it is a constant inhabitant of Great Britain.

The Greus.

The whole of this tribe, except the Quail, continues here the year round. The Quail either leaves us entirely, or retires towards the sea coasts.

BIRDS.



The NUTHATCH



The STARLING



The RING OUZEL



The MERULA or REDSTART



The CRESTED LARK



The PIED FINCH



The GOLD FINCH



The BRAMBLING



The SISKIN



The BUNTING



The CANARY BIRD



The HORTULANUS



PLATE IV

The Bustard.

This continues with us all the year, and inhabits our downs and their vicinities.

The Ring-Dove.

Many of these birds breed here; but the multitude that appears in the winter, is so disproportioned to what continue here the whole year, as to be a convincing proof that the greatest part quit the country in the spring. Perhaps they go to Sweden to breed, and return from thence in Autumn. Mr. Eckmark says they entirely quit that country before winter. The Turtle either leaves us in the winter, or changes its place, and retires to the southern counties.

The Thrush kind.

The Red-Wing and the Fieldfare breed in Norway and other cold countries, where they pass their summers: they feed upon berries, which are found in great plenty in these kingdoms, and tempt them to visit us in the winter. The Fieldfare, Red-Wing, and the Royston Crow, are the only land-birds that constantly and regularly migrate into this island, and do not breed here.

The Stare.

The Stare breeds in this island; though it is probable that many of them remove to other countries for that purpose; for the produce of those that continue here, seems unequal to the vast multitudes of them that appear in winter. Possibly many of them migrate into Sweden.

The Swallow.

At the approach of winter every species disappears.

Slender-billed small Birds.

Though all these feed on worms and insects, yet only part of them leave these kingdoms. The Nightingale, the Black-Cap, the Fly-Catcher, the Willow-Wren, the Wheat-Ear, the Whinchat, the White-Throat, and the Stone-Chatter, leave us before winter; while the small and delicate Golden-Crested Wren braves our severest frosts. It is probable that Spain, or the south of France, is their winter asylum; as they are incapable of very distant flights.

The Grosbeak and Crossbill.

These birds breed in Austria, and seldom visit this island.

The Finches.

All Finches feed on the seed of plants, and all continue in some parts of these kingdoms, except the Siskin, which is said to come from Russia, and is only an irregular visitant. The Linnets shift their quarters, breeding in one part of this island, and remove with their young to others.

Buntings.

All the genus inhabit this island throughout the year, except the greater Brambling, which, in very severe seasons, is forced here from the north.

Tit-Mice.

They feed on insects, and continue the whole year in this country.

Having thus given a history of birds in general, we cannot take leave of this most beautiful part of the creation without reluctance. These splendid inhabitants of air possess all those qualities that can soothe the heart and cheer the fancy: the brightest colours, the roundest forms, the most active manners, and the sweetest music. In sending the imagination in pursuit of these, in following them to the chirruping grove, the screaming precipice, or the glassy deep, the mind naturally lost the sense of its own situation, and, attentive to their little sports, almost forgot the task of describing them. Innocently to amuse the imagination in this dream of life is wisdom; and nothing is useless that, by furnishing mental employment, keeps us for a while in oblivion of those stronger appetites that lead to evil. But every rank and state of mankind may find something to imitate in those delightful songsters; and we may not only employ the time, but mend our lives by the contemplation. From their courage in defence of their young, and their assiduity in incubation, the coward may learn to be brave, and the rash to be patient. The inviolable attachment of some to their companions may give lessons of fidelity; and the connubial tenderness of others, be a monitor to the incontinent. Even those that are tyrants by nature never spread capricious destruction; and, unlike man, never inflict a pain but when urged by necessity.



A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of

NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature.

B O O K III.

A New and Complete History and Description of FISHES in general.

INTRODUCTION concerning FISHES in general.

THE great receptacle of Fishes is the ocean; and some have imagined, that all Fish are naturally of that salt element, and that they have accidentally migrated into fresh water. At this time, some of them swim up rivers to deposit their spawn; but the great body of Fishes keep to the Ocean, and would quickly expire in fresh water. In that extensive abode millions reside, whose very form is a secret to us. The curiosities, and the wants of mankind, have, indeed, forced many from their depths: with the figure of these they are acquainted, but for their pursuits, habits, and manners of gestation, these are all hidden in the turbulent element which they inhabit.

According to Linnæus, the number of Fish, whose names and figure we are in some degree acquainted with, somewhat exceeds four hundred. Most of them have the same external form; sharp at each end, and swelling in the middle; which enables them, with greater celerity and ease, to traverse the fluid which they inhabit. That peculiar shape which nature has granted to most Fishes, human art has endeavoured to imitate in such vessels as are designed to sail with the greatest swiftness; but the progress of such a machine is nothing, compared to the rapidity of an animal. Any of the larger kind of Fish can easily overtake a ship in full sail, play round it without any uncommon exertion, and swim before it at pleasure.

The fins are the chief instruments in the motion of a Fish: in some they are much more numerous than in others. A Fish completely equipped for sailing, is furnished with two pair, and three single fins, two above and one below. Thus qualified, it migrates with the utmost rapidity, and takes voyages of a thousand leagues in a season: but those Fish that have the greatest number of fins, have not always the swiftest motion; the shark, for example, is destitute of the ventral or belly fins, though it is thought to be one of the swiftest swimmers; and the haddock, though completely fitted for swimming, is less rapid in its motion.

Besides assisting the animal in progression, the fins are useful in rising, or sinking, in turning, or

even leaping out of the water. The pectoral fins, like oars, serve to push the animal forward; they are placed a little behind the opening of the gills, and are generally large and strong, answering the same purposes to all Fish in the water, as wings do to a bird in its proper element. By the continued motion of these, the flying Fish sometimes rises out of the water, and flies above an hundred yards, till, fatigued with its exertions, it falls again into the ocean. The ventral fins are placed under the belly, towards the lower part of the body. Whatever may be the situation of the Fish, these are always seen to lie flat on the water, and rather serve to raise or depress the Fish in its element, than assist progressive motion. The dorsal fin is situated along the ridge of the back, and not only serves to keep the Fish in equilibrio, but also to assist in its progressive motion. Many Fishes are destitute of this fin, but it is very large in all flat Fish, which have the pectoral fins proportionably smaller. The anal fin occupies that part between the anus and the tail, and serves to support the fish in its upright situation.

The tail, which is upright in some Fishes, and flat in others, appears to be the grand instrument of motion; the fins being only subservient to it. If the Fish is inclined to turn, a stroke with the tail sends it about: but, if the tail strikes both ways, the motion is progressive. If the dorsal and ventral fins of the Fish be cut off, it reels to the right and left. If it loses the right pectoral fin, it bears on that side: if the ventral fin on the same side be cut away, it loses its equilibrium entirely: but, when the tail is cut off, it is deprived of all motion, and is driven along with the current of the water.

It is certain, however, that the number, the size, and the situation of the fins, seem rather to correspond with the animal's figure, than entirely to answer the purposes of promoting its speed. If the head of the Fish is large and heavy, the pectoral fins are large, and placed forward, to prevent its over-setting. If the head of the Fish is small, sharp-pointed, and not too heavy for the tail, its pectoral fins are small, and it is totally destitute of the ventral fins.

Land animals are generally furnished with a covering to keep off the injuries of the weather, so the inhabitants of the water are covered with a slimy glutinous matter, that defends their bodies from the immediate contact of the surrounding fluid, and assists them in their easy progress through the water. Beneath this, in many kinds, a strong covering of scales is found, which, like a coat of mail, still more powerfully defends it.

But, though the Fish seems as well furnished with the means of happiness, as quadrupeds or birds; yet, on a close examination of its faculties, we shall find it greatly their inferior. The sense of touching, which is enjoyed in some degree by beasts and birds; the Fish, covered up in its own coat of mail, can have but little acquaintance with.

The sense of smelling, so exquisite in beasts, and known a little among birds, is given to Fishes in a very moderate degree. All Fishes, indeed, have one or more nostrils; but as air is the only medium we know for the distribution of odours, it cannot be supposed that these inhabitants of the water can be possessed of any power of being affected by them. If they have any perception of smells, it must be in the same manner as we distinguish by our taste; and the olfactory membrane in Fish, serves them, perhaps, instead of a distinguishing palate.

The sense of tasting is very defective among Fishes; the palate of most of them is hard and bony, and consequently incapable of the powers of relishing different substances: these voracious animals have been often seen to swallow the fisherman's plummet instead of the bait.

The sense of hearing, Fishes are entire strangers to, or they possess it in a very imperfect and limited degree. It is certain, however, that anatomists have not been able to discover, except in the whale kind, the smallest traces of an organ about the head of Fishes. To what purpose, indeed, should this sense be given to animals that are incapable of making themselves heard? Having no voice to communicate with each other, they consequently have no necessity for an organ of hearing. We are told by Mr. Gouan, who kept some gold fishes in a vase, that whatever noise he made, he could not disturb or alarm them. He hallooed as loud as he was able, and the Fishes still appeared insensible: it is necessary to be observed, indeed, that he placed a piece of paper between his mouth and the water, to prevent the vibrations from affecting the surface; and when the paper was removed, and the sound had its full scope upon the water, the Fishes instantly seemed terrified, and shrunk to the bottom. From this, and many other experiments, it is generally believed, that Fishes are as deaf as they are mute.

Fishes are in a tolerable degree possessed of the sense of seeing; and yet, if we compare it to that of other animals, even this appears obscure. The eyes of most Fish are covered with the same transparent skin that covers the rest of the head, which nature seems to have furnished to defend them in the water, as they are without eye-lids. The chrystalline humour, which in quadrupeds is flat, in Fishes is perfectly round, or sometimes in the shape of an egg. Hence it appears, that Fish are extremely near sighted, and that they can see objects but at a very small distance, even in the water.

It is indeed very apparent, that Fish are far behind terrestrial animals in their sensations, and consequently in their enjoyments. Nature seems to have fitted them with appetites and powers of an inferior kind; and formed them for a sort of passive existence in the heavy element to which they are consigned: their senses are incapable of making any distinctions, but they move forward in pursuit of whatever they can swallow, conquer, or enjoy.

A ceaseless appetite impels them to encounter

every danger; and indeed their rapacity seems insatiable. Even when taken out of the water, and almost expiring, they greedily swallow the very bait that allured them to destruction. Their digestive powers seem, in some measure, to increase with the quantity of food they are supplied with. But though their appetites are ever craving, no animals can endure the want of food for so long a time. Gold and silver Fishes, which are kept in vases, are often seen for months without apparent sustenance: whether they feed on the water insects, which are too minute for observation, or whether water alone is a sufficient supply, is not evident. Even the pike, one of the most voracious of Fishes, will live in a pond where there is none but himself.

Fishes that have very small mouths feed upon worms, and the spawn of others; some that have larger mouths, seek larger prey. Those with the largest mouths pursue almost every thing that has life. The life of a Fish, from the smallest to the greatest, is indeed but one scene of hostility, violence, and evasion. The smaller fry, standing no chance in the unequal combat, escape into those shallows where the greater are unable to pursue. There they become invaders in turn, and feed upon the spawn of larger Fish, which floats upon the surface of the water: yet, even in the shallows, they are beset with dangers; the muscle, the oyster, and the scallop, lie in ambush at the bottom, with their shells open, to receive the inadvertent wanderers, imprison them by closing their shells, and prey upon them at their leisure.

The pursuit of Fishes is not, like that of terrestrial animals, confined to a single region, or to a single effort: shoals of one species follow those of another through vast tracts of ocean, from the pole even down to the equator. The cod pursues the whiting even from the banks of Newfoundland to the southern shores of Spain. Thus the cachelot pursues a shoal of herrings, and swallows thousands at a gulp.

Though this may be one cause of the annual migration of Fishes, yet many are induced to change the place of their residence for one more suited to their constitutions, or more adapted to depositing their spawn. None of them delight in very cold water, but generally frequent those places where it is warmest. In summer they abound in the shallows near the shore, where the sun has power to warm the water to the bottom; but in winter they frequent the greatest depths of the sea, where the cold of the atmosphere is not sufficiently penetrating to reach them. Fresh-water Fishes are often seen dead after severe frosts, which have been killed by the severity of the cold, or by their being excluded from air by the ice.

Though all Fish live in the water; yet they all require air for their support. Those of the whale-kind breathe the air in the same manner that we do, and come almost every minute to the surface to take a fresh inspiration: but those which remain entirely under water, must be supplied with air, or they will expire in a very short time. When the ice covers the whole surface of a pond, and thus keeps off the air from the subjacent fluid, we sometimes find the Fish are all destroyed.

In every light we have hitherto considered Fish, they appear inferior to land animals; in the simplicity of their conformation, in their senses, and their enjoyments; but, as some degree of compensation, they enjoy that humble existence a much longer term than any other class of animated nature. We are told, by Bacon, that, "Most of the disorders incident to mankind arise from the changes and alterations of the atmosphere; but Fishes reside in an element little subject to change; theirs is an uniform existence; their movements are without effort,

fort, and their life without labour. Their bones also which are united by cartilages, admit of indefinite extension; and the different sizes of animals of the same kind among Fishes is very various. They still keep growing; their bodies, instead of suffering the rigidity of age, which is the cause of natural decay in land-animals, still continue increasing with fresh supplies; and as the body grows, the conduits of life furnish their stores in greater abundance. How long a Fish, that seems to have scarce any bounds put to its growth, continues to live, is not ascertained; perhaps the life of a man would not be long enough to measure that of the smallest."

Two methods, which are more ingenious than certain, have been devised for determining the age of Fishes; the one is by the circles of the scales, the other by the transverse section of the back-bone. By the first method, when a Fish's scale is examined through a microscope, it will appear to consist of a number of circles, one within another: and, as in trees, their age is known by the number of circles in the transverse section of them; so in Fishes we discover their age by the number of circles in every scale, reckoning one ring for every year. Mr. Buffon found a carp, which, by this method of computation, appeared to be upwards of an hundred years old. However incredible this may appear, the accounts of several authors of veracity tend to confirm the discovery. Gesner mentions one of the same age; and Albertus brings us an instance of one that existed upwards of double that period.

The scate and the ray, having no scales, their ages may be known by the other method, which is, by separating the joints of the back-bone, and then examining the number of rings, which the surface where it was joined exhibits.

We cannot vouch for the certainty of these methods, but we have no reason to doubt the extraordinary age of some Fishes. But the fecundity of these animals is more extraordinary than their longevity. Some produce their young alive, and others only eggs; the former are the least prolific, and yet they bring forth in great abundance. The viviparous blenny, for instance, produces two or three hundred at a time, all alive, which immediately divert themselves by playing round the parent. Those which exclude their progeny in eggs, and are obliged to leave them to chance, at the bottom of shallow water, or floating on the surface where it is deeper, are much more prolific; the stock being in some degree proportioned to the danger there is of its consumption. But very few of these eggs produce an animal, as they are devoured by Fishes and aquatic birds; still, however, the numbers that escape are

sufficient to supply the deep with inhabitants, and to relieve the wants of a very considerable part of mankind.

The number that a single Fish is capable of producing appears astonishing: a single cod is said to produce, in one season, as many of its kind, as there are inhabitants in England. Lewenhoeck assures us, that, in one season, the cod spawns above nine million of eggs: the flounder produces above one million, and the mackarel above five hundred thousand. This amazing increase preserves the species in the midst of innumerable enemies, and furnishes the rest with a sustenance suitable to their nature.

All Fishes, except those of the whale kind, are destitute of those parental solitudes, which so strongly mark the manners of the greater part of the terrestrial animals. When they have deposited their burthens, they leave their little progeny to shift for themselves. The spawn continues in its egg state, in proportion to the size of the animal. The young of the salmon, for instance, continue in the egg, from the beginning of December till the beginning of April; those of the carp continue in the egg about three weeks; and the little gold-fish of China is more expeditiously produced; but, scarce one in a thousand survives the numerous perils of its youth: the very male and female that brought them forth are equally dangerous and formidable with the rest.

There are some Fishes, indeed, that possess finer organs, and higher sensations; that nurse their young with care and tenderness, and protect them from all injuries: the *cetaceous* tribe, or the Fishes of the whale kind, are of this kind. The *cartilaginous* kinds, or those which have gristles instead of bones, bring their young alive into the world, and, though not capable of nursing them, defend them with activity and courage. But the fierce regardless tribe that leave their spawn without any protection, are called the *spinous*, or bony kinds; their bones resembling the sharpness of a thorn.

Thus the three grand divisions in the Fish kind are the *cetaceous*, the *cartilaginous*, and the *spinous*; all differing from each other in their conformation, their appetites, and their production.

Physicians assure us, that Fishes afford but very little nourishment as food, and soon corrupt: that they are cold and moist, and consequently produce juices of the same kind, which are ineffectual in strengthening the body: that they abound in a gross sort of oil and water; that they have few volatile particles, and are therefore less fit to be converted into the substance of our bodies.

C H A P. I.

NATURAL HISTORY of FISHES of the CETACEOUS KIND, viz. the WHALE and its Varieties, the CACHALOT, the DOLPHIN, the GRAMPUS, and the PORPUS.

NATURAL HISTORY of the GREENLAND WHALE.

LAND animals, compared with those of the deep with respect to magnitude, appear contemptible in the competition. It is indeed probable, that quadrupeds once existed much larger than those that are to be found at present; for it is evident, from the skeletons of some that have been dug up at different times, that there must have

been terrestrial animals twice as large as the elephant: but creatures of such enormous bulk required a proportionable extent of ground for subsistence, and, being rivals with men for large territory, they perhaps have been destroyed in the contest.

This species is the largest animal of which we have any certain information: it is even at present sometimes found in the northern seas ninety feet in length; but formerly they were taken of a much greater

greater size, when the captures were less frequent, and the fish had time to grow. Such is their bulk within the arctic circle, but in those of the torrid zone, where they are unmolested, Whales are still seen one hundred and sixty feet long.

It is a large heavy animal, and the head alone makes a third of its bulk: the under lip is much broader than the upper. The tongue is composed of a soft spongy fat, capable of yielding five or six barrels of blubber. The gullet is very small for so vast a fish, not exceeding four inches in width. In the middle of the head are two orifices, through which it spouts water to a vast height, and with a great noise, especially when disturbed or wounded. The eyes are not larger than those of an ox: they are placed towards the back of the head, being the most convenient situation for enabling them to see both before and behind. On the back there is no fin; but on the sides, beneath each eye, are two large ones. The tail is broad and semi-lunar; and when the fish lies on one side, its blow is tremendous.

This Whale varies in colour; the back of some being red, and the belly generally white. Some are black, others mottled, and others quite white, according to the observations of Marten, who says, that their colours in the water are extremely beautiful, and that their skin is very smooth and slippery.

What is called Whalebone, adheres to the upper jaw of the animal, and is formed of thin parallel laminæ, some of the longest being four yards in length: of these there are commonly three hundred and fifty on each side, and in old fish a great many more; of these about five hundred are of a length proper for use, the others being too short. They are surrounded with long strong hair, not only to prevent their hurting the tongue, but as strainers to prevent the return of their food when they discharge the water out of their mouths.

From these hairs Aristotle gave the name of *the bearded Whale*, to this species, which he tells us had in its mouth hairs instead of teeth; and Pliny describes the same under the name of *musculus*. Though the ancients were acquainted with these animals, yet it appears they were ignorant of their uses, as well as of the method of fishing for them.

Aldrovandus, indeed, describes from Oppian, what he mistakes for Whale fishing: he was deceived by the word *κντος*, which is used not only to express Whale in general, but any great fish. The poet here meant the shark, and shews the way of taking it in the very manner practised at present, by a strong hook baited with flesh. He describes too its three-fold row of teeth, a circumstance which at once disproves its being a Whale:

Whose dreadful teeth in triple order stand,
Like spears out of his mouth.

Though so bulky an animal, the Whale swims with vast swiftness, and generally against the wind. It brings either one or two young at a time. Its food is a certain sort of small snail, and, as Linnæus says, the *medusa*, or sea blubber.

The great resort of this species is within the arctic circle, but they sometimes visit our coasts. Whether this was the British Whale of the ancients, we cannot pretend to say, only we find, from a line in Juvenal, that it was of a very large size.

As much as British Whales in size surpass
The Dolphin race.

The English were late before they engaged in the Whale fishery: it appears by a set of queries, proposed by an honest merchant in the year 1575, in order to get information in the business, that we were

then totally ignorant of it, being obliged to send to "Biskaine for men skilful in the catching of the Whale, and ordering of the oil, and one cooper skilful to set up the staved cask." This indeed appears very strange; for by the account Oether gave of his travels to king Alfred, near seven hundred years before that period, it is evident, that he made that monarch acquainted with the Norwegians practising the Whale fishery; but it seems all memory of that profitable employ, as well as of that able voyager Oether, and all his important discoveries in the north, were lost for near seven centuries.

It was carried on by the Biscayeners long before we attempted the trade, not only for the sake of the oil, but also of the Whalebone, which they seem to have long trafficked in. The earliest notice we find of that article in our trade is by Hackluyt, who says it was brought from the bay of St. Laurence by an English ship that went there for the *barbes* and *fynnes* of Whales, and train oil, A. D. 1594, and who found there seven or eight hundred *Whale fynnes*, part of the cargo of two great *Biskaine* ships, that had been wrecked there three years before. Previous to that, the ladies stays must have been made of split cane, or some tough wood, as Mr. Anderson observes in his Dictionary of Commerce; it being certain, that the Whale fishery was carried on, for the sake of the oil, long before the discovery of the use of Whalebone.

The great resort of these animals was found to be on the inhospitable shores of Spitzbergen, and the European ships made that place their principal fishery, and for numbers of years were very successful: the English commenced that business about the year 1598, and the town of Hull had the honour of first attempting that profitable branch of trade. At present it seems to be on the decline; the quantity of fish being greatly reduced by the constant capture for such a vast length of time: some recent accounts inform us, that the fishers, from a defect of whales, apply themselves to the seal fishery; from which animals they extract an oil. We are also told, that the poor natives of Greenland begin to suffer from the decrease of the seal in their seas, it being their principal subsistence; so that should it totally desert the coast, the whole nation would be in danger of perishing through want.

In ancient times, the Whale seems never to have been taken on our coasts, but when it was accidentally flung ashore: it was then deemed a royal fish, and the king and queen divided the spoil; the king asserting his right to the head, and her majesty to the tail.

The Whale uses the tail only to advance itself forward in the water; this serves as an oar to push its mass along; and its enormous bulk cuts through the ocean with amazing force and celerity. The fins are principally used for turning in the water, and giving a direction to the velocity impressed by the tail.

The Whale produces its young at the end of nine or ten months, and is fatter at that time than usual, particularly when she is near her time of bringing forth. When she suckles her young, she throws herself on one side on the surface of the sea, and the young ones attach themselves to the teat. She has two breasts, which are white in some, and speckled in others, and are filled with milk, resembling that of land animals.

The tenderness of the female for her offspring is very remarkable: wherever she goes, she carries it with her, and when closely pursued, keeps it supported between her fins. Even when wounded, she still clasps her progeny. If she plunges to avoid danger, she takes it to the bottom with her, but rises more frequently than usual, in order to give it breath.

They

They are generally seen in shoals of different kinds together, and migrate from one ocean to another in very large companies. It appears astonishing how a number of these enormous animals find subsistence together; and still more extraordinary that they are usually fatter than any other animals of whatsoever element.

The Whale is an inoffensive animal, and consequently has many enemies, which take advantage of his disposition, and his inability to combat: a small animal of the shell-fish kind, called the whale-louse, sticks to his body, like shells that are seen at the foul bottom of a ship. It usually takes its station under the fins, and, spite of the efforts of the Whale, it continues its hold, and lives upon the fat; nature having furnished it with instruments adapted to the purpose.

The sword-fish is also a terrible enemy to the Whale: the latter has no instrument of defence except the tail, with which it endeavours to strike the foe. And indeed a single blow taking place would effectually kill it: but the sword-fish is extremely active, and easily avoids the stroke; then bounding into the air, it falls upon its adversary, not with intent to pierce with its pointed beak, but to cut with its toothed edges. "The sea," says Anderson, "all about is dyed with blood, proceeding from the wounds of the Whale; while the enormous animal vainly endeavours to reach its invader, and strikes with its tail against the surface of the water, making a report at each blow louder than the noise of a cannon."

A cetaceous animal, called, by the fishermen of New England, the killer, is a still more powerful enemy. A number of these surround the Whale; some attack it with their teeth before, and others behind, till the great animal is subdued; and, when it becomes their prey, it is said that they only devour its tongue.

But, the greatest of all the enemies of the Whale, is man: he destroys more of those enormous fishes in a year than the rest do in an age. The great resort of these animals was on the inhospitable shores of Spitzbergen; where the distance of the voyage, the severity of the climate, the dangers of the icy sea, together with their own formidable bulk, might have been expected to protect them from human injury: all these however were but slight barriers against the arts, the courage, and the necessities of man.

The flesh of the Whale is considered as a dainty in some nations, and the French seamen sometimes dress and use it as their ordinary diet: the English and Dutch sailors say it is hard and ill-tasted, but the French assert the contrary. The savages of Greenland, and those near the south pole, are exceedingly fond of it. They not only eat the flesh, but drink the oil, which they esteem one of their greatest delicacies. When they are so fortunate as to find a dead Whale, they make their abode near it, and seldom remove while any flesh remains upon the bones.

In the court-yard of St. James's, is placed one of the bones of the lower jaw of a Whale. We think it not impertinent to mention this, as it may tend to rectify a mistake of the numerous spectators who daily view it, and who in general suppose it to be a rib. They may, however, be easily distinguished; for the jaw-bone is of an irregular bend, and the rib is circular: and in circumference the jaw-bone measures four times as much as the rib.

The PIKE-HEADED WHALE.

The head is of an oblong form, sloping down, and gradually growing narrower to the nose; about six feet eight inches from the end of which, are two spout-holes, separated by a thin division. The eyes

are small, the pectoral fins about five feet long, and eighteen inches broad. It has a large horny protuberance on the back, about eight feet and an half from the tail; and the tail is about nine feet and an half broad. The belly is uneven, and formed into folds lengthways: the skin, which is remarkably bright and smooth, is black on the back, and white on the belly.

This species has its name from the shape of its nose, which is narrower and sharper pointed than that of other Whales.

This description was made from a Whale taken on the coast of Scotland, which was forty-six feet in length, and its greatest circumference twenty feet.

The ROUND-LIPPED WHALE.

The lower lip of this species is broader than the upper, and of a semi-circular form. One of them was taken near Abercon-castle, which was seventy-eight feet in length, and thirty-five in circumference. The gape was very wide; the tongue fifteen feet and an half long; the mouth was furnished with short whalebone about three feet in length; and two spout holes, of a pyramidal form, were on the forehead. The eyes were thirteen feet from the end of the nose: the length of the pectoral fins was ten feet; and the height of the back fin three feet. The back fin was placed near the tail, which was eighteen feet in breadth. The belly was full of folds.

There are no less than seven different kinds of the Whale, properly so called, viz.

The great Greenland Whale, which is black on the back, and has no back-fin.

The Iceland Whale, which is whitish on the back, and has no back-fin.

The New England Whale, which has a hump on the back.

The Whale with six humps on the back.

The fin fish, which is distinguished by a fin on the back, placed very low, and near the tail. Its length is equal to that of the common kind, but it is much more slender. The blubber on the body of this kind is very inconsiderable, which, added to its extreme fierceness and agility, render the taking of it very dangerous, and cause it to be neglected by the fishermen; who are greatly disappointed on seeing it, for, on its appearance, the others retire out of those seas.

NATURAL HISTORY of the CACHALOT, or SPERMACETI WHALE.

A Whale of this species was brought into Greenland dock, by a trading vessel, in January, 1762. Those who were concerned in taking it, give the following account of this fish, and the manner in which it was killed.

Going through the Hope, they saw something floating at a distance, which had the appearance of the mast of a ship; but, as they approached it, they perceived it to be a large fish, and, upon seeing it cast up a great quantity of water, concluded it was a Whale. They chased him ashore below the Hope-Point, and then went off to him in their boats. He seemed a motionless lump, his head and tail being concealed in the water. At first they pierced the prominent parts; and, after having dug a hole about twelve inches deep, a great torrent of blood issued forth. Then they withdrew to some distance, and soon after the boat had passed him, (as the water was deep enough over his tail) he struck the ground with such violence, as to force up stones and mud to a considerable height in the air. They waited about three quarters of an hour, and then he expired with the most horrible groans. After this, they fastened a cable to his body, and at length



Thornton sculp

View of the WHALE FISHERY, &c. *in Greenland.*

length brought him to Greenland-Dock, where he was daily visited by several thousands of people. Indeed the curiosity of the people drew them to Greenland-Dock, after the Whale stunk so extremely, as to be offensive at an hundred yards distance.

They took out of his head eight puncheons of spermaceti, which lay between the eyes and the spout-hole, in different cells of the brain. Its length was fifty-four feet, and its breadth fourteen; and the length of the lower jaw was ten feet; the tail measured fifteen feet.

The skeleton of a Whale of this kind was lately shewn at Mr. Rackstrow's exhibition-room, in Fleet-street. Those who shewed this curiosity said it would contain thirty people in its head, and fifty in its chest; and that twelve hogheads of spermaceti oil had been taken out of its upper jaw, or rather that part of the head above it, which was entirely composed of flesh and oil.

This Whale was thrown ashore on the Isle of Thanet, February 2, 1762, and measured, from the snout to the tail-fin, seventy-two feet. The upper jaw, which appeared to be one solid bone, was sixteen feet long, and six broad at the top, where it was widest, and from whence it grew narrower to the end of the snout, which terminated in a point. Along the middle of it run a deep round groove, through which he sucked up the water, which he afterwards discharged at the spout-hole. From the top of this jaw proceeded a large thick bone, which turned upwards almost perpendicularly to the height of about four feet, and formed part of a kind of skull. The under jaw was much narrower than the upper, which is just the reverse of the toothless Whale. At the distance of about eight feet from the snout, it divides and becomes forked, in order to receive in the cavity a protuberance of the upper jaw, which seems exactly to fit it. This jaw had two rows of teeth, of which only one tooth then remained; but this being quite loose, and kept in its place only by a piece of wire, it seems doubtful whether it be the real tooth or not. The upper jaw has no teeth; but, instead of it, there is a groove or socket to receive those of the lower: so that, when the mouth was shut, they must have resembled so many pointed weapons in a sheath.

The sockets of the eyes, which were almost round, and placed nearly at the farthest part of the jaws, measured about eighteen inches over. Hence, what is told us by some writers, that the chrySTALLINE humour of the eye in this fish is not larger than a pea, must appear to common reason as a fable; for it cannot be conceived, that nature is so unequal in her proportions. Beyond the sockets of the eyes are the two fin bones, which are very thick, five feet long, and two feet three inches in the broadest part.

There were eleven ribs on each side, the largest of which was ten inches in circumference. They formed a cavity, eight feet wide, within the body of the fish, and in which were contained the heart, lungs, &c. The back-bone was nearly the same distance from the floor, by which the ribs were supported. The back-bone, which is three feet ten inches thick, measured in the round part only; (the upper part of it being closely set, throughout the whole length of it, with spinal bones, like those of a hog) and the tail-fins, composed the rest of this skeleton. The tail-fins were each eight feet long.

Though many parts of this skeleton seemed much decayed, owing perhaps in a great measure to the injuries it must have unavoidably received in being removed from place to place, it was nevertheless highly worthy the attention of those, who delight in natural curiosities.

The substance called Spermaceti, which is prepared from the brain of this Whale, is an excellent

balsamic, and a very valuable medicine in diseases of the breast; as also to blunt the sharpness of the humours. It is very efficacious in old coughs, proceeding from defluxions, and in all internal ulcers. Indeed, various are the uses of this medicine, with respect to internal application: when applied externally, it is emollient and vulnerary, and is often used as a cosmetic, to soften the skin, and to render the complexion clear.

The GREAT-HEADED CACHALOT.

The head of this species is of an oblong form, and of such a bulk as to exceed that of all the rest of the body. The end of the upper jaw is about five feet longer than that of the lower: the spout hole is placed a little above the middle of the nose, and is divided in the middle, and covered with a lid. In the lower jaw there are forty-two teeth, bent like a sickle, thick in the middle, and growing smaller towards each end. The eyes are very small, not exceeding those of a haddock in magnitude; on the middle of the back it has a long spine instead of a fin: the skin has a silky appearance, is thin, and of a black colour. The length of this species is usually about fifty-four feet; and Linnæus informs us, that it pursues and terrifies the porpus so much, as frequently to drive them on shore.

The ROUND-HEADED CACHALOT.

One of this species was cast ashore on one of the Orkney isles, about twenty-four feet in length. The head of it was round, and the opening of the mouth small: the teeth were about an inch and three quarters long, and about the thickness of a man's thumb in the largest part. It had a rough place on the back, instead of a fin.

The HIGH-FINNED CACHALOT.

The spout-hole of this animal is placed in the front, and it has a fin on the middle of the back, which *Sibbald* compares to the mizen mast of a ship. The head abounds with the best sort of spermaceti. The teeth are slightly bent, about seven inches in length, and the greatest circumference nine. They are much compressed on the sides, and the points are rather blunt than flat: they are thin towards the bottom, having a very narrow but long orifice, or slit, hollowed to the depth of five inches and a quarter; and the teeth are immersed in the jaw as far as that hollow.

NATURAL HISTORY of the DOLPHIN, the GRAMPUS, and the PORPUS.

THESE fish have all teeth both in the upper and the lower jaw, and are much smaller than the whale. The Grampus, which is the largest, seldom exceeds twenty feet, which may be distinguished by the flatness of its head, resembling, in some degree, a boat turned upside down. The Porpus resembles the Grampus in many things, but the snout is not above eight feet long; its snout also has more the appearance of that of an hog. The Dolphin greatly resembles the Porpus, except that its snout is longer and more pointed. They have all fins on the back; they have all very large heads, like the rest of the Whale-kind; and resemble each other in their appetites, their manners, and conformations; being equally voracious, active, and roving.

Their great agility prevents their being often taken. They seldom remain a moment above water; sometimes, indeed, their too eager pursuits expose them to danger; and a shoal of herrings often allures them out of their depth. Then indeed the hungry animal continues to flounder in the shallows till knocked on the head, or till the retiring

tide seasonably comes to its relief. But all this tribe, and the Dolphin in particular, are equally swift and destructive. No fish could escape them; but from the aukward position of the mouth, which is placed in a manner under the head: yet, even with these disadvantages, their depredations are so great, that they have long had the appellation of the plunderers of the deep.

The predilection of the ancients in favour of these animals, particularly the Dolphin, is not easily accounted for. Historians and philosophers seem to have contended who should invent the greatest number of fables concerning them. The Dolphin was celebrated in the earliest time for its fondness to the human race, and was distinguished by the epithets of the boy-loving and philanthropist. Scarce an accident could happen at sea, but the Dolphin offered himself to convey the unfortunate to shore. The musician flung into the sea by pirates, the boy taking an airing into the midst of the sea, and returning again in safety, were obliged to the Dolphin for its services. It is indeed difficult to assign a cause why the ancients should thus have invented so many fables in their favour. Their figure is far from prejudicing us in their interests; their extreme rapacity tends still less to endear them: we know nothing that can reconcile them to man, and excite his prejudices, except that when taken they sometimes have a plaintive moan, with which they continue to express their pain till they expire. This, at first, might have excited human pity; and that might have produced affection. At present they are regarded even by the vulgar, in a very different light; their appearance is far from being esteemed a favourable omen by the seamen; and from their boundings, springs, and frolics in the water, experience has taught the mariners to prepare for a storm.

Neither is it to one circumstance only that the ancients have confined their fabulous reports concerning these animals; as from their leaps out of their element, they assume a temporary curvature, which is not their natural figure in the water; the old painters and sculptors have universally drawn them wrong. A Dolphin is scarce ever exhibited by the ancients in a strait shape, but curved, in the position which they sometimes appear in when exerting their force; and the poets too have adopted the general error. Even Pliny has asserted, that they instantly die when taken out of the water; but Rondelet, on the contrary, assures us, that he has seen a Dolphin carried alive from Montpellier to Lyons.

The moderns have juster notions of these animals, and disregard the many fables which every day's experience contradicts. Indeed their numbers are so great, and, though shy, they are so often taken, that such peculiarities, if they were possessed of any, would have been long since ascertained. They are found, the porpus especially, in such vast numbers, in all parts of the sea that surrounds this kingdom, that they are sometimes noxious to seamen, when they sail in small vessels. In some places they almost darken the water as they rise to take breath, and particularly before bad weather, are much agitated, swimming against the wind, and tumbling about with unusual violence.

Whether these motions of the Dolphin are the gambols of pleasure, or the agitations of terror, is not certainly known. Probably they dread those seasons of turbulence, when the lesser fishes shrink to the bottom, and their prey no longer present themselves in sufficient abundance. When the weather is fair, they are seen herding together, and pursuing shoals of various fish with great impetuosity. Their method of hunting their game, is to follow in a pack, and thus give each other mutual assistance. At that season, when the mackarel, the herring, the salmon, and other fish of passage, begin to make

their appearance, the cetaceous tribes are seen fierce in the pursuit; urging their prey from one creek or bay to another, deterring them from the shallows, driving them towards each other's ambush, and using a greater variety of arts than hounds are seen to exert in pursuing the hare. However, the porpus not only seeks for prey near the surface, but often descends to the bottom in search of sand-eels and sea-worms, which it roots out of the sand with its nose, as hogs harrow up the fields for food. For this purpose the nose projects a little, is shorter and stronger than that of the Dolphin; and the neck is furnished with very strong muscles, which enable it the readier to turn up the sand.

Sometimes indeed it happens, that the impetuosity, or the hunger, of these animals, in their usual pursuits, urges them beyond the limits of safety. The fishermen, who extend their long nets for pilchards, on the coasts of Cornwall, have sometimes an unwelcome capture in one of these. Their feeble nets, which are calculated only for taking smaller prey, suffer an universal laceration, from the efforts of this strong animal to escape; and if it be not knocked on the head, before it has had time to flounder, the nets are destroyed, and the fishery interrupted. There is nothing, therefore, they so much dread, as the entangling a porpus; and they do every thing to intimidate the animal from approaching.

These animals are so violent in the pursuit of their prey, that they sometimes follow a shoal of small fishes up a fresh-water river, from whence they find it difficult to return. We have often seen them taken in the Thames at London, both above the bridges and below them. It is curious enough to observe with what activity they avoid their pursuers, and what little time they require to fetch breath above the water. The manner of killing them is for four or five boats to spread over the part of the river in which they are seen, and with fire-arms to shoot at them the instant they rise above the water. The fish being thus for some time kept in agitation, requires to come to the surface at quicker intervals, and thus affords the marksmen more frequent opportunities.

The porpus yields a very large quantity of oil; and the lean of some, particularly if the animal be young, is said to be as well tasted as veal. The inhabitants of Norway prepare, from the eggs found in the body of this fish, a kind of caviare, which is said to be very delicate sauce, or good when even eaten with bread. There is a fishery for porpus along the western isles of Scotland during the summer season, when they abound on that shore; and this branch of industry turns to good advantage.

We are told that these animals go with young ten months; that, like the whale, they seldom bring forth above one at a time, and that in the midst of summer: that they live to a considerable age; and that they sleep with the snout above water. They seem to possess, in a degree proportioned to their bulk, the manners of whales; and the history of one species of cetaceous animals will, in a great measure, serve for all the rest.

The parts of the Dolphin, appropriated to medicinal uses, are the liver, the ashes, the belly, and the fat. The belly dried, triturated, and exhibited in some proper liquor, is said to cure splenetic patients. It is said, that the liver roasted, and used with aliments, perfectly cures tertian and quartan fevers; as also that species of nocturnal fever known by the name of typhus. The ashes are, by Pliny, enumerated among the medicines which cure the ring-worm and leprosy. According to the same author, the fat melted, and drank with wine, cures dropsical patients.

C H A P. II.

NATURAL HISTORY of FISHES of the CARTILAGINOUS KIND, viz. *the LAMPREY, the PRIDE, the SKATE, the RAY, the TORPEDO, the THORNBAC, the STING-RAY, the ANGEL-FISH, the DOG-FISH, the FROG-FISH, the SHARK, the SEA-FOX, the TOPE, the SAW-FISH, the STURGEON, the SUN-FISH, the LUMP-FISH, the SEA-SNAIL, and the PIKE-FISH.*

OF CARTILAGINOUS FISH.

ALL those Fishes, whose muscles are supported by cartilages instead of bones, are called Cartilaginous. Many of the Cartilaginous Fish are viviparous, being excluded from an egg which is hatched within them. The egg consists of a white and a yolk, and is lodged in a case, formed of a thick tough substance, resembling softened horn: such are the eggs of the ray and shark kinds. Some indeed differ in this respect, and are oviparous: such is the sturgeon and others.

Like the ray, some of them breathe through certain apertures beneath; like the shark, others breathe through apertures on their sides; or, like the pike-fish, others breathe through an aperture on the top of the head, for they have not covers to their gills like the bony Fish. Fishes of the Cartilaginous kinds have their bones always soft and yielding; and age, which hardens the bones of other animals, contributes still more to soften theirs. The size of all Fishes increases with their age; but from the pliancy of the bones in this tribe, they seem to have no bounds placed to their dimensions: it is indeed supposed, that they grow larger every day that they exist. They usually choose colder seasons and situations than other Fish for propagating their kind; and many of them bring forth in the midst of winter.

NATURAL HISTORY of the LAMPREY.

LAMPREYS are sea-fish, but, like the salmon, they quit the salt waters about the latter end of the winter, or the beginning of spring; and, after a stay of a few months, return again to the ocean, a very few excepted. Though the Severn is the most noted for them, they are found at certain seasons of the year not only in several of our rivers, but in the most considerable of the Scotch and Irish rivers. They are the most in season in the months of March, April, and May; for they are much firmer when just arrived out of the salt water, than they are afterwards; it having been observed, that they appear wasted and very flabby, at the approach of hot weather.

It has been an ancient custom, for the city of Gloucester to present annually to his majesty a Lamprey pye, covered with a large raised crust. As this present is made at Christmas, the corporation find it extremely difficult at that time to procure any fresh Lampreys, it being so early in the season; and sometimes they have been known to purchase them at a guinea a-piece.

Lampreys are sometimes found that weigh four or five pounds: when either potted or stewed, they are reckoned a great delicacy; but they are a forfeiting food, as one of our monarchs fatally experienced; the death of Henry the First being occasioned by a plentiful meal of Lampreys.

The mouth of this fish is round, and placed rather obliquely below the end of the nose: the edges are jagged, which enables them to adhere more strongly to the stones, as their custom is; and from which they are not to be drawn off without some difficulty. There are twenty rows of single teeth

placed in the mouth of this animal, disposed in circular orders, and placed far within. The colour of the fish is dusky, marked with irregular spots of dirty yellow, which gives it a disagreeable appearance.

There is a species called the lesser Lamprey, which grows to the length of about ten inches. The colour of the back is dusky, sometimes mixed with blue; and the whole under side is silvery. They are found in the Thames, Severn, and Dee; and, when potted, are by some preferred to the larger kind. Great numbers are taken about Mortlake.

NATURAL HISTORY of the PRIDE.

THESE are frequent in the rivers near Oxford, particularly the Isis; but they are to be found in other English rivers; where, instead of concealing themselves under the stones, they plunge into the mud, and never are seen to adhere to any thing like other Lampreys. The body is marked with several transverse lines, passing the sides from the back to the bottom of the belly. The back fin is not angular, like that of the former, but of an equal breadth. The tail is sharp at the end.

NATURAL HISTORY of the SKATE.

IN proportion to its bulk, the Skate is the thinnest of any of the genus, and also the largest, some weighing near an hundred pounds. The nose is short, and sharp-pointed; it has a set of short spines above the eyes: the whole of the upper part is of a pale brown, and sometimes streaked with black: the lower part is white, marked with numerous minute black spots: the jaws are covered with small granulated, but sharp pointed teeth. The tail, which is of a moderate length, has two fins near the end of it. One row of spines passes along the top of it, and a few others are irregularly dispersed on the edges. It is remarked, that in the males of this species the fins are full of spines.

Skates generate in March and April, at which time they swim near the surface of the water, several of the males pursuing one female. The females cast the bags in which the young are included, from May to September. They are exceedingly poor and thin in October, but they begin to improve in November, and grow gradually better till May, at which time they are in the highest perfection.

All fishes of this kind are ranker when first taken, than when they have been kept for two or three days.

NATURAL HISTORY of the SHARP-NOSED RAY.

THE nose of this fish is very long, narrow, and sharp-pointed, resembling the end of a spontoon. The body is smooth and thin, in proportion to the size. The upper-part is ash-coloured, spotted with numbers of white spots, and a few black ones: the lower part is entirely white: the tail is thick,

thick, with two small fins towards the end. The mouth is large, and furnished with numerous small sharp teeth, bending inwards. On each side of the tail is a row of small spines, and another row runs up the middle.

Mr. Ray mentions the fondness of this Ray for human flesh, and the method it takes of destroying men, by overlaying them, and keeping them down by its vast weight, till they are drowned. *Phile* gives nearly the same account of them; and we cannot refuse giving them credit, since Ulloa gives exactly the same account of a fish found in the South Seas, which is the terror of those employed in the pearl fishery. It is said to surround, or wrap up, the unhappy divers till they are suffocated; to guard against which, the negroes never plunge into the water without a sharp knife to defend themselves against the assaults of this formidable enemy.

One of this species was taken in the streight that divides Anglesea from Caernarvonshire in 1768, which was near seven feet in length, and five feet two inches in breadth. It made a most remarkable snorting noise, when it was first brought on shore.

The ROUGH RAY.

The Rough Ray derives its Latin name from the instruments used by fullers in smoothing cloth, the back being rough, with small spines resembling those instruments. These spines are spread over the head, and the upper part of the fins, as well as over the back: near the eye is a semi circular order of large spines, and about the nose are a few others; a row of the same kind extends half way down the back; and the tail is armed with a double row of still greater spines. The upper part is a mixture of ash-colour and yellow, and the lower part of the body is entirely white.

The Rough Ray inflicts but slight wounds with the prickles with which almost its whole body is covered. It appears harmless to the ignorant, and any one would, at first sight, venture to take it in his hand, without any apprehensions; but the adventurer would soon find, that there is not a single part of its body that is not armed with spines; and that there is no method of seizing the animal, but by the little fin at the end of the tail.

NATURAL HISTORY of the CRAMP-RAY, or TORPEDO.

THE Torpedo is a well-known formidable animal: the narcotic, or numbing quality of this fish, has been taken notice of in all ages. The body of this fish is almost circular, and thicker than others of the ray kind. The skin is soft, smooth, and of a yellowish colour, marked with large annular spots like the rest of the kind; the eyes are very small; the tail tapering to a point; and the weight of the fish from five to fifteen pounds. From its outward appearance, no person would suppose it to be furnished with any extraordinary powers; it has no muscles that seem calculated for any great exertions; no internal conformation essentially differing from the rest of its kind; yet such is that unaccountable power it possesses, that, when alive, it instantly deprives the person who touches it of the use of his arm, and even affects him if he touches it with a stick. Oppia says it will benumb the astonished fisherman, even through the whole length of line and rod.

The hook'd Torpedo ne'er forgets its art,
But soon as struck begins to play its part,
And to the line applies its magic sides;
Without delay the subtle power glides
Along the pliant rod, and slender hairs,

Then to fisher's hand as swift repairs:
Amaz'd he stands; his arms of sense bereft,
Down drops the idle rod; his prey is left:
Not less benumb'd than if he'd felt the whole
Of frost's severest rage beneath the arctic pole.

The shock given by the Torpedo resembles the stroke of an electrical machine. Kempfer gives us the following account of it. "The instant," says he, "I touched it with my hand, I felt a terrible numbness in my arm, and as far up as my shoulder. Even if one treads upon it with the shoe on, it affects not only the leg, but the whole thigh upwards. Those who touch it with the foot, are seized with a stronger palpitation than even those who touch it with the hand. This numbness bears no resemblance to that which we feel when a nerve is a long time pressed, and the foot is said to be asleep; it rather appears like a sudden vapour, which, passing through the pores in an instant, penetrates to the very springs of life, from whence it diffuses itself over the whole body, and gives real pain. The nerves are so affected, that the person struck imagines all the bones of his body, and particularly those of the limb that received the blow, are driven out of joint. All this is accompanied with an universal tremor, a sickness of the stomach, a general convulsion, and a total suspension of the faculties of the mind. In short, such is the pain, that all the force of our promises and authority, could not prevail upon a seaman to undergo the shock a second time. A negroe, indeed, that was standing by, readily undertook to touch the Torpedo; and was seen to handle it without feeling any of its effects. He informed us, that his whole secret consisted in keeping his breath; and we found, upon trial, that this method answered with ourselves. When we held in our breath, the Torpedo was harmless, but when we breathed ever so little, its efficacy took place."

Though Kempfer has given a good description of the effects of this animal's shock, yet succeeding experience has convinced us, that holding the breath will not preserve us from its violence; tho' the fish may be sometimes touched with perfect security.

Great as the powers of this fish are when in vigour, they are impaired as it declines in strength, and totally cease when it expires. No noxious qualities are imputed to it as a food, for they are frequently eat by the French, who find them more frequently on their coasts, than we do on ours.

There is a double use in this strange power the Torpedo is endued with: it is exerted as a means of defence against voracious fish, which are at a touch deprived of all possibility of seizing their prey; and by concealing itself in the mud, and benumbing the fish that are carelessly swimming about, it makes a ready prey of them.

The Torpedo inhabits hot or warm climates, and is rarely taken in the British seas.

It is generally supposed, that the female Torpedo is much more powerful than the male. Lorenzini, who has made several experiments upon this animal, is of opinion, that its power wholly resides in two thin muscles that cover a part of the back. These he calls the trembling fibres; and he seems convinced, that the animal may be touched with safety in any other part. It is now generally known, that there are other fish of the ray kind, possessed of the numbing quality, which has acquired them the name of the Torpedo. Atkins and Moore describe these as shaped like a mackarel, except that the head is considerably larger.

Condamine describes a fish possessed of the powers of the Torpedo, of a shape very different from the former, and greatly resembling a lamprey. He also informs us, that if it is touched by the hands,

FISHES

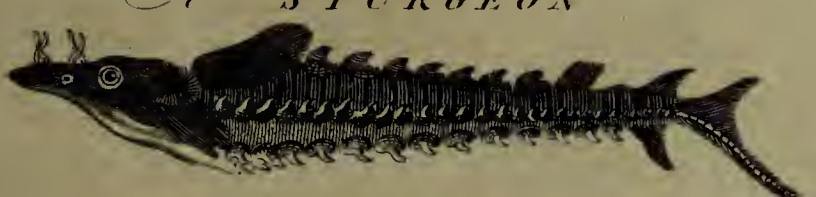
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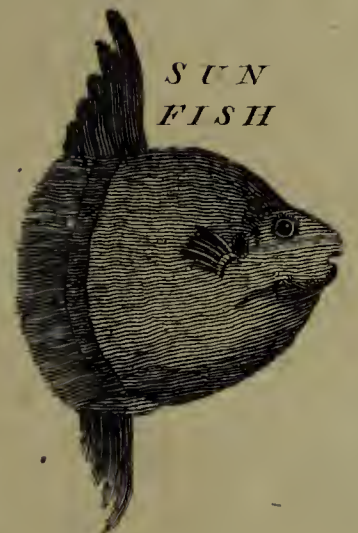
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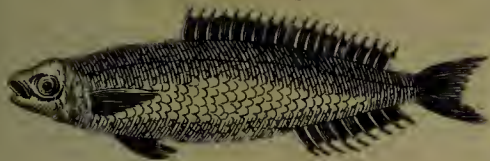
SWALLOW-FISH or SAPPHIRINE GURNARD



A SWORD-FISH



BOOPS



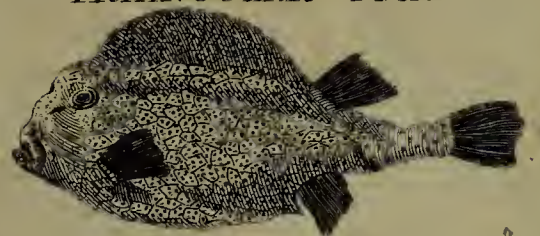
TORPEDO



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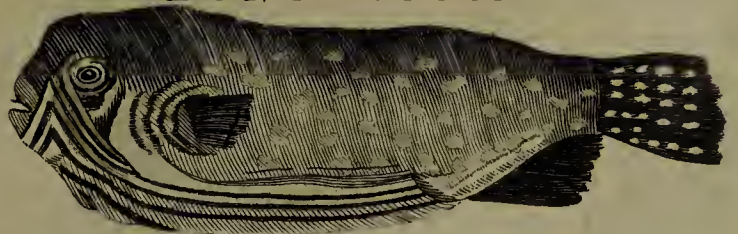
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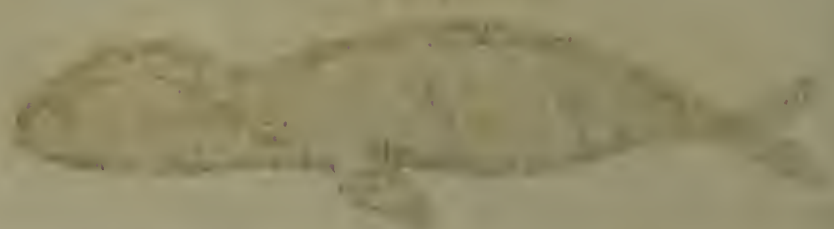
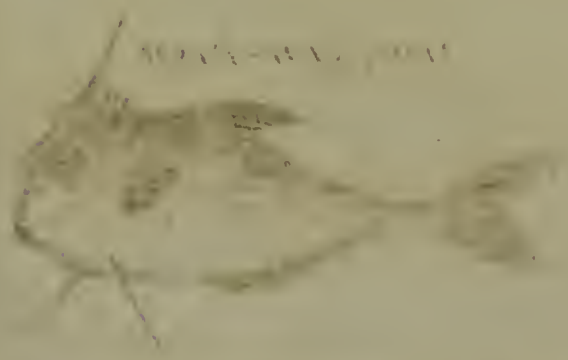
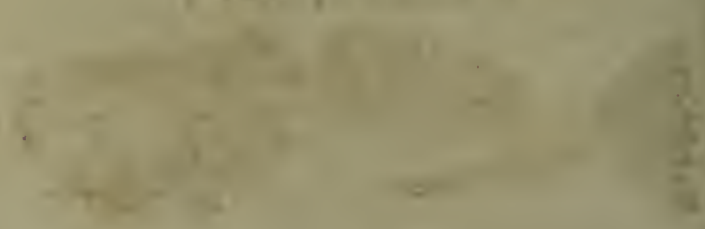
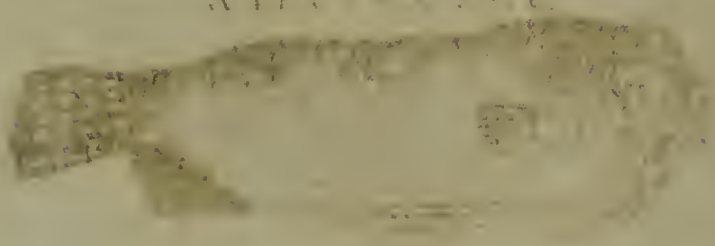
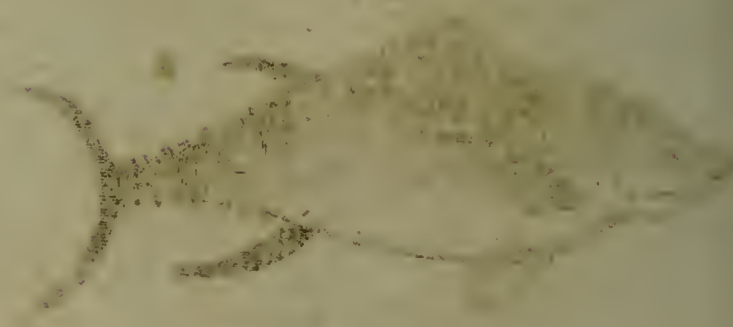
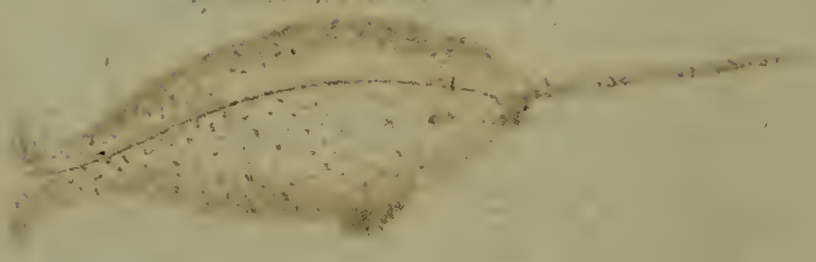
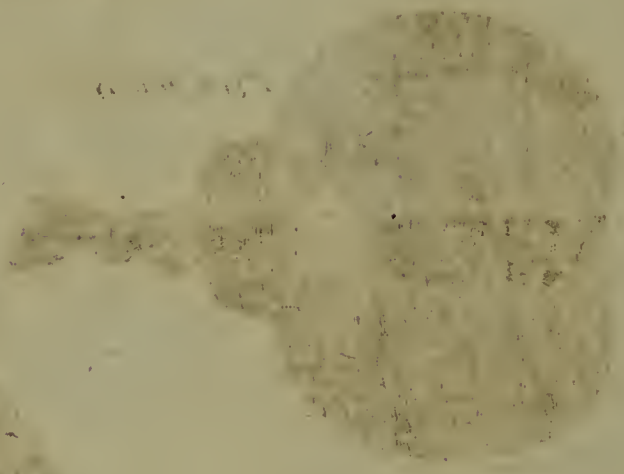
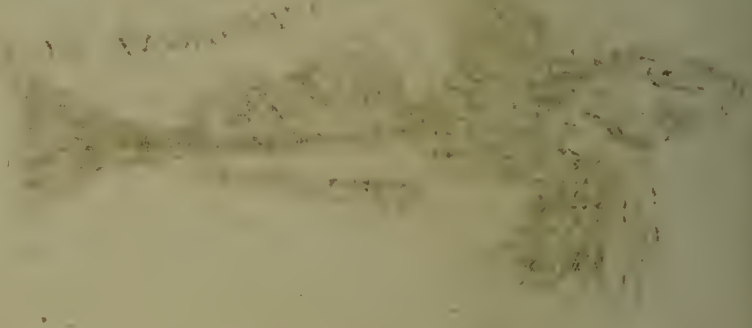
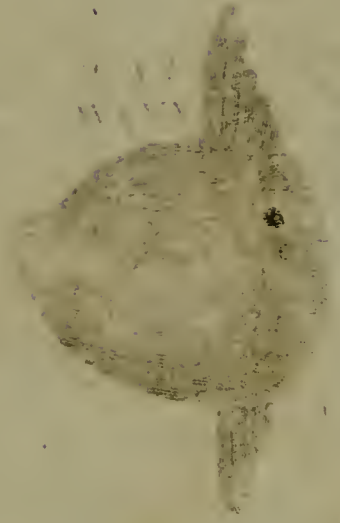
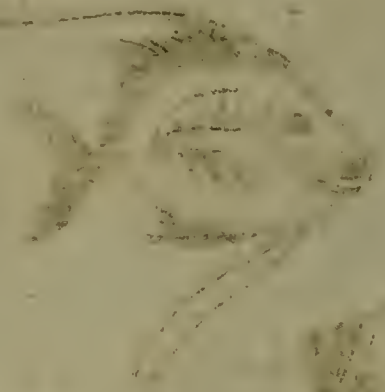


WHALE



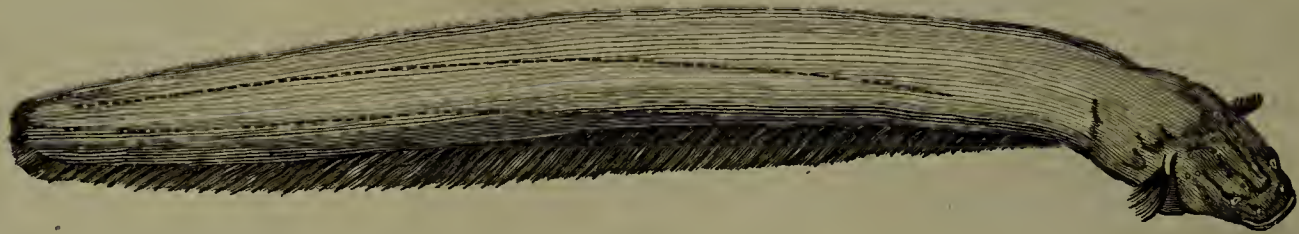
HORNED-FISH





FISHES.

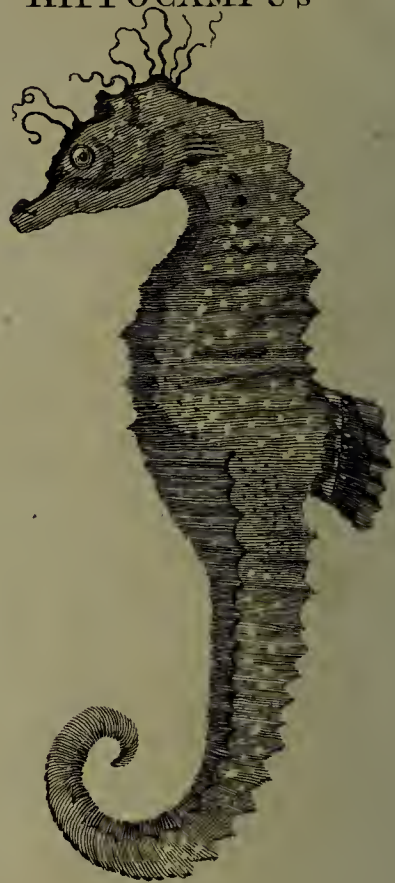
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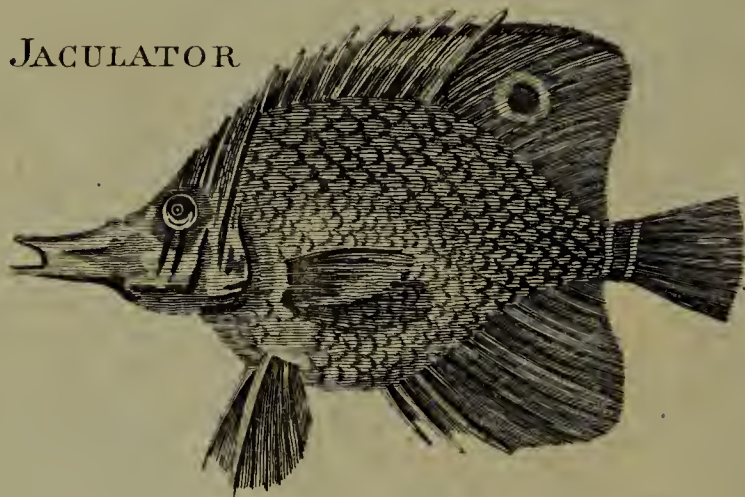
HUSO GERMANORUM



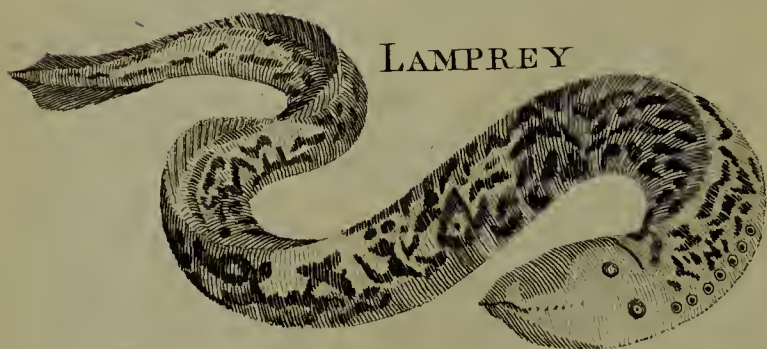
HIPPOCAMPUS



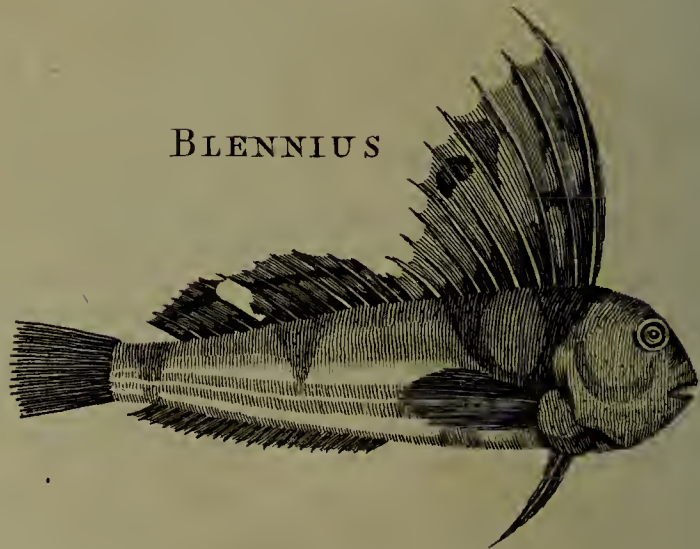
JACULATOR



LAMPREY



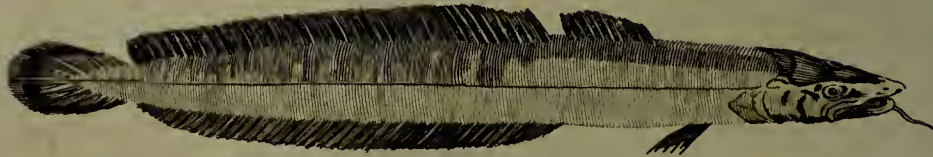
BLENNIUS



APER



LING



LUMP FISH



LUCERNA



or even with a stick, it instantly benumbs the hand and arm to the very shoulder.

Captain Johnson being at Cassan, a sailor caught one of these fish, which he supposed to be a bream; but the very instant that he touched it, he cried out that he had lost the use of his hand. His companions laughed at him, and one of them immediately trod upon it with his naked foot, when his whole leg became suddenly motionless: the cook was then called, and ordered to take the fish and dress it; but he immediately let it fall, and, in a mournful tone, declared he was seized with the palsy. At length a negro, who was present, said he was acquainted with the fish, and assured them that, after it was dead, it would lose the numbing quality.

The following experiment, made by Mr. Walsh, in presence of the academy at Rochelle, for evincing the circuit of the electric matter which issues from the Torpedo, deserves to be quoted.

"A living Torpedo was laid on a table, upon a wet napkin; round another table stood five persons insulated; and two brass wires, each thirteen feet long, were suspended from the ceiling by silken strings. One of the wires rested by one end on the wet napkin, the other end was immersed in a basin full of water, placed on a second table, on which stood four other basins, likewise full of water. The first person put a finger of one hand into the water in which the wire was immersed, and a finger of the other hand into the second, and so on successively till all the five persons communicated with one another by the water in the basins. In the last basin one end of the second wire was dipped, and with the other end Mr. Walsh touched the back of the Torpedo; when the five persons felt a shock, differing in nothing from that of the Leyden experiment, except being weaker. Mr. Walsh, who was not in the circle of conduction, felt nothing. This was several times successively repeated, even with eight persons; and the experiment being related by M. de Signette, mayor of the city, and one of the secretaries to the academy of sciences of Rochelle, and published by him in the French Gazette, the account becomes the more authenticated."

The discourse ends with the following address to Mr. Walsh, on presenting him with the medal.

"In consequence of the approbation of the choice made by the council, so unfeignedly expressed in the countenance of every gentleman present, it remains, that in the name, and by the authority, of the Royal Society in London, formed for the improvement of natural knowledge, I deliver into your hand this medal, the prize you have so meritoriously obtained; not doubting, Sir, of your grateful acceptance of so honourable and unperishing a memorial of their esteem, and of the sense of their obligations to a person, who in so distinguished a manner has contributed to promote the great ends of their institution. And, in the same respectable name, let me add, that they are so much persuaded of your abilities to assist in their grand work, the *interpretation of nature*, that they earnestly call upon you to continue your liberal and spirited labours. With pleasure they understand that you have already turned your views to the electric gymnotus, that other wonder of the waters, an animal possessed of powers similar to those of the Torpedo, but of superior energy; and the society flatter themselves, that so much light will be gained by that enquiry, that you will be enabled soon to make a farther discovery of the mysteries of nature. Her veil, fear not, Sir, to approach. Animated with the presence of this illustrious and successful body, I will venture to affirm, that nature has no veil, but what time and persevering experiments may remove. In the instance before us, view the progress of the powers of the mind; view the philosophers of the early ages,

like the "children of the world," amused and satisfied with the stories of the Torpedo, as incurious about their authenticity, as about the causes of such extraordinary effects. This animal served them for an emblem, or an hieroglyphic, for a figure of speech, or an allusion of pleasantry: at best as a theme for a copy of verses. But the world, rising in years and in wisdom, rejects such trifles. The interpreters of nature, in the adult state of time, make experiments and inductions, distrust their intellects, confide in facts and in their senses: and by these arts drawing aside the veil of nature, find a mean and groveling animal armed with lightning; that awful and celestial fire revered by the antients as the peculiar attribute of the father of their gods."

The following is a curious account of the Gymnotus Electricus, or electrical Eel. In a Letter from Alexander Garden, M. D. F. R. S. to John Ellis, Esq; F. R. S. read before the Royal Society the 23d of February, 1775.

"Charles-Town, South-Carolina.
August 14, 1774.

"Sir,

"A few days since I went to see some very curious fish, which were brought here about nine or ten weeks ago from Surinam; and I was both surprized and delighted to observe their strange shape, and experience their wonderful properties. I had before received some vague account of such a fish; but I always thought, that much of what I always heard was fabulous. There are five of these fishes now here, of different sizes, from two feet in length, to three feet eight inches. The following description was made out from the longest and largest. It might have been much more accurate, if there had been a possibility of handling the fish, and examining it leisurely; or if I could have had a dead specimen, as many things relating to the internal and external structure could in that case have been more exactly ascertained. But this fish hath the amazing power of giving so sudden and so violent a shock to any person that touches it, that there is, I think, an absolute impossibility of ever examining, accurately, a living specimen, and the person who owns them, rates them at too high a price (not less than fifty guineas for the smallest) for me to get a dead specimen, unless one should die by accident; if that should happen, you may depend on having a more exact and accurate account for the Society.

"George Baker, mariner, who brought them here, intends to carry them to England; but as it is very uncertain whether they will arrive in health, and all alive, I have recommended to him to get a small cask of rum, with a large bung, into which he may put any of them that may die, and so prepare them for the inspection and examination of the curious when he arrives.

"The largest of these fish was three feet eight inches in length, when extending itself most, and might have been from ten to fourteen inches in circumference about the thickest part of the body. The head is large, broad, flat, smooth, and impressed here and there with holes, as if perforated with a blunt needle, especially towards the sides, where they are more regularly ranged in a line on each side. The rostrum is obtuse and rounded. The upper and lower jaws are of an equal length, and the gape is large. The nostrils are two on each side; the first large, tubular, and elevated above the surface: and the others small, and level with the skin, placed immediately behind the verge of the rostrum, at the distance of an inch asunder. The eyes are small, flattish, and of a bluish colour, placed about three quarters of an inch behind the nostrils, and towards the sides of the head. The

whole head seems to be well supported; but whether with bones or cartilages, I could not learn. The body is large, thick, and roundish, for a considerable distance from the head, and then gradually grows smaller, but at the same time deeper, or becomes of an acinaci-form shape to the point of the tail, which is rather blunt. There are many light coloured spots on the back and sides of the belly, placed at considerable distances in irregular lines, but more numerous and distinct towards the tail. When the fish was swimming, it measured sixteen inches in depth near the middle, from the upper part of the back to the lower edge of the fin, and it could not be more than two inches broad on the back at that place. The whole body, from about four inches below the head, seems to be clearly distinguished into four different longitudinal parts or divisions. The upper part, or back, is roundish, of a dark colour, and separated from the other parts on each side by the lateral lines, which, taking their rise at the base of the head, just above the pectoral fins, run down the sides, gradually converging as the fish grows smaller, to the tail, and makes so visible a depression or furrow in their course, as to distinguish this from the second part or division, which may be properly called the body, or at least appears to be the strong muscular part of the fish. This second division is of a lighter and more clear bluish colour than the upper or back part, and seems to swell out somewhat on each side, from the depression of the lateral lines; but towards the lower or under part, is again contracted, or sharpened, into the third part, or carina. This carina, or keel, is very distinguishable from the other two divisions by its thinness, its apparent laxness, and by the reticulated skin of a more grey and light colour, with which it is covered. When the animal swims gently in pretty deep water, the rhomboidal reticulations of the skin of this carina are very discernible; but when the water is shallow, or the depth of the carina is contracted, these reticulations appear like many irregular longitudinal plicæ. The carina begins about six or seven inches below the base of the head, and gradually widening or deepening as it goes along, reaches down to the tail, where it is thinnest. It seems to be of a strong muscular nature. Where it first takes its rise from the body of the fish, it seems to be about one inch, or one inch and an half thick, and is gradually sharpened to a thin edge, where the fourth and last part is situated, *viz.* a long, deep, soft, wavy fin, which takes its rise about three or four inches at most below the head, and runs down along the sharp edge of the carina, to the extremity of the tail. Where it first rises, it is not deep, but gradually deepens or widens as it approaches the tail. It is of a very pliable, soft consistence, and seems rather longer than the body. The situation of the anus in this fish is very singular, being placed underneath, and being about an inch more forward than the pectoral fins, and consequently considerably nearer the rostrum. It is a pretty long rima in appearance; but the aperture must be very small, as the formed excrements are only about the size of a quill of a common dung-hill fowl. There are two pectoral (if I may call them so) fins, placed one on each side, just behind the head, over the *foramina spiratoria*, which are small, and generally covered with a lax skin, situated in the axillæ of these fins. These fins are small for the size of the fish, being scarcely an inch in length, of a very thin, delicate consistence, and orbicular shape. They seem to be chiefly useful in supporting and raising the head of the fish when he wants to breathe, which he does every four or five minutes, by raising his mouth out of the water: this shews that he has lungs, and is amphibious, and *foramina spiratoria* seem to indicate his having bron-

chiæ likewise; but this I only offer as a conjecture, not being certain of the fact. I must now mention the appearance of a number of small cross bands, annular divisions, or rather *rugæ* of the skin of the body. They reach across the body down to the base of the carina on each side; but those that cross the back seem to terminate at the lateral lines, where new rings take their rise, not exactly in the same line, and run down the carina. This gives the fish somewhat of a worm-like appearance: and indeed it seems to have some of the properties of this tribe, for it has a power of lengthening or shortening its body to a certain degree, for its own conveniency, or agreeable to its own inclination. I have seen this specimen, which I have measured three feet eight inches, shorten himself to three feet two inches; but besides this power of lengthening or shortening his body, he can swim forwards or backwards with apparently equal ease to himself; which is another property of the vermicular tribe. When he swims forwards, the undulation, or wavy motion of the fin and carina, begin from the upper part, and move downwards; but when he swims backwards, and the tail goes foremost, and the undulations of the fin begin at the extremity of the tail or fin, and proceed in succession from that backwards to the upper part of the body; in either case he swims equally swift. Every now and then the fish lays himself on one side, as it were, to rest himself, and then the four several divisions of his body above-mentioned are very distinctly seen, *viz.* the vermiform appearance of the two upper divisions; the retiform appearance of the carina; and the last, or dark-coloured fin, whose rays seem to be exceedingly soft and flexible, and entirely at the command of the strong muscular carina. When he is taken out of the water, and laid on his belly, the carina and fin lie to one side, in the same manner as the ventral fin of the *tertraodon* does, when he creeps on the ground. I have been the longer and more particular in the description of the external structure of this animal's body, because I think, as it is of a most singular nature, and endowed with some amazing properties, even the most minute circumstance I was able to observe relating to it, should be mentioned.

“ The person to whom these animals belong, calls them *electrical fish*; and indeed the power they have of giving an electrical shock to any person, or to any number of persons who join hands together, the extreme person on each side touching the fish, is their most singular and astonishing property. All the five we have here are possessed of this power in a very great degree, and communicate the shock to one person, or to any number of persons, either by the immediate touch of the fish with the hand, or by the mediation of any metalline rod. The keeper says, that when they were first caught, they could give a much stronger shock by a metalline conductor than they can do at present. The person who is to receive the shock, must take the fish with both hands, at some considerable distance asunder, so as to form the communication, otherwise he will not receive it; at least I never saw any one shocked from taking hold of it with one hand only; though some have assured me, that they were shocked by laying one hand on him. I myself have taken hold of the largest with one hand only, without ever receiving a shock; but I never touched it with both hands, at a little distance asunder, without feeling a smart shock. I have often remarked, that when it is taken hold of with one hand, and the other hand is put into the water over its body, without touching it, the person received a smart shock; and I have observed the same effect follow when a number joined hands, and the person at one extremity of the circle took hold of, or touched the fish, and the person at the other extremity

extremity put his hand into the water, over the body of the fish. The shock was communicated through the whole circle as smartly as if both the extreme persons had touched the fish. In this it seems to differ widely from the torpedo, or else we are much misinformed of the manner in which the benumbing effect of that fish is communicated. The shock which our Surinam fish gives, seems to be wholly electrical; and all the phenomena or properties of it exactly resemble those of the electric aura of our atmosphere when collected, as far as they are discoverable from the several trials made on this fish. This stroke is communicated by the same conductors, and intercepted by the interposition of the same original electrics, or electrics *per se*, as they used to be called.

“The keeper of these fish informs me, that he caught them in Surinam river, a great way up, beyond where the salt water reaches; and they are a fresh-water fish only. He says that they are eaten, and by some people esteemed a great delicacy. They live on fish, worms, or any animal food, if it is cut small, so that they can swallow it. When small-lived fishes are thrown into the water, they first give them a shock, which kills, or stupifies them, that they may swallow them easily, and without any trouble. If one of these small fishes after it is shocked, and to all appearance dead, be taken out of the vessel where the electrical fish is, and put into fresh water, it will soon revive again. If a larger fish than they can swallow, be thrown into the water at a time that they are hungry, they give him some smart shocks, till he is apparently dead, and then try to swallow or suck him in; but after several attempts, finding he is too large, they quit him. Upon the most careful inspection of such fish, I could never see any mark of teeth, or the least wound or scratch on them. When the electrical fish are hungry, they are pretty keen after their food; but they are soon satisfied, not being able to contain much at a time. An electrical fish of three feet and upwards in length, cannot swallow a small fish above two or at most three inches and a half long. Since I wrote the above description and remarks, I have had Mr. Bancroft's Essay on the Natural History of Guiana put into my hands, in which I find an account of this animal; but as I think he has not been very particular in the description of it, I resolved still to send you the above account, that you might judge for yourself. I observe, that his account, or description, and mine differ in several things, and amongst others, where he says, that those fish were usually about three feet in length; but the one, of which I have sent a slight description, was three feet eight inches. This small variation might indeed have happened without any error; but I am told, that some of them have been seen in Surinam river upwards of twenty feet long, whose stroke or shock proved instant death to any person that unluckily received it.”

NATURAL HISTORY of the THORNBACk.

THE Thornback differs from the skate, in being less, and in being armed with a greater number of spines or prickles, from whence it has its name. It has one row on the back, and three on the tail. Mr. Pennant mentions a large one that he had seen, which had three rows on the back, and five on the tail. The shape of the body, exclusive of the tail, is nearly square, and yet a transverse line, drawn from corner to corner, is longer than a line drawn from the head to the root of the tail, so that the fish may in reality be said to be broader than it is long. It has no scales, but is covered with a kind of slime, which renders it extremely slippery. The upper part is of a dusky colour, spotted with

white, and the belly is entirely white; the eyes are very prominent, and placed on the upper part of the head, having no bone or any thing else to defend them. On the nose, and on the inner side of the forehead, near the eyes, are a few prickles; and others are irregularly scattered on the upper part of the pectoral fins.

If a Thornback is placed with the belly uppermost, the nostrils appear, and are contiguous to the mouth, which is destitute of teeth; but the jaw-bones are as rough as a file. The gills, as in other fish of this kind, consist of five holes, placed in a semicircular form; and there are two semicircles on the lower part of the fish, one encompassing the breast, and the other the lower belly, which is divided from the upper by a bone, where these circles touch.

The young fish have very few prickles on them, and their backs are often spotted with white, each spot being encircled with black. Thornbacks are sometimes found to weigh fourteen or fifteen pounds, but with us they seldom exceed eight.

They frequent our sandy shores, and are very voracious; they feed on all sorts of flat fish, and are particularly fond of herrings and sand eels. Sometimes they feed upon crustaceous animals, such as crabs, &c. They begin to generate in June, and produce their young in July and August, which (as well as those of the skate) are called *Maids*, before they are old enough to breed. In November the Thornback begins to be in season, and continues so later than the skate, but the young of both are good at any time of the year.

The flesh of the Thornback resembles that of a skate, but is less delicate, and harder of digestion; but the liver is considered by some as a great delicacy.

NATURAL HISTORY of the STING RAY, or FIRE FLARE.

THIS is distinguished from other cartilaginous fish, in having a remarkable spine on the tail, which is a formidable weapon. The tail is very thick at the beginning; the spine is placed about a third the length of the former from the body, and is about six inches long, flat on the top and bottom, very hard, and sharp-pointed, the two sides of which are thin, and sharply bearded the whole way. The tail, which extends about four inches beyond the end of this spine, gradually becomes slender at the extremity.

The spine, with which nature has armed this fish, has occasioned the ancients to give many tremendous fables concerning it. Pliny, Ælian, and Opius, have given it a venom that affects even the inanimate creation. But there is not the least credit to be given to the account of its venomous qualities; though it is still believed by fishermen in several parts of the kingdom. Considered, indeed, as a weapon of defence, it is capable of giving a dangerous wound, when it falls on a tendinous part, or on a person in a bad habit of body. As to any fish having a spine charged with actual poison, we must beg leave to refuse our assent to it, though the opinion is sanctified by the name of Linnæus.

This species shed their spine, and renew them annually; and the new spine sometimes appears before the old one drops off, on which account the Cornish people call it the Cardinal Trilost, or three tailed.

The Sting Ray does not grow to the bulk of the others; the eyes are large, and placed in the upper part of the head, and the mouth in the lower. It has a hole behind each eye; the mouth is large, and placed transversely, and the nose is long and sharp-pointed.

pointed. The apertures on the gills are five on each side, beginning a little below the mouth, and extending to the breast. The sides are terminated, throughout their whole length, by a broad fin.

The body is quite smooth, and almost of a circular shape; it is thicker in the middle than any other Ray, but grows very thin towards the edges. The upper part of the body is of a dirty yellow colour, the middle part of a dullish blue; the lower side white, and the tail and spine dusky.

NATURAL HISTORY of the ANGEL FISH.

THIS is also called the monk-fish, and is of a middle nature between rays and sharks, partaking something of the character of both, though it is an exception to each in the situation of the mouth, which is placed at the extremity of the head; it grows to a very large size, and sometimes weighs upwards of one hundred and fifty pounds. The back and sides are of a dirty ash-colour, and very rough; and the belly is white. The head is roundish at the extremity, and in each jaw there are three rows of teeth, each row consisting of eighteen; but the number is not exactly the same in all fish of this kind; Mr. Pennant mentions one that had five rows of teeth all round the jaws. Like those of all sharks, the animal can raise or depress them at pleasure, by means of muscles uniting them to the jaws, not being lodged in sockets as the teeth of cetaceous fish are. The tongue is broad, and sharp at the end; and the nostrils, which are placed on the upper lip, are wide, and filled with a kind of slime; the eyes are smallish, and behind each is a semi-lunar orifice. Instead of gills, it has five holes like the thornback. It has two fins, placed near the head, which resemble wings, and is therefore called the Angel Fish; angels being represented with wings, the ventral fins are placed in the same manner.

This fish is frequently found on our coasts, where it prowls about for prey, like others of the kind. It is extremely voracious, and, like the ray, feeds on flat-fish and flounders, which keep near the bottom of the water. It is extremely fierce, and dangerous to be approached. Mr. Pennant acquaints us of an instance of a fisherman, whose leg was terribly torn by a large one of this species, which lay within his nets in shallow water, and which he went to lay hold of incautiously.

These, as well as the rest of the genus, have much malignity in their aspect: their eyes, which are oblong, sunk into their head, and over-hung by their skin, seem fuller of malevolence than fire.

Their skin, which is very rough, was used by the ancients to polish wood and ivory, for which purposes the moderns use that of the greater dog-fish. The flesh was formerly thought a delicacy, but is now neglected even by the poorest people, on account of its coarseness and rankness.

NATURAL HISTORY of the PICKED DOG-FISH.

THIS fish has its name from a strong sharp spine, placed before each of the back fins, which distinguishes it from the rest of the British sharks. It has a roundish oblong body, which is covered with a rough skin: the back is of a brownish ash-colour, and the belly is white, and smoother than the other parts: the eyes are oblong, and covered with a double membrane. The mouth is placed just under the eyes, and is armed with a double row of small teeth, which bend from the middle of each jaw towards the corners of the mouth. The nose is long, and extends greatly beyond the mouth, but is blunt at the end. It has no fin on

the lower part of the body, between the vent and the tail, by which it may be distinguished from all other fish of this kind. It grows to the weight of about twenty pounds, and is frequently taken in the British ocean and the Irish sea.

The SMOOTH DOG FISH.

This fish is destitute of teeth, but to supply the defect, the bones of each jaw are as rough as a file. The skin, as its name implies, is smooth, but that of all others of this kind is rough: by this difference it may be readily distinguished from the picked Dog-Fish.

NATURAL HISTORY of the FISHING FROG, or FROG FISH.

THE Frog-Fish resembles a tadpole or young Frog in shape, but it appears a tadpole of enormous size; for it sometimes exceeds five feet in length, and has a mouth above a yard wide. Its deformity is not to be exceeded: the head is considerably larger than the whole body; the under jaw projects beyond the upper, and both are armed with sharp slender teeth: there are also teeth in the palate, and at the root of the tongue, which is large and broad; the eyes are placed at the top of the head, and are encompassed with prickles: immediately above the nose are two long strings or filaments, which resemble a fishing-line, and it is said the animal converts them to the purposes of fishing. The back is flat, and greyish, with somewhat of a reddish and greenish cast: it has three bristles or strings on the middle of the back, which seem to supply the place of a fin; and several strings, resembling fins, hang round the body: two fins are placed under the throat, which resemble the feet of a mole, by the assistance of which they creep at the bottom of the sea.

The flesh of the Frog-Fish is white, when boiled, and tastes like that of a Frog. The fishermen have, in general, a great regard for this ugly fish, as it is an enemy to the dog-fish; the bodies of those voracious animals being frequently found in its stomach; and, whenever they take it, they make a point of giving it its liberty.

NATURAL HISTORY of the WHITE SHARK.

OF all the inhabitants of the deep, those of the Shark kind are the fiercest and the most voracious; but the great White Shark, which is the largest of the kind, joins, to the most amazing rapidity, the strongest appetites for mischief. In size, he approaches nearly to the whale, and far surpasses him in celerity and strength, in the formidable arrangement of his teeth, and his insatiable desire of plunder. Gillius informs us, that the Great White Shark will grow to the weight of four thousand pounds, and that in the body of one of them a human body was found entire.

The head is large and flattish; the eyes are also large, and the snout is long. The mouth is enormously wide, placed far beneath, and therefore these, as well as the rest of the Shark kind, are said to be obliged to turn on their backs to seize their prey; which is an observation as ancient as the days of Pliny. The throat is extremely wide, and capable of swallowing a man with the greatest ease. But its furniture of teeth is still more terrible: of these there are six rows, which are flat, triangular, exceedingly sharp at their edges, and finely serrated. It is said there are seventy-two in each jaw, but many are of opinion, that their number is uncertain; and that these terrible instruments of destruction increase in

FISHES.

SEA EAGLE

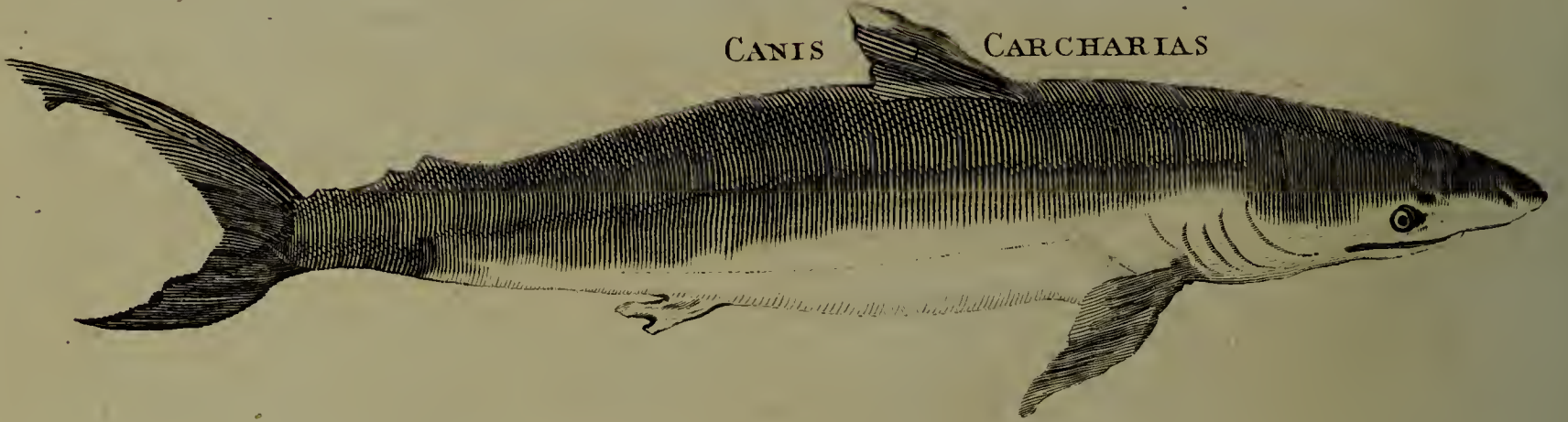


GUAMAJACU ATINGA

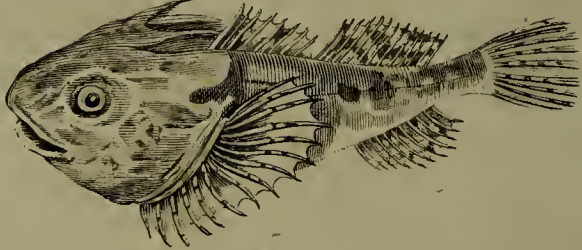


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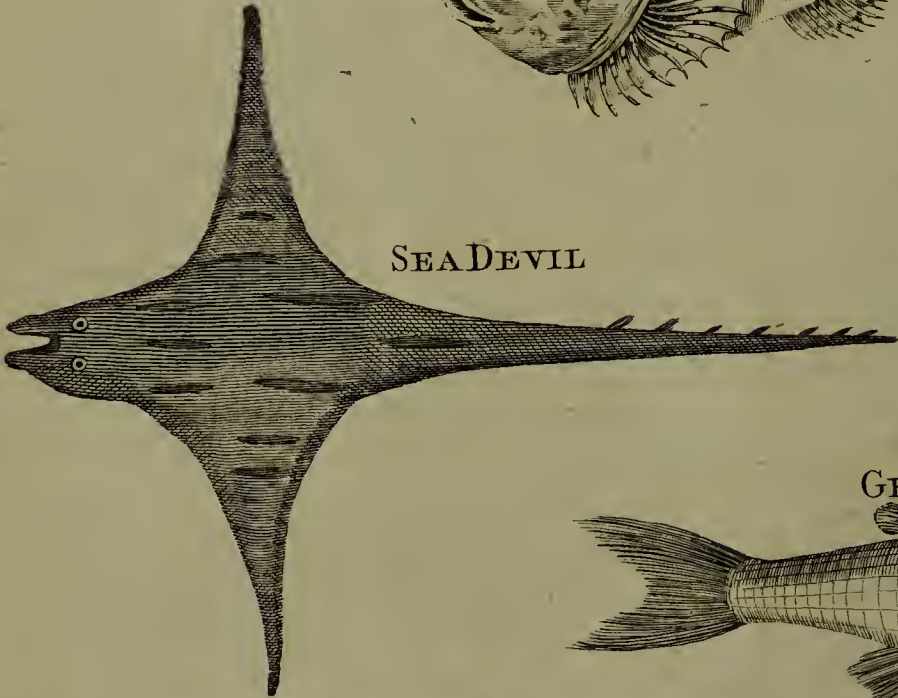
FATHER LASHER



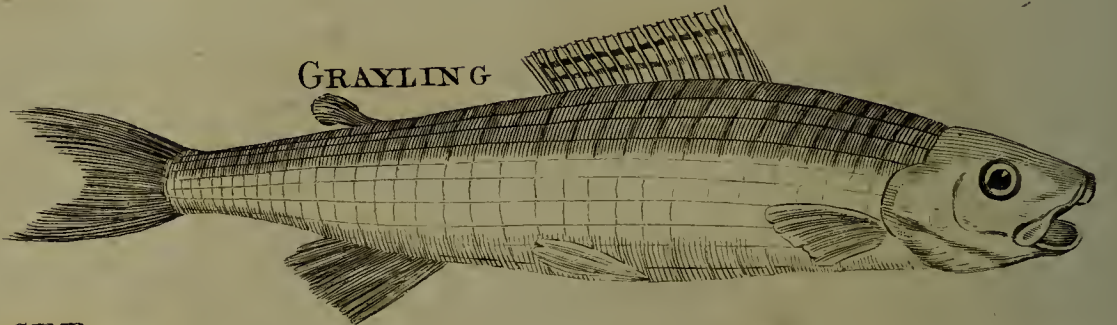
GOAT FISH



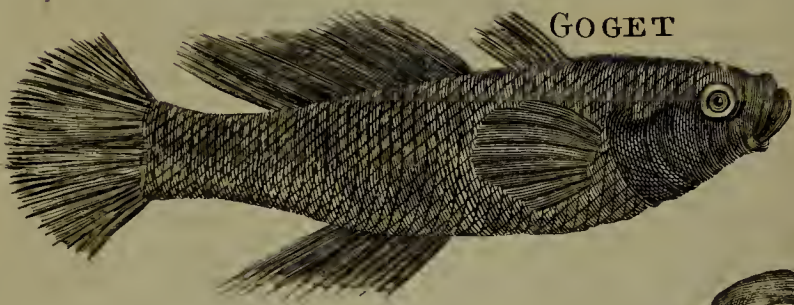
SEA DEVIL



GRAYLING



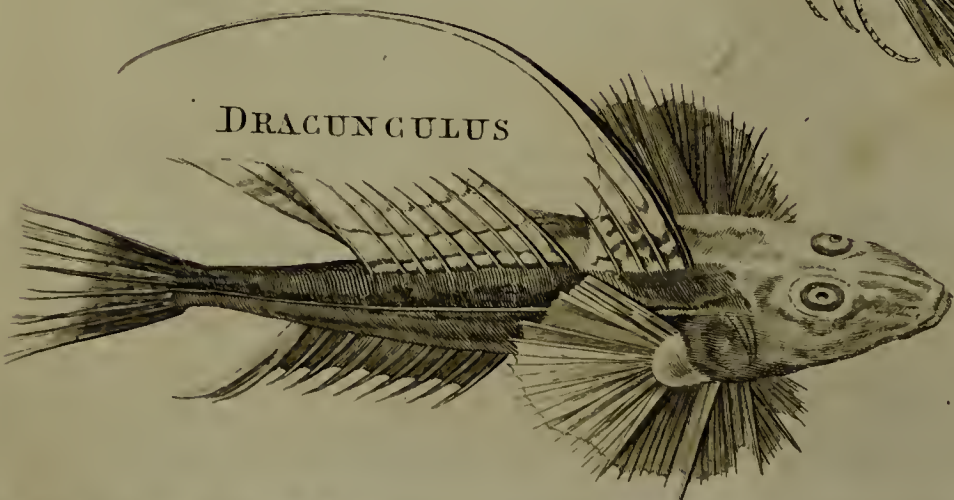
GOGET



GURNARD



DRACUNGULUS



SEA EEL



proportion as the animal grows older. When the fish is in a state of repose, this dreadful apparatus lie flat in the mouth; but, when it seizes its prey, it has a power of erecting them, by the assistance of a set of muscles that join them to the jaw.

The other parts of this fish are almost equally terrible to behold. Its pectoral fins are very large; it is furnished with large goggle eyes, which it turns with pleasure on every side, and can behold its prey behind it as well as before: its whole aspect is marked with a character of malignity. The tail is of a semi-lunar form, but the upper part is longer than the lower. It has vast strength in the tail, and can strike with amazing force; on which account the sailors cut it off with an ax as soon as they have got it on board. The colour of the whole body and fins of this animal is a light grey; its skin is rough, hard, and prickly; and is that substance that covers instrument cases, called shagreen.

The Shark is as dreadful from his courage and activity, as from his formidable appearance: no fish can swim faster, none are so constantly employed in swimming; he outstrips the swiftest ships, plays round them, and seems to gaze at the passengers, without exhibiting the smallest symptom of an effort to proceed.

The depredations this animal commits are frequent and formidable: in all hot climates he is the dread of the sailors, where he constantly attends the ships in expectation of what may fall overboard. Dr. Goldsmith relates, that as a sailor was bathing in the Mediterranean, near Antibes, in the year 1744, while he was swimming about fifty yards from the ship, perceived a monstrous fish approaching him: struck with terror at his approach, the poor man cried out to his companions in the vessel to take him on board; immediately they threw him a rope, and were drawing him up the ship's side, when the Shark darted after him, and bit off one of his legs. Indeed when a man has the misfortune to be pursued by any of these animals, he perishes without redemption; they having been perceived to dart at them like gudgeons at a worm. "A master of a Guinea ship," says Mr. Pennant, "informed me, that a rage of suicide prevailed among his new-bought slaves, from a notion the unhappy creatures had, that after death they should be restored again to their families, friends, and country. To convince them at least that they should not re-animate their bodies, he ordered one of their corpses to be tied by the heels to a rope, and lowered into the sea; and, tho' it was drawn up again as fast as the united force of the crew could be exerted, yet in that short space the Sharks had devoured every part but the feet, which were secured at the end of the cord."

So great is the rapacity of the Shark, that nothing which has life is rejected by it: but human flesh appears to be its most favourite food; when once it has fed upon mankind, it continually haunts those places where it expects a return of its prey: it is however asserted, that this voracious fish will take the black man's flesh in preference to the white, and that when men of different colours are in the water together, it always makes choice of the former.

The usual method of taking a Shark, is to bait a hook with a piece of beef or pork, which the sailors throw into the sea affixed to a strong cord, strengthened near the hook with an iron chain; as without such precaution the Shark would presently bite the cord in two, and set himself at liberty. He approaches it, swims round it, and examines it, and appears for a time to neglect it; but when the sailors make a pretence, by drawing the rope, as if intending to take the bait away, then his hunger excites him, he darts at the bait, and swallows it,

No. 25.

hook and all. When he finds the hook lodged in his maw, he exercises his utmost efforts to continue in his natural element; but, when his strength is exhausted, he suffers his head to be drawn above water, the sailors confine his tail by a noose, draw him on ship-board, and dispatch him as soon as possible, by beating him on the head; yet even this is attended with difficulty and danger; the enormous creature, terrible even in the agonies of death, still struggles with his destroyers, and is the most difficult to be killed of any animal in the world.

Belonius assures us, that he saw a female Shark produce eleven live young ones at a time, and that the female in this tribe is larger than the male.

The ancients were acquainted with this fish: Opius, in particular, gives a long and very entertaining account of its capture. Their flesh, which is sometimes eaten, is exceedingly coarse and rank, and hardly digestible by any but the negroes, who are remarkably fond of it: the liver affords three or four quarts of oil; and the skin, as we have already observed, is polished into that substance, known among us by the name of shagreen.

The BLUE SHARK.

The back of this animal is of a lively blue colour, and the belly of a silver white: it is of an oblong form, and from six to eight feet in length: the skin is smoother than that of other Sharks: the snout is long, sharp, flat, and indented with many small holes above and below: the mouth is large, and placed like that of the white Shark, but it is not furnished with so many teeth.

Ælian says this species will permit the small brood, when in danger, to swim down its mouth, and take shelter in its belly. This fact is confirmed by Rondeletius; and, as Mr. Pennant observes, it is no more incredible, than that the young of the opussum should seek an asylum in the ventral pouch of its parent; a fact too well known to be contested. It is probable, that this degree of affection is not peculiar to the blue Shark, but common to the whole genus.

The blue Shark frequents many of our coasts, particularly those of Cornwall during the pilchard season. Though Rondeletius says he was an eye-witness to its fondness for human flesh, yet it is less destructive in our seas, owing perhaps to the coolness of the climate, which is known to abate the fierceness of some animals, and the venom of others.

NATURAL HISTORY of the SEA FOX, or SEA APE.

THIS animal is called the Sea Fox on account of the length of its tail, and the rank smell of its flesh, which is not unlike that of the Fox. It is sometimes found so large as to weigh upwards of an hundred pounds, and has a round short body, and a small mouth a little below the snout, which is sharp, and armed with teeth. The belly of this fish is white, and the back of an ash colour. This fish is principally remarkable for the great length of its tail, which resembles a sword, is as long as the whole body, and has a fin at the root of it. It is usually met with in the Mediterranean sea, and is sometimes taken in our seas. Some imagine it to be the fish called the thresher, from its attacking and overcoming the grampus with its long tail, whenever that species of whale rises to the surface to breathe.

NATURAL HISTORY of the TOPE.

THE fins, and the upper part of the body of this fish, is ash coloured; the belly is white: the nose is very long, flat and sharp pointed, and the nostrils

nostrils are placed very near the mouth: the eyes have small pupils in proportion to the bulk of the body, and behind each eye is a small orifice. The teeth, which are very numerous, are small, sharp, triangular, and serrated on their inner edge: they are disposed in three rows. Its skin and flesh has a rank and offensive smell. Mr. Pennant mentions one that was taken on our coast in the year 1768, which weighed twenty-seven pounds, and was five feet in length; but they grow to a much larger size, and sometimes exceed an hundred pounds in weight. This is very fierce and voracious, and will even pursue its enemy to the edge of the shore.

NATURAL HISTORY of the SAW FISH.

THIS animal has its name from a saw, which the bones of its nose is supposed to resemble; but they bear a greater similitude to the teeth of a comb, placed at some distance from each other: they are placed on each side of the bone, and are from twenty to thirty in number, and some of them are near five feet in length, when the body of the fish is about ten feet. The back of this fish is of an ash colour, and the belly white: it has no teeth in its mouth, which is transversely cleft, but the lips are as rough as a file. The Saw Fish has no fins on the back, and four on the belly, two on each side, those next the head being the broadest and longest. The eyes stand high out of the head, and the mouth is directly underneath the eyes: the nostrils are oblong. These animals are great enemies to the whale and fin-fish; many of them assembling round one, which they never quit till they have destroyed. They feed only on his tongue; and leave the rest behind. The Saw Fish inhabits different parts of the ocean, but in the north seas they are found in the greatest plenty; perhaps because great numbers of whales inhabit those seas.

NATURAL HISTORY of the STURGEON.

THE Sturgeon grows to the length of eighteen feet, and to the weight of five hundred pounds, but it is seldom taken in our rivers of that bulk. The nose is very long, slender, and ends in a point; on the lower part of the nose are four beards: the mouth, which is situated far beneath, is small, and unsupported by any jaw-bones; neither is it furnished with any teeth. The eyes are extremely small, and the nostrils are placed near them. The whole under-side of the fish, from the end of the nose to the vent, is entirely flat; and on the back is a single fin, not very remote from the tail. It has also two pectoral fins, two ventrals, and one anal fin. The upper part of the body is of a dirty olive colour; the lower part silvery, and the middle of the tubercles white. It is an exception among the cartilaginous fish in the manner of breeding, being like the bony fish oviparous, spawning in winter.

In its general form it resembles a fresh-water pike. Though it is harmless and ill provided for war, the body is formidable enough to appearance. It is long, pentagonal, and covered with five rows of large bony knobs, one row on the back, and two on each side, and a number of fins to give it greater expedition. Of this fish there are three kinds; the common Sturgeon, the caviare Sturgeon, and the Huso, or Isinglass Fish. The first has eleven knobs or scales on the back; the second has fifteen; and the latter thirteen on the back, and forty-three on the tail. These differences seem slight to us who only consider the animal's form; but those who consider its uses find the distinction of considerable importance. The first is the Sturgeon, the flesh of

which is sent pickled into all parts of Europe. The second is the fish from the roe of which that celebrated delicacy called caviare is made; and the third, besides supplying the caviare, furnishes also the valuable commodity of isinglass. They all grow to a very large size.

This fish visits every country in Europe at different seasons; it annually ascends the largest rivers to spawn, and propagates in an amazing number. The inhabitants along the banks of the Po, the Danube, and the Walga, make great profit annually of its incursions up the stream, and have their nets prepared for its reception. The Sturgeon also is brought daily to the markets of Rome and Venice, and they are known to abound in the Mediterranean sea. Yet those that keep entirely either in salt or fresh water are but comparatively small. When the Sturgeon enjoys the vicissitude of fresh and salt water, it is then that it grows to an enormous size, so as almost to rival even the whale in magnitude.

England receives frequent visits from this much esteemed fish. It is often accidentally taken in our rivers in salmon nets, particularly in those parts that are not far remote from the sea. The largest we have heard of caught in Great Britain, was a fish taken in the Eske, where they are most frequently found, which weighed four hundred and sixty pounds. An enormous size to those who have only seen our fresh water fishes.

North America also furnishes the Sturgeon; their rivers in May, June, and July, supply them in very great abundance. At that time they are seen sporting in the water, and leaping from its surface several yards into the air. When they fall again on their sides, the noise is heard in still weather at some miles distance.

But the greatest numbers are to be found in the lakes of Frischehoff and Curischaff, near the city of Pillau. The adjacent shores are formed into districts, and farmed out to companies of fishermen, some of which are rented for six thousand gilders per annum. In the rivers also that empty themselves into the Euxine Sea, this fish is caught in great numbers, particularly at the mouth of the river Don. In all these places the fishermen regularly expect their arrival from the sea, and have their nets and salt ready prepared for their reception.

As the Sturgeon is not a voracious fish, it is never caught by a bait in the ordinary manner of fishing, but always in nets. From the description given above of its mouth, it is not to be supposed that the Sturgeon would swallow any hook capable of holding so large a bulk and so strong a swimmer. Indeed it never attempts to seize any of the finny tribe, but lives by rooting at the bottom of the sea, where it makes insects and sea-plants its whole subsistence. From this quality of floundering at the bottom it has received its name; which comes from the German verb *floeren*, signifying to wallow in the mud. It is obvious to all those who cut it open, that it does not subsist upon large animals, for nothing is found in its stomach but a kind of slimy substance; whence some imagine it lives only upon air and water. Hence arose a German proverb, applied to a man extremely temperate, when they say he is as moderate as a Sturgeon.

The Sturgeon is as timid in its nature as temperate in its appetites. There would be scarce any method of taking it, did not its natural desire of propagation induce it to incur so great a variety of dangers. The smallest fish is alone sufficient to terrify a shoal of Sturgeons; for, being unfurnished with any weapon of defence, they trust entirely to their swiftness, and their caution for security. Like all animals that do not make war upon others, Sturgeons live in society among themselves; rather for the purposes of pleasure, than from any power of mutual

mutual protection. Gefner asserts, that they are delighted with sounds of various kinds; and that he has seen them shoal together, at the notes of a trumpet.

The usual time for the Sturgeon to come up rivers to deposit its spawn, is about the beginning of summer, when the fishermen of all great rivers make a regular preparation for its reception. The nets in which the Sturgeon are caught, are made of small cord, and placed across the mouth of the river; but in such a manner that, whether the tide ebbs or flows, the pouch of the net goes with the stream. The Sturgeon thus caught, while in the water, is one of the strongest fishes that swim, and often breaks the net to pieces that incloses it; but the instant it is raised with its head above water, all its activity ceases: it is then a lifeless, spiritless lump, and suffers itself to be tamely dragged on shore. It has been thought prudent, however, to draw it to shore gently; for, if excited by any unnecessary violence, it has been found to break the fishermen's legs with a blow of its tail. The most experienced fishers, therefore, when they have drawn it to the brink, keep the head always elevated, which prevents its doing any mischief with the hinder part of the body: others, by a noose, fasten the head and tail together: and thus, without immediately dispatching it, bring it to the market, if there be one near; or keep it till their number is completed for exportation.

The flesh of the Sturgeon, pickled, is very well known at all the tables of Europe; and is even more prized in England, than in any of the countries where it is usually caught. The fishermen have two different methods of preparing it. The one is by cutting it in long pieces lengthwise, and having salted them, hang them up in the sun to dry: the fish thus prepared, is sold in all the countries of the Levant, and supplies the want of better provision. The other method, which is usually practised in Holland, and along the shores of the Baltic, is to cut the Sturgeon crosswise into short pieces, and put it into small barrels, with a pickle made of salt and saumure. This is the Sturgeon which is sold in England; and of which great quantities came from the north, until we gave encouragement to the importation of it from North America. From thence we are very well supplied; but it is said, the fish are inferior to those imported from the north of Europe.

A considerable trade is also carried on with the roe of the Sturgeon, which is salted and preserved in a peculiar manner, and called Caviare: it is made from the roe of all kinds of Sturgeon, but particularly the second. This is much more in request in other countries of Europe than with us. To all these high-relished meats, the appetite must be formed by degrees: and tho' formerly, even in England, it was frequently served at the politest tables; it is at present sunk entirely into disuse. It is still, however, a considerable merchandize among the Turks, Greeks, and Venetians. Caviare somewhat resembles soft soap in consistence; but it is of a brown, uniform colour, and is eaten as cheese with bread. The manner of making it is this: they take the spawn from the body of the Sturgeon, and freeing it from the small membranes that connect it together, they wash it with vinegar, and afterwards spread it to dry upon a table; they then put it into a vessel with salt, breaking the spawn with their hands, and not with a pebble; this done, they put it into a canvas bag, letting the liquor drain from it; lastly, they put it in a tub, with holes in the bottom, so that, if there be any moisture still remaining, it may run out: then it is pressed down, and covered up close for use.

But the Huso, or Isinglass fish, is caught in great

quantities in the Danube, from October to January: it is seldom under fifty pounds weight, and often exceeds four hundred: its flesh is soft, glutinous, and flabby; but it is sometimes salted, which improves the taste of it, and then it turns red like salmon. It is for the commodity it furnishes, that it is chiefly taken. Isinglass is of a whitish substance, inclining to yellow, done up into rolls, and so exported for use. It is serviceable not only in medicine, but many arts. The varnisher, the wine merchant, and even the clothier, are acquainted with its uses; and very large sums are yearly expended upon this single article of commerce. They make it thus: they cut the skin, the entrails, the fins, and the tail of this fish, into small pieces; these are left to macerate in a sufficient quantity of warm water, and they are all boiled shortly after with a slow fire, until they are dissolved and reduced to a jelly; this jelly is spread upon instruments made for the purpose, so, that drying, it assumes the form of parchment, and, when quite dry, it is then rolled into the form which we see it in the shops.

This valuable commodity is principally furnished from Russia, where they prepare great quantities surprisngly cheap. The ancients were acquainted with the fish that afforded this drug. Pliny mentions it under the name of Ichthyocolla, and says, that the glue which was produced from it had the same title; and afterwards adds, that it was made out of the belly of the fish.

Sturgeon, says Lemery, was much esteemed by the ancient Romans, and the belly is reckoned best. It contains much oil and volatile salt, and yields a nourishing and solid food, because of its thick and gross juices. It is also hard, toughish, fat, and difficult of digestion; and therefore it is injurious to weak and tender persons, and those who are sick or recovering from illnesses. As Sturgeon is fat, it relaxes the fibres of the stomach and bowels, and renders the body a little soluble. The bones of this fish, taken to the quantity of a dram, are looked upon to be opening, good for rheumatisms and the gravel; they extract what is called mouth or water-glue from it, which is not so soon dissolved as the common sort, but produces the same effects.

NATURAL HISTORY of the SUN FISH.

IT has a broad short body, covered behind with a circular fin, which answers the purpose of a tail, so that it has the appearance of a bulky head, and the body seems to have been cut off in the middle. Its ordinary length is about ten feet, though it is sometimes found to weigh upwards of an hundred pounds. It has a large rough thick skin, but no scales: the back is blackish, and the belly of a silver white; but both the belly and back terminate in a sharp ridge. In proportion to the size of the fish, the mouth is very small, and when opened is roundish. The jaws, which are hard and rough, are armed with several rows of sharp teeth. The eyes are small, and before each is a semi-circular aperture; the pectoral fins are very small, and placed behind them. The dorsal and the anal fins are high, and placed at the extremity of the body: the tail fin is narrower.

Here seems to be no satisfactory reason for calling this animal the Sun-fish: perhaps from the roundness of its body, or from its shining in the night. It is found in the Mediterranean sea, in the ocean, and on the coasts of Cornwall. A fish of this kind was taken near Plymouth, in 1734, which weighed five hundred pounds.

When boiled, it becomes a glutinous jelly, resembling boiled starch when cold, and serves the purposes of glue.

The SHORT SUN FISH.

This is much shorter and deeper than the other: the back and the anal fins are higher, and the aperture on the gills is not semi-circular, but oval. The situation of the fins are the same in both. Though both these kinds are taken on the western coasts of this kingdom, they are much more numerous in the warmer parts of Europe.

NATURAL HISTORY of the LUMP FISH.

THIS is also called the sea-owl, and in Scotland the cock-paddle. This singular fish increases to the weight of four pounds, and the length of sixteen inches: the shape of the body is like that of the bream, deep, but very thick, and it swims edgeways. It is of a blackish colour, a little tinged with red; it has no scales, but the skin is rough, with sharp tubercles of a blackish colour in every part. There are three rows of crooked spines or prickles on each side; and another row of the same on the top of the back. The belly is of a bright crimson colour; the pectoral fins are large and broad, almost uniting at their base. Beneath this is the part by which it adheres to rocks, &c. under the water, and this so firmly, that it is very difficult to remove it. It consists of an oval aperture, surrounded with a muscular and soft substance, edged with small appendages like threads, which concur as so many clasps. By the assistance of this part, it adheres firmly to whatever it pleases: on putting a fish of this species, just caught, into a pail of water, it fixes itself with such force to the bottom, that, on taking the fish by the tail, the whole pail may be lifted up, though it holds some gallons, and that without removing the fish from its hold. However extraordinary this may appear, we have sufficient testimony of the truth of it; for Mr. Pennant informs us, he has *known* an instance of the kind.

The mouth of the Lump-fish resembles that of the sun-fish, but is somewhat larger: the lips are flat and thick; the jaws are full of teeth, and the nostrils are tubes or pipes which rise above the skin.

These fish are found in great abundance in the Greenland seas, during the months of April and

May, when they approach the shore to spawn. They have extremely large roes, which the Greenlanders boil and eat: they are remarkably fat, which renders them more agreeable to the natives, who are fond of oily food.

NATURAL HISTORY of the SEA SNAIL.

THIS animal takes its name from the soft and unctuous texture of its body, resembling the Snail upon land; it is almost transparent, and quickly dissolves and melts away. It is but a small fish, not exceeding five inches in length. When fresh taken, the colour is of a pale brown: the shape of the body is round, and the back fin extends from the head to the tail. Beneath the throat is a round depression, of a whitish colour, surrounded by twelve broken spots, placed in a circle. The head is large, thick and round; the jaws are very rough, but are destitute of teeth: the belly is white and very protuberant. It adheres to the rocks, &c. like the other species. It is found in the sea, near the mouths of great rivers.

NATURAL HISTORY of the PIKE FISH.

THE body of this fish, in the thickest part, is not thicker than a swan's quill, when the animal is about sixteen inches long. This is angular, but as the angles are not very sharp, they are hardly discernible till the fish is dried. The general colour of this fish is an olive brown, marked with several blueish lines, pointing from the back to the belly; which, in dried fish, appear like the signs of so many joints. They are viviparous; for on crushing one immediately after it was taken, hundreds of minute young ones were perceived to crawl out.

There is another of this tribe called the shorter Pike-fish, which is shorter and thicker than the former, and is not longer than twelve inches.

The little Pike-fish, as its name implies, is very small, not exceeding five inches in length. It is very slender, and tapers off to a point.

C H A P. III.

NATURAL HISTORY of FISHES of the SPINOUS KIND, viz. the EEL, the SEA-WOLF, the LAUNCE, the SWORD-FISH, the DRAGON-FISH, the WEAVER, the COD, the TORSK, the HADDOCK, the WHITING, the BIB, the POOR, the COAL-FISH, the POLLACK, the HAKE, the LING, the BURBOT, the SEA-LEACH, the BLENNY, the SEA-GUDGEON, the BULL-HEAD, the POGGE, the FATHER-LASHER, the DOREE, the HOLLIBUT, the PLAICE, the DAB, the FLOUNDER, the SOLE, and the TURBOT.

Of SPINOUS FISHES.

THESE are obviously distinguished from the rest by having a complete bony covering to their gills; by their being furnished with no other method of breathing than with gills only; by their bones, which are sharp and thorny; and their tails, which are placed in a situation perpendicular to the body. This is that class which alone our later naturalists are willing to admit as fishes. The cetaceous class with them are but beasts that have taken up their abode in the ocean; the cartilaginous class are an amphibious band, that are but half denizens of that element: according to

the moderns, it is Fishes of the Spinous kind that really deserve the appellation.

The generality of mankind will hardly allow this distinction; but whatever be the justice of this preference in favour of the Spinous class, it is certain that the cetaceous and cartilaginous classes bear no proportion to them in number. Of the Spinous classes, above four hundred species are already known; the numbers of the former are therefore trifling in comparison, and not above a fifth part of the finny creation.

From the infinite variety in this class, it is obvious how difficult a task it must have been to describe or remember even a part of what it contains. When

six hundred different sorts of animals offer themselves to consideration, the mind is bewildered in the multiplicity of objects that all lay some claim to its attention. To obviate this confusion, systems have been devised, which, throwing several Fishes that agree in many particulars into one groupe, and thus uniting all into so many particular bodies, the mind that was incapable of separately considering each, is enabled to comprehend all when thus offered in larger masses to its consideration.

Of all the beings in animated nature, Fishes seem most to demand a systematical arrangement. Quadrupeds are but few, and can be all known; birds, from their seldom varying in their size, can be very tolerably distinguished without system; but among Fishes, which no size can discriminate, where the animal of ten inches, and that of ten feet, is entirely the same, there must be some other criterion by which they are to be distinguished; something that gives precision to our ideas of the animal whose history we desire to know.

Very little is yet known of the real history of Fishes; but of a great many we have full and sufficient accounts, as to their external form. It would be unpardonable, therefore, in an history of these animals, not to give what we do know; and at least arrange our forces, though we cannot tell their destination. In this art of arrangement, Artedi and Linnæus have long been conspicuous: they have both taken a view of the animal's form in different lights; and from the parts which most struck them, have founded their respective systems.

Artedi, who was the foremost of the two, perceiving that some Fishes had hard prickly fins, as the pike; that others had soft pliant ones, as the herring; and that others still were destitute of that particular fin, by which the gills are opened and shut, as the eel, made out a system from these varieties. Linnæus, on the other hand, rejecting this system, which he found liable to too many exceptions, considered the fins, not with regard to their substance, but their position. The ventral fins seem to be the great object of his system; he considers them in fishes supplying the same offices as feet in quadrupeds; and from their total absence, or from their being situated nearer the head or the tail, in different Fishes, he takes the differences of his system.

These arrangements, which are in a great degree arbitrary, and which are rather a method than a science, are always fluctuating; and the last is generally preferred to the preceding. There has lately appeared, however, a system composed by Mr. Gouan, of Montpellier, that deserves approbation for more than its novelty. It appears the best arrangement of this kind that ever was made; in which the divisions are not only precisely systematical, but in some measure adopted by nature itself. This learned Frenchman has united the systems of Artedi and Linnæus together; and by bringing one to correct the other, has made out a number of tribes, that are marked with the utmost precision. A part of this system, however, we have already gone through in the cartilaginous. In the arrangement of these we have followed Linnæus, as the number of them was but small, and his method simple. But in that which is more properly called the Spinous class of Fishes, we shall principally follow Mr. Gouan's system; the terms of which, as well as of all the former systems, require some explanation. We do not love to multiply the technical terms of a science; but it often happens, that names, by being long used, are as necessary to be known as the science itself.

If we pay due attention to the substance of the fin of a Fish, we shall find it composed, besides the skin, either of straight, hard, pointed, bony prickles, or spines, as in the pike; or of soft, crooked or forked

bones, or cartilages, as in the herring. The Fish that have bony prickly fins, are called prickly finned Fish; the latter, that have soft or cartilaginous fins, are called soft finned Fish. The prickly finned Fish have received the Greek new-formed name of *acanthopteri*; the soft finned Fish have likewise their barbarous Greek name of *malacopteri*. Thus far Artedi has supplied Mr. Gouan with names and divisions. All Spinous Fish are divided into prickly finned Fish, and soft finned Fish.

Linnæus, indeed, has taught him to remark the situation of the fins: for the ventral or belly fins, which are those particularly to be remarked, are either wholly wanting, as in the eel, and then the Fish is called *apodal* (a Greek word, signifying without feet;) or the ventral fins are placed more forward than the pectoral fins, as in the haddock, and then the animal is called a *jugular* Fish; or the ventral fins are placed directly under the pectoral fins, as in the father-lasher, and then it is called a *thoracic* Fish: or, lastly, the ventral fins are placed nearer the tail than the pectoral fins, as in the minow, and then it is an *abdominal* Fish.

The French naturalist then mixes and unites these distributions into two grand divisions. All the prickly finned Fish make one general division; all the soft finned Fish another. These first are distinguished from each other, as being either *apodal*, *jugular*, *thoracic* or *abdominal*. Thus there are prickly finned *apodal* Fishes, prickly finned *jugular* Fishes, prickly finned *thoracic* Fishes, and prickly finned *abdominal* Fishes. On the other hand, the soft finned Fishes fall under a similar distribution, and make the other general division. Thus there are soft finned *apodal* Fishes, soft finned *jugular* Fishes, soft finned *thoracic* Fishes, and soft finned *abdominal* Fishes. These general characters are strongly marked, and easily remembered. It only remains, therefore, to divide these into such tribes as are most strongly marked by nature; and to give the distinct characters of each, to form a complete system with great simplicity. This Mr. Gouan has done; and the reader, who can contain in his memory the characteristic marks of these, will have a tolerable idea of the form of every kind of Spinous Fish: but as to the history and nature of the animal, itself, that can only be obtained by information and experience.

Having mentioned a method by which Spinous Fishes may be distinguished from each other, the history of each in particular will naturally follow: the history of any one of this class, indeed, very much resembles that of all the rest: they breathe air and water through the gills; they live by rapine; each devouring such animals as its mouth is capable of admitting; and they propagate, not by bringing forth their young alive, as in the cetaceous tribes, nor by distinct eggs, as in the generality of the cartilaginous tribes, but by spawn, or peas, as they are generally called, which they produce by hundreds of thousands. These are the leading marks that run through their whole history, and which have so much swelled books with tiresome repetition.

We shall carefully draw this numerous class into one point of view, and mark how they differ from the former classes; and what they possess peculiarly striking, so as to distinguish them from each other: the first object that presents itself, and that by which they differ from all others, are the bones. These, when examined but slightly, appear to be entirely solid; yet, when viewed more closely, every bone will be found hollow, and filled with a substance less rancid and oily than marrow. These bones are very numerous and pointed; and, as in quadrupeds, are the props or stays to which the muscles are fixed, which move the different parts of the body.

In all Spinous Fishes of the same kind, the number of bones is always the same. It is a vulgar observation

ervation, that fishes are at some seasons more bony than at others; indeed this scarce requires contradiction. It is however true, that fish are at some seasons much fatter than at others; so that the quantity of the flesh being diminished, and that of the bones remaining the same, they appear to increase in number, as they actually bear a greater proportion.

It has been already observed, that all fish of the same kind, have the same number of bones: the skeleton of a fish, however irregularly the bones may fall in our way at table, has its members very regularly disposed; and every bone has its fixed place, with as much precision as we find in the orders of a regular fabric. But then, Spinous Fish differ in the number of bones according to the species; for some have a greater number of fins, by which they move in the water. The number in each is always in proportion to the number and size of these fins: for every fish has a regular apparatus of bones and muscles, by which the fins are moved; and all those fish where they are numerous or large, must consequently be considerably bony. Indeed in the larger fish, the quantity of flesh is so much, and the bones themselves are so large, that they are easily seen and separated: but in the smaller kinds with many fins, the bones are as numerous as in the great; yet being so very minute, they lurk almost in every part of the flesh, and are dangerous as well as troublesome to be eaten. In a word, those fish which are large, fat, and have few fins, are found to be the least bony; those which are small, lean, and have many fins, are the most bony of all others. Thus, for instance, a roach appears more bony than a carp, because it is leaner and smaller; and it is actually more bony than an eel, because it has a greater number of fins.

The Spinous Fish, as they partake less of the quadrupede in their formation than any others, so they can bear to live out of their own element a shorter time. In general, when taken out of the water, they testify their change by panting more violently and at closer intervals; the thin air not furnishing their gills the proper play; and in a few minutes they expire. Some indeed are more vivacious in air than others; the eel will live several hours out of water; and the carp has been known to be fattened in a damp cellar.

The method is by placing it in a net well wrapped up in wet moss, the mouth only out, and then hung up in a vault. The fish is fed with white bread and milk; and the net sometimes plunged into the water. The animal, thus managed, has been known not only to live for a fortnight, but to grow exceedingly fat, and of a superior flavour: from this it appears, that the want of moisture in the gills, is the chief cause of the death of these animals; and could that be supplied, their lives might be prolonged in the air, almost as well as in their own element.

It is, however, impossible to account for the different operations of the same element, upon animals that, to appearance, have the same conformation. To some fishes, bred in the sea, fresh water is immediate destruction: on the other hand, some fishes, that live in our lakes and ponds, cannot endure the salt water. Whence this difference can arise, is not easily accounted for. The saline quality of the water cannot properly be given as the cause; since no fishes imbibe any of the sea's saltiness with their food, or in respiration. The flesh of all fishes is equally fresh, both in the river, and at the saltiest depths of the ocean; the salt of the element in which they live, not in the least mixing with their constitution. Whence then is it, that animals will live only there, and will quickly expire, when carried into fresh water? It may pro-

bably arise from the superior weight of the sea water. As from the great quantity of salt dissolved in its composition, it is much heavier than fresh water, so it is probable it lies with greater force upon the organs of the respiration, and gives them their proper and necessary play: on the other hand, those fish which are used only to fresh water, cannot bear the weight of the saline fluid, and expire in a manner suffocated in the grossness of the strange element.

Thus it is evident, that there are some tribes that live only in the sea, and others only in fresh water, yet there are some whose organs are equally adapted to either element; and that spend a part of the time allotted them by nature in one, and a part in the other. Thus the salmon, the shad, the smelt, and the flounder, annually quit their native ocean, and visit our rivers to deposit their spawn. This seems the most important business of their lives; and there is no danger which they will not encounter, even to the surmounting precipices, to find a proper place for the deposition of their future offspring. The salmon, upon these occasions, is known to ascend rivers five hundred miles from the sea; and to brave not only the danger of various enemies, but also to spring up cataracts as high as a house. As soon as they come to the bottom of the torrent, they seem disappointed to meet the obstruction, and swim some paces back; they then take a view of the danger that lies before them, survey it motionless for some minutes, advance, and again retreat; till at last, summoning up all their force, they take a leap from the bottom, their body straight, and strongly in motion; and thus most frequently clear every obstruction. Sometimes indeed it happens, that they have not sufficient strength to make the leap; and then, in our fisheries, they are taken in their descent. But this is one of the smallest dangers that attend these adventuring animals in their progress: numberless are the methods of taking them; as well by the hook, as by nets, baskets, and other inventions. Their capture makes, in several countries, a great article of commerce; as being cured in several different manners, either by salting, pickling, or drying, they are sent to all the markets of Europe. They are indeed either fresh, dried, or pickled, very excellent food, and immense quantities of them are annually consumed.

NATURAL HISTORY of the EEL.

THIS is a very singular fish in many things that relate to its natural history, and in some respects borders on the nature of the reptile tribe. During the night it will quit its element to wander along the meadows; not only for the change of habitation, but also for the sake of prey, feeding on the snails which it discovers in its passage.

In winter it sinks deep into the mud, and continues in a state of rest like the serpent kind. Morton, in his history of Northamptonshire, informs us, that in the river Nyne there is a species of small Eel, with a smaller head and a larger mouth than the common kind, which is called the *bed-eel*, and is found in clusters at the bottom of the river.

The ancients adopted extravagant notions about the generation of these fish; supposing they were either created from the mud, or that the scrapings of their bodies, which they left on the stones, were animated and became young Eels. Some moderns have given into these, and other equally wild opinions. The appearance of Eels, in ponds that were never stocked with them, they knew not how to account for; especially when they were so remote, as to make their being met with in such places a phenomenon. It is however extremely probable, that

many waters are supplied with these fish by the aquatic fowl of prey; in the same manner as vegetation is spread by many of the land birds, by dropping feeds as they carry them to feed their young; and such may be the occasion of the appearance of Eels in places where they were never seen before. With respect to the immediate generation of these fish, it has been sufficiently proved to be effected in the usual course of nature, and that they are viviparous. They will live out of water longer than any fish, and are extremely tenacious of life, as their parts will move a considerable time after they are cut in pieces.

The Eel is extremely voracious, and very destructive to the fry of fish.

The eyes of the Eel are placed at a small distance from the end of the nose: the iris of the eye is tinged with red; the teeth are small, sharp, and numerous: the under jaw is longer than the upper: beneath each eye is a minute orifice; and at the end of the nose two others, which are small and tubular. The Eel has a pair of pectoral fins, rounded at their ends; it has also a narrow fin on the back, uniting with that of the tail; and the anal fin joins in the same manner beneath. The orifice to the gills is behind the pectoral fin.

Eels differ in their colours, from a sooty hue to a light olive green: those which are called silver Eels, have white bellies, and a remarkable clearness throughout.

There is a variety of this fish, known in the Thames by the name of Grigs, and about Oxford by that of Grigs or Gluts. They have a larger head, a blunter nose, and a thicker skin than the common sort: neither are they so fat, or so much esteemed; nor do they often exceed three pounds in weight.

Common Eels sometimes grow so large as to weigh upwards of twenty pounds, but that is extremely rare. The Eel is the most universal of fish, and yet it is hardly ever found in the Danube, tho' it is very common in the lakes and rivers of Upper Austria. Tho' the Romans held these fish very cheap, the luxurious Syberites were so fond of them, as to exempt the persons who sold them from every kind of tribute.

Those which are found in rivers, or other clear running waters, are the best; as to their size it is immaterial: the liver and the gall are extremely acrid. Boerhaave says, that no fishes have a more acrid gall; and that with a mixture of the galls of the Eel and the pike, made into pills, he hath cured many ricketty children with hard and swelled bellies. The Torporific Eel, found in Guiana, in South America, if caught by a hook, violently shocks the person who holds the line: the same Eel touched with an iron rod, held in the hand of a person whose other hand is joined to another, &c. communicates a violent shock to ten or twelve persons thus joining hands, in a manner exactly similar to that of the electric machine. No shock is perceived by the holding the hand in the water near the fish when it is neither displeased nor touched; but if it is angry, it can give a shock to a person at five or six inches distance. This shock is produced by an emission of electric particles, which the fish discharges at pleasure. On the death of the animal no such electric property remains, and then the Indians eat it.

The Eel is a fresh water fish; sometimes it is found in the sea; not that it is produced there, but because it goes often out of rivers into the sea, and so back again into rivers; it delights in pure and running waters; and they assure us it grows lean, poor, and dies at last, when confined to muddy water. It requires also a great deal of water, for otherwise it dies. It is said it

cannot bear any considerable difference of living; for in case it should in summer time be conveyed into a much colder water than that wherein it was before, it is soon destroyed. In the mean time, they say, it can live out of the water five or six days, provided the north wind blows at that time: it feeds upon roots, herbs, fish, insects, and any thing it can find in the bottom of rivers. Athenæus says, he had seen Eels in a certain country, which were so far tamed, that if they offered them any thing to eat, they would come and take it out of the person's hands. This fish lives commonly seven or eight years.

The Eel is good aliment, and much used; it is tender, soft, and nourishing, because it contains many oily and balsamic parts: it has also a great many that are dull, viscous, and gross, which make the Eel hard of digestion. They eat Eels either roasted or boiled: those that are roasted seem to be more wholesome than the other; and the reason is, because they are thereby the more digested of their viscous phlegm, than by the other way. They should also be well seasoned, and you should drink good wine upon them, in order to help the digesting of their phlegm in the stomach. The fat of an Eel is looked upon to be good to take away the signs of the small-pox in the face, to cure the piles, and to make the hair grow: it is also put into the ears to help hearing. They make a kind of mucilage of Eel's skin, by steeping and boiling it in water, which is applied to swellings, in order to the softening and dissolving of them; it is good for hernia's. *Lemery on Foods.*

The CONGER, or CONGER EEL.

This fish grows to an enormous size. Dr. Borlase assures us, that they are sometimes taken near Mount Bay of one hundred pounds weight: and we have been informed, that some have been taken near Scarborough, which were ten feet and an half in length, and eighteen inches in circumference in the thickest part. The shape of the Conger Eel is somewhat like that of the common Eel; but they differ from it in the following particulars: their colour is darker, their eyes are much larger in proportion, and the iris is of a silver colour. On each side it has a straight white broadish line, extending from the head to the tail, which seems composed of a double row of points. The fin placed on the body has its upper edge blackish throughout the whole length. The Conger has more bones than the common Eel; and the end of the snout or upper chap is furnished with two short horns or tubes, from which a liquor may be squeezed out; but this is not to be depended upon, being sometimes found in both kinds, and sometimes entirely wanting in both kinds.

Though a sea fish, it is supposed they generate like the fresh water species: innumerable quantities of what are supposed to be their fry, come up the Severn about the month of April, preceding the fads, which it is supposed migrate into that river to feed on them. Congers are extremely voracious fish, preying upon other fish. They, as well as other Eels in general, are remarkably fond of carcases of any kind, and are frequently found lodged in those that have been accidentally taken up. Congers are an article of commerce in Cornwall; great quantities being taken on that coast, and exported to Spain and Portugal.

Fishermen are much afraid of a large Conger, lest it should endanger their legs by clinging round them; therefore they kill them as soon as possible, by striking them on the navel.

In curing them, they are slit, and hung on a frame to dry; having a vast quantity of fat, which it is necessary should exude before they are fit for use.

use. It is said, that a Conger of an hundred weight will waste by drying to twenty-four pounds.

The SAND EEL, or LAUNCE.

It resembles the common Eel in shape, being long and round, but it seldom exceeds nine or ten inches in length. The colour of the back is blue, varying with green; the sides and back are of a silver white. It is destitute of scales, has a sharp snout, and a wide mouth without teeth: the lower jaw is longer than the upper, and the upper jaw is moveable, and capable of being protruded; so that, when open, the gape is very wide. It has a long fin, which extends almost the whole length of the back, is very narrow, and consists of fifty-eight rays: there is also a pair of fins at the gills, but none on the belly. The iris is silvery. The tail is forked, but the lobes are rounded at their extremities.

These fish are found in most of our sandy shores, during some of the summer months: on the recesses of the sides they conceal themselves about half a foot in the sand, in those places where the water is left at the depth of about a foot; and the fishermen of Cornwall, and the isle of Man, search for them with hooks provided for that purpose. They are very delicate eating, but they are generally used as baits for other fish. The female is longer and slenderer than the male.

NATURAL HISTORY of the WOLF FISH, or SEA WOLF.

THIS animal has a smooth slippery body without scales. It somewhat resembles an Eel, but is of a brownish grey, and the sides are adorned with blackish transverse shades. The head is large, and flat above the eyes, and the cheeks appear swelled and puffed out. It is a most voracious fish, and, when taken, will fasten on any thing within its reach. The fishermen, dreading its bite, endeavour to disarm it as soon as possible; they immediately pull out its fore-teeth, and then kill it by striking it behind the head. The Danish and German writers say, that its bite is so hard that it will seize on an anchor, and leave the marks of its teeth in it; and that the animal is capable of crushing even stones with its jaws. It feeds principally on crustaceous and shell fish.

They are taken in the sea near Yorkshire and Northumberland: on the Yorkshire coast they have been found of the length of four feet; and Dr. Gronovius informs us, that they have been taken near Hitland upwards of seven feet long. This fish has so disagreeable an aspect, that nobody at Scarborough, except the fishermen, will eat it, and they prefer it to holibut.

The body of the Wolf Fish is long, and a little compressed sideways, and the skin wants the lateral line: the tail is round at the end, and consists of thirteen rays: the sides, back, and fins, are of a livid lead colour, and the sides and back are marked downwards with irregular obscure dusky lines.

NATURAL HISTORY of the SWORD FISH.

THE snout of this fish is the upper jaw produced to a great length, and has a great resemblance to a sword, from whence it takes its name. They have been seen upwards of fifteen feet in length, and two hundred pounds in weight. The head is thick, the body is long and round, but grows gradually smaller towards the tail. The snout is one third of the whole length of the fish, and is compressed at the top and bottom, but sharp at the

point: the under jaw is about four times as short as the upper, and is also sharp-pointed. The mouth is destitute of teeth.

The skin of the Sword Fish is rough but very thin: the colour of the back is dusky, that of the belly a silver white. The dorsal fin begins a little above the gills, and extends almost to the tail. The tail is forked and almost in the shape of a crescent, and it has only one pair of fins at the gills.

The Sword Fish is extremely voracious, and particularly a great enemy to the tunny.

It sometimes frequents our coasts, but is much more common in the Mediterranean sea, especially in that part which separates Italy from Sicily, which has been long celebrated for it. The Sicilians, who are very fond of it, buy it up very eagerly, and, at its first coming into season, give about six-pence English per pound for it. The season for it continues from May till August. The ancients cut this fish into pieces, and salted it, whence it was called *tomus thurianus*, from *Thurii*, a town in the bay of Tarentum, famous for taking and curing it.

The ancient method of taking the Sword Fish is particularly described by Strabo, and agrees exactly with that practised at this day by the Italians and Sicilians. A man ascends one of the cliffs that overhangs the sea to observe the motions of these fish. As soon as he perceives any, he gives notice (by signs before agreed upon) of the course it takes: a fisherman, who is stationed in a boat, climbs up the mast, and on seeing the Sword Fish, directs the rowers which way to steer. When he thinks he is within reach, he immediately comes down, and strikes a spear or harpoon into its body; the handle of which being loose in the socket, separates from it, while the iron part, which is fastened to a long cord, remains in the body. The fish is then suffered to weary itself with flouncing in the water, and afterwards is drawn into the boat.

NATURAL HISTORY of the DRAGON FISH.

THE head of this fish is large and flat at the top; there are two orifices in the hind part, through which it breathes, and through which it also forces out the water it takes in at the mouth, in the same manner as the cetaceous fish. The eyes, which are large, are placed very near each other on the upper part of the head, so that in their natural position they look upwards: the pupils are of a rich sappharine blue, and the irides of a fine yellow. The upper jaw projects much farther than the lower; the mouth is very wide, and the teeth are small. It is found as far north as Spitzbergen, and as far south as the Mediterranean sea. It is also frequently seen on the Scarborough coasts. The colours are yellow, blue, and white; the fish making a beautiful appearance when it is just taken.

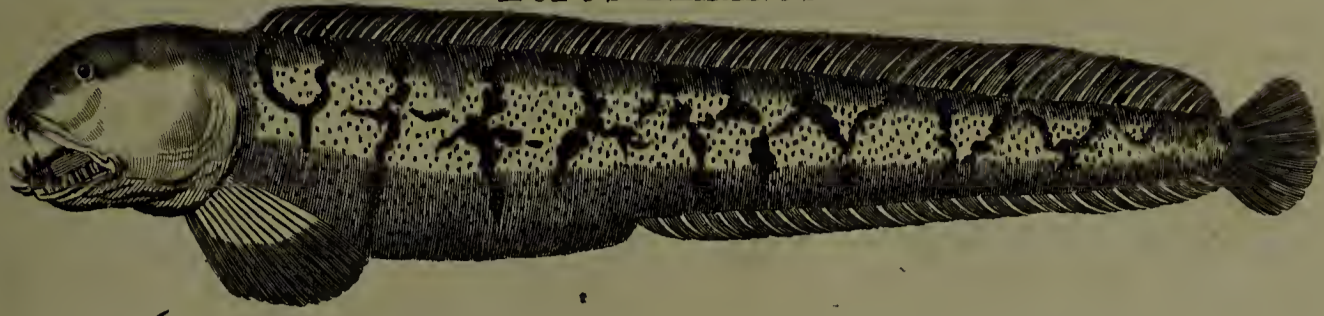
This species grows to the length of about ten inches: the body is slender, round, and smooth.

The SMALL DRAGON FISH.

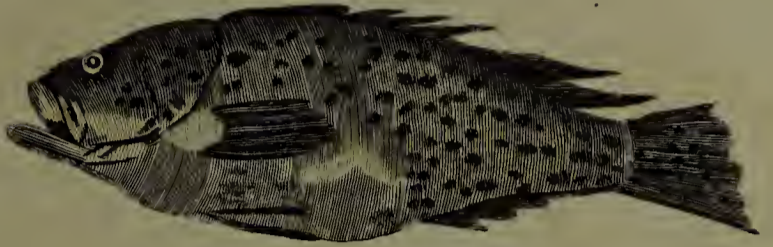
This species is of a yellowish green colour on the back, and white on the belly; the sides are speckled with small spots of a bluish silver colour. It may be distinguished from all other small fish by the spots just mentioned, by the round holes of the gills, by three pointed prickles at the corners of the gills, by the rays of the fore back-fin rising higher than the membrane that connects them, and by the jaws being furnished with exceeding small teeth. The mouth is small, the eyes large, and almost contiguous. The Small Dragon Fish is seldom seen to exceed six or seven inches.

FISHES.

LUPUS MARINUS



MEROS



LYRA CORNUTA



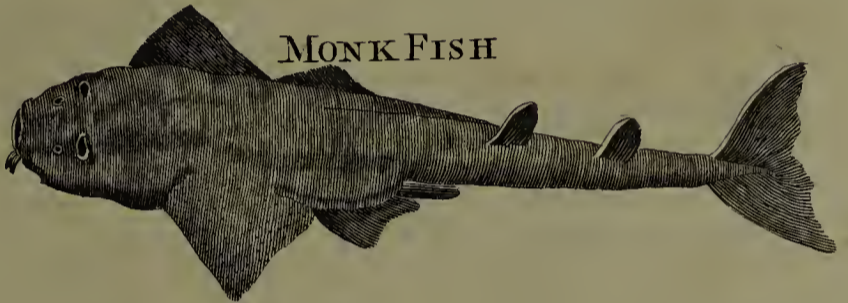
ACUS



MERLUCIUS



MONK FISH



MONOCEROS



NIQUI or PIETERMAN



OPAI



ORBIS



ORBIS MURICATUS



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PAGRUS

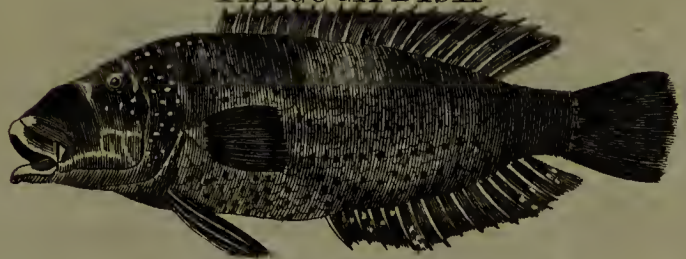


PASTINACA

MARINA



PEACOCK FISH



FISHES.

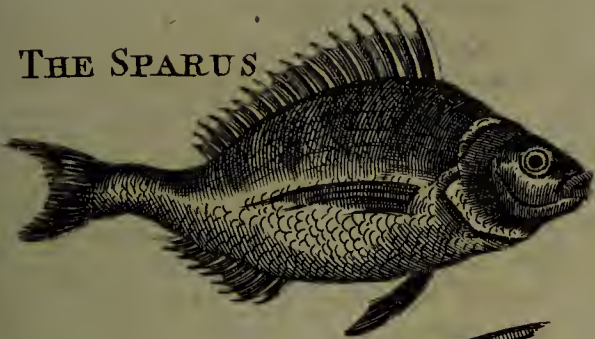
THE GATTORUGINE



THE ZYCENA



THE SPARUS

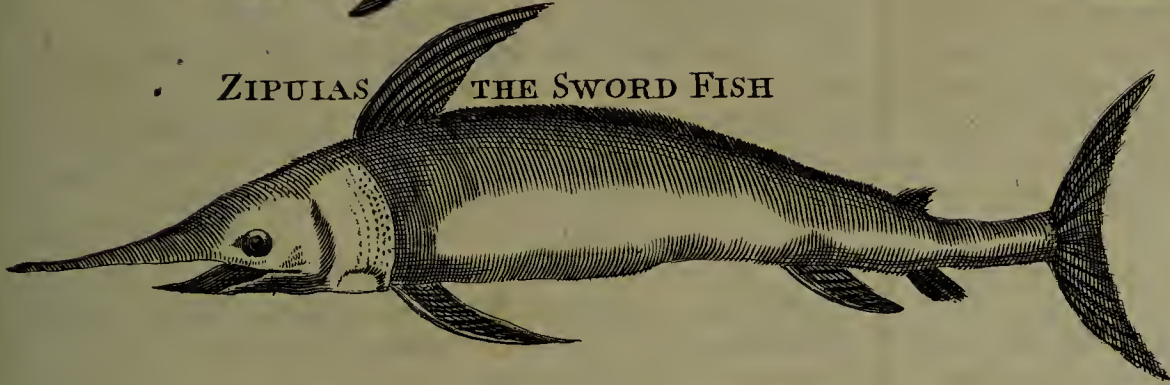


THE PAGANELLO

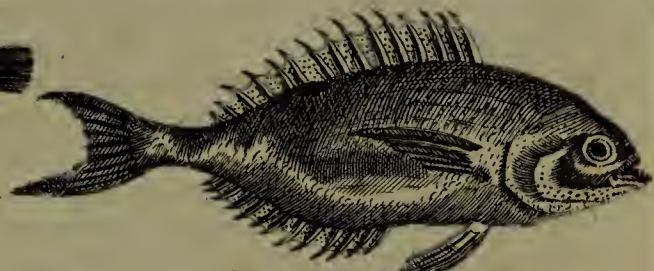


ZIPULAS

THE SWORD FISH



THE MELASURUS



THE BULLHEAD OF MILLAR'S THUMB



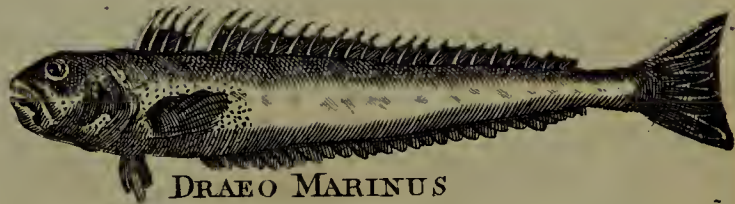
TRACHURUS THE BONITO



THE SEA PERCH



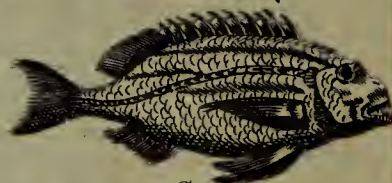
THE LUCIOPERCA OF PIKE PERCH



DRAEO MARINUS



THE MERULA

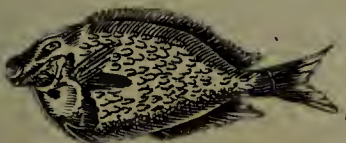


THE SYNAGRIS



THYNNUS THE TUNNY

THE LYRA OF PIPER



THE AGARAUNA



THE SEA SCORPION OF SALVIAN

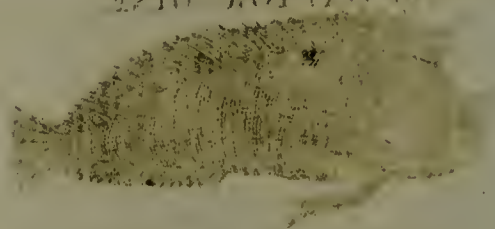


THE STARGAZER OF UNRANO SCAPUS



THE FABER OF JOHN DOREE

THE TROUT



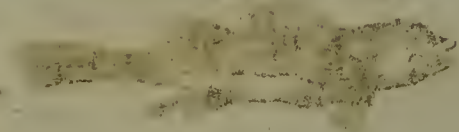
THE SALMON



THE HERRING



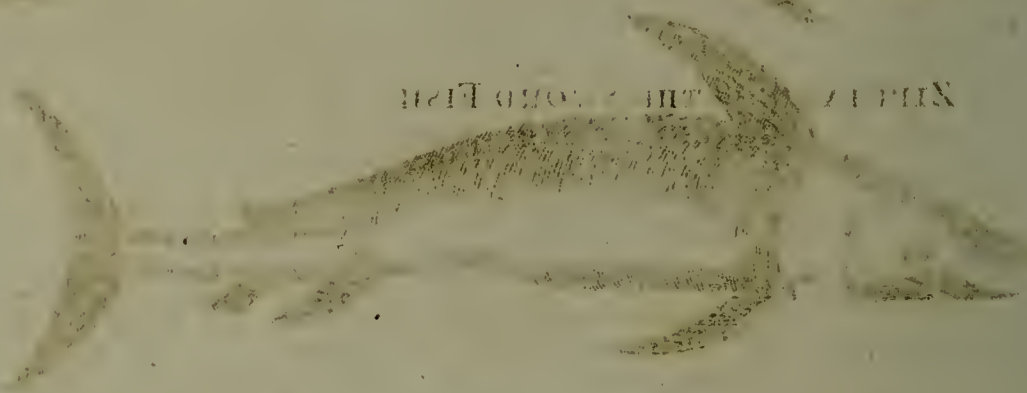
THE CARP



THE PERCH



THE TROTTER



THE EEL



THE SHAD



THE CATFISH



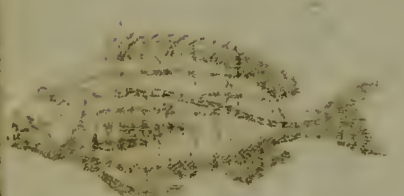
THE BASS



THE MACKEREL



THE TUNA



THE MACKEREL



THE SALMON



THE CARP



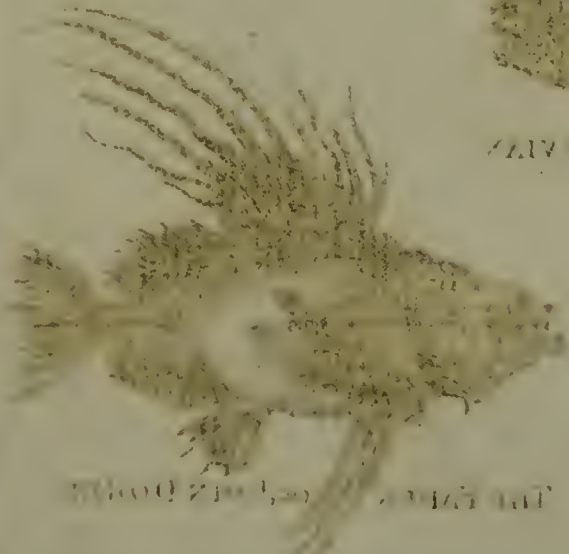
THE TROUT



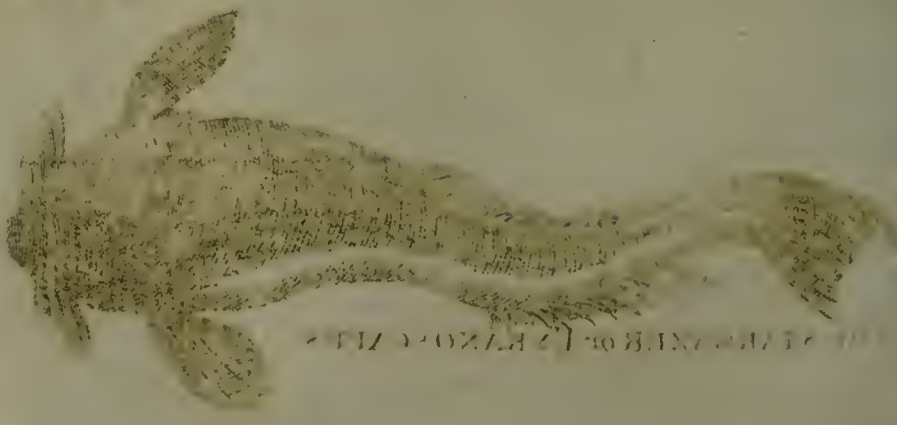
THE SALMON



THE TUNA



THE TUNA



NATURAL HISTORY of the WEAVER.

THIS fish is also called the sea dragon. It is a long fish, with flat sides, a straight back, and a prominent belly. The lines on the sides are partly yellow, and partly dusky, running obliquely from the back to the belly; the scales are thin and small, and the head moderately compressed: the eyes are placed on the top of the snout, and very near together. The iris of the eyes is yellow; the under jaw is longer than the upper, and slopes very much towards the belly: the teeth are small; the forward back-fin has six rays; the fin behind this, and which is almost close to it, reaches very near the tail.

The ancients were well acquainted with the qualities of this fish, and mention them without any exaggeration: the wound inflicted by the spines that form the dorsal fin are exceedingly painful, attended with a violent burning, and most pungent shooting; and, if the person who receives it is in a bad habit of body, it sometimes occasions an inflammation that will extend from the arm to the shoulder. Some are of opinion, that these symptoms proceed from something more than the small wound the fish is capable of inflicting. The common remedy used by fishermen is the sea-sand, with which they rub the place affected for a considerable time. In the Universal Museum for 1765, mention is made of a person who was dangerously wounded by this, and was cured by the application of sweet oil, and taking opium and Venice treacle.

This fish grows to the length of twelve inches. It buries itself in the sands somewhat like the sand-eel, leaving only its nose out; and, when trod upon, strikes with great violence. Notwithstanding this noxious quality of the spine, the Weaver is very delicate food.

NATURAL HISTORY of the COMMON COD FISH.

THE Cod inhabits only the northern parts of the world: it seems confined between the latitudes sixty-six and fifty: those which are caught either north or south of those degrees, being few in number, and bad in quality.

Immense quantities of Cod fish inhabit the banks of Newfoundland, and the other sand banks that lie off the coasts of Cape Breton, Nova Scotia, and New England. It is probable they are tempted to resort there on account of the quantity of worms produced in those sandy bottoms. Another cause of their particular attachment to these spots, is their vicinity to the polar seas, where they return to spawn.

The fishing banks of Newfoundland are a sort of mountains covered with the sea: one of these is deservedly called the Great Bank, for it extends four hundred and fifty miles in length, and upwards of one hundred in breadth. It is about seventy-five miles from the island of Newfoundland, in America: the largest, best, and fattest Cod, are those taken on the south side of the bank; those on the north side being considerably smaller. The season for catching them on this bank, is from the beginning of February to the beginning of May. Those that are taken in May and June will keep tolerably well; but those which are caught in July, August, and September, will spoil in a very short time, unless extraordinary care be taken of them. Sometimes, indeed, this fishing is over in a month or six weeks, and at other times it continues upwards of six months.

When Lent approaches, the fishermen hasten homewards, though they have not caught above half of their cargo, because the markets at that time are best. Sometimes, however, they make a second

voyage, before others have got a sufficient cargo for the first. They are all taken with a line and hook baited with the entrails of Cod-fish, a small fish called capelin, and a shell-fish called chams; and an expert fisherman will catch four or five hundred in a day.

On the north of Iceland, very few are taken; but on the south and west coasts they abound. They are found in great plenty on the coasts of Norway, in the Baltic, and off the Orkney and the western isles; after which their numbers gradually decrease, as they advance towards the south; and before they reach the mouth of the Straights of Gibraltar, they seem entirely to cease.

Before Newfoundland was discovered, the principal fisheries of Cod were in the seas of Iceland, and of our western isles; which were the grand resort of ships of all the commercial nations; but the greatest plenty was found near Iceland. This evidently appears, for queen Elizabeth condescended to ask Christian the Seventh of Denmark permission to fish in those seas; though she afterwards repented of her request, and instructed her ambassadors at that court, to insist on the right of a free and universal fishery.

The increase of shipping that now resort to the fertile banks of Newfoundland is astonishing. Great Britain still enjoys the greatest share; which ought to be esteemed as our greatest treasure, as it brings strength to the state, and wealth to individuals.

Providence hath benevolently ordained, that this fish, so useful to mankind, should be so very prolific, as to supply more than the deficiencies of the multitudes annually taken. Leuwenhoek counted nine millions, three hundred and eighty-four thousand eggs in a Cod-fish of a middling size.

They begin to spawn, in our seas, in the month of January, and deposit their eggs in rough ground among rocks.

Those fish are most esteemed for the table, which are of a middling size, and they are to be chosen by their plumpness or roundness, especially near the tail, and by the regular undulated appearance of the sides, as if they were ribbed. These, and other fish of this genus, are in the highest season in winter; but the glutinous parts about the head lose their delicate flavour, after they have been twenty-four hours out of the water.

The general weight of those taken on our coasts is from fourteen to forty pounds, though they are sometimes found to weigh sixty or seventy pounds.

The Cod-fish is short in proportion to its bulk; the belly is very large and prominent: the jaws are of an equal length, with a small beard on the lower jaw: the teeth are disposed in the palate as well as the jaws: the eyes are large. This fish has three soft fins on the back: the ventral fins are very slender; and it has two anal fins. It is ash coloured on the back and sides, and usually spotted with yellow: the belly is generally white; though they sometimes vary not only in colour, but in shape, especially that of the head. It has a side line, which is broad, straight and white, till it reaches opposite the vent, when it curves towards the tail.

Cod-fish are salted in the following manner on board the ships: the head is cut off, the belly opened, and the guts taken out; and then they are laid side by side, head to tail, at the bottom of the vessels, for about eight or ten feet square. One layer being compleated, it is covered with salt, and another laid upon that, which is covered as before. All the fish that are taken in one day are thus disposed of; but great caution is used not to cure those which have been caught on different days. They remain thus for three or four days, and are then removed into another part of the vessel, and salted again. They

are suffered to remain thus till the vessel has procured its full cargo, or till they depart for their destined port. Sometimes they are put into barrels and packed up, and they then go under the denomination of barrel-cod.

These fish, however, are not always salted, for some are dried on shore. Such are fished for along the coast of Placentia in Newfoundland, from Cape Race to the Bay of Experts; within which limits, there are several commodious harbours and places to dry the fish in. Those who mean to dry them in the sun, always take them in the summer season, that being the only proper time for that purpose. A smaller sort of fish are usually chosen for drying, because, as they sooner take salt, they are fittest for the purpose.

The tripes, tongues, and rows of the Cod-fish are also salted and barrelled up; the latter of which are of service to throw into the sea, in order to draw other fish together; particularly pilchards. An oil is taken from this fish, which answers all the purposes of train oil, and is much used for dressing leather.

NATURAL HISTORY of the TORSK.

THIS fish is much esteemed for its delicacy. On being boiled, the meat divides into flakes like that of the salmon. The head is small; the upper jaw somewhat longer than the lower. The belly is a little prominent; the side line white, broad, and placed nearer the back than the belly. It never grows to a large size, seldom exceeding thirty inches in length. These fish are found in great quantities in the Baltic and the northern seas, particularly in Brassa Sound, where it is called the tusk, and about the Orkney Isles. It is indeed supposed, that they never wander into the more southern seas.

NATURAL HISTORY of the HADDOCK.

THE Haddock is of a middle size between a whiting and a cod. The back is blackish, and covered with small scales. A black line extends from the upper corner of the gills to the tail; and on the middle of each side, not far from the gills, there is a large black spot, which distinguishes it from all others: the belly and lower parts of the sides are silvery. The eyes are large; a barb hangs from the lower jaw, and the tail is forked. In other respects it resembles a cod; and particularly on the back, are three fins, resembling those of the common cod. Superstition assigns this mark to the impression St. Peter left with his finger and thumb, when he took the tribute out of the mouth of a fish of this species, which has, ever since that miracle, been continued to the whole race of Haddocks.

Large Haddocks begin to be in roe about the middle of November, and continue so till the end of January; from which time till May, they are very thin tailed, and much out of season. The small ones are extremely good from May till February; and those which are not old enough to breed are good in February, March, and April.

The grand shoal of Haddocks comes periodically on the Yorkshire coasts. They appeared on the tenth of December, in 1766, and exactly on the same day in 1767: these shoals extended near three miles in breadth from the shore; and in length, from Flamborough-head to Tinnmouth Castle. Three fishermen, within the distance of a mile from Scarborough-harbour, frequently loaded their boat with them twice a day; taking each time about a ton of

fish. If they threw their lines beyond the distance of three miles from the shore, they caught only dog-fish; a circumstance which shews how exactly these fish observe their limits.

The largest of the Haddocks were sold for eighteen pence to a shilling a score; and the smaller sort were sold for a penny, and sometimes an half-penny per score.

This species, which is the most common in the London markets, seldom grow very large; one of fourteen pounds being of an uncommon size, and extremely coarse: those of two or three pounds are the best for the table.

As soon as large Haddocks are out of season, they quit our coasts, and leave behind them a great number of small ones.

NATURAL HISTORY of the WHITING.

THE Whiting is a fish of an elegant make, and differs from all other fish of this kind, in having the upper jaw longer than the lower; and in the teeth, which appear out of the mouth when it is shut. It has no barb, and the belly fins are placed more forward than they are in the others. It is a slender fish of its size, especially towards the tail, for about the head it is considerably larger in proportion. The head and back are of a pale brown, the belly is silvery; the lateral line is white and crooked: the fins below the vent are speckled with black. The scales are small; the eyes are large, and covered with a transparent loose skin.

They are the most delicate as well as the most wholesome of any of the genus, but never grow very large; the usual length being ten or twelve inches, though they have been seen twenty inches long. In spring they appear in vast shoals in our seas, from half a mile to three miles from the shore. Vast numbers of them are taken by the line, and they afford excellent diversion to the anglers.

The fishing for Whittings in a boat or smack is diversion enough, because they bite very freely, and require no very nice tackle to catch them. You may know where to cast anchor by the sea gulls, for they never fail to hover over the place where the Whittings lie, and if they seem to dip into the water every now and then, you are sure not to lose your labour.

At Portsmouth, the tradesmen frequently get small smelts as baits, and find good diversion amongst the Whittings; but if smelts are not to be had, a muscle, a herring, a hairy worm, a lob, or a marsh worm, are good baits. You need not use any rod, but a *Pater-noster* line, with half a dozen hooks half a yard distant from each other. The line may be fastened to the inside of the boat, by which means you will have but little trouble, except in drawing up your fish, and putting on fresh baits. The time of waiting before you examine your hooks need not be long; for they are a very greedy fish.

The WHITING-POUT.

In proportion to its length, the Whiting-Pout is extremely broad, by which it may be distinguished from all others of the kind. The extremity of the tail and fins are blackish, and there are large black spots at the roots of the gill fins on each side. It never grows to a large size, seldom exceeding eleven or twelve inches in length. The back is very much arched, the mouth small, and the beard short. The colour of the body is whitish, but more obscure on the back than on the belly. The lateral line is white, broad, and crooked. The back fin, which is of a triangular form, is produced into a longish horn: the tail is even at the end, and the scales are small. The young of these fish are called Whiting maps in London,

don, where they are generally very plenty in the month of October.

NATURAL HISTORY of the BIB or BLIND.

THE Bib has a barb under its chin, in which particular it agrees with the cod; but it differs from it in size, shape, and colour; being shorter, broader, and whiter. The scales adhere closely to the skin, and are twice as large as those of the cod. The cod is also furnished with a spine or thorn at the tail fin, of which this fish is destitute: it grows to the length of eleven or twelve inches: the body is deep, and the sides compressed: the eyes are covered with a loose membrane, which it is said the fish can blow up like a bladder: the mouth is small, and the teeth are disposed like others of the kind. It is esteemed delicate food, and resembles the whiting in taste.

NATURAL HISTORY of the POOR.

THE Poor is the only species of cod-fish with three dorsal fins that has hitherto been found in the Mediterranean sea. It is found near Marseille, and sometimes in such amazing quantities as to become a perfect nuisance; for no other kinds of fish are taken during that time. It is pretty good for food, but cannot be either salted or dried. It is a very small species, not exceeding six inches in length. The back is of a light brown colour, and the belly of a dirty white; the eyes are covered with a loose membrane: on the chin is a small beard; and on the gill-covers, and the jaws, there are nine punctures on each side.

NATURAL HISTORY of the COAL FISH.

THIS fish is called the Rawling Pollack in Cornwall. It takes the name of Coal-Fish from the colour it sometimes assumes. These fish are common on most of our rocky and deep coasts, but particularly those of Northumberland, Yorkshire, and Cornwall. The flesh is not so good as that of a cod, though it is superior to that of a haddock. The form of the Coal Fish is more elegant than that of the cod; they grow to the length of two feet and an half, and weigh about twenty-eight or thirty pounds at most. The head is small, the under jaw a little longer than the upper, and the iris is silvery, marked with a black spot on one side. The young appear at the beginning of July, in vast shoals on the Yorkshire coast; they are at that time about an inch and an half long. In the month of August, they are from three to five inches in length, at which time they are taken in great numbers with the angling rod, and are then esteemed a very delicate fish. When large they are salted, and dried for sale.

NATURAL HISTORY of the POLLACK, or WHITING POLLACK.

THIS is larger than the common Whiting, but nearly of the same shape; it is indeed a little broader, and not quite so thick; the back is of a dirty green colour. It differs from a cod fish in being smaller, broader and thinner; in having a lesser head, in being destitute of a barb, and in having the lower pair of fins much smaller. The sides, beneath the lateral line, are variously streaked with a dusky yellow, and the body is scaly; but the scales are very small. The mouth is large, the teeth small; the eyes are of a silver colour, and large; the under jaw is longer than the upper; the head and

body rises pretty high, as far as the first dorsal fin. The colour of the back is generally dusky; though in some it is inclining to green. The sides beneath the lateral lines are marked with lines of yellow, and the belly is white.

These fish are common in many of our rocky coasts. In summer they are seen in great shoals frolicking on the surface of the water, and throwing themselves into variety of forms. At that time they are so wanton as to bite at any thing that appears on the top of waves, and are frequently taken with a goose's feather fixed to the hook. They are a good eating fish, but never grow to a very large size; they seldom exceed seven or eight pounds in weight.

The teeth of the Pollack are said to be absorbent when reduced to powder, and good against fluxes and spitting of blood.

This fish has the English name of Whiting Pollack bestowed upon it, from its likeness to a whiting. However, it is larger, proportionably broader, and not quite so thick. He lives upon fish, particularly sand-eels, and is frequently taken near Penzance and St. Ives, in Cornwall; and is likewise often caught in rock-fishing. He struggles hard for his life, and yields the angler good diversion. Proper baits in rock-fishing, are small smelts, a live shrimp, a cockle, a perriwinkle, a lobster, a marsh-worm, and a hairy worm, that is found under the sand at the tide of ebb. This last, as it is the most natural, so it is the most successful bait; besides, it has this advantage, that it needs no scowering as other worms do.

If you fish out of a boat or smack, you will require no rod, and your line may be sixty yards long, with three or four hooks one above another, and baited with different baits. Some inches above the highest hook must be fixed about half a pound of lead. When you fish, you must coil your line in several rings in your left hand, and holding your lead in your right, throw it as far into the sea as you can, taking care to hold the loop of your line fast in your hand, lest you lose it. The best time for sea-fishing is in warm weather, and early in the morning, or after sun-set, provided the tide has been ebbing near an hour.

Some in this kind of fishing choose to place themselves under the covert of a rock, where they shelter themselves, and sit secure from the inclemencies of wind and weather, and this, in a proper sense, may be termed rock-fishing. In this case a rod is necessary, as likewise a float. It is common to use two hooks, one to lie at the bottom, and one to hang about mid-water; and if a little mischievous fish, called a miller's-thumb, should happen to carry your bait into the clefts of the rocks, you must have patience till he thinks proper to come abroad, for there is no dealing with him by force.

NATURAL HISTORY of the HAKE.

THESE fish are from a foot and an half to two feet and an half in length. It is of a slender form like that of the river-pike, and is therefore sometimes called the sea-pike. The back is of a pale ash colour, and the belly of a dirty white, with small scales. The head is broad and flat, and the mouth large, and full of sharp teeth, like that of a pike: the eyes are large, and of a gold colour, being covered with a transparent membrane. The tail is not forked, but terminates in a right line.

The Hake is from a foot and an half to near twice that length: it is esteemed a very coarse fish in England, and is seldom admitted to table either fresh or salted. It is known by the name of *poor John* when it is cured.

There

There was formerly a vast stationary fishery of Hake on the Nymph Bank, off the coast of Waterford; but Mr. Smith, in his history of Waterford, complains of its decline. The irregular migration of fish is sometimes owing to their being pursued and harrassed by an unusual number of fish of prey; and sometimes from a deficiency of the smaller fish, which served them as food.

There is also a fish called the lesser Hake, which is found from eleven to eighteen inches long. It is of a pale ash-colour.

NATURAL HISTORY of the LING.

THIS fish takes its name from its length, being a corruption of the word long. It resembles the hake both in shape and colour, except that it is longer, and its scales are not closely adhering to the skin. The body is slender; the head flattish; the upper jaw longer than the lower: the teeth in the upper jaw are small and very numerous; those in the lower are few, slender, and sharp. It has a small beard on the chin. The tail is round, not forked; and on the back fin there are a multitude of rays. The usual size of a Ling is from three to four feet in length; but they are sometimes upwards of seven feet long.

The flesh is much better and wholsomer than that of the hake, and is indeed, when cured, preferred to all other salt fish.

They abound about the Scilly Isles, on the coasts of Scarborough, and those of Scotland and Ireland, and form a considerable article of commerce: it was even considerable so long ago as the reign of Edward the Third, an act being made in his 31st year for regulating the price of lob, Ling, and cod.

Great quantities are salted for exportation, as well as for home consumption. When cut or split for curing, it must measure at least twenty-six inches from the shoulder to the tail: if smaller than that, it is not reckoned a sizeable fish, and therefore is not entitled to the bounty on exportation.

They are in perfection in the Yorkshire seas, from the beginning of February to the middle of May. In June they spawn, and deposit their eggs in the soft oozy ground of the mouth of the Tees. The males, at that time, separate from the females, and resort to rocky ground near Flamborough-head, where the fishermen take vast quantities, without ever finding a single female among them.

The liver of a Ling is extremely white, so long as the fish continues in season, and abounds with a fine flavoured oil; but as soon as it goes out of season, the liver becomes very red, and affords no oil. This is, in some degree, the case with cod and other fish, but the difference is not so very remarkable.

NATURAL HISTORY of the BURBOT, or EEL POUT.

THE body of this fish has some resemblance to that of an eel, except that it is shorter and thicker: its motions also resemble those of the eel; and it is equally smooth, slippery, and slimy. The head is broad and depressed like that of a toad, and the jaws are furnished with very small teeth, which make them as rough as a file. The tail is flat and roundish. A barb of about half an inch long grows on the under jaw; and there are two short barbs between the nostrils and the snout. The colour of this species varies; some being dusky, others of a dirty green, spotted with black, and sometimes with yellow.

The Burbot is found in the Trent, the Witham, and in the great Eastfen, in Lincolnshire. Though of a very disgusting appearance when alive, it is a

very delicate fish for the table. It is extremely voracious.

They are in great plenty in the lake of Geneva, where it is known by the name of the lota. They are seldom found in our waters above the weight of two or three pounds, but they are considerably larger in some places abroad.

Their places of resort are the same as the eels, if within the reach of the tide; and the best time to take them is after a storm of thunder and lightning with heavy rain. The best bait for them is a small gudgeon, roach, or dace: your hook should be armed, on account of his sharp teeth, and because he is a vigorous strong fish, and struggles hard for life. His flesh is good and sweet, and greatly esteemed. His usual size is from fourteen to twenty inches.

NATURAL HISTORY of the SEA LOACH.

THIS is termed the whistle-fish in Cornwall.

It is from nine to twelve inches in length, and the head is large and flat. Its mouth resembles that of an eel, furnished with numerous small teeth, disposed along the jaws in the form of a broad plate: it has also a set of small teeth, disposed in a triangular form, in the roof of the mouth. The eyes are near the end of the snout, and their iris is of a silver colour. The scales are very small, and the head, back, and sides, are variegated with large spots of a darkish red. In a dent or furrow near the middle of the back, instead of a fin, there is a low membrane, or skin, edged with very small hairs; by which it may be distinguished from all other fish of this kind. It varies greatly with regard to the spots: sometimes they are red, sometimes white, and sometimes it has no spots. The colour of the head and body are of a reddish yellow; but the sides are lighter, and the belly almost white. This species usually frequents the rocky shores of these islands, and is sometimes taken with a bait.

NATURAL HISTORY of the CRESTED BLENNY.

THIS is sometimes found on our rocky shores, and is usually about four or five inches in length. On the head it has a small crest-like fin, which it can erect or depress at pleasure. It has a triangular lump on the top of the head, between the eyes, which is red about its edges. The colour is brown and spotted, and the body is slippery and smooth.

The SMOOTH BLENNY.

The length of this fish is about five or six inches: the head is large, and sloping suddenly to the mouth: the iris is red: the teeth are sharp, slender, and close set: it has twenty-four in the upper, and nineteen in the lower jaw. The tail consists of twelve branched rays, and is rounded at the end. Some of these are black; others of a deep olive colour, marbled with a deeper tint; and others are spotted with white. This fish is very tenacious of life, and will live almost a whole day out of water. It feeds on shells, and small crabs.

The SPOTTED BLENNY.

This species, and the smooth Blenny, are found in great plenty, lying under the stones among the tang, on the rocky coasts of Anglesea, at the low water mark, and are used as a bait for larger fish. It is about six inches in length, and half an inch in depth: the sides are very much compressed, and extremely thin: the mouth is small, and the iris of the eye is whitish. The pectoral fins are of a yellow colour

Fig. 1



Fig. 2



Fig. 3



Fig. 4

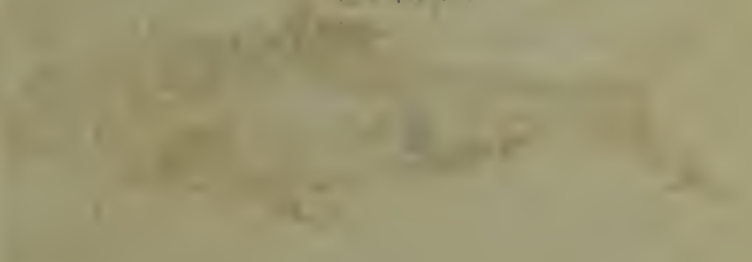


Fig. 5



Fig. 6



Fig. 7

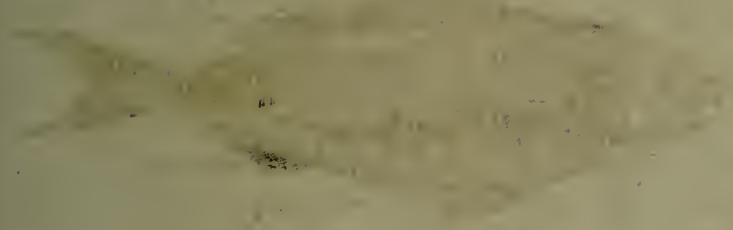


Fig. 8



Fig. 9

Fig. 10

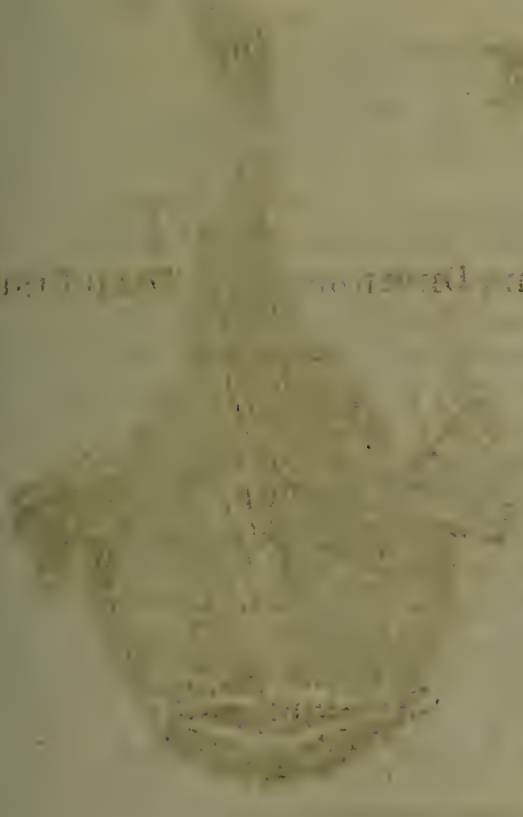


Fig. 11



Fig. 12

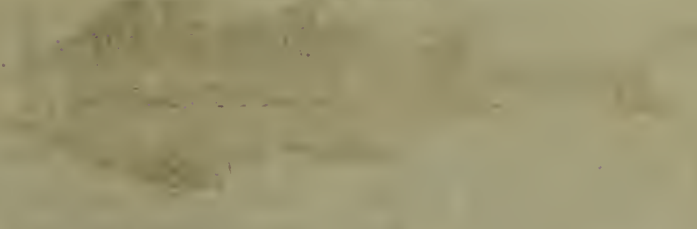


Fig. 13



Fig. 14

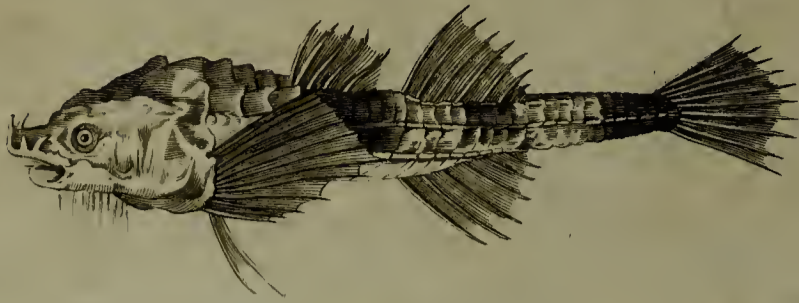


Fig. 15

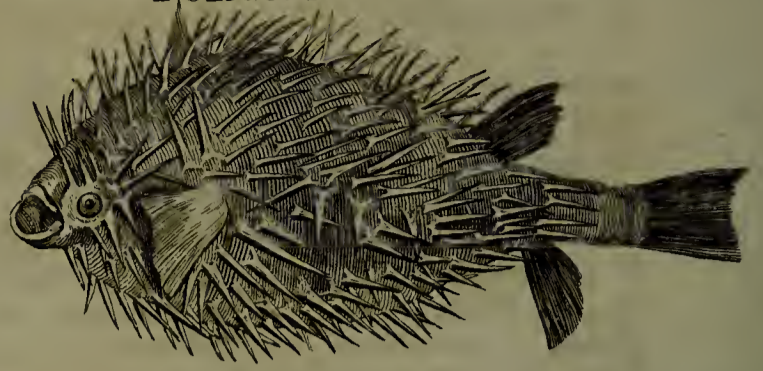


FISHES.

POGGE



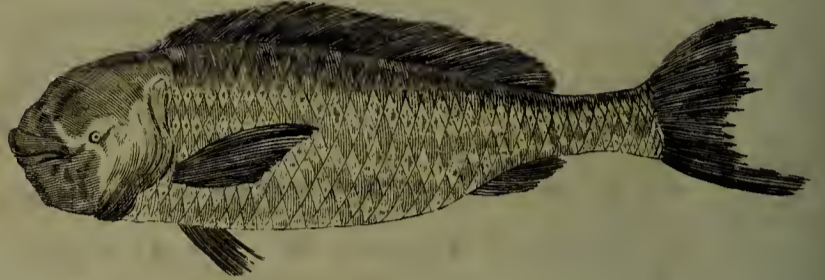
PORCUPINE FISH



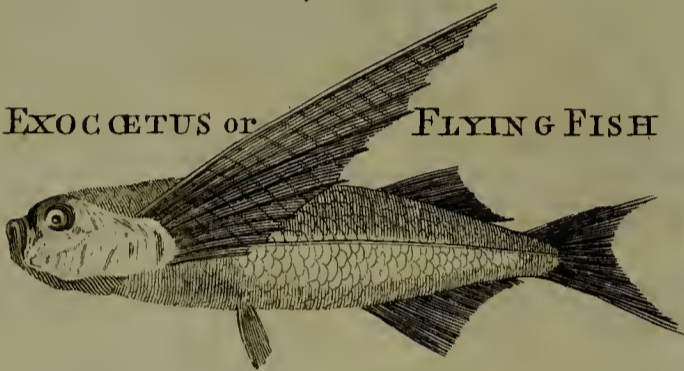
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PUDIANO VERDE



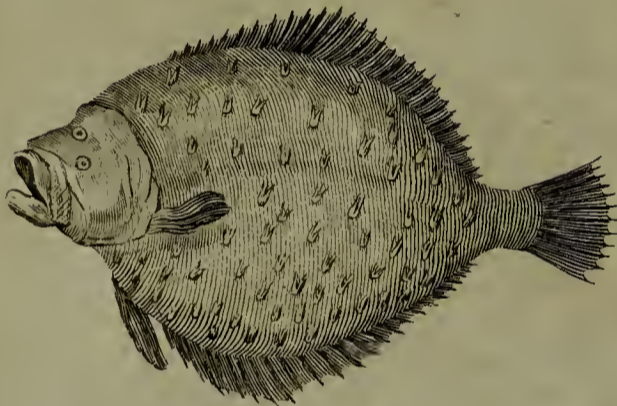
EXOCÆTUS or FLYING FISH



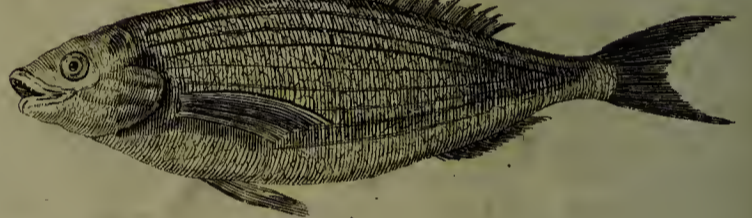
REMORA



RHOMBUS ACULEATUS



SALPA



SARGUS



SAW FISH



SEA DEVIL or TOAD FISH



BLUE SHARK



HAMMER HEADED SHARK



SEA SNAKE



lour and rounded; and, instead of the ventral fins, there are two minute spines. The back and sides are of a deep olive colour, and the belly is whitish: the tail is rounded, and of a yellow colour.

The VIVIPAROUS BLENNY.

This species is generally about a foot in length, and of an eel-like form: the skin is smooth and slippery. The back and head are of a yellowish brown, stained with black strokes: the sides are a little lighter, and the belly of a dirty white. It has two small beards at the nostrils, the jaws are rough, and the covers of the gills are open. It is viviparous, as may be imagined from the name, and brings forth two or three hundred young at a time. Their season of bringing forth, is a little after the depth of winter. Before Midsummer, they quit the bays and shores, and retire into the deep, where they are usually taken. They are a coarse fish, and but little esteemed as food.

NATURAL HISTORY of the SEA GUDGEON, or ROCK FISH.

IT is a soft slippery fish, of a slender form, and about six inches in length. It is covered with small rough scales. It is variegated with a mixture of white, yellow, brown, and other colours, interspersed with black spots; there are also transverse streaks of an orange colour. The head is rather large, the cheeks inflated, and the mouth is armed with a double row of rough teeth. The ventral fins coalesce, and form a sort of funnel, having the appearance of a double fin in the middle of the breast: this enables them to stick close to the rocks, from whence they have obtained the name of the Rock Fish. The eyes are small and yellow, looking upwards, and placed pretty near each other. The tail is rounded at the end. This fish is often taken on the coast of Cornwall, and is common in the fish-markets of Venice. The flesh is fat, tender, and delicate.

NATURAL HISTORY of the BULL-HEAD, or MILLER'S THUMB.

THIS species is very common in all our clear brooks: it is about four or five inches in length, with a large broad depressed head of a roundish shape. The gill fins are round, and notched on the circumference. The eyes are small; the iris of the eyes is yellow: the teeth are very minute, and placed in the jaws and the roof of the mouth. The body grows slender towards the tail, and is very smooth. At the beginning of the cover of the gills, on each side, there is a crooked prickle. The colour of this fish is as disagreeable as its form; being dusky, mixed with a dirty yellow: the belly is whitish. It usually lies at the bottom of a stream, either on the gravel, or under a stone: it forms a hole in the gravel, where it deposits its spawn, and quits it with great reluctance. It feeds on water insects.

NATURAL HISTORY of the POGGE.

THIS fish seldom exceeds five inches and an half in length, and very seldom arrives even at that size: it has a triangular depressed head, which is about two inches broad, and very bony and rugged. The end of the nose is armed with four short upright spines, and on the throat are a number of short white beards. The teeth are very minute, and situated in the jaws. The body, which is octagonal,

No. 26.

is covered with a number of strong bony crusts, divided into several compartments; the ends of which project into a sharp point. It is covered all over with bony scales, in the middle of each of which there is a hooked tubercle, which makes the fish appear full of angles. The Pogge is very common on most of the British coasts.

NATURAL HISTORY of the FATHER LASHER.

THIS is also called the sea-scorpion: it is no uncommon fish on the rocky coasts of this island: it lurks under stones, and will take a bait. It seldom exceeds eight or nine inches in length, and its form resembles that of a bull-head. Its head is very large, and has a most formidable appearance; being armed with large spines, which it can oppose to any enemy that attacks it; by swelling out its cheeks and gill covers to a very large size. The head is covered with prickles; the body is small, and the belly broad and flat. Above the lateral lines on the back, there are four roughish broad transverse spaces of a blackish colour; but the intermediate spaces are paler. The covers of the gills are connected below, appearing like a mantle thrown over its head and shoulders. The colour of the body is brown, or dusky and white marbled; and sometimes it is stained with red: the belly is of a silvery white. The fins and tail are transparent, sometimes clouded, and the rays are regularly barred with brown. The nose, and the face, contiguous to the eyes, are furnished with short sharp spines: the covers of the gills are terminated by exceeding long ones, which are very strong and sharp-pointed. The mouth is large, and the jaws are covered with rows of very small teeth; the roof of the mouth is furnished with a triangular spot of minute teeth. This species abounds in the Newfoundland seas; and on the coast of Greenland, in deep water near the shore. It is a principal food of the natives, and the soup made of it, is said to be both agreeable and wholesome. It will live a considerable time out of the water. Its food is shrimps, sea insects, and the young fry of fish.

NATURAL HISTORY of the DOREE, or GILT FISH.

IT has a broad compressed body, not much unlike that of a flounder; but it swims erect. The head is very large and compressed, and the mouth is extremely wide. The colour of the sides is olive, with a large round black spot on each; by which it may be distinguished from other fish of this kind. In short, the form of this fish is hideous; the body is oval, the eyes large, and the irides yellow. The lateral line is very much distorted, sinking at each end, and rising near the middle of the back. The first dorsal fin consists of ten strong spiny rays, with long filaments reaching far beyond their ends. The second, which is placed near the tail, consists of twenty-four soft rays; the middlemost of which are the longest. The pectoral fins have fourteen rays, and the ventral seven: it has also two anal fins. The tail is round at the end, and consists of fifteen branched rays. They never grow to a great size; one of the weight of twelve pounds being considered as a very large fish. It is called the Doree, or Gilt Fish, on account of its shining appearance when alive.

It was very long before this fish attracted our notice as an edible one: the vulgar prejudices on account of its deformity, deterred our ancestors from venturing to eat it; but that judicious actor and bon

vivant,

vivant, Mr. Quin, has effectually established its reputation, and added a most delicious repast to our table.

This fish is found not only in the southern seas of this kingdom, but also on the coast of Anglesea. Those of the largest size are taken on the Bay of Biscay, off the French coasts; they are also very common in the Mediterranean.

NATURAL HISTORY of the HOLLIBUT.

THIS is the largest of all flat-fish in these parts of the world; it greatly exceeds a turbot in size, and is of a longer make. Some have been taken in our seas, weighing from one to three hundred pounds. In the seas of Newfoundland, Greenland, and Iceland, they are found much larger.

The Hollibut, with respect to its length, is the narrowest of any of this genus, except the sole. It is perfectly smooth and free from spines, either above or below. The colour of the upper part is dusky; that of the lower part of a pure white. The eyes are placed on the right side, or to the left of the mouth: the fins are at a greater distance from the head than in other flat fish. In both the upper and the lower jaws it has a double row of teeth, which are very sharp, and somewhat crooked at the end. It has very sharp prickles on the gills. It swims sideways.

Of all flat fish the Hollibut is the most voracious. They are common in the London markets; where they are exposed to sale cut into large pieces. They are by some supposed equal to the turbot, but in general they are thought very coarse eating; excepting the part which adheres to the side fins, which is extremely delicious.

NATURAL HISTORY of the PLAICE.

THE back of this fish is of a dirty olive colour, or brown, and speckled with roundish red spots; of which there are some also on the fins. The belly is white. The eyes are on the right side, to the left of the mouth; and, at the upper edge of the coverings of the gills, there are seven bony tubercles, or warts; the fifth from the eyes being the highest and the largest. There is a row of teeth in each jaw, and a cluster of teeth on the palate. One of the nostrils is seated on the upper side, near the eyes; and the other on the lower side under the eyes. The tail is long, and roundish at the end.

These fish are very flat. They are common on most of our coasts, and are sometimes taken of the weight of fifteen or sixteen pounds: but they are very rarely found of that size, one of seven or eight pounds being reckoned a large fish. The largest are taken off Rye, on the coast of Sussex, and also off the Dutch coasts. They spawn about the beginning of February.

NATURAL HISTORY of the DAB.

THIS fish is somewhat thicker than the plaice, but smaller. It is found with the other species, but it is less common. The scales are small and rough on the edges; in which it differs from the plaice, as well as in not having any tubercles near the head, nor red spots. But the eyes are situated like those of the plaice; and the colour on the upper part is of a dirty olive, with a reddish cast, and some spots of a dusky yellow. The mouth is of a middle size, and has a row of teeth in each jaw. The lateral line is very crooked at the beginning,

but afterwards goes quite straight to the tail. The lower part of the body is white. This fish is best in season during the months of February, March, and April: they spawn in May and June, and remain flabby and watery all the rest of the summer. They are superior in goodness to both the plaice and flounder.

The SMEAR DAB.

It is about eighteen inches long and eleven wide, between fin and fin, on the widest part. The head appears very small; the dorsal fin beginning very near its mouth, and extending almost to the tail. The eyes are very near each other, and the mouth is full of small teeth. The back, which is covered with small smooth scales, is of a light brown colour, spotted obscurely with yellow. The belly is white, and marked with five large dusky spots. The flesh of the Smear Dab is equal in goodness to that of the Common Dab.

NATURAL HISTORY of the FLOUNDER.

THE Flounder is easily distinguished from the plaice, or any other fish of this genus, by a row of sharp small spines or prickles, that surrounds its upper sides, and are placed just at the junction of the fins with the body. Another row marks the side-line, and runs half way down the back. The scales, which are exceeding small, stick so close to the skin, that there seems to be no roughness. This fish has a small mouth, a narrow tongue, and a row of teeth in each jaw. It greatly resembles the plaice in shape; but the body is somewhat longer and thicker. It inhabits every part of the British sea, and even frequents our rivers which communicate with the sea; and though it does not grow large in our fresh-water streams, it is reckoned sweeter than those which live in the ocean. It does not grow so large as the plaice, and is hardly ever seen to exceed six pounds in weight. The colour of the upper part of the body is a pale brown, and frequently marked with a few obscure spots of dirty yellow: the belly is white.

Flounders are in season all the year, except in June and July, which is their time of spawning, and then they are sick and flabby, and infested with worms which breed on their backs. The flesh is white, soft, innocent, and nourishing; but it is always best when it is most firm. The taste of it greatly resembles that of the plaice, from which it differs but little in any respect.

It is the nature of all flat fish to lie and feed at the bottom; some indeed are fond of mud, but the Flounders avoid it as much as possible, delighting to lie on sandy or gravelly bottoms, especially on the declivity of a deep hole, near a bank, and in an eddy.

They may be angled for either with a float or a running bullet, but the latter is preferable. The bullet should rest at least a foot from the hook, that the bait may be at liberty to be put in motion by the water. If you use a float, let it lie flat on the water, and when you perceive it to move along slowly, and soon after become upright, then strike, and you will be sure of your prey. But always remember, that he is some time in sucking the bait into his mouth before he gorges it.

The best baits are red worms, or very small marsh worms put on a small hook. You should bait the ground with a handful of small red worms cut in two pieces. They may be angled for all the day, but early in the morning is the best time. He likewise takes earth bobs very well.

In the hot months, there are great quantities caught with the fluke-rake. The method is to get one

FISHES.

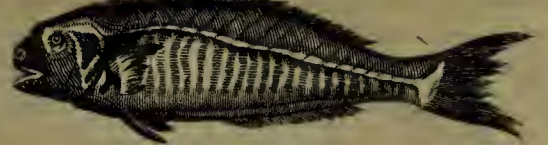
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THE HIPPURUS



THE POMPILUS



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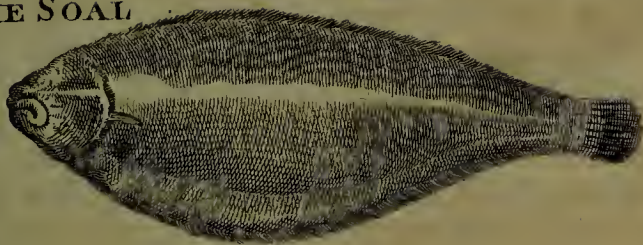
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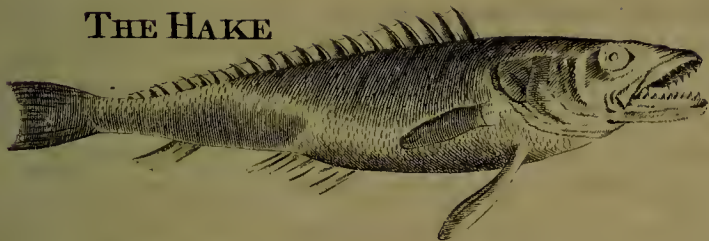
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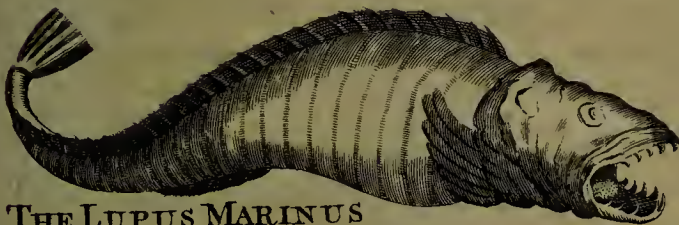
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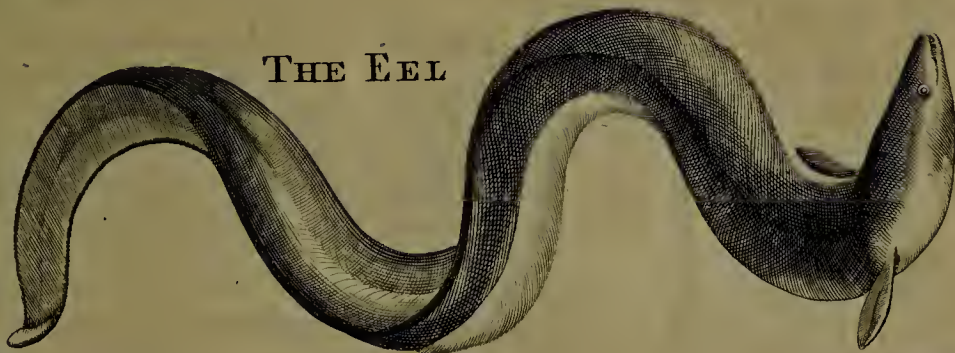
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THE LUPUS MARINUS
or SEA WOLF



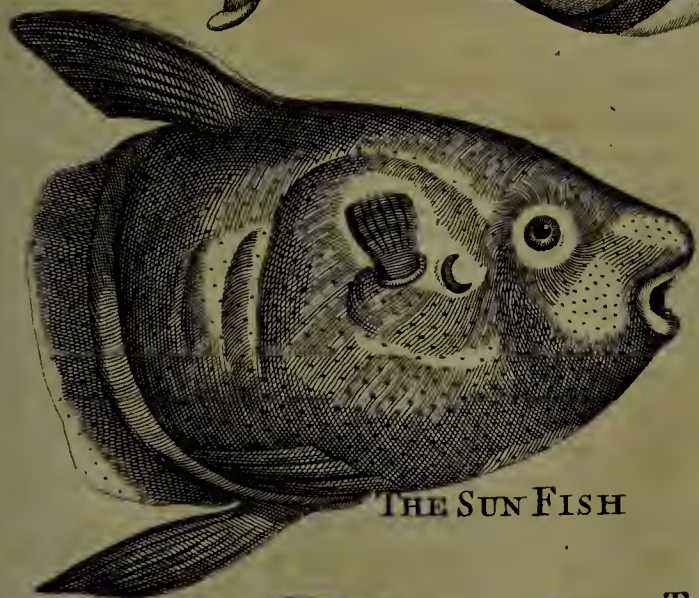
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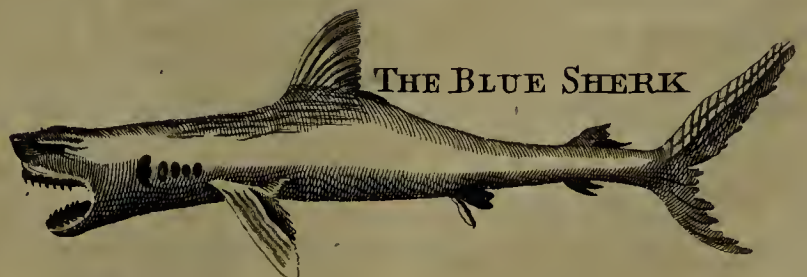
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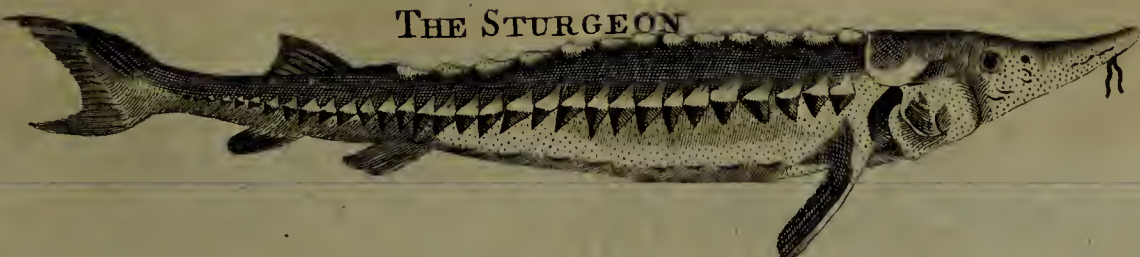
THE SUN FISH



THE UNICORN FISH

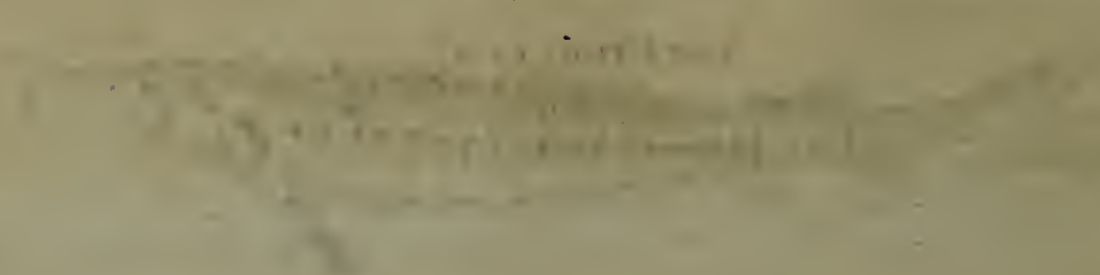
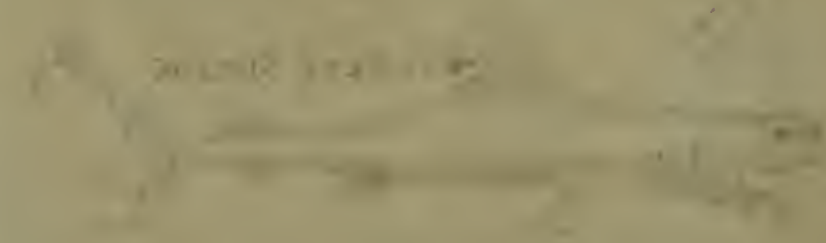
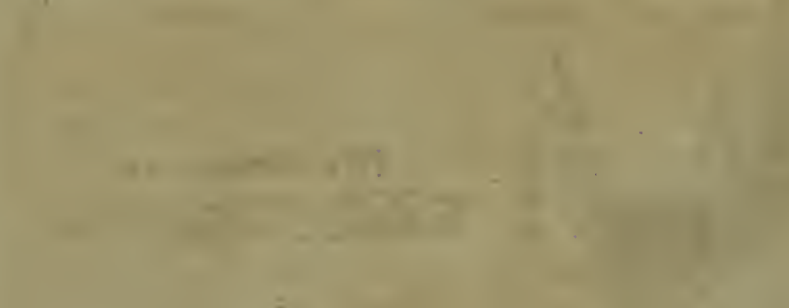
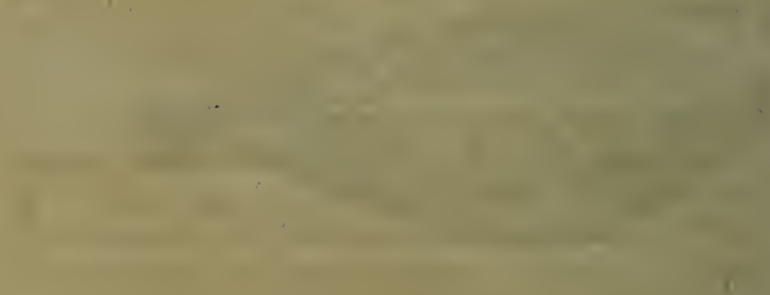
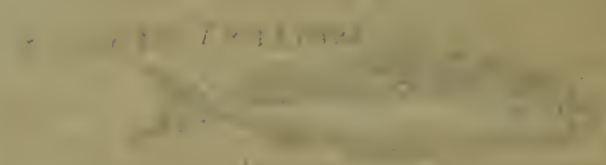
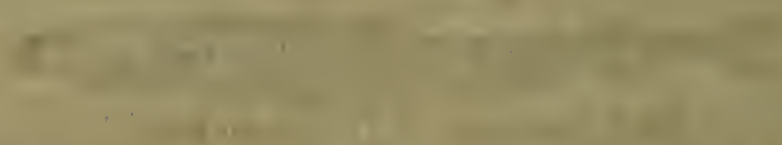


THE BLUE SHARK



THE STURGEON

1871



one about two yards long, and go to the shallow parts of the water where it is the most sandy, and as you go along, keep thrusting the rake into the sand, which you may easily do by setting one foot upon the frame, and when you have caught one you will easily perceive it by the rake's grashing as the forks enter his back. This method is only used in the tide's way after it is gone down.

NATURAL HISTORY of the SOLE.

THIS is a longish flat fish, resembling the sole of a shoe in shape, from whence it has its name. It is found on all our coasts, but those on the western shores are much superior in size to those of the north. On the western coasts they are sometimes taken of the weight of five or six pounds; but towards Scarborough they seldom exceed one pound; and one of two pounds is reckoned an uncommon fish. The upper part is of a dark ash colour, and the lower part white: it is covered with rough scales. The lateral line passes directly from the head to the tail, thro' the middle of both sides. The corners of the mouth are rough, having a kind of small bristles or hairs: the body is surrounded with short fins, which begin near the eyes, and extend almost to the tail. The eyes are small, round, and covered with a loose skin: the irides are yellow, and the pupils of the eye are of a bright sappharine colour: the tail is rounded at the end.

The Sole is a fish of a very delicate flavour; but the large Soles are much inferior in goodness to the small ones. The chief fishery for them is at Blixham, and in Torbay. About twelve or fourteen years ago, Mr. Blake, a gentleman of great probity and fortune, took indefatigable pains to reduce the price of this delicious fish, by contriving a method of bringing them to London by land-carriage; and though his scheme did not meet with that success it merited, and was opposed by the whole trade of mercenary fishmongers, yet the plan appears now to be in a great measure adopted by the fishmongers themselves; and Soles are now to be purchased of them at about half the price they were usually sold at, before Mr. Blake projected his plan.

By the ancient laws of the Cinque Ports, a penalty was inflicted upon every person who should take Soles from the first of November to the fifteenth of March; also upon every person who should fish for them from sun-setting to sun-rising.

There is a species called the smooth Sole, which is very scarce, and found chiefly about Cornwall. It is extremely thin, white, and transparent; and, on that account, is sometimes called the Lantern Fish.

NATURAL HISTORY of the TURBOT.

IN the northern part of England this fish is called a Brett: it grows to a very large size; and sometimes, though very rarely, is found to weigh thirty pounds. It is the largest of all this kind, the hollibut excepted. These fish are taken chiefly off the north coast of England, and others off the Dutch coast; but we believe the last has, in many instances, more credit than it deserves for the abundance of its fish. They have no scales, but a rough spotted skin, full of exceeding small prickles, placed without order on the upper part of the body.

The large Turbots, and several other kinds of flat fish, are taken by the hook and line, for they lie in deep water: the method of taking them in wares, or staked nets, is too precarious to be depended on for the supply of our great markets, because it is by meer accident that the great fish stray into them.

Mr. Pennant furnishes us with the following method of fishing for Turbot, cod, ling, scates, &c. The inhabitants of many of our fishing coasts, says he, especially those of the north part of North Wales, are unacquainted with the most successful means of capture: for their benefit, and perhaps that of other parts of our island, we shall lay before them the method practised by the fishermen of Scarborough.

When they go out to fish, each person is provided with three lines. Each man's lines are fairly coiled upon a flat piece of wicker work; the hooks being baited, and placed very regularly in the center of the coil. Each line is furnished with fourteen score of hooks, at the distance of six feet two inches from each other. The hooks are fastened to the lines upon snoods of twisted horse hair, twenty-seven inches in length.

When fishing there are always three men in each coble, and consequently nine of these lines are fastened together, and used as one line, extending in length near three miles, and furnished with two thousand five hundred and twenty hooks. An anchor and a buoy are fixed at the first end of the line, and one more of each at the end of each man's lines; in all four anchors, which are commonly perforated stones, and four buoys made of leather or cork. The line is always laid across the current. The tides of flood and ebb continue an equal time upon our coast, and when undisturbed by winds run each way about six hours. They are so rapid, that the fishermen can only shoot and haul their lines at the turn of tide; and therefore the lines always remain upon the ground about six hours. The same rapidity of tide prevents their using hand-lines; and therefore two of the people commonly wrap themselves in the sail, and sleep while the other keeps a strict look out, for fear of being run down by ships, and to observe the weather. For storms often rise so suddenly, that it is with extreme difficulty they can sometimes escape to the shore, leaving their lines behind.

The coble is twenty feet six inches long, and five feet its extreme breadth. It is about one ton burthen, rowed with three pair of oars, and admirably constructed for the purpose of encountering a mountainous sea: they hoist sail when the wind suits.

The five men boat is forty feet long and fifteen broad, and of twenty-five tons burthen; it is so called, though navigated by six men and a boy, because one of the men is commonly hired to cook, &c. and does not share in the profits with the other five. All our able fishermen go in these boats to the herring-fishery at Yarmouth the latter end of September, and return about the middle of November. The boats are then laid up until the beginning of Lent, at which time they go off in them to the edge of the Dogger, and other places, to fish for Turbot, cod, ling, scates, &c. They always take two cobles on board, and when they come upon their ground, anchor the boat, throw out the cobles, and fish in the same manner as those who do go from the shore in a coble, with this difference only; that here each man is provided with double the quantity of lines, and instead of waiting the return of tide in the coble, return to the boat and bait their other lines; thus hawling one set, and shooting another every turn of tide. They commonly run into harbour twice a week to deliver their fish. The five-men boat is decked at each end, but open in the middle, and has two large lug sails.

The best baits for all kinds of fish is fresh herring cut in pieces of a proper size; and notwithstanding what has been said to the contrary, they are taken here at any time in the winter, and all the spring.

spring, whenever the fishermen put down their nets for that purpose. The five-men boats always take some nets for that end. Next to herrings are the lesser lampreys, which come all winter by land-carriage from Tadcaster. The next baits in esteem are small haddocks cut in pieces, sand-worms, muscles, and limpets (called here fiddets,) and lastly, when none of these can be had, they use bullock's liver. The hooks used here are much smaller than those employed at Iceland and Newfoundland. Experience has shewn, that the larger fish will take a living small one upon the hook, sooner than any bait that can be put on; therefore they use such as the small fish can swallow. The

hooks are two inches and an half long in the shank, and near an inch wide between the shank and the point. The line is made of small cording, and is always tanned before it is used.

Turbots, and all the rays, are extremely delicate in their choice of baits. If a piece of herring or haddock has been twelve hours out of the sea, and then used as bait, they will not touch it.

Such is the manner of fishing for those fish that usually keep near the bottom on the coasts of England; and Duhamel observes, that the best weather for succeeding, is half calm, when the waves are just curled with a silent breeze.

C H A P. IV.

Containing the NATURAL HISTORY of the PEARL, the GILT HEAD, the SEA BREEM, the OPAH, the WRASSE, the COOK, the PEARCH, the BASS, the RUFF, the STICKLEBACK, the MACKREL, the TUNNY, the SCAD, the GURNARD, the PIPER, the TUB FISH, the LOACH, the SALMON, the GREY, the SALMON TROUT, the TROUT, the SAMLET, the CHAAR, the GRAYLING, the SMELT, the GUINIAD, the PIKE, the ARGENTINE, and the MULLET.

NATURAL HISTORY of the PEARL.

THE Pearl differs from others of this kind, in having a scaly body, and from a place in the prickles, which surround the roots of the fins. The upper part of the body is of a deep brown, marked with spots of dirty yellow: the lower part is of a pure white. Its eyes are on the left side, to the right of the mouth, and are at a greater distance from each other than those of the plaice. These fish are frequently brought to the London markets, but they are smaller than the turbot, and inferior in goodness.

belly is of a silver white. The eyes are large, and the covers of the gills resemble those of a salmon. It has only one fin on the middle of the back, which extends its whole length; and another fin, at the bottom of the belly, reaches almost from the vent to the tail. The scales are very large, and the tail is forked. This fish is not very common in England; the flesh of it cuts red, and has a very delicate taste, far surpassing either the river or the pond Bream. It is frequently caught in rock-fishing, and by the salmon fishermen in the Mersey.

There is a variety of the Sea Bream, whose body is entirely red.

NATURAL HISTORY of the GILT-HEAD, or GILT-POLL.

IT is a broad fish, compressed on the sides, and somewhat resembling a bream. It grows to the length of eight or ten inches, and to the weight of ten pounds. The back is sharp, and of a dusky green colour. Between the eyes is an arched stripe, resembling a crescent, of a gold colour; the horns of which point towards the head; and from this semilunar gold coloured spot, the Gilt-Head takes its name. It has usually a black spot at the upper corner of the cover of the gills, and another of a purple colour below them. The teeth in each jaw are oblong and roundish. The tail is very much forked.

This is one of those fish that haunt deep waters on bold rocky shores: it feeds principally on shell-fish, which it comminutes with its teeth before it swallows. It is frequently seen in the markets of Rome, Genoa, and Venice; and is sometimes taken on our coasts. It is but a coarse fish; and was held in very little esteem by the Romans, except it had fed on the Lucrine oyster.

No praise no price a gilt-head e'er will take,
Unfed with oysters of the Lucrine Lake.

MARTIAL, lib. iii. ep. 90.

The SEA BREEM.

This species grows to a size equal to that of the gilt-head: its form and the figure of the teeth are also much the same. The upper part of the body is black, the sides are of a lighter colour, and the

NATURAL HISTORY of the OPAH.

THE Opah is a beautiful, and an uncommon fish, weighing about seventy or eighty pounds, and somewhat like the sea-bream in shape. The length is about three feet and an half; the breadth from back to belly almost two feet; and the thickness, from side to side, does not exceed six inches. In proportion to the size of the fish, the mouth is small, forming a square opening, and the jaws destitute of teeth. The tongue is rough, and thick set with beards or prickles, pointing backwards, so that any thing may pass down, but cannot easily return back. The eyes are very large, covered with a membrane, and shining with a glare of gold. The body diminishes very small to the tail, which is forked, and expands twelve inches. The fins and tail of this fish are of a fine scarlet; but the rest of the body is beautiful beyond description. It is smooth, and covered with almost imperceptible scales. The colour of the upper part is a kind of bright green, variegated with whitish spots, and enriched with a shining golden hue, resembling, in a great degree, the splendour of the peacock's feathers; this gradually vanishes in a bright silver colour; and the gold begins again to predominate near the belly, in a lighter ground than on the back.

NATURAL HISTORY of the WRASSE, or OLD WIFE.

THE shape of this fish resembles that of the river tench: it grows to the weight of four or five pounds, and is covered with large scales.

This

These fish vary infinitely in colour; but in general are reddish, and most beautifully striped, especially about the head, with the richest colours, such as red, blue, and yellow. We must not therefore multiply the species from these accidental tints, but particularly attend to the form which never alters. The snout is oblong, and turns upwards; the lips are thick and fleshy, projecting beyond the jaws; but the mouth is small. The teeth in the jaws are serrated, but not very sharp. The tail is rounded at the end, and is formed of fourteen soft branching rays.

This species is found in deep water, adjacent to the rocks, and is to be met with in the British and Irish seas. It is more agreeable to the sight than to the taste. The Welch call it *gurach*, or the old woman; the French call it *la veille*, or the old woman; and the English give it the name of *Old Wife*. It is difficult to assign a reason why they all so exactly agree in these synonyms.

The LESSER GREEN WRASSE.

The body of this species is entirely green, except that some of them have bluish spots about the belly; and the body is broader and thicker than that of others of this kind. The fins are somewhat spotted, and it has a purple tubercle near the vent. The painted Wrasse, the black Wrasse, the striped Wrasse, and the variegated Wrasse, are varieties of this species.

NATURAL HISTORY of the COOK.

THIS is a scaly fish, and does not grow to any great size. The back is purple and dark blue, and the belly yellow. They are sometimes taken in great plenty on the Cornish coasts.

NATURAL HISTORY of the PEARCH.

THE Pearch was much esteemed by the Romans, and is now equally admired as a firm and delicate fish; and the Dutch are particularly fond of it when made into a dish called *water souchy*. This fish delights in deep holes, and gentle streams: it is extremely voracious, and a very eager biter: if an angler meets with a shoal of them, he is almost sure of taking every one. A full-grown Pearch is about twelve or fourteen inches long, tho' they are sometimes found to exceed sixteen; but this is an extraordinary size. The body is deep, the scales very rough, and the back very much arched. The iris of the eye is of a yellow or gold colour; the mouth is wide; and the teeth are small, disposed in the jaws and on the roof of the mouth: the edges of the covers of the gills are serrated; and on the lower end of the largest is a sharp spine. The colours of the Pearch are beautiful: the back and part of the sides are of a dark green, marked with five broad black bars, pointing downwards: the belly is white, tinged with red: the ventral fins are of a bright scarlet; and the anal fins and the tail are of the same colour, but somewhat paler. The tail is a little forked.

It is said, that the pike will not attack this fish, being fearful of the spiny fins which the Pearch erects at the approach of the former. With respect to large fish, this opinion may be well founded; but it is well known the small ones are the most alluring bait that can be offered for the pike: it is probable the fins are then too soft to do him any injury.

The Pearch is very tenacious of life, and may be carried forty or fifty miles in dry straw, and yet survive the journey. The flesh of it is very wholesome,

and easy of digestion. The bones of the head are used in medicine, and, when pulverized, have the same virtue as other absorbent powders.

There is a very singular variety of Pearch in a lake called *Llyn Raithlyn*, in *Merionethshire*, in which the lower part of the back-bone, next the tail, is strangely distorted.

The liver of the Pearch is usually thrown away, because it is apt to be measly. These fish spawn but once a year, and that is in the latter end of February. Some think the male is to be distinguished from the female, by the fins being of a deeper red.

The most natural places for this fish are rivers, and yet it will live and even thrive when shut up in a pond. In the day-time it does not appear to be fond of any particular haunt, because it is almost continually roving about in quest of food, being, as already observed, a very voracious fish; and yet they are more likely to be found under the hollow of a bank, the piles of bridges, stumps of trees, or in a gentle stream of a middling depth. In the night, indeed, they retire to a place of repose, which, if you are so lucky as to discover, early in the morning, you have an excellent chance of taking them all, for they bite very boldly, generally herd together, and the taking of one does not intimidate the rest from falling into the same danger.

It will be to no purpose to angle for this fish before the mulberry-tree begins to bud; that is, before the spring is so far advanced as to put the fruit out of danger of being killed by nipping frosts, and for the same reason he always bites best in warm weather; yet, in the midst of summer, he is soonest taken in cool, cloudy, and windy weather, and you may angle for him any time of the day, but you will be more likely to succeed from seven to ten in the morning, and from two till sun-set in the afternoon, or later. In angling for Pearch, you need not continue long in the same place, for they usually bite as soon as the bait drops in: you ought to angle at or near the bottom, constantly raising your bait almost to the top, letting it drop gently again. The dog or flag-worm is an excellent bait.

The most likely baits are worms, minnows, and small frogs; but the most sure killing is the brandling-worm, two upon the hook at a time, well scoured in moss, unless it be in the Mole, and some other rivers that run into the Thames, where minnows are scarce. But they are not very nice in the choice of their feed, and have frequently been caught with a fly in fishing for trout; and sometimes a brace at a time have been caught in angling for gudgeons with two hooks baited with red worms. They will take their own gills very well. They take the bait best within a foot of the ground, and swallow it instantly, because they have the largest mouth, in proportion to their size, of any other fish. However, when you fish with a minnow, or frog, they should have a little more time when you strike, than when you bait with a worm.

The Pearch struggles hard for his life, and consequently yields the angler much diversion: when a Pearch is pursued by the pike, he sets up his prickly fins, and often saves himself from being swallowed. If you find that you have a bite from a large one, give him a little time to gorge the bait; but if it is a small one, you may strike instantly, especially if your bait be a brandling. He will bite at a worm, a minnow, or a little frog; of which you may find many in hay-time: of worms, the lob-worm, or the brandling, is taken to be the best, being well scoured in moss or fennel; and the worm that lies under cowdung, with a bluish tail. He will also take the red-worm, and the dew-worm.

When the Pearch bites, be sure you give him time enough to pouch the hook, for scarce any angler ever gave him too much. Some, in angling for

Pearch, will suffer their bait to touch the ground, especially when they fish with a worm. The turning of the water, or eddy, in a good gravel-scour, is an excellent place for sport. Your tackle should be strong, because, in fishing for Pearch, pikes are often taken. Bait the ground over night with lob-worms cut in pieces.

The following directions in angling for Pearch with a worm, may be worth observing. In March use the red-worm at the bottom. In April the oak-worm, a young frog with its feet cut off, or a red-snail. In May the dock-worm, or the bait that breeds on the osier-leaf, the oak-leaf, and the hawthorn. In June the red-worm with the head cut off, and a cod-bait put before it, or the dor. In July, the large grass-hopper, or dunghill-grub: in August, and the following months, red-worms, or brandlings; at any time two or three gentles.

The Pearch has been often fished for with two hooks and a live minnow with good success. The hooks have been tied to silk, one of which is put through the upper jaw, and the other through the middle of the back. When you bait with a frog, thrust the hook through its leg near the thigh, and when you throw it into the water, keep it from the shore as much as possible, for it will be for making thither as fast as it can.

As the Pearch generally swallows the bait, and as it is difficult to get the hook out of his entrails without breaking the line, it will be necessary to carry an instrument in your pocket, which is called a gorge. It may be made of iron, or wood, about six inches long, and half an inch thick, with a hollow at the extremity. This hollow end you are to thrust down the throat of the fish, till you feel the hook, at the same time keeping your line straight, lest the hook should catch again; when you have disengaged it with this instrument, you may draw them both out carefully together.

Ausonius, says Lemery, reckons the Pearch of the number of those fishes that have a delicious taste. It may be said, in general, that the Pearch has but few gross humours; that it produces many good effects, and but a few bad ones; and the reason is, because this fish lives generally, and out of choice, in pure, clear, and rapid waters, rather than in those that are muddy, and run slowly. Moreover, it feeds upon good food, and is very active, which, also, contributes to make it more delicious and wholesome. It is nourishing, and affords good food, because it contains many balsamic parts, and most pure juice. It is, also, easy of digestion, when middle-aged; for then it is of a middling consistence: when, on the contrary, it is too young, or too old, it is soft and viscous, or else hard, like leather.

NATURAL HISTORY of the BASS.

THE Bass is a strong, active, and voracious fish: it is frequently called the wolf-fish, on account of its voracity. It will grow to the weight of fifteen pounds, and its shape resembles that of a trout, except that it has a thicker head. The mouth is large: the teeth, which are situated in the jaws, are very small. In the roof of the mouth is a triangular rough space, and near the gullet there are two others of a roundish form. The scales are of a middling size, thick set, and adhere closely to the skin. It has thorns or prickles about its head; and the eyes are large, with an iris of a silver colour. The back is dusky, tinged with blue, and the belly is white. In young fish, the space above the side-line is marked with small black spots, which gradually disappear as it advances. The Bass is esteemed a very delicate fish, and extremely wholesome. It is

an inhabitant of the sea, and has never been found in our fresh-water streams.

NATURAL HISTORY of the RUFF.

THIS fish resembles the pearch, but is slenderer and smaller, seldom exceeding six inches in length: the body is covered with rough compact scales, from whence it has its English name. The back and sides are of a dirty green, the latter inclining to yellow; but both spotted with black. About the covers of the gills it is of a shining gold colour; whence it is sometimes called the gilded pearch. It is gregarious, assembling in large shoals, and keeping in the deepest part of the water. The first rays of the dorsal fin, like those of the pearch, are strong, sharp, and spiny; the other soft. The Ruff is a river fish.

NATURAL HISTORY of the STICKLEBACK.

THESE are common in many of our rivers; and are found in vast quantities in the Fens of Lincolnshire, and some of the rivers that creep out of them. Once in seven or eight years, such amazing quantities are found in the Welland, near Spalding, that they are used to manure the land. We are credibly informed, that a man employed by a farmer, got near four shillings a day, for a considerable time, by selling them at an halfpenny per bushel. They are supposed to be the multitudes that have been washed out of the Fens by the floods of several years, and collected in some deep hole, till, overcharged with numbers, they are periodically obliged to attempt a change of place. This fish has only one fin on the back, with three distinct spines or prickles placed before it, which it can raise or depress at pleasure: the eyes are large, the belly prominent. The mouth is furnished with very small teeth; and the upper jaw is somewhat longer than the lower. The tail consists of twelve rays, and is even at the end. The colour of the back and sides is an olive green, and that of the belly is white.

There is a species of the Stickleback which has ten spines or prickles, and is a smaller fish than the above; and another that has fifteen spines, which grows to the length of six inches. The latter inhabits the sea, and is sometimes called the Sea Stickleback.

NATURAL HISTORY of the MACKREL.

THE Mackrel was greatly esteemed by the Romans, because it furnished the precious *garum*, a kind of pickle that gave a high relish to their fauces. It is a summer fish of passage that visits the British coasts in immense shoals. It is usually from a foot, to a foot and an half in length, and seldom exceeds two pounds in weight.

The Mackrel is a most beautiful fish when alive, as nothing can exceed its brilliancy of colour; but it is greatly impaired by death, though it continues to merit the appellation of a beautiful fish. The body is long, thick, and fleshy, but very small and slender towards the tail. It is not entirely destitute of scales, but what it has are extremely thin and small. The colour of the back and sides is a fine green, varied with blue, marked with black lines, pointing downwards; beneath the line, the sides and belly are of a silvery colour: the tail is broad and forked, and appears to be almost separated into two distinct fins. The nose is taper and sharp-pointed; the jaws are of an equal length, and furnished with teeth, which are small and numerous:

the eyes are large, the tongue sharp, and the nostrils small and round. It is a fish of prey. When just taken, the flesh of a Mackrel is delicate food, and it is esteemed even after it is brought up to London. Those who have tasted Mackrel perfectly fresh, know how much they are superior to those which have been taken two or three days.

They have a method in Cornwall of pickling and salting Mackrel, where it proves a great relief to the poor during winter. They are recommended for the jaundice, and obstructions of the liver. This fish is much used in England, but, as we have already observed, only for a certain season of the year, after which it disappears; but in some countries they have it at all seasons.

It is nourishing food, and reckoned to be of a dissolving nature; but is heating, and not reckoned wholesome, producing viscous and gross juices, and is not easy of digestion. It contains much oil, volatile salt, and phlegm. Bellonius blames those who boil a Mackrel, and says it should be roasted, and seasoned with such things as promote digestion. The roasting certainly divests it more of its viscous and gross juices. It agrees, in spring and summer, with young people of a healthy constitution, who have a good stomach.

Mackrel are found in large shoals in many parts of the ocean, but especially on the coasts of France and England. They enter the English channel in April, and take their course through the straits of Dover, insomuch that in June they advance as far as Cornwall, Suffex, Kent, Normandy, and Picardy.

They are taken either with the angle or with nets. When they are angled for, it must be out of a boat, or smack, or a ship that lies at anchor. The best bait for them is a bit of herring put upon a strong hook; but when this is wanting, a shrimp, or a bit of any other fish will do, or even a piece of scarlet cloth; for they bite so freely, there is almost a certainty of having sport: when you have taken one, a bit of their own flesh will serve for a bait. There is no occasion to be curious about your tackle, for you may even fish without a rod, and with several hooks at a time. In the West of England they fish for them with nets, near the shore, in the following manner: one man fixes a pole into the sand, near the sea, to which he fastens one end of a long net. Another in a boat takes the other end of the net in his boat, and rows round in a circuit as far as the length of the net will permit, and then back towards the shore; when his boat turns round he steps into the water, and taking the cord of the net with him, drags the net towards the shore; then upon a signal given, both the men draw the net out of the sea, and by this method often catch three or four hundred fish; they are immediately carried away by horses, which wait for that purpose. The quantity of Mackrel sometimes taken upon that coast is almost incredible; and then they are so cheap, that they are not worth carrying away.

The flesh of a Mackrel is very good when fresh, especially if they are dressed when just taken out of the water, and there is such a difference between them and those that are brought to London, that it is not to be conceived by any that have not tried. However, they are not to be despised, even when they are well cured by pickling, and put up into barrels.

There are two ways of pickling them; the first is, by opening and gutting them, and filling their bellies with salt, cramming it as hard in as possible with a stick; which done, they range them in strata, or rows, at the bottom of the vessel, strewing salt between the layers. In the second method, they put them immediately into tubs of brine, made of fresh water and salt, and let them steep so long, till they

think they have imbibed salt enough to make them keep; after this, they take them out and barrel them up, taking care to press them down as close as possible.

NATURAL HISTORY of the TUNNY.

THIS is also called the Spanish mackrel. The form of the Tunny, however, is less elegant than that of the mackrel, being rather thicker in the middle. The colour of the upper part of the body is dusky, varied with blue and green, and the sides and belly are silvery. They grow to a large size, sometimes being found of upwards of a hundred weight. They are fish of passage, and ramble from one part of the sea to another, at a considerable distance. In the months of September and October they quit the ocean, and pass through the strait of Gibraltar, into the Mediterranean sea, towards the Levant. They make a great article of provision in the adjacent kingdoms. Amazing quantities of them are taken in nets, for they come in vast shoals, keeping along the shores. They are not common in our seas, but are sometimes taken on the coast of Cornwall, with their stomachs full of pilchards. The flesh of the Tunny, though not very delicate, is said to be tolerable food when properly cooked.

NATURAL HISTORY of the SCAD.

THIS is called the horse-mackrel by the inhabitants of London: it resembles the common mackrel in colour, shape, and flavour; but it is smaller, and the body is thinner. The head, and the upper part of the body are varied with green and blue, and the belly is silvery. The scales are very large and thin: the lower half of the body is quadrangular, and marked on each side with a row of thick strong scales, prominent in the middle, and extending to the tail. It is taken on the coast of Cornwall, and many other places.

NATURAL HISTORY of the GREY GURNARD.

THE colour of the back and tail of this fish is of a deep grey, covered with small scales, and spotted with yellow or white. The head is very large, covered with bony plates which have prickles on them. The snout terminates in two horns; the mouth is large; and the jaws, the roof of the mouth, and the base of the tongue, are armed with very small rough teeth. The body gradually becomes smaller from the head to the tail, and it has a furrow in the middle of the back, armed on both sides with a row of bony thorns, from which the fins arise. The flesh of the Grey Gurnard is firm, and has a good flavour.

The red Gurnard, or rocket, resembles the former, but differs in size; seldom exceeding twelve inches in length: the head is less; the body and fins are more red, and the covers of the gills are engraved with streaks or rays, proceeding, as it were, from a center.

NATURAL HISTORY of the PIPER.

THE Piper is of the same colour as the red Gurnard, except that it has a yellowish head. The snout is divided into two broad horns, each terminated with three spines or prickles. The spines on the back are larger and longer than those in other fish of this kind. The nostrils are very minute;

minute; the eyes large; the lower jaw much shorter than the upper; and the teeth very minute in both. This fish is found on the Western coast, at all seasons of the year, and is esteemed a great delicacy. It is called the Piper, from the noise it makes. They are often seen to weigh three or four pounds, and to measure from twenty to twenty-four inches.

NATURAL HISTORY of the TUB FISH.

THE form of the Tub Fish is more slender than that of the piper. The pupil of the eye is green, and on the inner corner of each are two small spines. But it is principally distinguished from the other species, by the breadth and colours of the pectoral fins, which are very broad, and of a palish green, most beautifully edged, and spotted with rich deep blue. The back is of a greenish cast: the sides are tinged with red; and the belly is white. These fish are often taken on the coast of Cornwall.

NATURAL HISTORY of the LOACH.

THIS is also called the Groundling; it is found in several of our brooks or small rivers, where it usually keeps at the bottom on the gravel, whence it owes its second name. It is frequent on the stream near Amesbury, in Wiltshire, where the sportsmen swallow it down alive in a glass of white wine, and suppose it an excellent remedy in consumptive cases. In shape and colour it resembles a gudgeon, but is smaller and shorter. The body is soft and slippery, and his tail broad, but not forked; and there are few or no scales. The colour of the head, back, and sides is white in some, and in others of a dirty yellow, very elegantly marked with large spots, consisting of numberless minute black spots. On the upper jaw there are three pair of barbs, one at each corner of the mouth, and two near the end of the snout. The eyes are small, and have their iris yellow. The flesh is extremely tender and delicate.

NATURAL HISTORY of the SALMON.

THIS is a northern fish, being unknown in the Mediterranean sea, and other warm climates; it is found in France, in some of the rivers that empty themselves into the ocean; and North as far as Greenland. In several countries they are a great article of commerce, being cured different ways, by salting, pickling, and drying: there are stationary fisheries for them in Iceland, Norway, and the Baltic; but the greatest are at Colrairie in Ireland; and at Berwick, in Great Britain. The Salmon was known among the Romans; and Pliny speaks of it as a fish found in the rivers of Aquitaine.

It has different names, according to its different ages: those which are taken in the river Ribble, in Yorkshire, are in the first year called smelts, in the second, sprods, in the third, morts, in the fourth, fork-tails, in the fifth, half-fish, and in the sixth, when they are thought to have attained their proper growth, they are deemed worthy of the name of Salmon. In all parts of Europe the size of this fish is nearly the same, and the largest weigh from thirty to forty pounds.

The Salmon is a beautiful fish; the body is longish, covered with small thin scales; the head is small in proportion to the body, and has a sharp snout: the tail is forked. The back is of a bluish colour; and the other parts are generally white, intermixed with

blackish or reddish spots, placed in a very agreeable manner. The female may be distinguished from the male, by having a longer and more hooked snout, in having scales that are not so bright, and also in having its body speckled all over with dark brown spots. The belly is also flatter, and not so red.

The excrescence growing from the lower jaw of the male, which is a bony gristle like the beak of an hawk, is a defence provided by nature, against such fish as would devour their spawn: it grows to the length of about two inches, and falls off when the fish returns to the sea. The Salmon is likewise more spotted in fresh water than in the sea: the teeth are small in proportion to its body; and the gills are quadruple; with a broad cover full of red spots. The flesh, when fresh killed, is not so red as when it is boiled or salted: it is tender, luscious, and flaky, and soon satisfies; it is generally preferred to that of other fish.

The Salmon is indeed so universally known, that a minute description is unnecessary. They are cured in the following manner: they are split, and rubbed with fine salt, and after lying in pickle for six weeks, they are packed up with layers of coarse brown Spanish salt in casks, six of which make a ton. These are exported to Leghorn and Venice, at the price of twelve or thirteen pounds per ton; though they were formerly sold at a much greater price.

The Salmon lives both in the fresh and salt waters; quitting the sea at certain seasons in order to deposit its spawn in security, in the gravelly beds of rivers remote from their mouths. Salmon are often taken in the Rhine, as high up as Basil; they gain the sources of the Lapland rivers, in spite of their rapid courses, and surpass the perpendicular falls of Leixlip, Kennerth, and Point Aberg-lafstyn.

This fish lives several years, and may be kept a long time out of the water before it dies. The best Salmon is well fed, large, of a middling age, tender, short, reddish, and taken in fine clear and running water. It is tender, short and savoury, and abounds with volatile salt, and oily and balsamic principles, which render it nourishing, strengthening and invigorating; it is diuretic, pectoral and restorative; but if eat immoderately, being very fat, it causes reachings and indigestions; and if too old, it is dry, hard, and heavy upon the stomach.

The Salmon-fishery was an article of so much importance, that so early as the 13th of Edward the First, an act was passed to prohibit the capture of the Salmon, from the nativity of our Lord to St. Martin's day, in the waters of the Humber, Owse, Trent, Done, Arre, Derwent, Wharfe, Nid, Yore, Swale, and Tees; and successive monarchs have provided for the security of the fish in other rivers.

The smelts, or fry of Salmon, leave the Mersey about May or June, and then weigh about two ounces a-piece: they return about August or September, and weigh from one pound and an half to two pounds. Their greatest magnitude is much the same in most parts of Europe, and when they are largest, they weigh from thirty-six to fifty-four pounds; one of this last weight being caught at Lachford Causey, in the year 1763.

Salmon ought to be kept a few days before it is dressed, for which reason it is better when it reaches London, than when caught in the Mersey. About the time of spawning, it grows more insipid, and loses its lively colour. Some begin to be out of season presently after the summer solstice, and others soon after, which may be known by their falling away, their losing their beautiful spots, and by their colour;

colour; infomuch, that when they are quite out of feafon, they look like a fish of a different fpecies, and are then called knippers.

The Salmon chufes the river for his abode about fix months in the year; they enter the fresh water about December or January, and are fometimes caught in the Mersey, in November, February, or March, where they continue till the autumnal feafon, at which time they caft their spawn, and foon after return to the fea. But directly the contrary of this is reported of thofe in the river Ex in Devonfhire, and the river Wye and Ufk in Monmouthfhire, where the Salmon are faid to be in feafon during the other fix months.

When spawning time arrives, the female feeks a proper place, in a gravelly bottom, where ſhe has been obferved to work with her head, tail, belly, and fides, till ſhe has formed a kind of *nidus*, of the ſame dimenſions with herſelf; which done, ſhe diſcharges her spawn, and retires; then the male or milter, advances: this is no ſooner over, but the female returns to the male, when they uſe their joint endeavours to cover their brood with the gravel, in which they work with their noſes like hogs: after this they return to the deeps to recover their ſtrength, which they do in about twenty days. About this time this fiſh is of very little value; but to prevent their deſtruction, the laws of the land inflict a penalty on thoſe who ſhall deſtroy Salmon between the 11th of Auguſt and 22d of November; but it would be better for the community, if it was the 11th of September and the 22d of December.

There is nothing relative to this fiſh, which has been more talked of, than its agility in leaping over the obſtacles which oppoſe its paſſage either to or from the ſea; for they are frequently ſeen to throw themſelves up cataracts and precipices many yards high. They ſometimes make ſeveral eſſays before they can gain their point, and when they have done it, it has been often to their own deſtruction, for they have leapt into baſkets placed on purpoſe to catch them. There is a remarkable cataract on the river Tivy in Pembrokeſhire, where people often ſtand wondering at the ſtrength and agility which they exerciſe to get out of the ſea into the river; on which account it is known in thoſe parts by the name of the Salmon-leap. On the river Wear, near the city of Durham, there is another of this kind, which is ſuppoſed to be the beſt in England: there is another at old Aberdeen in Scotland, where ſuch great plenty of Salmon has been caught, that they have been deemed the principal trade of the place. Whenever their paſſage to the ſea is intercepted by weirs, or any other contrivance, they ſoon grow ſickly, lean, and languid; and if they are caught in that condition, when they come to the table, they prove taſteleſs and inſipid: in the ſecond year they pine away and die. It is worth obſervation, that the Salmon is not only deſirous of returning back to the rivers, but to that very river where it was spawned, as evidently appears by an experiment made by fiſhermen and others, who have caught them when very ſmall, and have run a ſmall ribbon, tape, or thread, through the tail fin: by this mark they have been certain that they have retaken the ſame fiſh, at the ſame place, as they returned from the ſea: by this means they have likewiſe diſcovered, that the Salmon is of very quick growth, and conſiderably more ſo than any other fiſh.

The chief rivers in England that yield this excellent fiſh are the Thames, Severn, Merſey, Trent, Medway, Dee, Ex, Ufk, Wye, Lon, Tyne, Werkington, Weaver, &c. However, our London markets are ſupplied ſooner from the north, where they are not only more plentiful, but are in ſeaſon before thoſe of the ſouthern rivers. The Merſey greatly abounds with Salmon, which in the ſpring

ſtrive to get up that arm of the ſea, and with difficulty evade the nets, which the fiſhermen ſpread to catch them before they get to Warrington-bridge, at which the place the river becoming narrower, and the land-owners having an excluſive right, each proprietor, by his agents, catches Salmon, which, in the whole, amounts to above one thouſand pounds a year; by which means the towns of Warrington, Mancheſter, and Stockport, are well ſupplied, and the overplus ſent to London, by the ſtage-coaches; or carried on horſeback to Birmingham, and other inland towns. Thus having given a general account of the nature of the Salmon, we ſhall now proceed to the method of taking him with the angle.

It is neceſſary to premiſe, that the Salmon does not remain long in a place, but ſeems deſirous of getting ſtill nearer to the head of the ſpring. He does not lie near the bank-ſide, nor under the roots of trees, but ſwims in the deep and broad parts of the water, generally in the middle and near the ground. But the Salmon-smelts generally lie in the rough and the upper part of a gentle ſtream, and uſually pretty near the middle in the months of April and May, and nearer the ſide earlier in the ſpring.

The moſt alluring bait for the Salmon, in the weſtern iſlands of Scotland, is a raw cockle taken out of the ſhell; with this they fiſh at the bottom, uſing a running bullet. This method is practiſed in the river Medway, in Kent, with ſucceſs: let the cockle fall into a ſhallow, from which there is a gradual deſcent, into a deep hole. In moſt of the Salmon rivers of France, they uſe prawns or muſcles taken out of the ſhell. In the month of October, they go up the ſmaller rivers as far as they can to spawn. At that ſeaſon of the year many Salmon get high up the river Merſey, where ſome few are caught by angling: but the far greateſt part of them are deſtroyed by poachers with ſpears, though the fiſt are at that time of little or no value. Thus conſiderable damage is done to the breed of Salmon; and it were to be wiſhed, that the juſtices of the peace would a little more exert themſelves, and enforce the laws to puniſh theſe offenders.

The moſt uſual baits are lob-worms, ſmall dace, gudgeons, bleaks, minnows, or two well-ſcour'd dew-worms, which ſhould be often varied, in order to ſuit the humour of this fickle fiſh; as what he likes one day he will deſpiſe the next. Though it muſt be own'd it is a very diſagreeable circumſtance to an angler, and which he often meets with to exerciſe his patience, to ſee the fiſh ſporting on the ſurface of the water, and not be able to tempt him with any of his baits. However he generally bites beſt about three in the afternoon, in May, June, and July, eſpecially if the water happens to be clear, and there is a little breeze of wind ſtirring; but there will be ſtill a greater probability of ſucceſs if the wind and ſtream ſet contrary ways. There is a fly called the horſe-leech-fly, which he is very fond of; they are of various colours, have great heads, large bodies, very long tails; and two, ſome have three pair of wings; behind each pair of wings, whip the body about with gold or ſilver twiſt, or both, and do the ſame by the head; with this fly, fiſh at length, as for trout, and grayling; but if you dip, do it with two or three butterflies, of different colours, or with ſome of the moſt glaring ſmall flies you can find. When you make uſe of the fly, let your hook be ſtrong and large; but it would be better to have two well ſcour'd lob-worms, as they have been found moſt ſucceſſful in fiſhing at the bottom. In this caſe, let your hook be large, and armed with gimp; for though a ſalmon, when ſtruck, ſeldom attempts to bite the line, yet, as you will be oblig'd to play the fiſh for ſome time, the line muſt rake

against his teeth, and you will be in great danger of losing your prize without this precaution. Next to gimp are recommended the bristles of a Westphalia hog doubled; which yet are only preferable to ours on account of the length. If, therefore, you cannot easily procure the former, you may make use of our own, which being often lapped into the length of half a yard, have been found proof against the teeth of a jack, when trowling for that fish. Whenever you observe a Salmon leap out of the water, you may safely conclude there is a deep hole not far off; and if the river is too broad for you to throw a fly, or if a contrary wind hinders you, then lay your ledger-bait as near the hole as you can, and you may probably meet with success, for he always chuses such places for retirement. If you bait with a dace, gudgeon, &c. then put on your swivel and reel, and make use of a large cork-float, with your live bait about mid-water.

For the Salmon-fry, or scegger, called also a Salmon-smelt, the properest baits are ant-flies, brandlings, earth-bobs, gentles, black and dun gnats, all coloured small hackles, and dub'd flies according to the season; when they rise at fly, and a little before they leave the river, they usually get together in large shoals, where you will see ten or a dozen rise at a time; if you light of a shoal, you will never fail to have sport, as they rise very freely. You may use three or four hooks to one line, tied to single hairs. They are also frequently caught with the red worm in fishing for gudgeons. The places where they are generally found are the scours near the deeps, or amongst wood or weeds. They always leave the Mersey in May or June. Two of them were, whilst small, put into a fish-pond, at Stockport, and took out again in three years, when they weighed five pounds.

The chief Salmon fisheries in Europe, are along the coasts of England, Scotland and Ireland; the fishing usually begins about the first of January, and ends the eleventh of August. It is performed with nets in the places where the rivers empty themselves into the sea, and along the sea-coast thereabout; because these fish are seen to crowd thither from all parts in search of fresh water. They also fish for them higher up in the rivers, sometimes with nets, and sometimes with locks or weirs made for that purpose with iron gates: these gates are so contrived, that the fish in passing up the river can open them with their heads, but they are no sooner entered than the gates clap to, and prevent their return. Thus the Salmon are inclosed as in a reservoir, where it is easy to take them.

Near Flixon in Lancashire, they fish for Salmon in the night-time, by the light of torches, or kindled straw, which the fish mistaking for the day-light, make towards, and are struck with the spear, or taken with the net, which they lift up with a sudden jerk from the bottom, having laid it in the evening before opposite the place where the fire is kindled. In some parts of Scotland, it is said, they ride a fishing up the rivers, and when they espy them in the shallows, they shoot them with fire-arms. It is very common to dart Salmon as they are endeavouring to get over the weirs.

When the fish are caught, they open them, take out the guts and gills, and salt them in large tubs made for that purpose, out of which they are taken before October; and are packed up in casks, from 300 to 450 pounds weight.

The season for fishing in the Tweed, begins November the 30th, but the fishermen work very little till after Christmas; it ends on Michaelmas day: but the corporation of Berwick, who are conservators of the river, indulge the fishermen with a fortnight after that time, on account of the alteration of the style.

There are forty-one considerable fisheries on the Tweed, extending upwards of about fourteen miles from the mouth, which are rented for near five thousand four hundred pounds per annum. A misfortune attends this river, which requires a parliamentary remedy: there is no act of parliament for preserving the fish in it during the fence months, as there is in the case of many other British rivers. The Tweed being the boundary between England and Scotland, part of it belongs to the city of Berwick, and the whole north side (beginning about two miles from the town) is entirely Scotch property. From some disagreement between the parties, they refuse to unite for the preservation of the fish; and in some fisheries on the north side they continue killing Salmon the whole winter, when the death of one fish is the destruction of thousands.

About the month of July, the capture in the Tweed is prodigious: in a good fishery a boat load of them are often taken at a time: upwards of seven hundred fish have been known to have been taken at one haul: but from fifty to one hundred is no uncommon occurrence.

NATURAL HISTORY of the SALMON TROUT.

THIS fish is also called the Bull Trout, from the thickness and shortness of its head. It differs from the salmon in having the tail less forked; from the grey, in having a shorter and thicker head; and from both in being smaller, seldom exceeding twenty inches in length. Its flesh is white, and less delicate than that of the salmon and grey.

They delight to lie in deep holes, and usually shelter themselves under the root of a tree. When they watch for their prey, they generally chuse that side of the hole which is towards the stream, that they may the more readily catch whatever food the stream brings down. They will rise at an artificial fly like a salmon: but the best bait for them is a well scoured brandling, especially those that breed in a tanner's yard.

You may angle for them any time in a morning, and in the afternoon from five till night. They are in season all the summer. When you try to catch them, remember to keep out of sight, and let your line fall into the stream, without any lead, except one single shot, and then it will be carried gradually into the hole. When you have a bite you ought not to strike too eagerly; they bite freely enough, and struggle hard for their lives. It is necessary to observe, that some give the name of Salmon Trout to a young salmon, which has occasioned several to run into errors in treating of this fish. They have likewise in France a kind of Pond Trout, which they call a Salmon Trout, that grows to such a magnitude as to weigh above thirty pounds; and in the Lemane Lake near Geneva, there are some of this kind, that weigh fifty pounds.

NATURAL HISTORY of the GREY:

IT differs but little from the Salmon in size, though it is very different in shape; being broader and thicker; and the tail not being forked. The body is all over speckled with ash-coloured or grey spots; from whence it derives its name. The flesh is preferable to that of salmon, and bears a much higher price. This fish has great strength and agility, making its way from the sea into the rivers with extreme swiftness; surmounting almost every obstacle with the greatest ease. This fish is therefore seldom taken, and consequently but little known. It does not ascend the fresh waters till August, which is the time of spawning.

NATURAL HISTORY of the TROUT.

THE Trout is a fish of excellent taste, and is covered with small scales, usually streaked with red. There are several species of this fish, which live in various places, and differ in colour and size. Some are found in deep and rapid rivers, others in lakes; some are of a blackish colour, others reddish, and rather of a gold colour, and variously marked with spots of a purple or vermilion die; but on the belly they have a yellowish cast.

This fish swims with much agility and swiftness, and is said on hearing thunder to be so astonished, as to become immovable. It feeds upon worms, slime, mud, insects, and small fishes, which it pursues with so much eagerness, from the bottom to the surface of the water, that it sometimes throws itself into the boats passing near it.

Trouts, besides being well tasted, produce good juice, because they are always in motion, feed upon good food, and usually swim in clear and running streams: thus they acquire less gross and vicious humours, eat short, and are easily digested; but they soon putrefy and corrupt, and therefore should be eaten soon after they are brought out of the water.

The Trout contains much oil, volatile salt, and phlegm; and agrees with any age and constitution. In summer it is most delicious, but in winter it is deprived of almost all the excellency of its taste. It may be boiled, fried, roasted, or baked; and some salt it for exportation.

There is a variety which is called in Latin *Thymallus*, a *Thymi Odore*, because it smells like thyme. It is delicious food, easy of digestion, has good juice, and so wholesome, that in some places they allow sick persons to eat it. Its shape resembles that of the common Trout, and it also lives in clear and running waters: it feeds upon the same food, and in some countries is more valued for the goodness of its taste than the other sorts. Its fat is good to remove prints of the small-pox, deafness, noises of the ears, specks, and catarrhs of the eyes.

The Trout is of a longish form, and resembles the salmon more than any other fish. The head is short and roundish, the nose blunt, the body thick, and the tail broad. The mouth is wide, and it has teeth, not only in the jaws, but on the palate and tongue. The eyes are large, with a reddish circle round the pupil; the rest of the iris being of a silver colour. The skin readily falls into wrinkles, and separates from the flesh. In the larger trouts, the back is of a dusky hue, and full of black spots, which in some are mixed with red. This fish has two fins on the back; that next the head is full of black spots, and the edge of that near the tail is of a vermilion colour. On the belly there are two pair, which are always either red or yellow.

It is surprizing that this common fish has escaped the notice of all the ancients, except Ausonius, who only celebrates it for its beauty; and that so delicate a species should be neglected at a time when the folly of the table was at its height; and that the epicures should overlook a fish that is found in great quantities in the lakes of their own neighbourhood, when they ransacked the universe for dainties. The milts of *Muræna* were brought from one place; the livers of *Scari* from another, and oysters even from so remote a spot as our *Sandwich*; but there was, and is now, a fashion in the article of good living.

The Trout is a voracious fish, and affords excellent diversion to the angler. These fish shift their quarters to spawn, and, like the salmon, make up towards the heads of rivers to deposit their spawn. They delight in cool and small streams, which de-

scend from rocky hills, and seem particularly fond of swimming against the course of the water. They are found in small rivers among the Alps, the waters of which are so cold, that no other fish can accompany them.

Trouts are not in the highest season when they are fullest of spawn, for they are fattest, and have the most delicious taste in July and August. They begin, however, to be in season in March, and become so in some rivers much sooner than in others. In winter they are lean, sick, and unwholesome, breeding a kind of worm with a large head, which in some degree resembles a clove. At that time the beautiful spots disappear, and the lively colour of the belly becomes dusky and disagreeable. But, towards the latter end of March, he rouses from his lethargy, rubs off his ill-bred sores against the gravelly bottoms, and soon after recovers his former strength and vigour. The flesh is drier and less tender than that of the salmon; it is, however, esteemed the most agreeable of all those fish that reside continually in fresh water.

The Fordich Trout seems to be of a different sort from the rest, because it is almost as large as a salmon, and lives nine months in the sea; besides it is seldom caught with the angle, being supposed not to feed at all in fresh water; and there seems to be a probable ground for this opinion, for when they are opened there is nothing found in their maw. Yet their return to the river is so very constant and punctual, that the fishermen know almost to a day when to expect them. When this fish is in full season, the flesh of it cuts white.

The usual baits for a Trout are a worm, minnow, and fly, either natural or artificial. The proper worms are the brandling, two upon a hook, lob-worm, earth-worm, dung-worm, and muggot, but especially the two first, and indeed, in fishing at the bottom, the lob-worm is preferable, and is most generally used.

This fish, as already observed, delights in the swiftest streams, at a stream-tail in spring and latter end of summer: in May he keeps the upper end, and on the shallows in summer, or at the tails of mills: he is particularly fond of a hole covered with boughs, and where the roots shoot down to the water's edge, where he can find a good hold: in such a place you may find the largest, and consequently you must angle for them near such places. When they watch for their prey, they generally shelter themselves under a bank, a large stone, or in the weeds, where they are often seen lurking entirely covered over except their heads. When they are discovered in this situation, go a little up the stream, and with great care and caution muddy the water, putting in your bait immediately in the muddy part; then keeping yourself as far from the bank as you can, in order to be out of sight, follow your float, and expect success.

Trout may be taken in this manner, either with a minnow, or two well scoured lob-worms. When you use two worms, put the first on the hook with the head foremost, and then slipping it a little up the line to make room, put on the other with the tail foremost, after which draw the first down to it quite close. This is likewise a good bait when you angle in the dawn of day, or in the dusk of the evening, or even in the night when it is dark. In this case you must put no lead on your line, but throw your bait as gently as you can across the stream, and draw it softly to you on the top of the water. This is the best method of catching the oldest and largest Trout, for they are very fearful and shy in the daytime, but in the night they are bold and undaunted, and generally lying near the top of the water in expectation of meeting with food; for if they see any thing in motion, let it be what it will, they will certainly

tainly follow it, if it glides gently along. If you put the point of your hook in at the head of your first worm, and out at the knot, and slip it a little way up the line, that you may bait the other the same, so that both tails may play, you will find it answer very well.

In angling for a large Trout in muddy water, it requires some art in baiting your hook; suppose, for instance, the bait is a dew-worm, you must then thrust the hook in towards the tail, a little above the middle, and out again below the head, then draw him above the arming of the hook, or whipping, and put the point into the head of the worm, till it is very near the place where the point of the hook first came out, and so draw back the worm, or that part that was above the shank. This hook should be pretty large. A water clearing, after a flood, or dark, cloudy, and gloomy weather, when it is windy, is most favourable for worm fishing. In March, April, September, and part of October, the warmest sun-shiny weather, and the middle of the day, is best.

Some make a practice of fishing at the bottom in the dark, with a little bell fixed to the top of the rod, in such a manner, that when the Trout takes the bait, the sound of the bell may give notice of the bite; but others think this method is very precarious, because the least weed that touches your line as it comes down the stream will deceive you. The surest way is to hold your rod in your hand, for as the Trout is a bold biter, you will easily perceive when he takes the bait: as soon as you have struck it, give it the but of your rod, for if you hold it the least upon a level, you are in danger of losing your line. There is a very excellent method: make a pair of wings of the feather of a land-rail, and point your rod with one or more cadis; your hook should be bristled, and the head of your cadis kept close to your wings, and angle with a rod about five yards, and a line about three; cast your wings and cadis up the stream, which will drive it down under the water towards the lower part of the hole; then draw it gently up the stream, a little irregular, shaking your rod, and in a few casts you will be sure to hook him, if there is one in the hole. You may angle the same way with two brandlings. If you use two cadis with your wings, run your hook in at the head, and out at the neck of the first, and quite through the other from the head to the tail: this is a much approved method for catching large Trout.

In angling with a fly, let your rod be rush-tapered, with a very slender top, that you may throw your fly with greater certainty and ease; for if the top is too stiff, the fly will be soon whipped off. Your line should be three times the length of your rod. In this kind of angling, you should place yourself so that the wind may be upon your back, or at least you must chuse such a time and place, that the wind may blow down the stream, and then it will assist you in laying your fly upon the water, before your line touches it; for if your line touch the water first, it will cause a rippling that will fright the fish away.

The cad-bait upon the point of the hook with the artificial fly is recommended. Or another way to angle with the cad-bait, is on the water, as with a fly. It must stand on the shank of the hook, as the artificial fly, (not come into the bend, or the fish will not value it, nor if you pull the blue gut out) and thus it is a most excellent bait for the Trout. Where the river is not violently swift, you may place a very slender lead on the shank, and draw the cad-bait over it: raise it often from the bottom, and so let it sink again; by which means you will find good sport, either in muddy or clear water. You may imitate the cad-bait, making the head of black silk, and the body of yellow wax, or

of shamoy. When the fish appear at the top, they will take the oak-worm upon the water, rather than under it, or than the fly itself; and it is more desired by them. After you have dibbed with these flies on the surface till they are dead, cut off their wings, and fish with them at mid-water, or a little lower. You may dib for a Trout also with a fly or grafshopper, as you do for a chub, under a bush, by the bank side, with a strong rod, and a short strong line. If they do not rise after half a dozen trials, there are none in the stream, or they dislike your bait.

You need not be very particular in the choice of your flies, for a Trout is not difficult, nor yet very curious about the season, for some have angled successfully with an artificial May-fly in August. The time of the Trout's biting is from sun-rising till near eleven in the morning, and from two in the afternoon till sun-set; and yet the most certain times, are nine in the morning, and three in the afternoon, especially if the wind be at south, for when it blows from that point it is most favourable to the angler. At this time, if you angle with a loach about a quarter of a yard deep in the stream, you are sure of catching fish. If you have not this bait, a bull-head, with the gill fins cut off, may prove a good bait, or a minnow, for want of the others. And as the Trout may be deceived by almost any fly at the top, so he seldom refuses any worm at the bottom, or small fish in the middle; for which reason he is sometimes caught when trolling for jack.

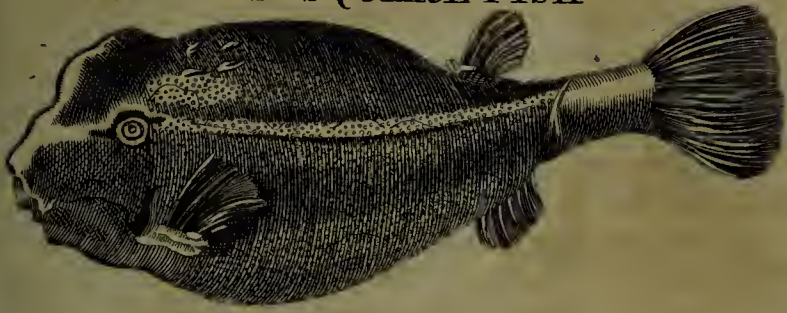
You may likewise dib for Trout in the same manner as you do for chub, only let your fly drop as gently into the water as possible, and keep it easily gliding along the surface; let it sink a little, and suddenly raise it again, with a strong rod, and a short strong line; but be careful to keep out of sight, for the shadow of your rod, or the flight of a bird over the river, will make them fly almost as swift as the bird, and it will be some minutes before they will shew themselves again. You will find good sport if you dib with the green snake-fly whilst alive, which is thus practicable: collect a quantity of them into a long draw-box, with holes in the cover to give them air, where also they will continue fresh and vigorous a night or more; take them out from thence by the wings, and bait them thus upon the hook: first take one, for it is common to fish with two of them at a time; and putting the point of the hook into the thickest part of the body under one of the wings, run it directly through, and out at the other side, leaving him spitted across upon the hook, and then taking the other, put it on after the same manner, but with its head the contrary way; in which posture they will live upon the hook, and play with their wings for a quarter of an hour, or more: but you must be careful to keep their wings dry; and also that your fingers be not wet when you take them out to bait them; for then your bait will be spoiled.

With the stone-fly you may likewise dib, but with this variation: the green drake is common both to stream and still, and to all hours of the day; this is seldom dibbed with but in the streams, (for in a whistling wind a made fly in the deep is better,) but observe, that morning is the time: but much better towards eight, nine, ten, or eleven o'clock at night, at which time also the best fish rise, and the later the better, provided you can see your fly, and when you cannot, a made fly will answer the purpose.

Trouts are taken in some parts of England by tickling them; there was a person who was very expert in that art; he would grope for them in their lurking places, and gently tickle their sides, which they seemed to be delighted with, till, at length, approaching their gills, he held them fast, and made

FISHES.

THE GREAT SQUARE FISH



THE BROAD GUAPERVA



THE SALAR



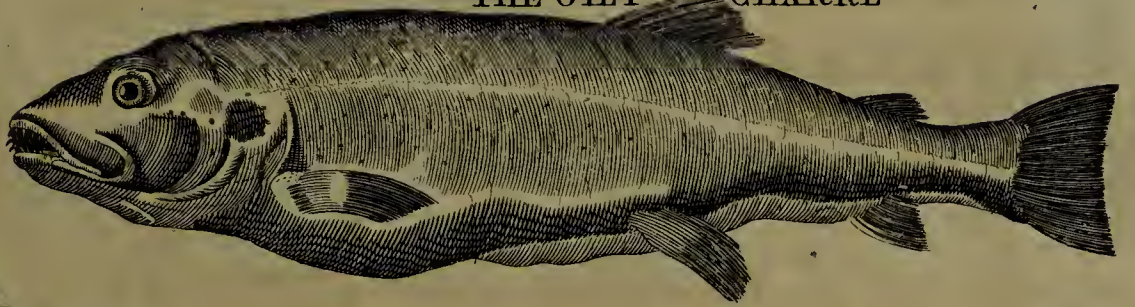
THE OXYRINCHUS



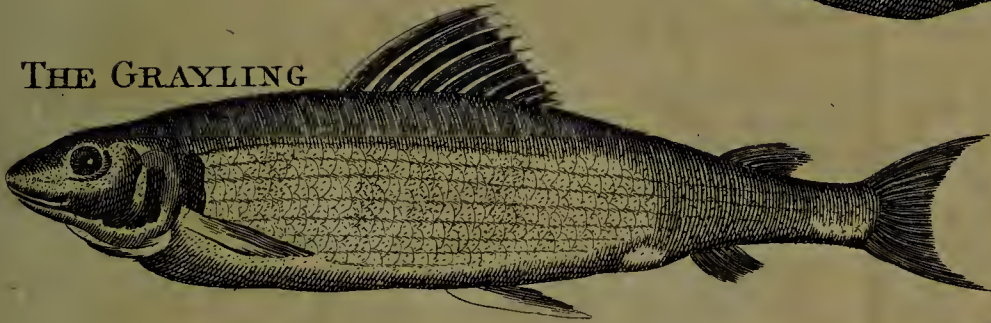
THE RIVER TROUT



THE GILT CHARRE



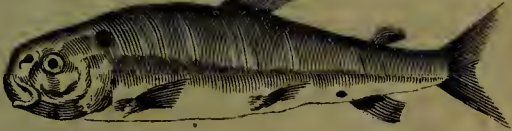
THE GRAYLING



THE SMELT



THE LAVARELUS



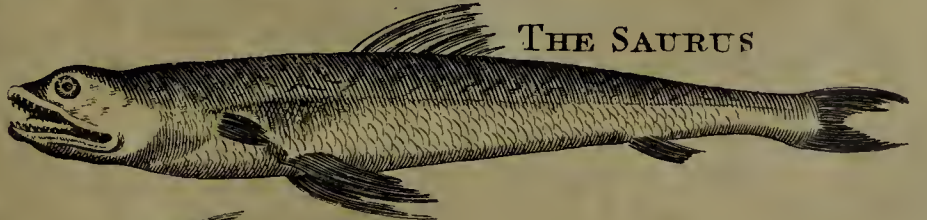
THE SALMARINUS



THE ACUS OF OPPIAN



THE SAURUS



THE HIRUNDO PESCIS
or FLYING FISH



THE LITTLE IPHYRCENA



THE SEALY ACUS





Salmon



made them prisoners; and it is observed in the Philosophical Transactions, that carp are sometimes taken by the same way. Great quantities are also taken with the spear and lamp.

NATURAL HISTORY of the SAMLET.

THIS is the least of the trout kind, and is frequently found in the Wye, in the upper part of the Severn, and the rivers that run into it, in the north of England, and in Wales. It has a great resemblance to the trout, but is much smaller, seldom exceeding six or seven inches in length, and an inch and an half in breadth. It has fewer spots than the trout, and those which it has are not so bright. The Samlet is whiter, and has a more forked tail; the sides are not so yellow under the spots; and the lateral lines in a trout are larger and more red than in the Samlet. The Samlet has transverse spaces near the lines of a bluish colour, which the trout has not. Some imagine the Samlet to be the fry of the salmon, but they are certainly mistaken.

NATURAL HISTORY of the CHARR, or RED CHARR.

THE Charr is an inhabitant of the lakes of the north, and of those of the mountainous parts of Europe. It is found in great abundance in the cold lakes on the summits of the Lapland Alps, and is almost the only fish that is met with in any plenty in those regions. Very few lakes in our island produce this fish, and even those in no great plenty. It is found in Winander-mere, in Westmoreland; and in Llyn Quellyn, near the foot of Snowdon, and in certain lakes in Merionethshire. It is also found in Scotland, in Loch Inah, and other neighbouring lakes.

The body of the Charr is longer and more slender than that of the trout, and the back is of an olive colour, speckled with whitish spots. In general the belly is red, though it is sometimes white, especially in the spawners: the scales are very small, and the lateral lines straight: the mouth is wide, and the jaws are nearly equal: the lower part of the fins are of a vermilion die, and the gills are quadruple. The Charr has teeth both in the jaws and on the tongue; and in the upper jaw it has a double row. The flesh is softer and more tender than that of a trout. The Charr is in very high esteem, and exceeding scarce. The inhabitants in the neighbourhood of Winander-mere make a practice of potting Charrs, which are usually sent as presents to remote friends; but they cannot be taken in sufficient quantities for sale even at an unreasonable price.

The GELT-CHARR.

The Gelt or Barren Charr, is one that has not spawned the preceding season, and on that account is reckoned to be in the greatest perfection. It is more slender than the red charr, as being without spawn. The back is of a glossy hue; the sides silvery, mixed with blue, and spotted with pale red: the sides of the belly are of a pale red, and the bottom white. This is found only in those lakes, which are also inhabited by the red charr.

NATURAL HISTORY of the GRAYLING, or UMBRÆ.

THIS is a voracious fish, and takes a bait very eagerly. It swims rapidly, and disappears like the transient passage of a shadow, from whence it probably derived the name of umbra.

No. 27.

“The *umbra* swift escapes the quickest eye.”

It is a fish of an elegant form: the body is longer and flatter than that of a trout, and seldom exceeds eighteen inches in length. The head is dusky: the covers of the gills of a glossy green: the back and sides are of a fine silvery grey, from whence it has its name of Grayling; though they seem to glitter with spangles of gold, and are marked with black spots irregularly placed. The top of the back fin is red, and the lower part of a bluish purple: the fins of the belly are bluish, spotted with black. The lips are rough like a file, the tongue smooth, and the gills quadruple.

The Grayling haunts clear and rapid streams; particularly those that flow through mountainous countries. It is found in the Hodder, the Dove, the Trent, the Derwent, the Wye, and the Lug. It is also very common in Lapland. It is a firm, good, and wholesome fish. It may be eaten all the year, but in December it is in the highest season.

NATURAL HISTORY of the SMELT.

SMELTS are usually about six inches long, and near an inch in breadth, but they are sometimes found of the length of twelve inches; they have a very peculiar scent, from whence their English name is derived—*smelt*, that is, *smell it*. People greatly disagree respecting the scent of this fish; some assert it flavours of the violet, others of the cucumber: we acknowledge that we are of the latter opinion. The Germans however distinguish it by the delicate title of *streck-fisch*. The Smelt is the least of these kind of fish, and is of a very beautiful form and colour: the head is so transparent, that all the lobes of the brain may be plainly and distinctly seen; and the skin in general is so thin, that, with a good microscope, the blood may be observed to circulate. The scales are small, and fall off with the slightest touch. The back is of a dusky colour, but the belly and sides shine like silver: the tail consists of nineteen rays, and is forked. The iris of the eye is silvery; the pupil of a full black; and the under jaw is the longest. It has four large teeth in the front of the upper jaw, and several small ones in the sides of both. It has two rows of teeth in the roof of the mouth; and two others of large teeth on the tongue.

Smelts inhabit the seas that wash the islands of Great Britain and Ireland the whole year, and never go very remote from shore, except when they ascend the rivers. It has been observed, that they are seen in rivers some months before they spawn, but immediately afterwards they all return to the salt water, and never appear again in the fresh streams till the next season. The flesh of the Smelt is soft and tender, and of a delicate taste; and is therefore in very high esteem. They are frequently served up to table as a kind of garnish to large fish; and they ought, in that case, to be considered only as garnish, for they are seldom fit to be eaten; the cook generally keeping them so long before the fire that they become dry, insipid, and tasteless.

Less than twenty years ago, Smelts were so scarce and valuable as sometimes to sell for four or five pounds the hundred; but they are now to be purchased, in general, for eight, ten, or twelve shillings per hundred.

In March, if the spring be mild, prodigious quantities of this delicate fish make their appearance in the river Mersey, which often seems of a greenish colour, from the vast bodies of Smelts which then swim about. At this time, every boat, every fisherman, and every net, is employed, and even the boys with cabbage-nets, catch these fish, which are double the size of those usually caught in the Thames;

3 O

sometimes

sometimes the baskets, pails, boats, and the very banks, are filled with sparlings, as they are called in Cheshire, where, from the great plenty, they are frequently sold at four-pence *per score*. Some of these fish have been caught in Rostern Mere, and other still waters, where the fishermen have washed the spawn from their nets; but these fish appear lean; neither do they breed in ponds.

The best way of angling for them is with a pater-noster line, with a small shot to sink it under water: your baits should be earth-bobs, gentles well scoured, paste, or the fish itself, cut into small bits sufficient to cover your hook; they are seldom caught with angling, as they stay about Warrington but a little time after they have spawned, but they are caught in the salt part of the river all the year round with nets.

The SOUTHAMPTON SMELT.

This agrees with the common kind, in having two back fins, in colour, in the transparency of the back and head, &c. but has nothing of the violet or cucumber smell. It swarms in the sea about Southampton, and is the common bait for whiting, mackerel, flat-fish, &c.

NATURAL HISTORY of the GUINIAD.

THE Guiniad is an inhabitant of several of the lakes of the Alpine parts of Europe. It is also found in Scotland, Ireland, and Wales, particularly in Pemble-meer, a lake in Merionethshire. The shape of this fish is not much unlike that of the salmon, the usual length is about twelve or thirteen inches, and its greatest depth about three inches. The back is dusky, and the belly white. The head is small, smooth, and of a light blue on the top, speckled with darker spots, and the ends of all the fins are of a dark blue: the eyes are very large, and the pupil of a deep blue: the mouth is small and toothless; and the covers of the gills are silvery, powdered with black. The British word guiniad, which signifies whiting, was given it on account of the whiteness of its body. They are in season in the summer, and, though the fish is white, it has the flavour of that of the trout: it is however much higher in esteem, because it is a greater rarity. The Scotch have a tradition, that it was first introduced there by the beautiful queen, their unhappy Mary Stuart. These fish approach the shores in immense quantities in spring and in summer, and, in many places, prove a great relief to the poor.

NATURAL HISTORY of the PIKE.

THE Pike has a roundish oblong body, with a flat head, and square back: the snout is very prominent, and the lower jaw is somewhat longer than the upper. The mouth is very wide, and the teeth are very sharp, disposed only in the front of the upper jaw; but in both sides of the lower jaw, in the roof of the mouth, and sometimes on the tongue: the eyes are small, and the tail is forked. The body is covered with small thick scales, which are moistened on the edges with a kind of slime that has a greenish cast; and the younger the fish is, the greener he appears. The back and sides when turned towards the light, appear to have somewhat of a golden hue; the sides are spotted with yellow, and the belly is white. It has dusky spots, and reddish lines on the tail, especially towards the corners.

The Pike will swallow other fish which are almost as large as itself; not even excepting those of their

own kind. Innumerable are the instances mentioned by authors of the voracity of this fish. Mr. Pennant informs us of a Pike being choaked, by attempting to swallow one of its own species, that proved too large a morsel. It will devour the water-rat, and draw down the young ducks as they are swimming on the water. At lord Gower's canal at Trentham, a Pike seized the head of a swan, as it was feeding under water, and gorged so much of it as killed them both. Gesner indeed relates an instance that borders a little on the marvellous. He tells us, that a famished Pike on the Rhine seized on the lips of a mule that was brought to water, and that the beast drew the fish out before it could disengage itself.

The longevity of the Pike is very remarkable. Rzaczynski tells of one that was ninety years of age; and Gesner says, that in 1497 a Pike was taken near Hailbrun, in Suabia, with a brazen ring affixed to it, on which were the following words in Greek characters: "I am the fish which was first of all put into this lake by the hands of the governor of the universe, FREDERICK the Second, the 5th of October 1230;" supposing this to be a fact, the fish was at least two hundred and sixty-seven years of age.

Their usual time of spawning is in March, and sometimes sooner if the spring is forward. They are exceedingly prolific, forty-eight thousand eggs having been found in one of their roes. They are in season all the year, except in spawning time, and about six weeks after it. The flesh is firm, white and sweet; but if the fish exceeds ten or twelve pounds in weight, it has a rankish flavour.

The Pike is good and nourishing food, and agrees at all times, but especially in winter, with any age and constitution. Some authors pretend, that it is hard of digestion, heavy in the stomach, and always affords bad juice; but these qualities are only applicable to such as live in ponds, and marshy places, and feed upon slime and mud. Jovius thinks the Pike has but an ordinary taste, and Ausonius does not esteem it; but its taste differs according to the country in which it is bred. The roe provokes vomiting, and sometimes purges violently. The Pike contains much oil, and volatile salt.

Mr. Lee, of Thelwell in Cheshire, had stored a pit; but when he laded it, in expectation of catching a great number of fish, to his disappointment he found only a large lean Pike, which had devoured all the store-fish, and had in his stomach a water-wagtail, and a young throstle, which were supposed to have been hopping on a twig near the water.

A Pike caught in Barn-meer (a large standing water in Cheshire,) was an ell long, and weighed thirty-five pounds; it was presented to lord Cholmondeley, who ordered it to be put into a canal in the garden, wherein were abundance of several sorts of fish. About twelve months after, his lordship drew the canal, and found that this overgrown Pike had devoured all the fish, except one large carp, that weighed between nine and ten pounds, and that was bitten in several places. The pike was then put into the canal again, together with abundance of fish with him to feed upon, all which he devoured in less than a year's time; and was observed by the gardener and workmen there to take the ducks, and other water fowl, under water; whereupon they shot magpies and crows, and threw them into the canal, which the Pike took before their eyes: of this they acquainted lord Cholmondeley, who thereupon ordered the slaughterman to fling in calves bellies, chickens guts, and such like garbage to him to prey upon; but being soon after neglected, he died, as supposed for want of food.

In the stew for preserving fish, at John Egerton's, Esq;

Esq; at Tatton in Cheshire, a large Pike was taken out, when there appeared at his mouth the tail of a fish, which being pulled out, proved to be another Pike, weight one pound, and was then alive.

In 1730, whilst Peter Bold, of Bold, in Lancashire, was netting some pits in Burton-wood, he saw a Pike lying amongst the weeds. Mr. Ralph Taylor, a gentleman who accompanied him, twice attempted to seize the Pike, but it escaped. Afterwards the pit was drawn, and a tench about five pounds weight pulled out; and so was this pike, with the tail of another hanging out of its mouth, which being measured with the other, proved nearly of equal size.

About the year 1740, when Robert Hyde of Cofnal, Esq; came of age, he had a large company of gentlemen to dine with him, to whom a fisherman brought three Pikes, one of twenty-three pounds, another of twelve pounds, and a third of four pounds, which he had caught by trolling in the Weaver: that of twelve pounds appeared in many places to have been bit, which he thus accounted for. Whilst he was drawing the fish to land, it was laid hold of by a larger Pike, which stuck fast, and was landed, but then quitted his hold and got away.

The Pike delights in a quiet, shady, unfrequented water, and lurks in the midst of weeds, flags, or bull-rushes: yet he frequently makes excursions from thence, and ranges about in search of prey: in cold weather he lies deep, and near the bottom, but as the weather grows warm he frequents the shallows. In a very hot, clear, sultry day, he may be seen lying on the surface of the water, but then you cannot tempt him with any bait. His best biting time is early in the morning and late in the evening, when there is a brisk wind, and where the water is clear. If they bite at all, they will take the bait at first; it is therefore useless to throw it often in the same place. He will take any sort of bait, except a fly; but the principal are young roach, dace, gudgeons, minnows, loaches and bleak: in July young frogs and Salmon-smelts are proper; and in winter the fat of bacon. Your baits in general should be fresh, sweet and clean, and if you expect to catch large ones, your baits must not be too small, otherwise you may spend a great deal of time to little purpose.

The best of the water-frogs for a Pike is the yellowest that can be got: and that your frog may continue long alive, put your hook into its mouth and out at his gills, and then with a fine needle and silk fasten the upper part of his leg with only one stitch to the arming-wire of your hook, or tie it gently above the upper joint to the armed-wire, being careful to hurt him as little as possible. There are several ways of fishing for a Pike, but the principal are trowing, trimmer-angling, and snap-angling.

In trowing, the line should be made of green silk, or thread, and should be forty yards long, or upwards, if the river is broad. Very great care should be taken that your line may run freely out; for if it knots, or entangles, and by that means checks the motion of the Pike as he runs away with the bait, he will let it go, and will not be prevailed upon to take it again very soon, unless he be extremely hungry. When you have fixed your bait on your hook, with as little damage to it as possible, cast it up and down such places as you imagine the Pike frequents, letting it sink a considerable depth before you pull it up again. When the Pike comes, you may sometimes perceive by a motion in the water, or at least you may feel him, which is the same thing. When this happens, your business is to give him line enough, that he may have free scope to go where he pleases, without the

least check, for the reasons above-mentioned. When he is got into his hold, there let him lie till you perceive the line move, and then you may conclude he has pouched the bait; then wind up your line till you think it is almost straight, and with a nimble jerk, contrary to the way the Pike takes, hook, and land him as soon as you can.

A trimmer is made use of in the still part of a river, or in a pond, meer, or canal. Your bait, which should be a young roach, dace, or gudgeon, may hang about mid-water, and may be left to itself while you are fishing elsewhere. By this artifice one person may do as much execution as if he had a companion along with him, with little or no additional trouble to himself.

A snap is generally two large hooks placed back to back, and a perch-hook in the middle to hang your bait upon. When you make use of it, take a gudgeon, dace, or small roach, and fix it to the small hook, by running it under the back fin; then let it swim down the current, and when you perceive the float to be drawn under water, you may conclude the Pike has laid hold of it; therefore give it a smart jerk, and without giving him time to play, keep your line always straight, drawing him towards the shore as soon as you can, without breaking your tackle, and then with your landing-net throw him out of the water. It will always be the most prudent method to have gimp or brass wire next your hook, and your line to be rather shorter than the rod.

Observe, that in trowing, the head of the bait-fish must be at the bent of the hook, and must come out at or near his tail. But the essential difference between these two methods is, that in the former, the Pike is always suffered to pouch or swallow the bait; but, in the latter, you are to strike as soon as he has taken it.

The common trowing hook, for a living bait, consists of two large hooks, with one common shank, made of one piece of wire, of about three quarters of an inch long, placed back to back, so that the points may not stand in a right line, but incline so much inwards, as that they, with the shank, may form an angle, little less than equilateral. At the top of the shank is a loop, left in the bending, the wire to make the hook double, through which is put a strong twisted brass-wire, of about six inches long; and to this is looped another such link, but both so loose, that the hook and the lower link may have room to play: to the end of the line fasten a steel swivel.

There is however a sort of trowing-hook different from that already described, and to which it is thought preferable, which will require another management; this is no more than two single hooks tied back to back, with a strong piece of gimp between the shanks; in the whipping the hooks, and the gimp together make a small loop, and take into it two links of chain of about an eighth of an inch diameter; and into the lower link, by means of a small staple of wire, fasten by the greater end a bit of lead, of a conical figure, and somewhat sharp at the point. These hooks are to be had at the fishing-tackle shops, ready fitted up. This latter kind of hook is to be thus ordered, viz. put the lead into the mouth of the bait-fish, and sew it up; the fish will live some time, and will swim with near the same ease as if at liberty. But if you trowl with a dead-bait, as some do, let the shank be about six inches long, and leaded from the middle as low as the bent of the hook, to which a piece of very strong gimp must be fastened by a staple, and two links of chain; the shank must be barbed like a dart, and the lead a quarter of an inch square: the barb of the shank must stand like the fluke of an anchor, which is placed in a contrary direction to that of the

the stock. Let the gimp be about a foot long, and fix a swivel to the end of it. To bait it, thrust the barb of the shank into the mouth of the bait-fish, and bring it out at his side near the tail; when the barb is thus brought through, it cannot return, and the fish will be perfectly straight; a circumstance that renders the trouble of tying the tail unnecessary.

There is also another sort of trowling-hook, which is, indeed, no other than what most writers on this subject have mentioned; but the others here described are late improvements; and this is a hook either single or double, with a long shank, leaded about three inches up the wire with a piece of lead about a quarter of an inch square at the greater or lower end: fix to the shank an armed wire about eight inches long; to bait this hook, thrust your wire into the mouth of the fish, quite through his belly, and out at his tail, placing the wire so as that the point of the hook may be even with the belly of the bait-fish; and then tie the tail of the fish with strong thread to the wire. Some fasten it with a needle and thread, which is a neat way. Both with the trowl, and at the snap, cut away one of the fins of the bait-fish close at the gills, and another behind the vent on the contrary side; which will make it play the better. The bait being thus fixed, is to be thrown in, and kept in constant motion in the water, sometimes suffered to sink, then gradually raised; now drawn with the stream, and then against it; so as to counterfeit the motion of a small fish in swimming. If a pike is near, he mistakes the bait for a living fish, seizes it with prodigious greediness, goes off with it to his hold, and in about ten minutes pouches it. When he has thus swallowed the bait, you will see the line move, which is the signal for striking him; do this with two jerks, and then play him. Chuse to trowl in clear, and not in muddy water, and in windy weather, if the wind be not easterly. Some use in trowling and snapping, two or more swivels to their line; by which means the twisting of the line is prevented, the bait plays more freely, and, though dead, is made to appear as if alive; which, in rivers, is doubtless an excellent method; but those who chuse to fish in ponds, or still waters, will find very little occasion for more than one.

The Pike is also to be caught with a minnow; for which method observe the following directions. Get a single hook, slender, and long in the shank; let it resemble the shape of a shepherd's crook; put lead upon it, as thick near the bent as will go into the minnow's mouth: place the point of the hook directly up the face of the fish; let the rod be as long as you can properly manage, with a line of the same length, cast up and down, and manage it as when you trowl with any other bait: if, when the Pike has taken your bait, he runs to the end of the line before he has gorged it, do not strike, but hold still only, and he will return back, and swallow it: but if you use that bait with a trowl, it is preferable to all others. When you have struck him, be sure to have your line ready and slack, that he may take as much liberty as he will: for when he finds himself trepanned with the hook, he will exercise all his strength and cunning to get loose. As you feel him come easily towards you, you may be still drawing, till you feel him make resistance again: then let him have his swing till his fury is over; after which gather your line to you again till he starts away; and if you can get him to the top it will sooner tire him; for the more he strives and throws himself from you, the sooner he will be weary. After this manner, by drawing him up, and letting him loose again, you may tame him till you bring him to shore, and land him by the net. But if you are unprovided with this convenience, beware

of attempting to take him out by the back or tail, but grasp him by the head, and put your fingers into his eyes. If you lay hold by his gills, your fingers may be injured with his bites.

The Pike is common in most of the lakes of Europe, but the largest are those taken in Lapland.

The SEA PIKE.

This fish is also known by the name of the Sea-Needle: its form resembles that of the river pike, but is proportionably longer and rounder. It is covered with small scales, and has an oblong conical snout. The colour of the inside of the mouth is between a yellow and a purple, and the jaws and tongue are furnished with teeth. The eyes, which are large, have each a silver coloured iris: the nostrils are wide and round. The tail is forked. The Sea Pike is an inhabitant of the Mediterranean.

NATURAL HISTORY of the ARGENTINE.

THIS is a small fish of a slender form, not unlike that of the pike. The back is green, and the sides, beneath the lateral line, are silvery. The nose is sharp-pointed, the eyes large, and the teeth very minute; the head is so transparent, that the brain may be seen thro' the skull. It is however principally distinguished from all other fish by the air-bladder, which is conical at both sides, and outwardly appears as if it was covered with polished leaf silver. This is used in the manufacture of artificial pearl. This fish is often seen in the fish-markets at Rome.

NATURAL HISTORY of the MULLET.

THE form of a Mullet resembles that of a dace: the head is almost square, and flat at the top; the nose is sharp, and the lips thick. It has large scales, not only on the body, but also on the head, and the covers of the gills. The back is of a bluish brown, and the belly white. The lateral lines are variegated alternately with black and white. The eyes have no other skin than their own coats, and the forward back-fin is radiated with five long spines. The mouth is destitute of teeth, but the tongue is roughish; and there are two rough bones on each side of the palate. This fish has also a bone beset with prickles, at each corner of the mouth: when at its full growth, it is about eighteen inches long. It visits the rivers in the southern parts of England, in the beginning of the summer with every tide, and returns back when the water ebbs. Those taken near Arundel, in Suffex, are said to be much superior to any others. The Mullet is an excellent fish for the table.

Mullets generally come in great shoals, and keep rooting in the sand or mud, like hogs. They are very sagacious, and when surrounded with a net, the whole shoal frequently escapes by leaping over it; for when one takes the lead, the others immediately follow. Oppian takes notice of this circumstance, and his observations are thus translated by Jones,

The Mullet, when encircling seines inclose,
The fatal threads and treach'rous bosom knows,
Instant he rallies all his vig'rous pow'rs,
And faithful aid of ev'ry nerve implores;
O'er battlements of cork updarting flies,
And finds from air th'escape that sea denies.
But should the first attempt his hopes deceive,
And fatal space th' imprisoned fall receive,
Exhausted strength no second leap supplies;
Self-doom'd to death the prostrate victim lies
Resign'd, with painful expectation waits,
Till thinner elements complete his fates.

The Mullet was in great estimation among the Romans, and bore an exceeding high price. The price given for one in the days of Juvenal and Pliny is a striking evidence of the luxury and extravagance of that age.

The lavish slave
Six thousand pieces for a Mullet gave,
A sesterce for each pound. DRYDEN.

Asinius Celer, however, a man of consular dig-

nity, was infinitely more lavish than the epicure mentioned by Juvenal; for he gave eight thousand mummy, or sixty-four pounds eleven shillings and eight-pence, for a fish of so small a size as the Mullet. Such indeed was the luxury of the times, that there were stews in the eating-rooms, so that the fish could at once be brought from under the table and placed upon it; they even put the mullets in transparent vases, that they might be entertained with the various changes of its colour while it lay expiring.

C H A P. V.

Containing the NATURAL HISTORY of the FLYING FISH, the HERRING, the PILCHARD, the SPRAT, the ANCHOVY, the SHAD, the CARP, the BARBEL, the TENCH, the GUDGEON, the BREEM, the BUD, the ROACH, the DACE, the CHUB, the BLEAK, the WHITE BAIT, the MINNOW, the GOLD FISH, the LOBSTER, the CRAB, the TORTOISE, the TURTLE, the SEA SNAIL, FISHES of the OYSTER KIND, and the SEA URCHIN.

NATURAL HISTORY of the FLYING FISH.

IN shape and colour the Flying Fish nearly resembles that of a herring, but the eyes are larger in proportion. It has two pair of fins like wings; the greater of which are placed a little behind the gills, and the lesser about the region of the vent. The wings before are preceded with a small fin of six rays; and the upper part of the wings is of a dirty olive colour; but on the edge they are beautifully painted with round blue spots. By the help of these wings they arise out of the water, and fly a considerable way, to avoid the pursuit of the *dolphins* and other fishes that would devour them. Some authors say that they will fly for two hundred paces together, and fall down when their fins grow dry: in their flight, they go sometimes on one side, sometimes on the other, and are taken either in the water by gilt-heads, or out of it by seamews or cormorants. They are never taken by fishing for them; but will often fly into the ships that sail between the tropics. Nieuhoff says, that the Flying Fish is bluish on the back, but inclining to brown towards the tail; that it has large eyes, broad yellowish fins, and in shape resembles the smelt. Different authors, says a naturalist, having given different accounts of this fish, renders it highly probable, that there are several kinds of them. The flesh of them has a very agreeable flavour, and is very wholesome; which, very likely, may be the inducement to other fishes so frequently to pursue it. Mr. Ray affirms, that he has seen them frequently in the fish-markets at Rome, as well as in the islands of Sicily, and Malta, where they are brought for sale. The ancients were acquainted with this species: Pliny mentions it under the name of *hyrundo*, and speaks of its flying faculty.

NATURAL HISTORY of the HERRING.

HERRINGS differ greatly in size, but the usual length is from nine inches to a foot. The colour of the back and sides is green, varied with blue, and the belly is silvery. What principally distinguishes this fish from all others, is a scaly line that runs along the belly from the head to the tail. The scales are large, thin, and fall off with a slight touch. It has no spots, and the belly is sharp like a wedge. The eyes are very large; the

No. 28.

edges of the upper jaw and the tongue are very rough, but the whole mouth is void of teeth: the gill covers are very loose, and open wide; which occasions the immediate death of the fish when taken out of the water; whence the proverb arises, *as dead as a herring*. The tail is forked, and the swimming-bladder is of a silver colour.

The flesh of the herring is in great esteem, being fat, soft, and delicate; especially if it is dressed soon after it is taken.

Herrings are met with in vast shoals on the coast of America, as low as Carolina: they are also extremely numerous in the seas of Kamtschatka. Their great winter rendezvous is within the arctic circle; where they continue several months in order to recruit themselves after the fatigue of spawning; the seas within that space swarming with insect food, in a much greater degree than in our warmer latitudes.

Herrings begin to appear off the Shetland Isles in April and May; but the grand shoal make their appearance in June. Their number is so immense as to alter the appearance of the very ocean. They are divided into distinct columns of five or six miles in length, and three or four in breadth, and they drive the water before them with a kind of rippling: sometimes they sink for a few minutes, then rise again to the surface, and in fine weather reflect a variety of splendid colours.

Towards the end of June, Herrings are in full roe, and they continue in perfection till the beginning of winter, when they begin to deposit their spawn. The young Herrings approach the shores in July and August, and are then from half an inch to two inches in length. Very few young Herrings being found in our seas during winter, it is imagined, that they must return to their parental haunts beneath the ice, to repair the vast destruction of their race during summer, by men, fowl, and fish. Some few of the old herrings continue on our coasts the whole year, but their number is very inconsiderable.

The Herring fishery is of great antiquity: the Dutch first engaged in it about the year 1164: their diligence and skill gives them a superiority over us in that branch of trade even at this day; it is nevertheless a considerable article among the English. Yarmouth has long been famous for its Herring fair, which was regulated by an act in the 31st of Edward the Third: that town is obliged, by its charter, to send to the sheriffs of Norwich one hundred Herrings, to be made into twenty-four pies,

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by them to be delivered to the lord of the manor of East Carleton, who is to convey them to the king.

This valuable fishery has not escaped the attention of the present generation. By the 28th of Geo. II. c. 14. it is enacted, that if any person shall damnify or destroy, without the consent of the Society of the Free British Fishery, any of the nets, sails, cordages, stores, or other materials, belonging to the said society, he shall forfeit to the society treble value by distress; and for want of distress, to be committed to the house of correction for three months.

Immense quantities of these fish are annually taken, many of which are consumed whilst they are fresh, and the rest are salted, pickled, or smoak-dried, and are an edible article all over Europe.

Fresh Herrings, considered as a food, are said to be very good aliment, if used moderately; but, taken in quantities disproportioned to the powers of digestion, they produce a putrefaction in the stomach, of the alkaline kind, and are attended with very bad consequences. But pickled Herrings are very bad aliment, the flesh being rendered hard, and scarcely digestible by the vital powers. These, however, are less injurious than those that are salted and dried; these last being more hardened, and consequently less easily digested.

It was a question formerly, whether Herrings fed upon any thing besides water? but Lewenhoeck has made it evident, that they come every year in pursuit of worms and small fish, which at the time of their arrival abound in the channel; for when they have cleared the northern seas of their stock of provisions, then they travel southward, in search of a fresh supply.

The Dutch begin their Herring fishery on the 14th of June, in which they employ no less than a thousand vessels. These vessels are a kind of barks, called buffes, carrying from forty-five to sixty ton, and two or three small cannon. None of them are allowed to stir out of port without a convoy, unless they carry twenty pieces of cannon among them all, in which case they are permitted to go in consort. Before they set out, they make a verbal agreement, which has the same force as if it was in writing. The regulations of the admiralty of Holland are in a great measure followed by the French, and other nations: the principal are, that no fisher shall cast his net within a hundred fathom of another's boat: that while the nets are cast, a light shall be kept on the hind part of the vessel: that when a boat is by any accident obliged to leave off fishing, the light shall be cast into the sea: likewise, that when the greater part of the fleet leaves fishing, and casts anchor, the rest shall be obliged to do the same.

The best times of fishing on the coast of Norfolk and Suffolk, near Yarmouth, Lestoffe, and Southwold, are from the middle of September till the middle of October. The nets that they use are about five yards deep, and twenty-five yards long: they sometimes fasten so many of these nets together as will take a mile in compass. They judge whereabouts the herrings lie by the hovering and motion of the sea-birds, which continually pursue them in expectation of prey. The fishers, as they row gently along, let their nets fall into the sea, taking their course as nearly as they can against the tide, that so when they draw their nets they may have the assistance of the tide. As soon as any boat has got its load, it makes to the shore, and delivers the Herrings to the man who is to wash and gut them. They distinguish their Herrings into six different sorts, as the fat Herring, which is the largest and thickest of all, and will keep about two or three months; the meat Herring, which is likewise large, but not so thick nor so fat as the former; the night Herring, which is of a middle size; the pluck, which has received some damage from the nets;

the shotten Herring, which has lost its milt or spawn; and the copphen, which by some accident or other has been deprived of its head. All these Herrings are put into a tub with salt or brine, where they lie for twenty-four hours; when they are taken out and put into wicker baskets, and washed; after this they are spitted on small wooden spits, and hung up in a chimney built for that purpose, at such distances that the smoke may have free access to them all. When they have filled these places, which will hold ten or twelve thousand, they kindle the billets, which are laid on the floor, in order to dry them: this done, they shut the doors, all other air-holes being stopt before, and immediately the place is filled with smoke. This is repeated every quarter of an hour, insomuch, that a single last of Herrings requires five hundred billets to dry them. A last is ten barrels, each barrel containing near a thousand Herrings. These, thus prepared and dried, are called red Herrings.

The pickled Herrings are best done by the Dutch, who take them for that purpose about the summer solstice. The usual method of pickling them is this: as soon as the Herrings are taken out of the sea they are gutted and washed: then they are put into a strong brine, made with water and sea-salt, for fifteen hours; after this, they are taken out and well drained, and put in a regular order into barrels, with a layer of salt at the bottom of the barrel, and another at the top. Then take care to stop them up carefully that no air may get in, nor brine out, either of which would be prejudicial to the fish.

NATURAL HISTORY of the PILCHARD.

THE Pilchard greatly resembles the Herring, but differs from it in some particulars; it is a third part less, and the body is proportionably broader: it has a black spot near the upper corner of the gills, and the belly is not so sharp. It has no teeth, either in the jaws, the tongue, or the palate.

Pilchards appear in vast shoals off the Cornish coasts about the middle of July, and disappear at the beginning of winter; though a few of them sometimes return again after Christmas. This fishery employs a great number of men on the sea; and men, women, and children, on land, in salting, pressing, washing, and cleaning; in making boats, nets, ropes, casks; and all the tradesmen depending on their construction and sale. The usual quantities exported *each* year, for ten years, from 1747 to 1756, inclusive, on the average, is as follows: Fawy has exported 1732 hogsheds, annually; Falmouth, 14,631, and one third; Penzance and Mount's Bay, 12,149, and one third; St. Ives, 1,282: in all amounting to 29,795 hogsheds.

NATURAL HISTORY of the SPRAT.

IT was supposed by Mr. Willoughby and Mr. Ray, that Sprats were the fry of the herring or the pilchard, as they exactly resembled either the one or the other in every particular except the size: Mr. Pennant, however, is of a different opinion, and says, that on comparing a Sprat and a young herring of equal size, some specific differences were discovered. He also observes, that the Sprats visit our coasts, and continue with us in shoals innumerable, when the young herrings have, in general, retired to the great northern deeps.

Sprats appear below bridge in the river Thames, early in November, and leave it in the month of March, and are, during that season, a great relief to the poor of the metropolis.

The Sprat seldom exceeds the length of five inches;

171

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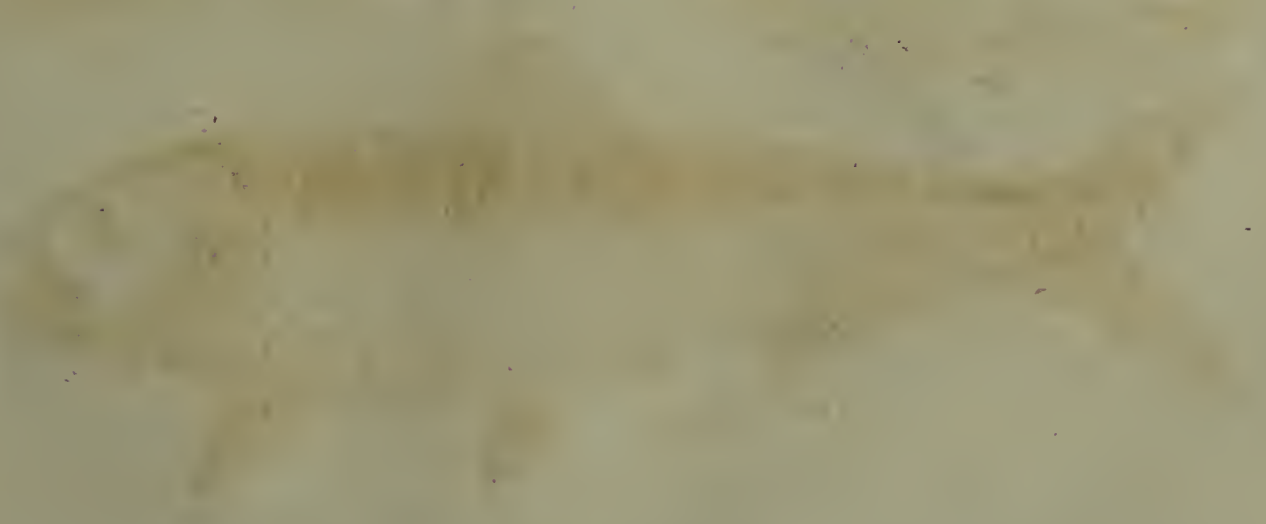
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FISHES.

THE NEEDLE FISH



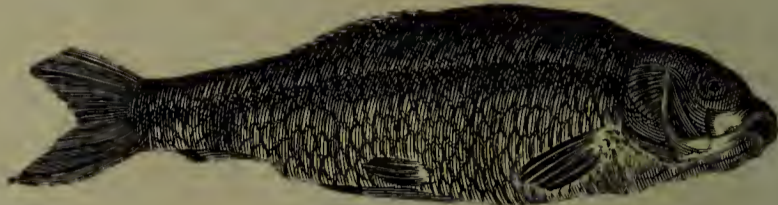
THE LESSER NEEDLE FISH



THE HIPPOCAMPUS or SEA HORSE



THE CARP



THE BEARDED LOACHE



THE LOACHE



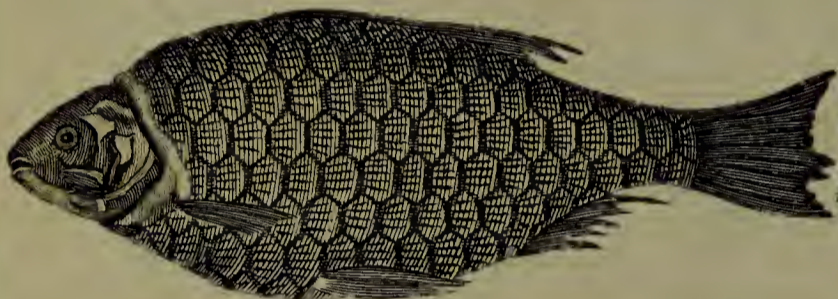
THE GUDGEON



THE BREAM

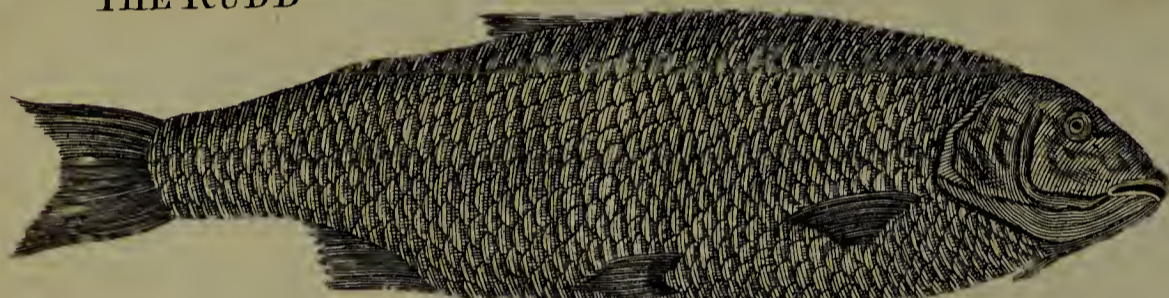


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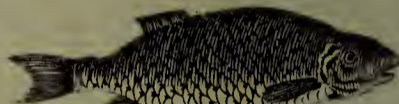
THE RUDD

THE LAKE BLEAK



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THE ROACH



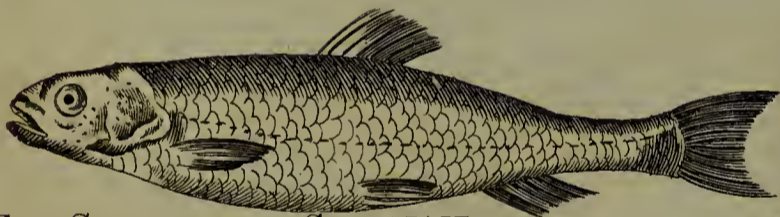
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THE CYPRINUS CLAVATUS or PISEE PIGO



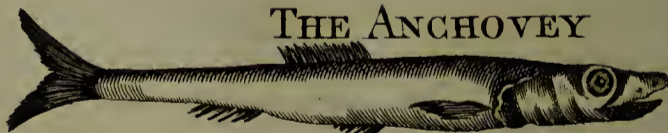
THE SQUALUS or SALUIAN



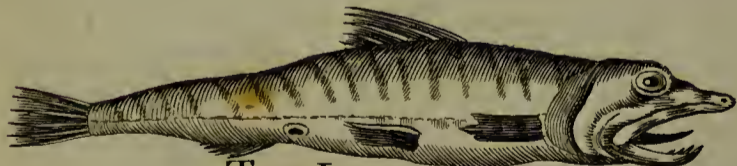
THE PILCHARD



THE ANCHOVEY



THE LYCOSTOMUS



THE SHAD



inches; and the body is proportionably deeper than that of a herring.

NATURAL HISTORY of the ANCHOVY.

THE Anchovy is about a palm in length, and almost of the colour of a sprat. The true Anchovies are taken in vast quantities in the Mediterranean, and are brought over here pickled. The body is rounder, and not so compressed as that of the herring: they are also transparent, except where the spine of the back prevents it: they have a sharp nose, and the upper jaw is longer than the lower: the mouth is extremely wide in proportion to the size of the fish: the eyes, and the apertures of the gills, are also very large. The Anchovy has this peculiar property, that it will dissolve in almost any liquor, when it is set over the fire.

There is a fish sometimes taken in the sea near Chester, which Mr. Ray, and some others, suspected to be the anchovy; but it is different from those taken in the Mediterranean.

The GOLDEN ANCHOVY.

This is an East Indian fish, and is so called on account of its shining golden colour. The mouth, which is very large and long, is armed with sharp teeth: the body is long, and almost as slender as that of the eel.

NATURAL HISTORY of the SHAD.

THE Shad differs from the herring in being broader, thinner, and more compressed on the sides: it is also larger than the herring, the general size being three or four pounds; though they sometimes weigh seven or eight pounds. On each side, near the gills, it has a large round black spot, and six or seven small ones, placed in a right line towards the tail; in which particular it agrees with the pilchard. The Shad enters the mouths of rivers, which herrings never do. The Severn affords the Shad in higher perfection than any other river. This fish makes its first appearance in April and May, according to the temper of the air: in very warm seasons it is always seen in April, and usually continues in the river about two months. The Severn Shad is a very delicate fish about the time of its first appearance, especially in that part of the river near Gloucester. The Thames Shad is reckoned a very coarse insipid fish: it does not frequent that river till the month of July. There is indeed so great a difference between the Thames Shad, and that of the Severn, that they can hardly be considered as the same fish.

NATURAL HISTORY of the CARP.

THE colour of the Carp, especially when full grown, is yellowish, and the scales are large: the head is short, like that of the tench, and the mouth is of a middling size, with fat fleshy yellow lips. It has no teeth in the jaws or on the tongue, but it has a triangular bone in the palate, and two other bones in the throat, which answer the purpose of teeth. It has a single barb on each side of the mouth, and another above those, which is shorter: the fins are large; the tail is broad, a little forked, and of a reddish black colour: the lateral line is straight, and passes through the middle of each side.

There were no Carps in our ponds or rivers, till they were introduced here by Leonard Maschal, about the year 1514. Russia has none of these fish

at this day; Sweden has them only in the ponds of the people of fashion; but they abound in the rivers and lakes of Polish Prussia, where they are taken of a vast size. They are there a great article of commerce, and are sent in well-boats to Russia and Sweden.

Pliny says it lives in the sea; and we are credibly informed, that Carps are sometimes found in the harbour of Dantzick. They are very long lived. Gesner affirms, that he knew a man of good reputation, who assured him he had seen one of an hundred years old. They also grow to a very great size: a Carp was taken in the river Thames, near Hampton-court, that weighed thirteen pounds. Jovius says, Carps were sometimes caught in the Lacus Larius, of two hundred pounds weight; and, according to Rzaczynski, others have been taken in the Dniester, which were five feet in length. They are extremely tenacious of life, and have been kept alive out of water upwards of a fortnight, by being wrapped up in wet moss, with the mouth only remaining out. It should be hung up in a cool place, fed with bread and milk, and sometimes plunged into the water. By this treatment they grow fatter, and have a finer flavour than those which are immediately killed from the pond.

The Carp is a prodigious breeder: the roe has sometimes been taken out, and weighed with the fish itself, when the former has been found to preponderate. The Carp has perhaps the longest scales of any fish, in proportion to its bulk. Some of these are brown, and others yellow and white: the brown colour prevails in the largest scales; the middle are of a yellow and gold colour; but the white are small and silvered.

The flesh of the river Carp is much better than that of the pond, and in general it is more or less wholesome, according to the nature of the water in which they are bred, and consequently muddy stinking ponds produce the worst fish. It is soft, insipid, and not entirely free from viscosity. But curious eaters value it chiefly for the palate, or tongue, as they call it. The river Carp is not fond of a rapid stream, but delights in a still deep water, with a marly, or clayey bottom, especially if there be green weeds, which he is extremely fond of. A Carp exercises the angler's patience as much as any fish, for he is very shy and wary. They seldom bite in cold weather, and, in hot, a man cannot be too early or too late for them. But when they do bite, there is no fear of their hold.

Proper baits are the red-worm in March, the cadew in June, and the grasshopper in July, August, and September. But a recent discovery has proved a green-pea to be a bait inferior to none, if not the best of all; and that the best method to prepare them for use, is by half-boiling a sufficient quantity, and covering them with melted butter. In hot weather, he will take a lob-worm at top, as a trout does a fly: or, between the weeds, in a clear place, sink it without a float, about eight inches in the water, with only one large shot on the line, which is to be lodged on the leaf of some weed: then retire, keeping your eye upon the shot, till you see it taken away, with about a foot of the line, and then you may venture to strike; but keep him tight, and clear of the weeds. Great numbers of Carp have been taken in this manner.

In ponds, the best method is to throw six or eight slices of bread, to be carried with the wind, and in a short time, it is probable, you will see many fish feeding on it: if not, crumble a little very small, and cast it in where the slices rest; which will be a means to make them find the pieces at top; and after suffering them to feed on it, take a very long rod, a strong line, a middle sized hook, and one shot fixed just above the hook, and baited with about the size of a large

large horse-bean of the upper-crust of a rasped French roll, and you may pick out what size and quantity you please, by dropping your bait before the largest fish, as he is feeding on the slices at the top. This is a sure means of getting sport, and but little known. This fish, as already observed, is very cautious, and therefore your float must be small, and you must be sure to keep out of sight. And because when hooked he struggles in a violent manner, you must take care that your tackle be very good and strong, otherwise he will break from you.

Having fixed upon a place which you think a proper harbour for Carp, you should plumb your ground over-night, in order to find the depth of the water. Likewise at the same time bait the place with small bits of congealed blood, boiled malt, wheat, or rye, mixed with bran. The next morning early repair to the place as gently as you can, taking care, as mentioned above, to keep out of sight; when you have a bite, let the float sail away before you strike, and then do it strongly, and the contrary way to the motion of the float, and there will be less danger of pulling the bait out of the fish's mouth. When you have hold of him, if your tackle is good, you need not fear losing him, for he seldom breaks his hold. When you angle for a Carp, you ought not to forget your landing-net, which is by much the safest way of taking him out; otherwise play the fish till you draw it to the shallows, where you may fix your rod upright in the ground, at a proper distance from the river, and, putting both your hands under the fish, throw it on the shore.

If you are desirous of angling with a paste, the following is as good as any: take fine flour, a bit of lean raw veal, a little honey, and cotton-wool sufficient to keep the ingredients together, and beat them in a mortar to a paste. Or white bread mixed with cotton-wool, and worked into paste with some of the water where you are fishing, is not a despicable bait. Carp will take red currants, green figs, or almost any sort of bait. When you fish with a grasshopper, your must take off its wings, and let it sink into the water without lead or float. Gentles, two upon a hook, and throwing in chewed white bread, is a good method to angle for Carp, especially in a pond.

As the Carp is but indifferent food without excellent sauce, we beg leave to observe, that the following method is in high repute for dressing Carp.

Take a Carp, alive if possible, scour him, and rub him clean with water and salt, but do not scale him; then open him, and put him, with his blood and liver, into a small kettle; then take sweet marjoram, thyme, and parsley, of each half a handful, a sprig of rosemary, and another of savoury, bind them into two or three small bundles, and put them to your Carp, with four or five whole onions, twenty pickled oysters, and three anchovies. Then pour upon your fish as much claret as will cover him, and season your claret well with salt, cloves, mace, and the rinds of oranges and lemons; cover your pot, and set it on a quick fire till it be sufficiently boiled; then take out the Carp, and lay it with the broth into the dish, and pour upon it a quarter of a pound of fresh butter melted, and beaten with half a dozen spoonfuls of the broth, the yolks of two or three eggs, and some of the herbs shred: garnish your dish with lemons, and so serve it up.

NATURAL HISTORY of the BARBEL.

THE weight of the Barbel is generally about seven or eight pounds: though they are sometimes found of the length of three feet, and eighteen

or twenty pounds in weight. The back is of a palish olive colour, and the belly is silvery: the back and sides are marked with black spots; and the shape of the body is long and roundish; but the back is sharp and arched. The scales are not large, and the lateral lines run through the middle of the sides. The snout is sharpish, and the mouth is without teeth, like the rest of this kind. The upper jaw is longer than the lower, and it has two barbs on each side; one at the corner of the mouth, and the other on the side of the nose. The eyes are small, and their iris is either of a silver or a gold colour, spotted with brown. In summer their bellies are red. The flesh is soft, flabby, and extremely coarse: the Barbel is indeed the worst and coarsest of fresh-water fish. The roe is very noxious, affecting those who eat of it with a nausea, vomiting, purging, and a slight swelling. In summer, these fish move about in the night in search of food; but in autumn and winter they confine themselves to the deepest holes.

The Barbel is bred in most rivers; and the Thames, in particular, abounds with them. In the summer, he haunts the swiftest and shallowest streams, where he lurks under the weeds, and works and routs with his nose in the sand, like a hog. Yet sometimes he retires to bridges, flood-gates, locks, and weirs, where the waters are swift and deep. He never feeds off the ground, and will take any sort of worm, bits of bacon, old cheese, or new cheese, if kept in a linen rag, dipped in honey, two or three days, to make it tough. The watermen, who attend on you when you fish in their boats, sometimes provide graves, to be had at the tallow-chandlers, for a ground bait over night; yet they generally use the same worm that you bait with. They are very subtle, strong fish, struggling hard for their lives, and will often pick off your baits.

On the morning of August 23, 1771, Mr. Warren, the Perfumer, of Marybone-street, began to angle in Walton Deeps, and found such sport, that he stopped before noon, tired with fatigue, and found that he had caught two hundred and eighty pounds of large sized Barbel. This gentleman usually has the Deeps baited with worms over night, and in the morning fishes from a well boat, with a perfumed paste on his hook.

His time of biting is early in the morning, in June, July, and August, till ten o'clock, and from four in the afternoon, till sun-set; but September and October are to be preferred to any other months, because then they retire to the deep holes. In the summer they come to the shallows about sun-set, where they may be easily taken with a scoured lob-worm. Your rod must be very strong, with a tough whalebone at the end. You have no occasion for a float, but must put a large bullet on the line, that your bait may lie ledger. You must have ten hairs next the hook, but the remaining part of your line must be silk. If you make use of a wheel, as in trout-fishing, it will answer your purpose the better.

The most famous places near London, for Barbel angling, are Kingston-bridge, and Shepperton-deeps; but Walton-deeps, Chertsey-bridge, the small isle at Brentford, Hampton-ferry, and the holes under Cooper's-hill, are thought to be in no wise inferior: you may likewise meet with them at all the locks between Maidenhead and Oxford.

NATURAL HISTORY of the TENCH.

THE Tench seldom exceeds four or five pounds in weight in this island, but in some countries it has been found to weigh twenty. It is some-

sometimes called the physician of the fish, and it is said that the skin is so healing, that the wounded apply it as a styptic. Mr. Diaper, in his piscatory eclogues, says, that even the voracious pike will spare the Tench on account of its healing powers.

The Tench he spares a medicinal kind:
For when by wounds distressed, or sore disease,
He courts the salutary fish for ease;
Close to his scales the kind physician glides,
And sweats a healing balsam from his sides.

It is a mucous, excrementitious fish, which delights in marshy and muddy waters. As to its medical uses, it is cut and applied to the wrists, and soles of the feet, in order to mitigate feverish heats, and to divert the venom of the pestilence; in like manner it is applied in pains of the head and joints. Live Tenches, applied one after another to the regions of the umbilicus and liver, and kept there till they die, are said to cure the jaundice; for they contract. it seems. a yellow colour.

There are two small stones in the head of the Tench, that have an absorbent, detergent, and diuretic quality. Whatever may be the uses of its slime to the inhabitants of the water, its flesh is certainly a wholesome and delicious food to those of the earth.

The Tench has a small head and nose in proportion to the size of the body; which is broad, thick, and short: the colour of the body is dusky; the dorsal and ventral fins are of the same colour: the head, sides, and belly, are of a greenish cast, beautifully mixed with gold, which is in its greatest splendour when the fish is in the highest season. The tail is blackish, somewhat square, and consists of nineteen rays: the eyes are small, seated on the sides of the head, and the iris is red. The Tench delights in still waters, and is seldom found in rivers.

The Tench delights so much in standing waters and ponds, and the still parts of rivers, whenever they are found there, for they seem to be the natives of standing water. However, they are said to breed in the rivers Stower, in Dorsetshire, and the Tiber, in Italy. Their time of spawning is the latter end of June, or the beginning of July; and they are in season from the beginning of September to the end of May. Most anglers declare, that this fish bites best in the three hot months; and yet others have found they will bite at all times, and at all seasons, unless after a shower of rain, but best of all in the night.

The best baits for this fish are a middling-sized lob-worm, or red-worm, well scoured, a gentle, a young wasp, a grub boiled, or a green grub; or you may use the clotted black blood in a sheep's heart, made with fine flour and honey into the consistence of an unguent; and your bait (when it is a red-worm) anointed with this, is by many preferred to other baits. But some have had more success with a red-worm dipped in tar, than any other. They bite almost in the same manner as the pond-carp, and will run away with your float; but when once you have hooked him, you are in no danger of losing him, if your tackle is but strong enough. The ground bait should be the same as for all pond fish, that is, either blood, or blood and grains mixed.

When the weather is very warm, you must fish about mid-water, gently pulling your bait almost to the surface, and then letting it down as slow as possible. Be not too eager in striking him when he bites, for as he delights in sucking the bait, allow him time and he will not quit it. Use a strong grass or gut, and a goose-quill float, without a cork, except in rivers; where the cork is always to be preferred.

No. 28.

Fish very near the ground; and if you bait with gentles, throw in a few at the taking every fish; which will draw them to your hook, and keep them together.

When you angle with a paste, let a little tar be mixed with it. They bite best one hour before and after the sun rises and sets. In hot weather you may snare them at the top of the water, as the pike, with a double-wired link, not over-twisted, hung in a noose, tied to a line, on a long rod: let it fall softly before him on the water, without touching him, till you have brought it over his gills; then pull gently, and you have him.

NATURAL HISTORY of the GUDGEON.

THIS fish is generally found in gentle streams, and is about five or six inches long; with a round body, small scales, a brown or olive-coloured back, and a whitish belly: the iris is tinged with red; the gill-covers with green and silver; and at each corner of the mouth is a single barb. The tail is forked, and both that and the dorsal-fin are spotted with black. They bite eagerly to a proverb—hence the poet's observation—

What Gudgeons are we men!
Every woman's easy prey.

The Gudgeon grows to a much larger size in some rivers than in others. We have heard of one taken in that near Uxbridge, which weighed a pound. The flesh is in high esteem, and thought to be little inferior to that of the smelt.

The Gudgeon will bite all day from the end of March till Michaelmas, but not till an hour after sun-rise, nor longer than an hour before sun-set. You may sometimes have full as good sport an hour after sun-set, as at any time in the day.

The principal baits for the Gudgeon, are the small red-worm, gilt-tail, brandling, and a meadow-worm. He will likewise take a gentle, cod-bait, brood of wasps, or cow-dung bob; but the small red worm is what he is the fondest of. If you can find a bridge or plank over a small river, chuse to angle underneath for Gudgeons, for they love the shade: and are so far from being shy, that you may not only appear in sight, but if you drive them from their place of resort, they will immediately return. A single hair line, a fine taper rod, a float, and a small hook, is what is in general use, and the bait to drag on the ground. When you angle for them in the shallows, raise up the sand or gravel with a rake or pole, and it will draw the Gudgeons about your bait; when you have no such conveniency, throw in some handfuls of earth. Use a float, and let your bait always touch or drag on the ground.

When you angle for them in a boat in the Thames, let the waterman rake the gravel up to draw the Gudgeons about you; then plumb the ground, and bait your hook with a small well-scoured red-worm; by this method you will seldom fail of good sport. Your tackle, as for dace, with a well-scoured gilt-tail. There have been an hundred dozen, or more, taken at Metwell Weir, in the river Mersey, with angling, in one day; you may use two hooks at a line at a time, and two rods is not amiss; and then you may sometimes take perch or trout instead of Gudgeons.

NATURAL HISTORY of the BREAM.

THIS is a broad flattish fish, with a small squarish head, and a sharp nose. It is extremely deep and thin in proportion to its length: the top of the head is broad and flat; and the back, which

which rises like that of a hog, is of a dusky blue colour: the belly and sides are white: the scales are large, and the mouth, in proportion to the size of the fish, is very small, and without teeth: the iris of the eye is of a silver colour, and the pupil is small. This fish is an inhabitant of lakes, or the deep parts of still rivers. It is extremely insipid, and consequently very little esteemed.

Breams naturally feed upon slime, weeds, and dirt; but will take any sort of paste, the brood of bees or wasps, flies under water, and cod-baits. But a short well-scoured marsh-worm, or a large red-worm, will prove most successful, or the tail of a well-scoured dew-worm, or two or three large brandlings. They bite best when there is a breeze of wind, and require a great deal of baiting to keep them together. When the water is rough, your bait must be placed within a foot of the bottom. They are usually found in the deepest and broadest part of a river, early in the morning, and from three or four in the afternoon, till sun-set, when the weather is warm. They bite very slow, and the larger they are, the slower. As soon as you have struck one, he will immediately make to the bottom, and stay there some time; if he stays too long, give him a gentle touch, and he will immediately rise, and give two or three strong tugs; but when you have once turned him, he will soon yield.

The best method of angling for him is this: seek a shallow sandy bottom, that leads into a deep hole; then throw into the shallow part of the stream four or five handfuls of marsh-worms, cut in pieces, which will soon drive down into the hole. Use a long rod of proper strength, with a line proportionable; a small hook, and no float. The hook must be tied to India grass, on which put a cut shot six inches from the hook, and next to that a small bullet. The use of the shot is to keep the bullet from slipping lower. This done, bait your hook with a short well-scoured marsh-worm, throw in the shallow, and the stream will drive it into the hole. By this method you may catch more in two hours, than you can well carry away.

Another method often attended with success, is this: seek a deep hole near the bank, plumb the depth over night, and bait it at the same time with grains well squeezed, and mixed with blood. In the morning early visit the place again, and take your stand out of sight; bait your hook with a large red-worm, and drop it gently into the hole. With these precautions you will find sport. But remember always when you have occasion to plumb the depth of a place the night before, to take notice, at your return, whether the water be risen or fallen, and make an allowance accordingly. You may have very good sport, if you bait with chewed white bread, and angle with gentles, or the brood of wasps, but then you are not to use so long or strong a rod or line, and a smaller hook.

NATURAL HISTORY of the RUD.

THIS is broader than a roach, and thicker than a bream. The back is of an olive-colour; and the sides and belly of a gold colour, marked with red. The ventral and anal fins, and the tail, are generally of a deep red. The tail is also a little forked. The head is small, and the iris yellow, inclining to red. The scales are very large. This fish is in great esteem, and always in season, except in April, which is the time of spawning. It is found in the Rhine, in Germany; in the Charwell, near Oxford; and in the Witham, in Lincolnshire.

NATURAL HISTORY of the ROACH.

THE body of the Roach is pretty deep, but thin. The back, which is pretty sharply ridged, is of a dusky colour, and sometimes bluish: the belly is pale: the iris of the eyes, the fins and tail, are red. The tail is also forked. It is of a gold colour about the gills; and the mouth is round and destitute of teeth; it being a leather-mouthed fish. It breeds both in ponds and rivers, but those bred in the latter are the best, though the others are the longest. This fish and the dace are coarse and insipid meat.

Angle, as for dace or dace, with one gentle. They spawn about the middle of May, and recover their strength in a month's time.

When you angle for roach in a pond, throw in a little chewed white bread, and let your bait (which ought to be one large gentle) lie within six inches of the bottom, and you will not only take much larger, but more in number than you will by any other method. In winter you may fish for him with paste or gentles; in April with worms or cod-bait; but in very hot weather with very little white snails, earth-bobs, new cheese, or with flies under water, for he seldom takes them at the top, as the dace will; and this is the principal thing wherein they differ.

In August the Roach-fishery affords great diversion about London, where it is thus practised: any waterman will provide a boat, with rip-hooks, to fix it in the middle of the stream; and prepare your ground-bait, which is of bran and stale bread, mixed in balls, and thrown in, up the stream, with clay or small stones within, sufficient to sink it speedily, and lodge it at the bottom. Not more than three can conveniently fish in one boat. Your tackle must be strong, your float large, and heavy leaded, to sink the quicker. The constant bait is a well-scoured gentle, three at least on your hook, which must swim ten or twelve inches, at most, from the bottom. The best times are, from half-ebb tide, to within two hours of high-water: and the best places are, the whole sand-bank in the middle, facing the Tower; that opposite the Temple; before Whitehall; and against Chelsea-church. At these places you will find plenty of sport. Some, with very good success, pick out some stand upon the shore, among the chalk-stones, at the banks of the Isle of Dogs, near Limehouse, under the wind-mills, and fish there in the same manner, from dead-ebb, till within an hour or more of high-water, retiring backwards as the flood comes in.

There is also another highly-approved method of this diversion below-bridge, called stern-fishing, by fastening a boat at the stern of any collier or vessel that has lately been a voyage, and has her bottom foul, which contains insects and food for the fish; use about two joints of your rod at most, and a line not longer than four feet, your float fixed within twelve inches of the top of it. Angle there with three or four gentles on your hook at a time, and lay in as close to the ship's stern as you can, letting it swim about three yards. In this you use no ground-bait. You must begin when the tide first ebbs, and for two hours, at least, you will not fail of catching many fish (roach and dace) and those very large ones.

In Thames angling, you must not attempt when there is a cold and raw air, high wind, rough water, or wet weather, or when there are spring-tides, or the land-floods come down. At the chalk-hill, and about the piles of London-bridge, there is excellent sport when the tide is low. Be always careful to pitch your boat on that side the river that is most under the wind.

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NATURAL HISTORY of the DACE, or DARE.

THE Dace haunts the same places as the roach, and is a great breeder. It is a very lively fish, and in summer delights in frolicking near the surface of the water. The back is varied with dusky and blue; the sides and belly are silvery, and the tail is much forked. It resembles a chub, though it is smaller and somewhat whiter. The iris of the eye is yellow.

The flesh of the Dace is sweet, soft, and of good nourishment, but is in no great esteem. They spawn in February and March, and are fit to eat in April and May; but their highest season is from September to the latter end of February. They delight in gravelly and sandy bottoms, and the deepest part of the river under the shade of trees, or dock-leaves.

It is a very simple fish, and will often bite when you least expect it. However, their darling bait is a gentle at the bottom, and a small fly at the top. In the summer months an ant-fly is best. They will likewise take any paste, as well as all sorts of small worms.

Angle for him with a very slender rod, a line of single hairs from the top to the hook, which is to be a very small one; one small shot, a float made of two sea-gull quills, cut within about half an inch of the feather, and thrust one of the open ends into the other, and then whipt fast with fine waxed silk. This makes the very best float, and is drawn under the water without danger of pricking the fish. When you are so provided, get some white bread, and chew it, and throw it into the water in small pieces, and bait with gentles, you will have good sport: or you may fish with boiled malt, and bait with grains, and you will frequently catch chub, bream, and many other sorts of fish. He will likewise take all sorts of flies very well. If you point your hook with one gentle in the spring, he takes an earth-bob very well.

If you angle where two mill-streams are going at one and the same time, let it be in the eddy between the two streams: first make use of your plummet; and if the water be deep, you must angle within a foot of the bottom, and perhaps you will find but little sport. But if it proves to be shallow, that is, about the depth of two feet, or not exceeding three, then bait your hook with three large gentles: use a cork float, which ought not to be a foot and a half from the hook, and have a quick eye to strike at the very first bite; for if there be any large Dace in the mill-pool, they will resort to the eddy between the two streams.

NATURAL HISTORY of the CHUB.

THIS is a very coarse fish, and full of bones: it has a large blackish head, and its body is longer than that of the carp. The back is of a dark green, and the belly and sides of a silver colour: the temples are yellowish, and the scales, like those of the carp, are large and angular. The iris of the eyes is of gold and silver colours. The tail is forked, and the fins are of a blackish blue; though sometimes they are tinged with red. The belly is broadish, and the lateral lines run parallel to the bottom of the belly. The Chub is a very timid fish, sinking to the bottom on the least alarm. It does not grow to a very large size; though they have been known to weigh upwards of five pounds.

In August, and in the cooler months, a yellow paste, made of the strongest cheese, and pounded in a mortar with a little butter, and so much saffron, as being beaten small, will turn it to a lemon colour, is a very good bait. In the winter months, the

Chub is esteemed the best, it being observed, that the forked bones are then lost, or turned into a kind of gristle, especially if the fish is baked. Some make a paste for this season of cheese and turpentine. He will also bite at a minnow, as well as the trout. But take this for a rule in chub-fishing, that in hot weather he is to be angled for towards the mid-water, or near the top; and in colder weather near the bottom. And if you fish for him near the top, with a beetle or fly, be careful to let your line be very long, and to keep out of sight. The spawn of this fish is excellent meat; and the head of a large chevin, the throat being well washed, is the best part of him. The flesh is white, soft, and insipid, and is but in very little esteem among the generality of people. The Chub is very fond of a large bait. In the summer, at mid-water, five or six cabbage, nettle, or cattle dock-grubs, or a mixture of all or any of the above, mixed with flies, are very good baits.

The Chub usually swims in mid-water, and sometimes at the top, and therefore is best taken by dibbing. From the beginning of May to September, you may angle for him before the sun rises till nine, and in June, July, and August, from five till dark, and with the white moth all the night over; but in the winter he lies lower, and then you may fish for him at the bottom in the middle of the day, with new cow-brains. Some people will chew and spit them into the hole where they fish; but if you can mix them very small in a cup with a little water, and throw a small quantity in at a time, you will have sport, if you bait with the same; this, and the spinal marrow of an ox, is the very best winter bait. They will take almost any bait, as the brains of oxen or sheep dried, and cut into small pieces; all sorts of worms, gentles, the brood of wasps, blackberries, dewberries, new cheese, grasshoppers, black snails with their bellies slit, and all sorts of paste.

In dibbing, the Chub will take a black ant-fly, small butterflies with the great wings cut off, oak-worms, ash-flies, green caterpillars, and the cod-bait; in short, there is scarce any thing comes amiss to him. It is but a cowardly fish, and when once turned, yields presently. But you must master it as soon as you can, because when he is hooked, he does not make to the middle of the stream, but to the banks, which may endanger your tackle. When you throw your bait into the water, they fly from it, but return immediately to see what it is, and, if they like it, they swallow it without hesitation, if you keep yourself out of sight.

This fish will afford good sport, if you do as follows. Go to one of their holes, where, in most hot days, you may find a number of them floating near the top of the water. Get two or three grasshoppers as you go over the meadows, and place yourself secretly behind a tree, remaining as free from motion as possible. Put a grasshopper upon your hook, and let your hook hang a quarter of a yard short of the water; to which end you must rest your rod on some bough of a tree. It is probable the Chub will sink down towards the bottom of the water at the first shadow of your rod, they being the most fearful of fishes, and apt to do thus if but a bird flies over them, and makes the least shadow on the water: but they will presently rise up to the top again, and there lie floating till some shadow frights them afresh: when they lie thus upon the top of the water, fix your eye upon the best Chub you can single out, and move your rod gently towards him. Let your bait fall easily upon the water, three or four inches before him, and he will infallibly take it, and you will be as certain to catch him; for he is one of those leather-mouthed fishes, of which a hook scarce ever loses its hold: but be sure to give him play enough, before you offer to take him out of the water. When a grasshopper cannot

cannot be found, a black snail, with his belly slit, to shew his white, or a piece of soft cheese, or any sort of natural flies, will usually do as well.

When you angle for him with a fly, let it be a very large hackle, and point your hook with four or five large gentles, or botts; cast your line, which ought to be fourteen or fifteen yards long, across the stream, and let the current carry it down, as they will take a fly much better a little under water than at top. When you see your line draw, strike pretty smart. Your rod should be six yards, and not too slender. A small lamprey is no bad bait for a Chub.

NATURAL HISTORY of the BLEAK.

THE Bleak seldom exceeds six inches in length: the body is broadish, and not unlike that of a sprat; the head small; the scales are thin, and of a silver colour, and come off easily. The back is of a bluish or greenish brown, and the eyes are large, marked on the lower side with a blood-coloured spot. The skull is transparent, and the flesh is sweet, delicate, and nourishing. Artificial pearls are made with the scales of the Bleak. They are beat into a fine powder, then diluted with water, and introduced into a thin glass bubble, which is afterwards filled with wax. This art was invented by the French, and one artist in Paris has been known to use thirty hampers full of fish in his manufacture in one year. At certain seasons of the year, these fish seem to be affected with the vertigo: they are seen tumbling about near the surface of the water, and are then called mad Bleaks by the Thames fishermen.

The Bleak spawns in March, and recovers its strength in three weeks. The flesh is sweet, nourishing, and pleasant, but little sought after on account of the diminutive size of the fish.

The best baits for him in the cold months, are gentles and small red-worms, and in summer you may catch great numbers with an artificial ant-fly, or a very small gnat. There cannot be better sport than whipping for Bleaks, in a boat, or on a bank, in the swift water, in a summer's evening, with a hazle-top, about five or six feet long, and a line twice the length of the rod. Point your hook with a small gentle. As this fish is always changing its situation, and seems to be ever restless, and ever in motion, the best method of angling for him is with a pater-noster line; that is, a line with half a dozen or more hooks, tied to the main line, about three or four inches above one another. He will take your bait wherever he meets it.

NATURAL HISTORY of the WHITE BAIT.

VARIOUS are the conjectures about this species; the general opinion however is, that they are the fry of some fish. Some attribute it to the bleak, others to the shad, the sprat, and the smelt. It bears a greater similarity to the bleak than to any other, but it is impossible for us to class it with any degree of certainty. In the months of July and August, innumerable multitudes of these fish are taken in the Thames, near Blackwall and Greenwich. They are esteemed very delicious when fried with flour, and the taverns contiguous to those places are much resorted to, when the White Bait are in season, by the lower order of epicures. The head, back, and sides of this fish are silvery, and the back tinged with green. Its usual length is about two inches. It is remarkable, that these fish expire the very instant they are taken out of the water. A wager was laid in the summer of 1775,

that a person could not shew a live White Bait above London-bridge. The experiment was tried, a well-boat was procured, and some hundreds of these little fish poured into it the instant they were taken out of the Thames; the utmost expedition was then used to get to the west side of London-bridge; after which the fish were immediately inspected, and not one of them remained alive.

NATURAL HISTORY of the MINNOW.

THE Minnow is much smaller than the gudgeon, having a roundish body, and seldom exceeds three inches in length. Its body is smooth, and the scales are so small as to be hardly visible. The back is flat, and of a deep olive colour: the belly and sides are mottled with scarlet in some, in others white, and in others with a shining blue. The tail is forked, and marked near the base with a dusky spot. These beautiful fish appear in shoals in many of our small gravelly streams.

NATURAL HISTORY of the GOLD FISH.

THE Gold Fish was first introduced into this country about the year 1691, but were not generally known till 1728, when many of them were brought to England. In China Gold Fish are kept for amusement by every person of fashion, either in porcelain or glass vessels, or in the small basons that decorate the courts of the Chinese houses. The form of the Gold Fish resembles that of the carp; they have been seen in England of the length of eight inches, and Du Halde informs us, they grow to the size of our largest herring in their native country. In the colours of this fish there is infinite variety: some are marked with a fine blue, a brown, and a bright silver; but the general and predominant colour is gold of a most amazing splendour. This species is particularly distinguished by the anal fins, which are placed opposite each other like the ventral fins; and not behind each other, like those of other fish.

Of the DIVISION of SHELL-FISH.

THESE are usually divided, by naturalists, into crustaceous and testaceous animals. Crustaceous fish, such as the crab and the lobster, are furnished with a shell that is not of a stony hardness, but is in some measure capable of yielding. Testaceous fishes, like the oyster or cockle, are furnished with a shell of a stony hardness; which is brittle, and incapable of yielding. The lobster, the crab, and the tortoise, are of the crustaceous kinds: the numerous tribe of oysters, muscles, cockles, and sea-snails, which offer infinite variety, are of the testaceous kinds.

NATURAL HISTORY of the LOBSTER.

THE Lobster and the crab, however different in figure, are nearly the same in manners and conformation. Though without any warmth in their bodies, or even without red blood circulating through their veins, they are animals wonderfully voracious: they seize upon every thing that has life, and whatever they attack is sure to perish, tho' never so well defended. These voracious animals even devour each other; and they may, in some measure, be said to eat themselves; as they annually change their shell and stomach, and their old stomach is usually the first repast for the new one.

Locusta marina Indica



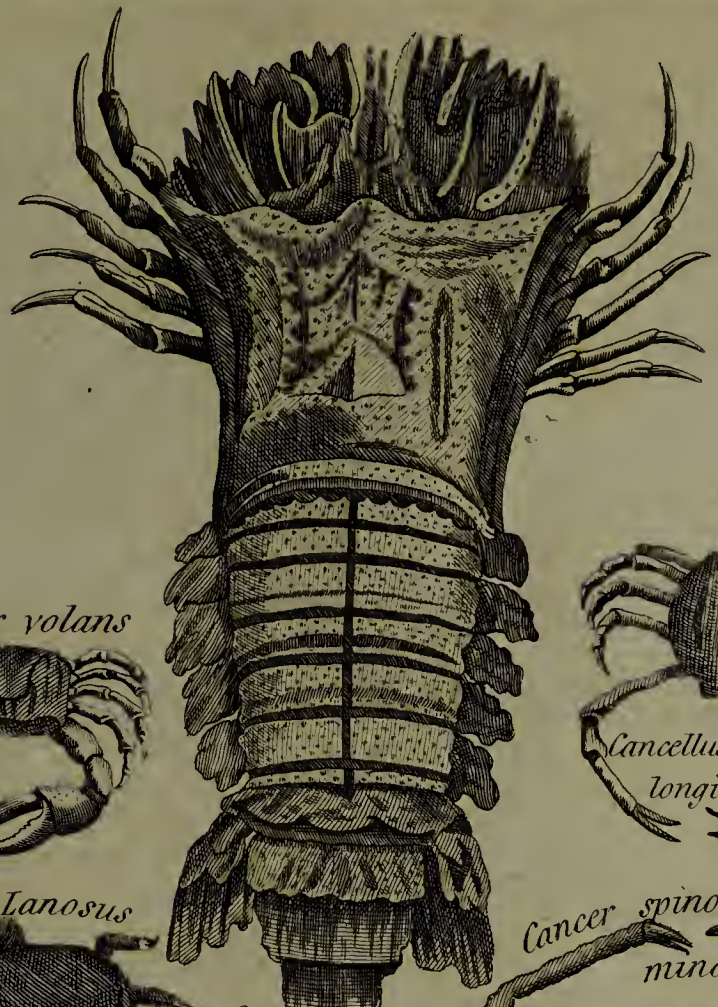
Cancer volans



Cancer lanosus



Squilla lata



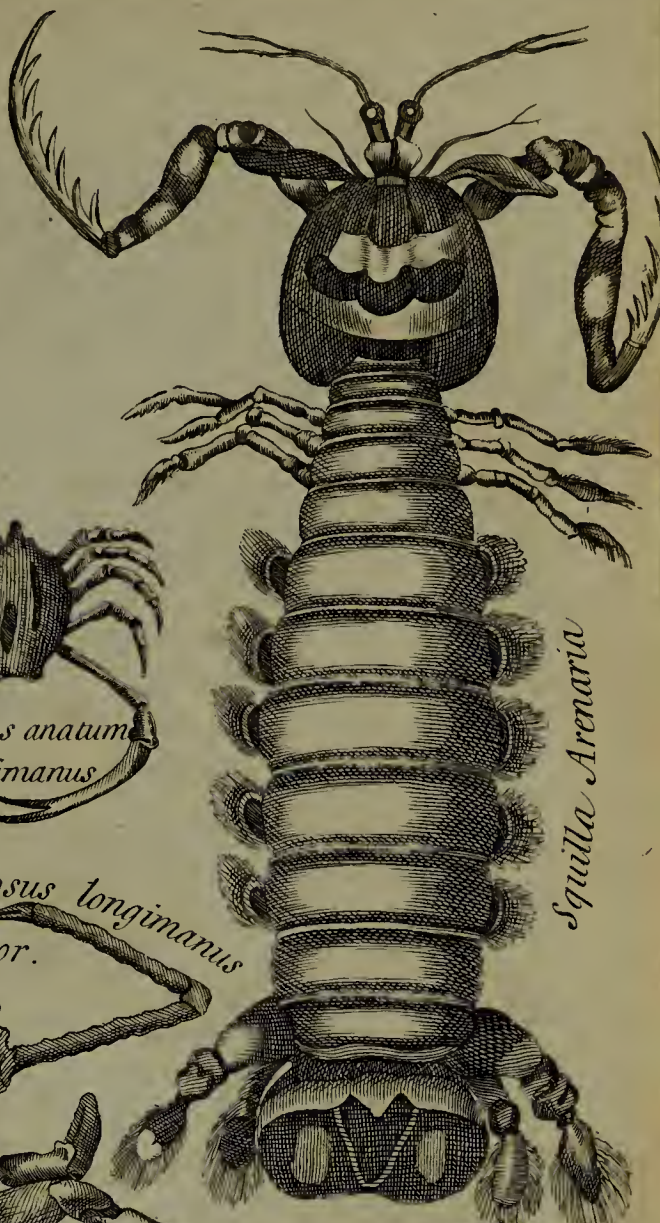
Cancellus anatum longimanus



Cancer spinosus longimanus minor.



Squilla Arenaria



Squilla lutaria



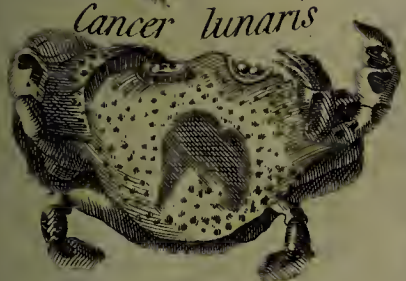
Pagurus



Cancer raniformis



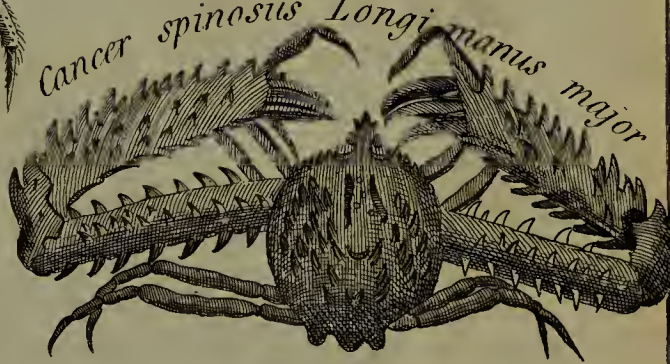
Cancer lunaris



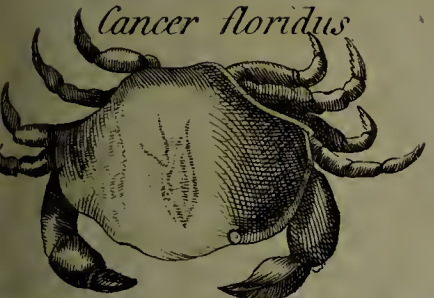
Cancer Spinosus



Cancer spinosus Longimanus major



Cancer floridus



Cancer Spinosus, or the Rots-Crab



Pediculus Marinus, or The Sea Louse.



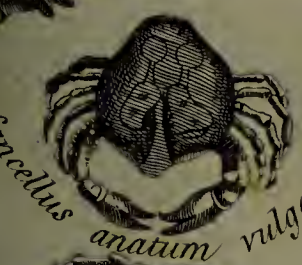
Cancellus anatum crafus



Cancer Arachnoides or The Spider Crab.



Cancellus anatum vulgaris



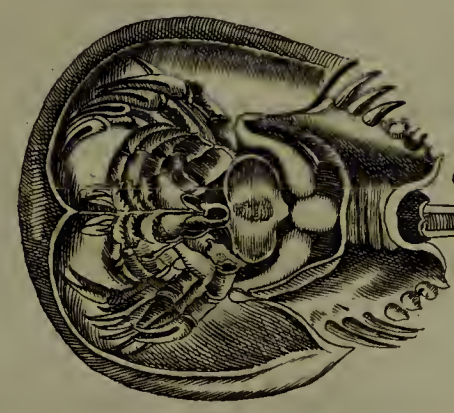
Cancellus Anatum rotundus



Cancer Calappoides



Cancer Moluccensis or The King-Crab.



The form of the Lobster is so very extraordinary, that the head may be almost mistaken for the tail; but it may be soon discovered, that the animal moves with its claws foremost; and that the part which plays within itself by joints, like a coat of armour, is the tail. The two great claws, which are the Lobster's instruments of provision and defence, open like a pair of nippers, and have very great power; they are usually notched like a saw, which enables it to take the firmer hold. Besides these instruments, the animal has eight legs, four on each side; which, with the assistance of the tail, give the animal its progressive and sideling motion. The head, which is very small, is between the two claws, and is furnished with eyes, which appear like two black horny specks on each side. The mouth, like that of insects, opens the long way of the body; and is furnished with two teeth for the comminution of its food: between the two teeth there is a fleshy substance in the shape of a tongue. It has also three teeth in the stomach; one on each side, and the other below. It has two long feelers, or horns, that issue on each side of the head. The tail is the grand instrument of motion; and with this it can raise itself in the water. Under this the spawn is lodged in great abundance; every pea adhering to the next by a very fine filament, which is almost imperceptible. They continue in this situation till they become furnished with limbs and motion, and then drop off into the water.

After leaving the parent, the young lobsters immediately seek for refuge in the smallest clefts of rocks, or other crevices at the bottom of the sea, where the opening is but small, and such opening can be easily defended. There they grow larger in a very short time, from the mere accidental nourishment which the water washes to their retreats. In a few weeks they acquire a hard firm shell, which furnishes them with offensive and defensive armour.

The body of the Lobster continues to increase, while the shell continues of the same size; the animal thus becomes too large for its habitation, and is imprisoned within the crust that nature has gathered round it; and is therefore under a necessity of getting free. As the young of this kind grow faster, they change their shell oftener than the old; the latter remaining in the same shell for two or three years together. In general, however, they change their shell once a year; but for some days before it undergoes this change, it ceases to be so voracious as formerly, and lies torpid and motionless, as if in anxious expectation of the approaching alteration. Just before casting its shell, it throws itself upon its back, and the whole body is in violent motion, and at length the shell is seen beginning to divide at its junctures. It also appears turned inside out, and its stomach comes away with its shell. In a short time, however, this wonderful creature finds itself at liberty; but in so weak and enfeebled a state, that it continues motionless for several hours. After this extraordinary change, it has the softness and the timidity of a worm; every animal of the deep being then a powerful enemy, which they can neither escape or oppose. But this state of defenceless imbecility is of short duration, for in less than two days, the skin of its body is almost as hard as before; its appetite also increases; and, however extraordinary it may appear, its first repast is upon its own stomach, and afterwards it devours its former shell. In about forty-eight hours, the new shell is perfectly formed, and becomes as hard as that which it has parted with.

Thus newly equipped, the creature ventures more boldly among the animals at bottom, and, in its combats, frequently suffers some mutilation. A joint or a claw is sometimes lost in these encounters,

which nature quickly repairs; a new claw speedily springs out, which, at first, is small and tender, but in the space of three weeks becomes *almost* as large as the old one which is lost; but it never arrives to the full size: we often see the claws of Lobsters of unequal magnitude, which is thus accounted for.

There are many variations of this extraordinary animal. It is found above three feet in length, and if we admit the shrimp and the prawn in the class, it is sometimes seen not above an inch. These all live in the water, and cannot long endure its absence. The shell, when taken out of the water, is black, but becomes red by boiling.

The river craw-fish differs little from the Lobster; but it will live only in the fresh water, and the other only in the sea.

NATURAL HISTORY of the CRAB.

THE Crab resembles the lobster in its habits and conformation, but differs materially in shape. It is found equally in fresh and salt water, as well upon land as in the ocean. The tail is not so apparent as in the former; being that broad flap that appears to cover a part of the belly, and, when lifted, discovers the spawn situated there in great abundance. Like the lobster, it has two claws; and, like the lobster, it has eight legs, four on each side. Like the lobster, it is also a bold voracious animal; and indeed it resembles that animal in every thing but the amazing bulk of its body, compared to the size of its head, and the length of its intestines, which have many convolutions.

The VIOLET CRAB.

The Violet Crab of the Caribbe Islands is truly remarkable for its shape, the delicacy of its flesh, and the singularity of its manners. It resembles two hands cut through the middle, and joined together; for each side looks like four fingers, and the two nippers or claws resemble the thumbs. The rest of the body is covered with a shell, as large as a man's hand, and bunched in the middle; on the fore part of which there are two long transparent eyes, about the size of a grain of barley, and as hard as horn. The mouth is covered with a kind of barbs; under which there are two broad sharp teeth as white as snow. With these the animal can easily cut fruits, leaves, and rotten wood, which is their usual food.

The shell is full of a thick, fat, fibrous liquor, which is used by the inhabitants in fauces. In the middle of this is the stomach; and under the body there is a kind of breast-plate, composed of several pieces set together; and beneath that, on each side, there are five or six barbs.

These animals are, in general, of a violet colour, though some are variegated with white, blue, and violet: but the surprizing part of this creature's history is to follow; and what we are going to relate, were it not as confidently confirmed as any other circumstance in natural history, might well stagger our belief. They not only live in a kind of orderly society in their retreats in the mountains, but in the months of April or May, they march down to the sea-side in a body of some millions at a time: they fall out by thousands from the stumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themselves under the surface of the earth. The ground is then covered with this band of adventurers, insomuch that it is almost impossible to set down one's foot without treading upon them. The procession sets forward from the mountains with as much regularity, as an army under the guidance of an experienced general; and are usually divided into three battalions, or companies

nies; the first of which consists of the largest and strongest males, that, like pioneers, march forward to clear the route, and face the greatest dangers. These are often obliged to halt for want of rain, and go into the most convenient encampment till the weather changes, for they cannot long endure the intense heat of the sun. The main body of the army is composed of females, which never leave the mountains till the rain is set in for some time, and then they descend in regular battalia, being formed into columns of fifty paces in breadth, and three miles in length, and so close, that they almost cover the ground. Three or four days after this the rear guard follows; a straggling undisciplined tribe, consisting of both males and females. They march chiefly in the night, but if it rains in the day, they do not fail to profit by the occasion; and they continue to move forward in their slow uniform manner. When the sun shines, they get to the sides of woods to avoid the heat, waiting till the cool of the evening. When they are terrified, they march back in a confused disorderly manner, holding up their nippers, with which they sometimes tear off a piece of the skin, and then leave the weapon where they inflicted the wound: they even try to intimidate their enemies, by clattering their nippers together. They are however possessed of one very unsocial property, for if any one of them becomes accidentally maimed, so as to be incapable of proceeding, the rest fall upon him, and devour him on the spot.

In dry seasons, they are sometimes three months in marching down to the sea-side; but, in heavy rains, they often reach it in eight or ten days.

When they have arrived at their destined port, they prepare to cast their spawn. The Crab has no sooner reached the shore, than it hastens eagerly to the edge of the water, and suffers the waves that beat upon the shore to flow over its body two or three times. This seems only a preparation for bringing their spawn to maturity; for, without farther delay, they withdraw to seek a lodging upon land. In the mean time the spawn grows larger, is excluded out of the body, and adheres to the barbs under the breast-plate. This bunch is seen as large as a hen's egg, and exactly resembling the roes of herrings. In this state of pregnancy, they again seek the shore for the last time, and shaking off their spawn into the water, leave chance to bring it to maturity. Immense shoals of hungry fish are at the shore, in expectation of this annual supply; and about two-thirds of the Crabs eggs are immediately devoured by these rapacious invaders. The eggs which escape are hatched under the sand; and soon after millions at a time of these little Crabs are seen quitting the shore, and slowly travelling up the mountains.

The old ones, however, are not so active to return; they become so lean and feeble that they can hardly creep along, and the flesh at that time changes its colour; therefore most of them are obliged to stay in the flat parts till they recover, making holes in the earth, which they cover at the mouth with leaves and dirt, so that no air may enter. There they throw off their old shells, which they leave in a manner quite whole; the place where they opened on the belly being unseen. After this they are quite naked, and almost without motion, for five or six days together, when they become so fat as to be delicious food. They have then four large white stones under their stomachs, which gradually decrease in proportion as the shell hardens, and, when they come to perfection, entirely disappear. At that time the animal is seen slowly making its way back to its retreats in the mountains.

The SOLDIER CRAB.

The Soldier Crab has some similitude to the lobster, if divested of its shell. It is usually about four inches long, has no shell behind, but is covered down to the tail with a rough skin, terminating in a point. Like the lobster, however, it is armed with strong hard nippers before; one of which is as thick as a man's thumb, and pinches most powerfully. But though nature has refused a shell to any part of this animal except its nippers, the Soldier Crab has recourse to art for a supply: it takes possession of the deserted shell of some other animal, in which it resides, till by growing too large for its habitation, it is under a necessity of change. They descend every year to the sea-side to deposit their spawn and provide themselves with a new shell; and when they find one proportionable to their bulk, they get into it, and march along as if they were clothed in armour; from whence they have the name of Soldiers. They march up to the tops of mountains, and take their lodgings in hollow trees, where they live upon leaves, fruits, and rotten wood. The next year, when the body begins to grow too large for the shell, they travel down to the sea-side again, in search of others that fit them better. After examining several, and finding out one of a proper size, they immediately quit their old habitation, and occupy the new one.

Besides these, there are the white Crab of the Caribbe Islands; the sea Crab; the square Crab; the South-American Crab; the Indian Land Crab, &c. but they have all one property, which is very wonderful. When their nippers are laid hold of, they can easily part with them to make their escape; besides, if one of them should happen to be wounded, the animal immediately parts with it, and by that means gets rid of the wound and the limb together; well knowing that nature will soon furnish it with another.

NATURAL HISTORY of the TORTOISE:

TORTOISES are usually divided into those that live upon land, and those that subsist in the water; and use has made a distinction even in the name; the one being called Tortoises, the other turtles. Seba has proved, however, that all Tortoises are amphibious; that the land Tortoise will live in the water, and that the sea turtle can be fed upon land. The land Tortoise is generally found from one foot to five feet long, from the end of the snout to the end of the tail; and from five to eighteen inches across the back. It has a small head, somewhat resembling that of a serpent; an eye without the upper-lid; the under eye-lid serving to cover and keep that organ in safety. It has a long scaly tail, like that of the lizard. It can put out or conceal its head at pleasure, under the great pent-house of its shell; where it can remain secure from all attacks.

Though peaceable in itself, the Tortoise is admirably formed for war, and seems almost endued with immortality. Nothing can kill it; the depriving it of part of its body, is but a slight injury; it will live, though deprived of the brain; it will live though deprived of the head. Redi informs us, that he made a large opening in the head of a land Tortoise, drew out all the brain, and washed the cavity so as not to leave the smallest part remaining, and then, leaving the hole open, set the animal at liberty. Notwithstanding this, the Tortoise marched away without seeming to have received the smallest injury; and lived without a brain for six months. The Italian philosopher carried his experiment

experiment still farther; for he cut off the head, and the animal lived twenty-three days after its separation from the body.

Tortoises are also remarkable for their longevity: they are commonly known to live upwards of eighty years. There was one kept in the garden belonging to Lambeth Palace, that was remembered above an hundred and twenty.

This animal retires to some cavern to sleep for the winter; and, at that time, when its food is no longer in plenty, it happily becomes insensible to the want: it is sometimes buried two or three feet in the ground, having first providently furnished its hole with moss, grass, and other substances; as well to keep the retreat warm, as to serve for food, in case it should prematurely wake from its state of stupefaction. From this dormant state the Tortoise is awakened by the genial return of spring.

These animals are frequently taken into gardens, as they are thought to destroy insects and snails in great abundance. The strength of the Tortoise is very great; children have been seen to get upon the back of it, and it has not appeared to be overloaded, but moved off with its burthen to where it expected to be fed; but would carry them no farther.

In their external form, all Tortoises nearly resemble each other; their outward covering being composed of two great shells; one of which is laid upon the other, and they touch only at the edges: but upon a closer inspection, we shall find that the upper shell is composed of no less than thirteen pieces, which are laid flat upon the ribs, like the tiles of an house; by which the shell is kept arched and supported. Indeed, to an inattentive observer, the shells, both above and below, seem to make each but one piece; but they are bound together at the edges by very strong and hard ligaments.

NATURAL HISTORY of the SEA TORTOISE, or TURTLE.

TURTLES are usually distinguished by sailors into four kinds: the trunk Turtle, the logger-head, the hawkbill, and the green Turtle.

The trunk Turtle is generally larger than the rest, and its back is higher and rounder. The flesh of this Turtle is rank and unwholesome.

The logger-head has obtained his title from the size of his head, which is much larger in proportion than that of the other kinds. The flesh of this also is rank, and very seldom eaten.

The hawkbill Turtle has a long and small mouth, somewhat resembling the bill of an hawk. Though the flesh of this Turtle is very indifferent, the shell serves for the most valuable purposes. This is the animal which supplies the Tortoise-shell, of which snuff-boxes and a variety of beautiful trinkets are made. The flesh of this also is very indifferent eating.

The green Turtle is the most celebrated, and the most valuable of all the animals of the Tortoise kind. The delicacy of its flesh, and its nutritive qualities, together with the property of being easily digested, are now well known among us. Dampier appears to be the first who informed us of the distinctions among these animals; and that, while the rest might be valuable for other purposes, the green Turtle alone was chiefly prized for the delicacy of its flesh. The green Turtle is indeed become a branch of commerce, and ships are provided with conveniences for supplying them with water and provision, to bring them over in health from Jamaica, and other West-India Islands. This cannot, however, be always effected; for though they scarce require any provision upon the voyage, yet the

working of the ship occasions them to be beat against the sides of the boat which contains them, by which they become very lean and battered; so that, in order to eat this animal in the highest perfection, instead of bringing the Turtle to the epicure, the epicure ought to be transported to the Turtle.

The colour of the shell of this animal is rather greener than that of others of this kind; whence it has the name of the green Turtle. Those which are about two hundred weight are the most common size, though they are sometimes found to exceed five hundred. During the season, the citizens of London are remarkable for regaling themselves upon Turtle, and great numbers of these animals are dressed at the Queen's-arms-tavern, in St. Paul's church-yard, where we remember to have seen them in the two extremes; Mr. Bates exhibited at one time three Turtles, two of which together did not weigh three ounces, and the other exceeded nine hundred pounds in weight. The ancients, however, speak of much larger Turtles: Ælian assures us, that the houses in the island of Taprobane, are usually covered with a single shell; and Diodorus Siculus tells us, that a people neighbouring on Ethiopia, called the Turtle-eaters, coasted along the shore in boats made of the upper shell of this animal.

The Turtle seldom comes from the sea, but to deposit its eggs, and sometimes to sport in fresh water. In about twenty-five days after laying, the eggs are hatched by the heat of the sun; and the young Turtles, about the size of quails, are seen bursting from the sand, as if earth-born, and running directly to the sea, with instinct only for their guide. But it sometimes happens that the surges of the sea beat them back upon the shore, and they become a prey to the innumerable quantities of birds, which at that time haunt the coasts.

NATURAL HISTORY of SEA SNAILS.

THOUGH the land and Sea Snails resemble each other in many particulars, many of the latter are totally destitute of horns, and none of them have more than two. Indeed, if the horns of Snails are furnished with eyes, and if, as some imagine, the length of the horn, like the tube of a telescope, assist vision, these animals that reside in the gloomy bottom of the deep, can have no great occasion for them.

On viewing the shells of Sea-snails, we are convinced, that the animal which produces them is larger than those of the same denomination upon land. The sea appears to have the property of enlarging the magnitude of all its inhabitants. There is also a difference in the position of the mouth of the garden and Sea-snail. In the former, the mouth is placed cross-wise, as in quadrupeds; furnished with jaw-bones, lips, and teeth. In most of the Sea Snails, the mouth is placed longitudinally in the head; and, in some, obliquely, or on one side. Others of the trochus kind, are without a mouth, but are furnished with a trunk, which is very long in some kinds, and shorter in others. Those which are provided with this trunk, are, among Snails, what the tiger, the eagle, or the shark, are among beasts, birds, or fishes: the whole race of shelled animals avoid their approach; and their strongest built habitations yield to the superior force of these invaders. Though their own shells are thick and clumsy, yet their motion at the bottom is swifter than that of most other shell fish, and they seize their prey with greater facility. They boldly venture to attack even the largest shells, and with their piercing trunk bore it through in a very short time, and destroy its inhabitant.

But, of all Sea Snails, that which is most frequently seen swimming on the surface, is the nautilus; of which there are several species, which may be all divided into two. The one inhabits a small white shell as thin as paper, which it is often seen to quit and resume again; the other has a thicker shell, of the colour of mother of pearl, and but seldom quits it. This shell externally resembles that of a large snail; but is generally six or eight inches across: within it is divided into forty partitions, that communicate with each other by doors, if they may be so called. But the peculiarity for which the nautilus has been the most distinguished, is its spreading the thin oar, and catching the flying gale, to use the poet's description of it. These animals, especially those of the light kind, are chiefly found in the Mediterranean. In a calm sea, they are observed floating on the surface; some spreading their little sail; some rowing with their feet, as if they were engaged in business of the utmost consequence; and others floating upon their mouths, like a ship with the keel upwards.

The nautilus has eight feet, which issue near the mouth, and may as properly be called barbs: these are connected to each other by a skin, resembling that between the toes of the duck; but thinner and more transparent; six of these feet are shorter than the rest, and are held up as sails to catch the wind in sailing: the two others, which are longer, are kept in the water, serving like paddles, to steer their course by. When the weather is calm, it is seen expanding only a part of its sail, and rowing with the rest.

Sea Snails of every species appear to be a much more active animated tribe, than from their figure we should be induced to imagine. Though they seem, to an inattentive spectator, as mere inert masses of soft flesh, rather *loaded* than *covered* with a shell; when more closely examined, they are found to be furnished with the organs of life and sensation in tolerable perfection; and are possessed of appetites more poignant than those of animals that seem more perfect in their formation.

NATURAL HISTORY of FISHES of the OYSTER KIND.

THE Oyster differs very little from the muscle, except in the thickness of its shell, and its greater imbecility. It is formed with organs of life and respiration; with intestines which are very voluminous, and with a liver, lungs, and heart. Like the muscle it is self-impregnated; and the shell, which the animal soon acquires, serves it for its future habitation. Like the muscle, it opens its shell to receive the influx of water; and like that animal, is strongly attached to its shell both above and below.

In many particulars, however, the Oyster differs from the muscle. The shells are not equal like those of the muscle, the one being cupped, and the other flat: it always rests upon the cupped shell; for it would lose all its water if it lay upon the flat side. The shells of the Oyster are also thicker than those of the muscle: they are indeed so strongly lined and defended, that no animal will attempt to pierce them.

The muscle is capable of erecting itself on an edge, and going forward with a slow laborious motion; but the Oyster is utterly unable to change its situation. It is wholly passive, and endeavours by all its powers to remain fixed to one spot at the bottom. Rocks, stones, sea-weeds, &c. secure it against the agitation of the waves. In the rivers of the tropical climates, Oysters are frequently seen growing even amidst the branches of the forest.

Trees on the banks of the stream often bend their branches into the water, and particularly the mangrove, which delights in a moist situation: on these the Oysters hang in clusters; and in proportion as their weight sinks the plant into the water (where it still continues growing) the Oysters increase in number, and hang upon the branches. These animals will adhere to any thing; and are often found sticking to each other. This is effected by means of a kind of glue, which, when it cements, the jointing is as hard as the shell, and is as difficult to be broken. Sometimes, indeed, the Oyster grows to the rocks, somewhat like the muscle, by threads; but these only take root in the shell, and do not spring from the body of the fish itself, as in the muscle.

Oysters usually cast their spawn in May: in the space of two or three days, the young are covered with a shell; and in three years the fish is large enough to be brought to market. As they continue in the places where they are deposited, and as they seem to have no other food than the afflux of seawater; it is the custom at Colchester, and other places, where the tide settles in marshes on land, to pick up large quantities of young Oysters along the shore, which hardly exceed the size of a six-pence. These are placed in beds where the tide comes in, where they remain for the space of two or three years; and are then of a proper size to be taken for sale. Oysters are said to be better tasted for being thus sheltered from the agitations of the deep; and the fresh water, which mixes with the salt in these repositories, is said to increase their growth in fatness, and to improve their flavour.

But these Oysters are much smaller than those which are found sticking to rocks at the bottom of the sea, usually called rock Oysters: these are sometimes found five or six inches in diameter, and are esteemed excellent food; but even these are very diminutive, compared to the Oysters of the East Indies, some of which are upwards of two feet over: those found along the coast of Coromandel, are capable of furnishing a plentiful meal to eight or ten people; but they are much inferior to ours, both in delicacy and flavour.

Other bivalved shell fish, such as the cockle, the scallop, and the razor-shell, have very minuted distinctions. The scallop is principally remarkable for its method of moving forward upon land, or swimming upon the surface of the water. When it is deserted by the tide, it makes very extraordinary efforts to regain the water, moving towards the sea in a most singular manner. When in the water, it is capable of raising itself to the surface, supporting itself there, and even of making its way with some degree of celerity.

The pivot, or razor-shell, which has the latter name from its resembling the haft of a razor, has all its motions confined to sinking or raising a foot downwards or upwards in the sand; for it never quits the spot where it was first planted. It is frequently seen to rise about half-way out of its hole, but as soon as it is disturbed, it sinks perpendicularly down again.

It is in this class of shell fish that pearls are found in greatest abundance; and it is in the internal parts of these shells that are of a shining silvery colour, that these gems are usually generated; but the pearl is also found in the muscle or the scallop, as well as in the Oyster: but that which particularly obtains the name of the pearl Oyster, has a large strong whitish shell, wrinkled and rough without, and within smooth, and of a silver colour. From these the mother-of-pearl is taken; which is nothing more than the internal coats of the shell, resembling the pearl in colour and consistence.

The roundest pearls, and those of the best colour, are

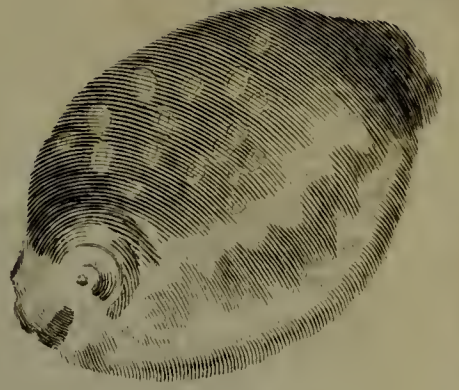
SHELL - FISH.



The Conic prickly Oyster



The Hammer Oyster



The Map Shell



The White mouth'd Yellow Dolium



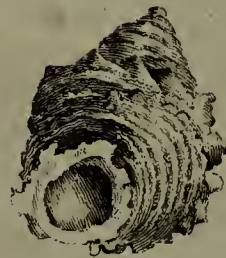
The great Ear Shell



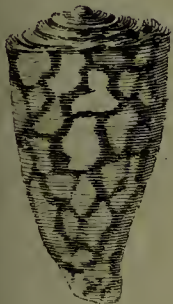
The Olive Shell



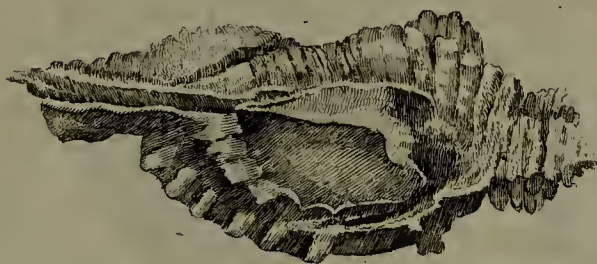
The Zizzag Chama



The Golden-mouth'd Snail



The Tyger Shell



The Rough-mouth'd Buccinum



The toothed Nerite Snail



The Purple Magellanick Muscle



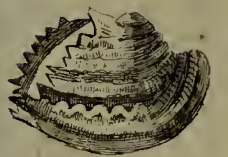
The Mitre Shell



The Mulberry Shell



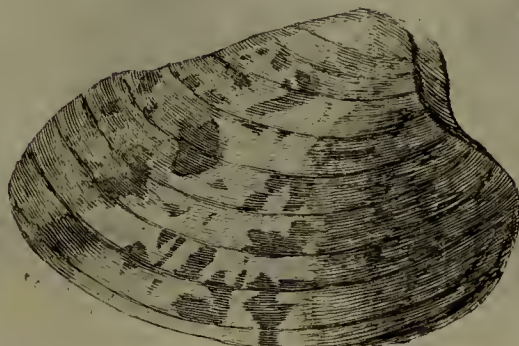
The Ducal Mantle Scallop



The Old Woman Shell or wrinkled Chama



The Noah's Ark Heart Shell



The Agate Chama



The Spider Shell



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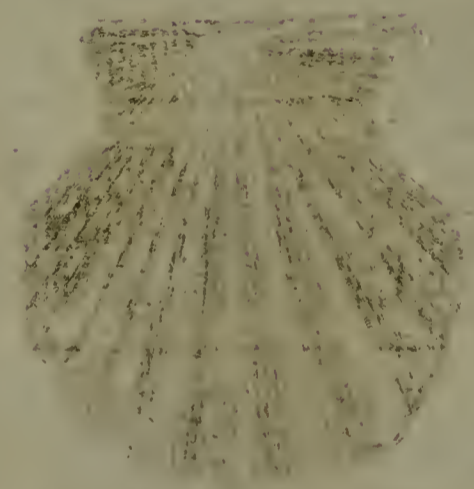
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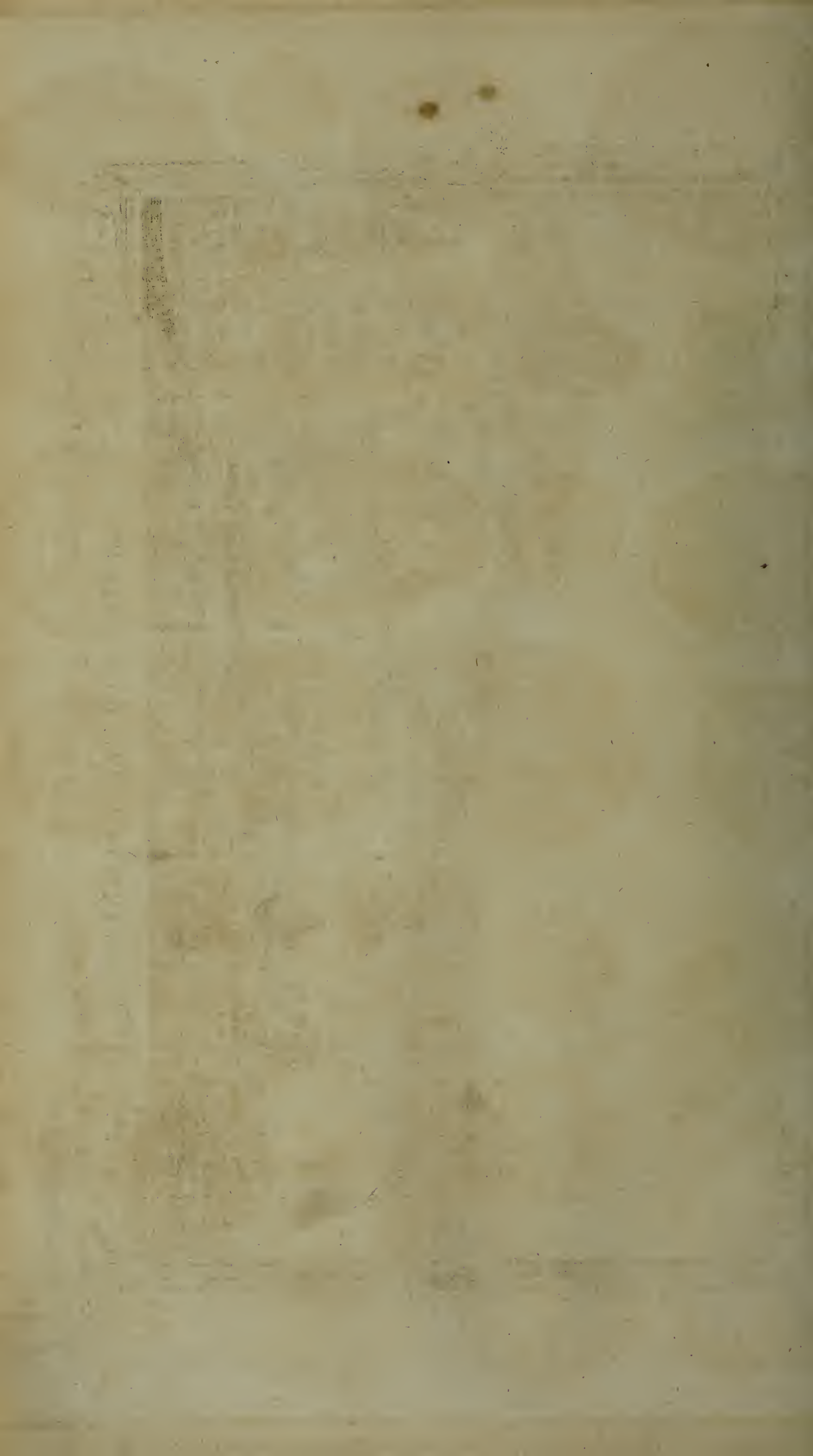


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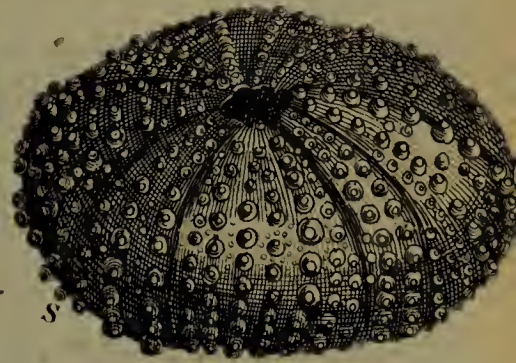
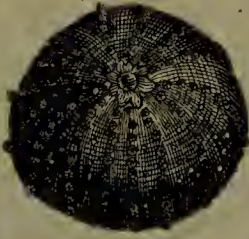
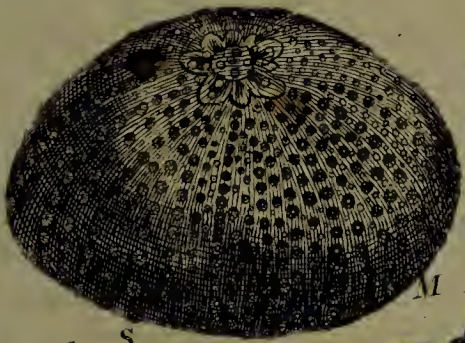
A VIEW of the PEARL-FISHERY.

Lodge sculp.

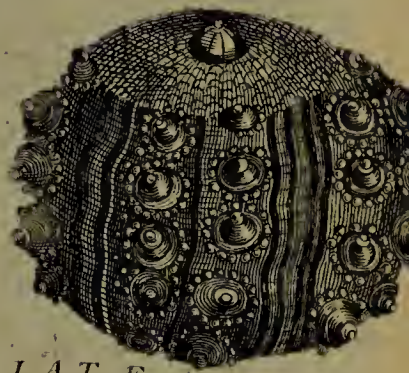
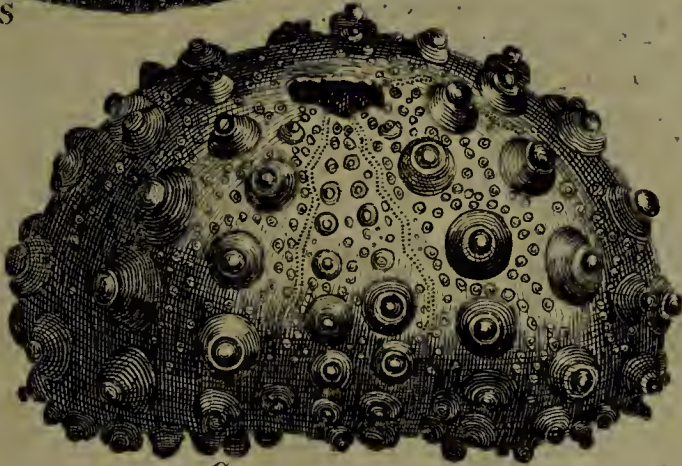
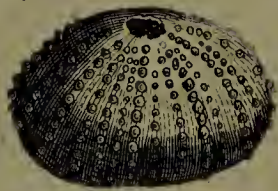


TESTACEOUS ANIMALS.

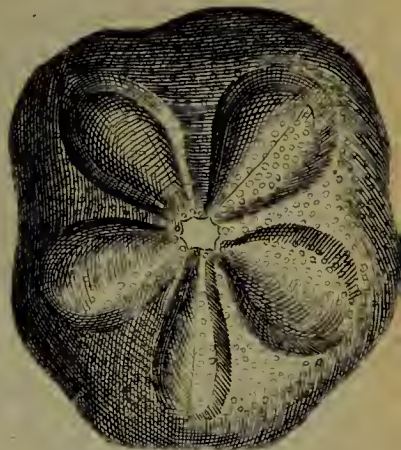
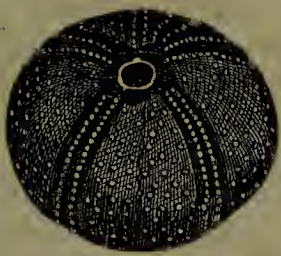
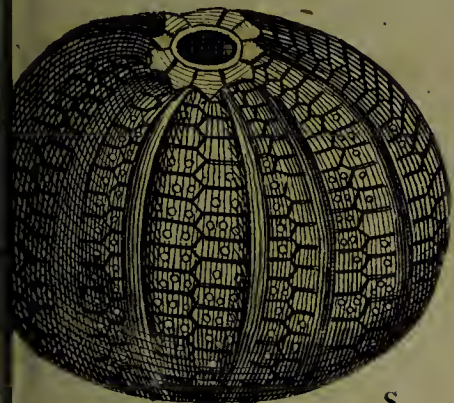
ECHINODERMATA or SEA URCHINS.



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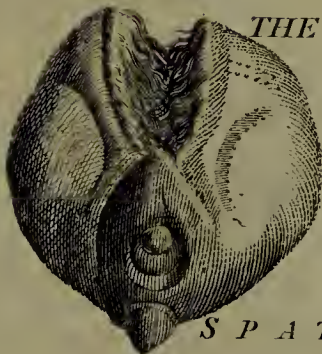


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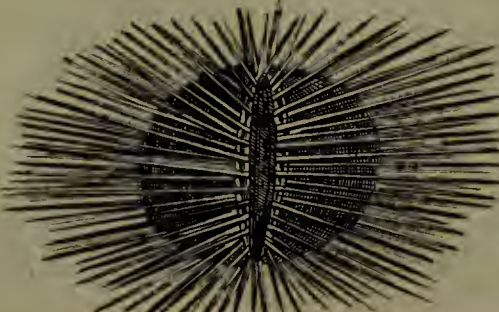
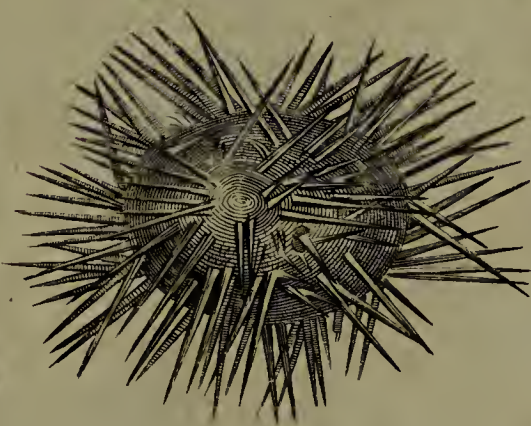
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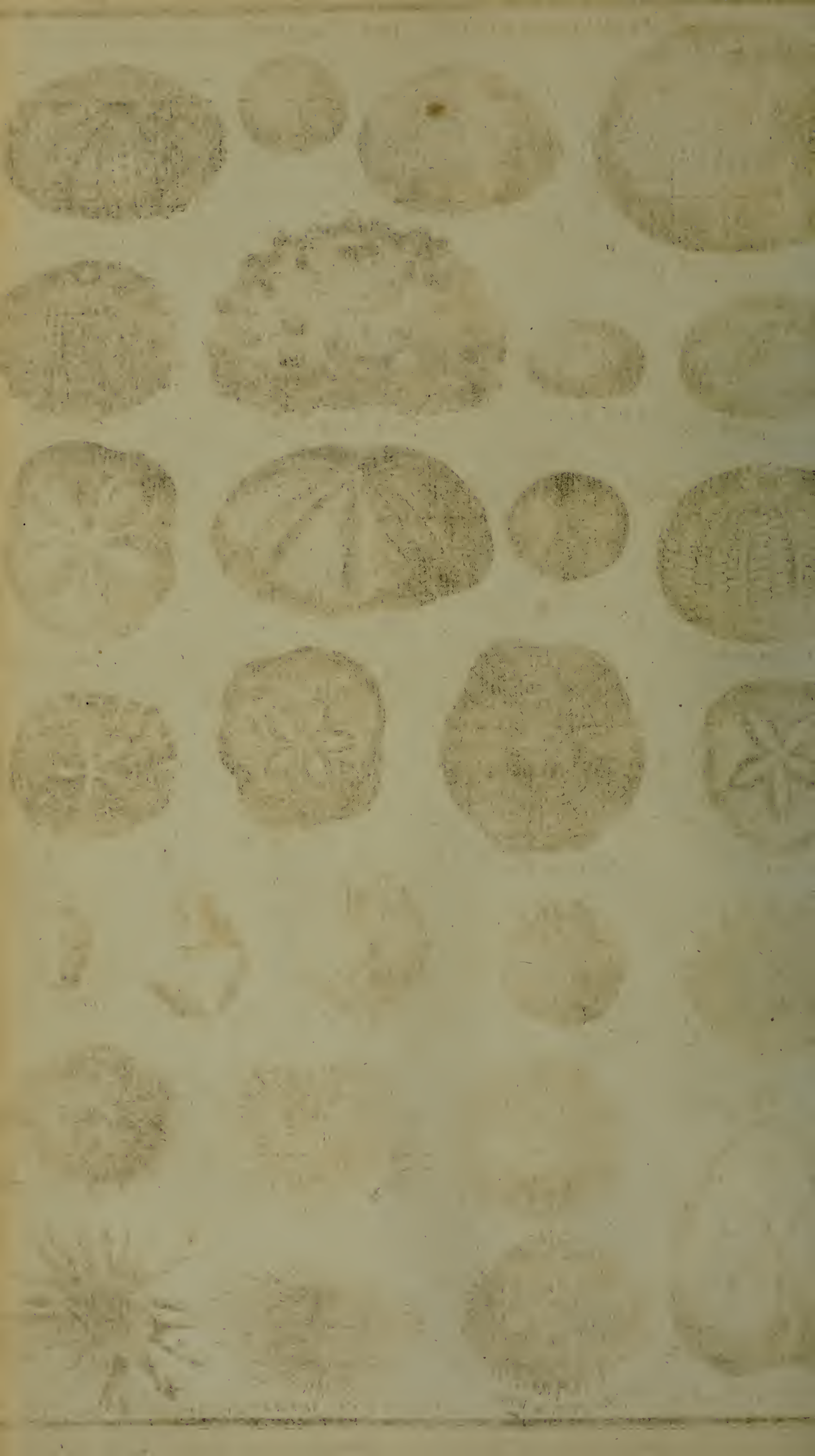
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are brought from the east: they are whiter and more regular than the American pearls; but they all become yellow in time. When kept in damp places they decay, and moulder into a substance not much harder than chalk. The greatest pearl-fisheries are in America and Asia; but as pearls are less valuable than they formerly were, those of America are in a great measure discontinued.

NATURAL HISTORY of the SEA URCHIN.

AT the first view, the Sea Urchin may be compared to the husk of a chesnut; being like it in shape, and having a number of bony prickles standing out on every side. The mouth is placed downwards; the vent is above; the shell is a hollow base, resembling a scooped apple, and is filled with a soft muscular substance, through which the intestines wind from the top to the bottom. The mouth, which is large and red, is furnished with five sharp teeth, which are easily discerned. It is principally remarkable on account of its horns and spines, which point from every part of the body, like the horns of a snail, and serve at once as legs to move upon, as arms to feel with, and as instruments of capture and defence.

It is in general observed of insects, that those which have the greatest number of legs, always move the slowest; this animal, however, is an exception to the general rule; for though it is furnished with two thousand spines, and twelve hundred horns, all serving for legs, and from their number seeming to impede each other's motion, yet it moves at the bottom with some degree of swiftness. Some kinds of this animal are as good eating as the lobster, and its eggs, which are red, are esteemed a great delicacy.

The acorn shell fish, the thumb-footed shell fish, and the imaginary barnacle, resemble the Sea Urchin in shape, but are very different in motion. They are fixed to one spot, and appear to vegetate from a stalk. To an inattentive spectator, each appears to be a kind of fungus, that grows in the deep, destitute of animal life as well as motion: but it has a cover, by which it opens and shuts its shell at pleasure. It has twelve long crooked arms, furnished with hair, which it thrusts forth for its prey; and eight smaller, which are generally kept in the shell.

But of all animals of the shelly tribe, the pholas is the most wonderful. The pholas assumes different figures; but in general it somewhat resembles a muscle; except that the shell is composed of five or more pieces; the smaller valves serving to close up the openings, left by the irregular meeting of the two principal shells. But the most wonderful part of their history is that of their penetrating into rocks, and taking up their residence there. When divested of its shell, this animal resembles a roundish soft pudding: it is indeed furnished with two teeth; but they are so situated as to be incapable of touching the hollow surface of its stony dwelling. The instrument with which it performs all its operations, and buries itself in the hardest rocks, is only a broad fleshy substance, resembling a tongue, which is seen issuing from the bottom of the shell. Thus, furnished with the bluntest and softest augre, it effects, by patience and successive applications, what other animals are incapable of performing by force; penetrating the hardest bodies only with its tongue. It begins to make its way into the stone while young and little, by a very narrow entrance; and as it grows bigger, it enlarges its apartments. Here it continues at ease for its life; and the sea-water, which enters at the little aperture, supplies it with luxurious plenty.



NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;

Being a Grand, Accurate and Extensive
Display of Animated Nature.

B O O K IV.

Containing the Natural History of **REPTILES and INSECTS.**

C H A P. I.

NATURAL HISTORY of *the FROG, the TOAD, the PIPAL, the NATTER JACK, the LIZARD, the CROCODILE, the SALAMANDER, the SCALY LIZARD, the TARAQUINA, the IGUANA, the CAMELEON, the VIPER, the AMMODYTES, the GERENDA, the GI-BOYA, the BOIGUACU, the AMPHISBÆNA, the DEPONA, the RATTLE-SNAKE, the SNAKE, and the BLIND WORM.*

NATURAL HISTORY of the FROG.

THE Frog is an animal too well known to require any description; but some of its properties are too singular to be passed by unnoticed. Compared to the bulk of its body, its leap or spring is remarkably great; and it is the best swimmer of all four-footed animals. For these purposes nature has finely adapted the parts of this animal; the arms being light and active, the legs and thighs long, and furnished with very strong muscles. Though it may appear superfluous to describe the form of animals so well known as the Frog and toad, it may be necessary to mark those differences which distinguish them from each other. The Frog moves by leaping; the toad crawls along the ground: the Frog is in general smaller than the toad; it has a brighter colour, and a more polished surface: the toad is brown, rough, and dusky. The Frog is light and nimble, and its belly is small, in proportion to the size of the animal; the toad is slow, corpulent, and heavy. Their internal parts are nearly the same, except that the lungs of the toad are more compact than those of the Frog. Neither has the toad so many air-bladders as the Frog; consequently it is less fitted for living under water.

The Frog has a very little brain for its size; it has a very wide swallow; the stomach is apparently small, but capable of great distention. The heart, like that of all other truly amphibious animals, has but one ventricle; the blood therefore can circulate while it keeps under water, without the assistance of the lungs. The lungs resemble a

number of small bladders joined together, like the cells of the honey-comb: they are connected to the back by muscles, and the animal can distend or exhaust them at pleasure. These are the most striking peculiarities in the anatomy of a Frog; in which it agrees with the toad, the lizard, and the serpent.

The egg which produces a tadpole, is small, black, and globular, and is surrounded with two different kinds of liquor: that which immediately surrounds it, is clear and transparent, and contained in its proper membrane; that which surrounds the whole, is muddy and mucous: the tadpole receives its nourishment from the transparent liquor, in the same manner as young birds are supported by the white of the egg. When this membrane is broken, the tadpole adheres with its mouth to part of it for some time; and as soon as it gets free, sinks to the bottom of the water; whence it never rises while it continues in its tadpole state.

When they are released from their tadpole state, they immediately take to land; and, if the weather has been hot, and some showers fall to refresh the earth, the ground is sometimes seen, for a considerable space, perfectly blackened by myriads of these animalcules, seeking for some secure lurking-places. Hence some have imagined that these animals were generated in the clouds, and thus showered down on the earth. But had they, like our countryman Derham, traced them to the next pool, they would have found a better solution of the difficulty.

The Frog is longer out of the water than in it; but when the cold nights begin to set in, it returns to its native element; always choosing stagnant waters,

waters, where it can lie concealed at the bottom.

Frogs, as well as all other reptiles, feed but a small space of the year. During winter, Frogs and toads remain in a torpid state; the latter of which will dig into the earth, and cover themselves, with almost as much agility as the mole.

Frogs live upon insects of all kinds: they continue motionless till their prey appears, and when it comes sufficiently near, they jump forward with great agility, dart out their tongues and seize it. In this animal, as well as in the toad, lizard, and serpent kinds, the tongue is extremely long, and formed in such a manner, that it swallows the point down its throat. It therefore draws out a length of tongue, like a sword from a scabbard, to assail its prey; and whatever insect touches its tongue, infallibly adheres to it, nature having furnished it with a glutinous substance for that purpose.

The croaking of Frogs is well known, and from thence they are distinguished by the ludicrous title of Dutch nightingales and Boston wails in the fenny countries. The aquatic Frogs of Holland, indeed, are loud beyond conception; and though the animal does not exceed a man's fist in magnitude, it sends forth a note that may be heard at the distance of three miles. The large water Frogs have a note as loud as the bellowing of an ox, and when they exert it, they puff up their cheeks to an amazing size.

Of all Frogs, however, the male only croaks: before wet weather their voices are in full exertion; they are then heard, with unceasing assiduity, sending forth their call, and welcoming the approaches of their favourite moisture. Mr. Pennant informs us, that "There is a time of the year when they become mute, neither croaking, nor opening their mouths for a whole month: this happens in the hot season, and that is in many places known to the country people by the name of the Paddock-moon."

The male Frog is usually of a greyish brown colour: the female is more inclining to yellow, speckled with brown.

When a Frog is ninety-two days old, two small feet are seen towards the tail, and the head appears to be separate from the body. The next day, the legs are considerably enlarged; and four days after that, it refuses all vegetable food; its mouth appears furnished with teeth; and its hinder legs are completely formed: the arms are completely produced in two days more; and the animal is then entirely perfect, except that it still continues to carry the tail: that, however, drops off by degrees, and in the space of a few days, no part of it remains.

With its figure, the Frog also changes its appetites; and, so extraordinary is this transformation, that it immediately rejects the food it greedily fed on a few days before; it would even starve if no other could be procured. When the animal acquires its perfect state, it becomes carnivorous, living entirely upon worms and insects, though before that time it fed entirely upon vegetables. These, however, are not to be found in the water; it is therefore obliged to quit its native element, and hunt after food upon land. At first it is too feeble to endure the warmth of the sun, and therefore conceals itself among bushes, and under stones; but when the earth is refreshed by a shower, they immediately quit their retreats, in order to enjoy the grateful humidity.

We shall conclude our description of the Frog, with an observation of the great Swammerdam, in his book of Nature. "As we see insects lose many parts with their old skin, this is likewise the case in the Frog; which, besides other things, plainly casts off its mouth and tail; so that, however admirable

the art, order, construction, and parts of its members may appear to be; yet the nerves, arteries, veins, cartilages, muscles, and many other remarkable parts, which gradually vanish, and are, as it were, become insensible, are destroyed at once, cease their motions, and stop their several functions, on the change. Are not these changes admirable? And do not they lay before our eyes the omnipotent hand of God, conspicuous in his inaccessible radiancy and infinite majesty? He, in this case, forms another out of one and the same animal, which, though different in appearance, yet remains one and the same creature. May not the *resurrection of the dead* be exemplified in this illustrious instance? all this is very elegantly manifested in various insects."

NATURAL HISTORY of the TOAD.

THE Toad, a well known animal; also called *rubeta, rana rubeta*. The Toad is of the frog kind, and of the number of those animals which have only one ventricle in the heart. It resembles the frog, but its belly is more inflated, and skin more full of tubercles: it is of an ash colour, with brown, blackish, and yellow spots. It does not croak like the frog; but makes an indistinct noise that is obscure, and like the word *geu*, or rather *bu*, from which some suppose it is called *bufo*. It is said to have its name *rubeta* from *rubus*, because it is often found under bramble-bushes.

The Toad, says Mr. Pennant, is the most deformed and hideous of all animals; the body broad, the back flat, and covered with a pimply dusky hide; the belly large, swagging, and swelling out, the legs short, and its pace laboured and crawling; its retreat gloomy and filthy: in short, its general appearance is such, as to strike one with disgust and horror; yet we have been told by those who have resolution to view it with attention, that its eyes are fine: to this it seems that Shakespeare alludes, when he makes his Juliet remark,

Some say the lark and loathed Toad change eyes.

As if they would have been better bestowed on so charming a songster than on this raucous reptile.

But the hideous appearance of the Toad is such, as to make this one advantageous feature overlooked, and to have rendered it, in all ages, an object of horror, and the origin of most tremendous inventions. Ælian makes its venom so potent, that, basilisk-like, it conveyed death by its very look and breath; but Juvenal is content with making the Roman ladies, who were weary of their husbands, form a potion from its entrails, in order to get rid of the good man.

To quench the husband's parching thirst, is brought

By the great dame, a most deceitful draught;
In rich Calenian wine she does infuse

(To ease his pain) the Toad's envenom'd juice.

This opinion begat others of a more dreadful nature; for in after-times superstition gave it preternatural powers, and made it a principal ingredient in the incantations of nocturnal hags:

Toad that under the cold stone,
Days and nights has thirty-one,
Swelter'd venom sleeping got,
Boil thou first i'th' charmed pot:

We know by the poet, that this charm was intended for a design of the first consideration, that of raising the dead from their repose, and bringing before the eyes of Macbeth a hateful second sight of the prosperity of Banquo's line.

This

This shews the mighty powers attributed to this animal by the dealers in the magic art; but the powers our poet endues it with, are far superior to those that Gesner ascribes to it: Shakespeare's witches used it to disturb the dead; Gesner's only to still the living.

We may add here another superstition in respect to this animal: it was believed by some old writers, to have a stone in its head, fraught with great virtues, medical and magical: it was distinguished by the name of the reptile, and called the toad-stone, bufonites, crapaudine, krottenstein; but all its fancied powers vanished, on the discovery of its being nothing but the fossil-tooth of the sea-wolf, or of some flat-toothed fish, not unfrequent in our island, as well as in several other countries; but we may well excuse this tale, since Shakespeare has extracted from it a simile of uncommon beauty:

Sweet are the uses of adversity,
Which like the Toad, ugly and venomous,
Wears yet a precious jewel in his head.

But these fables have been long exploded: we shall now return to the notion of its being a poisonous animal; and deliver, as our opinion, that its excessive deformity, joined to the faculty it has of emitting a juice from its pimples, and a dusky liquid from its hind parts, is the foundation of the report.

That it has any noxious qualities, we have been unable to bring proofs in the smallest degree satisfactory, though we have heard many strange relations on that point.

On the contrary, we know several of our friends, who have taken them in their naked hands, and held them long, without receiving the least injury: it is also well known that quacks have eaten them, and have, besides, squeezed their juices into a glass, and drank them with impunity.

We may say also, that these reptiles are a common food to many animals; to buzzards, owls, Norfolk plovers, ducks, and snakes, who would not touch them, were they in any degree noxious.

So far from having venomous qualities, they have of late been considered as if they had beneficent ones. We wish, for the benefit of mankind, that we could make a favourable report of the many attempts of late to cure the most terrible of diseases, the cancer, by the application of live toads; but alas, they seem only to have rendered a horrible complaint more loathsome.

In a word, we may consider the Toad as an animal that has neither good nor harm in it; that being a defenceless creature, nature has furnished it, instead of arms, with a most disgusting deformity, that strikes into almost every being capable of annoying it, a strong repugnancy to meddle with so hideous and threatening an appearance.

The time of their propagation is very early in the spring: at that season the females are seen crawling about oppressed by the males, who continue on them for some hours, and adhere so fast, as to tear the very skin from the parts they stick to. We are uncertain whether they are viviparous: Linnæus says they are, and diverts us with a report he had heard, that the male acts the midwife to the female in parturition.

To conclude this account with the marvellous, this animal is said to have often been found in the midst of solid rocks, and even in the centre of growing trees, imprisoned in a small hollow, to which there was not the least adit or entrance: how the animal breathed, or how it subsisted (supposing the possibility of its confinement) is past our comprehension. Plot's solution of this phenomenon is far from satisfactory; yet as we have the great Bacon's

authority for the fact, we do not entirely deny our assent to it. *British Zoology*, vol. iii. p. 7.

There is a very poisonous species in America, called cururu by the Brasilians, and capo by the Portuguese.

The common Toad was first introduced into medicine upon a cure being performed on an hydroptic person, to whom powdered Toads were given, in order to dispatch him, but he voided a large quantity of urine after taking it, and soon recovered of his disorder. Since this, Toads, gently dried and powdered, have been used as a diuretic; but the present practice is quite unconcerned with them.

In the cure of a cancer, says Etmuller, and more particularly unexulcerated cancers in the breasts of women, Toads are of singular service, either calcined alone, or dried to such a degree, that they may be reduced to a powder. The method of applying this powder, is to sprinkle it on the part affected. This powder may also be mixed with orpiment and foot, and applied, when spread, upon a pledget moistened with saliva. We are also told, that many patients labouring under epidemical dysenteries, have been happily recovered by the use of this powder, which operates as a sudorific. Some prescribe half a dram of it, and upwards, in the small-pox. D. Carlius recommends the powder of calcined Toads, mixed with the powder of blue linen cloth burnt, in epilepsies of adult persons, attended with an inspissation of the juices; and affirms, that as much of it as may be taken at twice upon the point of a small knife, has in some epileptic patients produced the most happy and surprizing effects. He also informs us that a dose from ten to twenty grains of the powder of calcined Toads, exhibited internally, wonderfully mitigates arthritic pains, and more especially those with which wounds are attended.

We have an account of two boys, who towards the latter end of a pestilential disorder, in which they had been long afflicted with carbuncles, together with an universal anasarca and dropsy, were cured by a plentiful diuresis excited by the powder of Toads, mixed with salt of wormwood, daily exhibited.

The diaphoretic virtue of this powder, by which it must of course contribute to the cure of a dropsy, was accidentally discovered, as Boecler from Solenander informs us in the following history. At Rome a certain man had the misfortune to be afflicted with a dropsy, and his wife, thinking much of the expences attending his cure, maliciously resolved to poison him; for which purpose she gave him a dose of the powder of a Toad, calcined in an earthen vessel, by which means a very plentiful discharge of urine was occasioned. But the wife, heartily wearied of so useless and expensive a husband, was exceedingly desirous to put an end to his miserable life by a sudden death. With this view, she exhibited the same powder a second time, by which means the waters were plentifully discharged by urine, and the patient cured. Thus her views were disappointed, and what was intended for a poison, happily proved a noble and efficacious medicine.

The following remarkable particulars were communicated in a letter from J. Arscott, Esq; of Tabott, in Devonshire, to Mr. Pennant. "It would give me, says he, the greatest pleasure to be able to inform you of any particulars concerning the Toad who lived for many years with us, and was so great a favourite. The greatest curiosity in it, was its becoming so remarkably tame. It had frequented some steps before the hall door, some years before my acquaintance commenced with it, and had been admired by my father for its size (which was of the largest

largest I ever met with) who constantly paid it a visit every evening. I knew it myself above thirty years, and by constantly feeding it, brought it to be so tame, that it always came to the candle, and looked up, as if expecting to be taken up and brought upon the table, where I always fed it with insects of all sorts: it was fondest of flesh maggots, which I kept in bran; it would follow them, and when within a proper distance, would fix its eye, and remain motionless for near a quarter of a minute, as if preparing for the stroke, which was an instantaneous throwing its tongue at a great distance upon the insect, which stuck to the tip by a glutinous matter: the motion is quicker than the eye can follow.

“ I always imagined that the root of its tongue was placed in the fore part of its under jaw, and the tip towards its throat, by which the motion must be a half circle; by which, when its tongue recovered its situation, the insect at the tip would be brought to the place of deglutition. I was confirmed in this, by never observing any internal motion in its mouth, excepting one swallow, the instant its tongue returned. Possibly I might be mistaken, for I never dissected one, but contented myself with opening its mouth, and slightly inspecting it.

“ You may imagine that a Toad, generally detested (although one of the most inoffensive of all animals) so much taken notice of and befriended, excited the curiosity of all comers to the house, who all desired to see it fed; so that even ladies so far conquered the horrors instilled into them by nurses, as to desire to see it. This produced innumerable and improbable reports, making it as large as the crown of a hat, &c. &c. This I hope will account for my not giving you particulars more worth your notice. When I first read the account in the papers of Toads sucking cancerous breasts, I did not believe a word of it, not thinking it possible for them to suck, having no lips to embrace the part, and a tongue so oddly formed; but as the fact is thoroughly verified, I most impatiently long to be fully informed of all particulars relating to it.”

Mr. Arscott, in a second letter to the same gentleman, mentions among others, the following additional particulars, in answer to some queries proposed by him. “ I cannot say how long my father had been acquainted with the Toad, before I knew it; but when I first was acquainted with it, he used to mention it as the old Toad I've known so many years; I can answer for thirty-six years.

“ No Toads that ever I saw appeared in the winter season. The old Toad made its appearance as soon as the warm weather came, and I always concluded it retired to some dry bank to repose till the spring. When we new-laid the steps, I had two holes made in the third step on each, with a hollow of more than a yard long for it, in which I imagine it slept, as it came from thence at its first appearance.

“ It was seldom provoked: neither that Toad (nor the multitudes I have seen tormented with great cruelty) ever shewed the least desire of revenge, by spitting or emitting any juice from their pimples.

“ A Toad has no particular enmity for the spider.

“ I hardly remember any persons taking it up, except my father and myself: I do not know whether it had any particular attachment to us.

“ In respect to its end, I answer this last query. Had it not been for a tame raven, I make no doubt but it would have been now living; who one day seeing it at the mouth of its hole, pulled it out, and, although I rescued it, pulled out one eye, and hurt it so, that notwithstanding its living a twelve-month, it never enjoyed itself, and had a difficulty

of taking its food, missing the mark for want of its eye. Before that accident, it had all the appearance of perfect health.”

It is said, that cancerous complaints may be cured by a Toad. It is, however, certain, great relief has been obtained by that animal's sucking a cancerous breast. The whole of the animal, except its head, is put into a linen bag, and the head is held to the part. It generally seizes the foulest part of the sore in an instant, and sucks with greediness, till it drops off dead. It frequently happens, that the creature swells immensely. Some have lived above a quarter of an hour after sucking; others much longer. Some have been known to suck upwards of four hours, and then dropped dead from the wound, swelled exceedingly, and turned of a pale colour. During the time of their sucking, they are heard to smack their lips like a young child.

NATURAL HISTORY of the PIPAL, or SURINAM TOAD.

THE form of this animal is even more hideous than that of the common Toad: the body is flat and broad; the head small; the skin of the neck forms a kind of wrinkled collar; the colour of the head is of a dark chestnut; and the eyes are small: the back is of a lightish grey, and seems covered with a number of small round eyes, placed at nearly equal distances. These eyes are very different from what they seem; for they are the animal's eggs, covered with their shells, and placed there for hatching. These eggs are buried deep in the skin, and hardly appear in the beginning of incubation; but they are very visible when the young animal is about to burst from its confinement. Their colour is a yellowish red, and the spaces between them are full of small warts, resembling pearls. In all nature, there is not perhaps a more extraordinary phenomenon, than that of an animal breeding and hatching its young in its back; from whence, when arrived at maturity, they crawl out one after the other. This animal, like the rest of the frog kind, is most probably harmless; though we are told of terrible effects resulting from its powder when calcined.

NATURAL HISTORY of the NATTER JACK.

THIS animal neither leaps, nor crawls with the slow pace of the toad, but its motion rather resembles running. The upper part of the body is of a dirty yellow, clouded with brown: it is covered with porous pimples of unequal sizes. The Natter Jack has a yellow line on the back: it has four divided toes on the fore feet, and five on the hind feet a little webbed. It frequents dry and sandy places.

Of LIZARDS in General.

IT is difficult to say to what class in nature Lizards are chiefly allied. They cannot properly be raised to the rank of beasts as they bring forth eggs, dispense with breathing, and are not clothed with hair. They cannot be ranked with fishes, as the majority of them live upon land: their feet, upon which they run with great celerity, exclude them from the serpent tribe; and they cannot be placed among insects, on account of their size. But, tho' the Lizard is in some measure excluded from every rank, it exhibits somewhat of the properties of all: it has the legs and celerity of the quadruped; the facility of creeping through narrow and intricate ways,

ways, like the serpent; and the power of living in the water like the fish.

Lizards not only differ from every other class of animals, but they also differ widely from each other: with respect to size, no class of beings has its ranks so opposite. What can be more removed than the small cameleon of an inch long, and the alligator above twenty-seven feet. Their colour is also very various: they are found of a green, blue, red, chestnut, yellow, spotted, streaked, and marbled. If colour alone could constitute beauty, the Lizard would often please; but there is something so repelling in its figure, that the brilliancy of its scales, or the variety of its spots, cannot make it a desirable object to behold.

But animals of the Lizard kind, are principally distinguished by the manner of bringing forth their young. The crocodile, the iguana, and all the larger kinds, bring forth eggs, which are hatched by the heat of the sun: their produce are complete upon leaving the shell; and their first efforts are to run to seek food in their proper element. The viviparous kinds, in which are all the salamanders, are produced alive by the female, perfect and active, and suffer no succeeding change. But those which are bred in the water, suffer a very considerable change in their form. They are produced with an external skin or covering, which sometimes encloses their feet, and gives them a serpentine appearance. Above and below their tail, fins are added to this false skin, that serve the animal for swimming; these, and the false skin, drop off together; and the lizard has four feet, is completely formed, and forsakes the water.

The three kinds, however, have many points of similitude: they have all four short legs: they have tails which are thick at the beginning, and run tapering to a point: they are all amphibious, and equally capable of living upon land and in the water; and they are all formed internally in the same manner as the tortoise, and other animals that can continue a long time without respiration.

NATURAL HISTORY of the CROCODILE.

THIS animal is placed at a happy distance from the inhabitants of Europe. To look for the Crocodile in all its natural terrors, grown to an enormous size, and committing unceasing devastations, we must go to the uninhabited regions of Africa, and America. In the river Amazons, or the river Niger, they are found from eighteen to twenty-seven feet in length; and sometimes lying as close to each other, as a raft of timber in the Thames.

Of this animal there are two kinds; the Crocodile, properly so called, and the cayman or alligator. Travellers, however, have rather made the distinction than nature; for in the general outline, and in the nature of these two animals, they are entirely the same. It would be speaking more properly to call these animals, the Crocodiles of the eastern and the western world; for in books of voyages, they are so entirely confounded together, that there is no knowing whether the Asiatic animal be the Crocodile of Asia, or the alligator of the western world. The usual distinctions between the Crocodile and alligator are these: the body of the Crocodile is more slender than that of the alligator; its snout runs off tapering from the forehead, like that of a greyhound; while that of the other is indented like the nose of a lap-dog. The Crocodile has a much wider swallow, and is of an ash colour; the alligator is black, varied with white, and is said to be less mischievous.

The Crocodile grows to a great length, some-

times exceeding thirty feet long, from the tip of the snout to the end of the tail: its most usual length, however, is eighteen. They are seen in some places lying for whole hours, and even days stretched in the sun and motionless; so that a person unacquainted with the sight, might mistake them for trunks of trees, covered with a rough and dry bark; but the mistake would soon be fatal, if not prevented: for the torpid animal at the near approach of any living thing, darts upon it with instant swiftness, and at once drags it down to the bottom. In the times of an inundation they sometimes enter the cottages of the natives, where the dreadful visitant seizes the first animal it meets with. There have been several examples of their taking a man out of a canoe in the sight of his companions, without their being able to afford him the least assistance.

Every part of the Crocodile is remarkably strong; and its arms both offensive and defensive are irresistible. We have seen, from the shortness of its legs, the amazing strength of the tortoise: but how insignificant is the strength of such an animal, compared to that of the Crocodile, whose legs are very short, and whose size is so superior? The backbone is jointed in the firmest manner; the muscles of the fore and hinder legs are vigorous and strong; and its whole form finely calculated for force. Its teeth are sharp, numerous, and formidable; its claws are long and tenacious; but its principal instrument of destruction is the tail; with a single blow of which it has frequently overturned a canoe; and seized upon the poor savage who was the conductor of it.

Though less powerful upon land, the Crocodile is terrible even there. It seldom leaves the water, except when pressed by hunger, or with a view of depositing its eggs. It usually floats along upon the surface, and seizes whatever animals come within its reach; but when this method fails, it then goes nearer to the bank. Disappointed of its fishy prey, it there waits covered up among the sedges, in patient expectation of some land animal that comes to drink; the dog, the bull, the tiger, or man himself. Nothing is to be seen of the insidious destroyer as the animal approaches; nor is its retreat discovered till it be too late to escape its fury. It seizes the victim with a spring, and goes at a bound much faster than so unweildy an animal could be thought capable of exerting; then having secured the creature with both teeth and claws; it drags it into the water, sinks with it to the bottom, and drowns it in an instant.

The animal which the Crocodile has thus surprised, sometimes, indeed, escapes from its grasp, wounded, and makes off from the river-side. The tyrant, however, pursues with all its force, and often seizes it a second time. Thus it is frequently seen above half a mile from the bank, in pursuit of some animal, which it has wounded beyond the power of escaping, and then dragging it back to the shore, where it feasts in security.

In its depredations along the bank, the Crocodile sometimes seizes on a creature as formidable as itself, and meets with a most desperate resistance. Frequent combats happen between the Crocodile and the tiger. Creatures of the tiger kind are continually oppressed by a parching thirst, which keeps them always in the vicinity of great rivers, whither they descend to drink very frequently. Upon these occasions they are seized by the Crocodile; and they die not unrevenged. The instant they are seized upon, they turn with the greatest agility, and force their claws into the Crocodile's eyes, while he plunges with his fierce antagonist into the river. There they continue to struggle for some time, till at last the tiger is drowned.

The

The Crocodile thus seizes and destroys every animal, and is equally dreaded by all. Man alone can combat it with success. Labat assures us, that a negro, with no other weapons than a knife in his right hand, and his left arm wrapped round with a cow's hide, ventures boldly to attack this animal in its own element. As soon as he approaches the Crocodile, he presents his left arm, which the animal most greedily swallows; but sticking in its throat, the negro has time to give it several stabs under the throat; and the water also getting in it at the mouth, which is held involuntarily open, the creature soon becomes swelled as large as a tun, and expires.

To those who live at a distance from the rapacity of these animals, these stories appear strange and romantic. From not having seen any thing so formidable in the circle of their own experience, they should not, however, determine upon the wonderful transactions in distant climates. It is probable that these, and many other dreadful encounters, happen every day among those forests and in those rivers, where the most formidable animals are known to reside; where the elephant and the rhinoceros, the tiger and hippopotame, the shark and the Crocodile, have frequent opportunities of meeting, and renewing their engagements.

Crocodiles are taken by the Siamese in great abundance. The natives of that empire are particularly fond of the capture of all the great animals with which their country abounds. The manner of taking the Crocodile in Siam, is by throwing three or four strong nets across a river, at proper distances from each other; so that if the animal breaks through the first, it may be caught by one of the rest. When it is first taken, it employs the tail with great force; but after many unsuccessful struggles, the animal's strength becomes exhausted. Then the natives approach their prisoner in boats, and pierce him with their weapons in the most tender parts till he is weakened with the loss of blood. When he has done stirring, they begin by tying up his mouth, and with the same cord they fasten his head to his tail, which last they bend back like a bow. However, they are not yet perfectly secure from his fury; but, for their greater safety, they tie his fore-feet, as well as those behind, to the top of his back. These precautions are not useless; for if they were to omit them, the Crocodile would soon recover strength enough to do considerable mischief.

The Crocodile thus brought into subjection, or bred up young, is used to divert and entertain the great men of the East. It is often managed like an horse; a curb is put into its mouth, and the rider directs it as he thinks proper. Though awkwardly formed, it proceeds with some degree of swiftness; and is thought to move as fast as some of the most unweildy of our own animals, the hog or the cow. Some, indeed, assert that no animal could escape it, but for its difficulty in turning; but to this resource we could wish none would trust, who are so unhappy as to find themselves in danger.

In the rivers of Africa the Crocodile is sometimes taken in the same manner as the shark. Several Europeans go together in a large boat; and throw out a piece of beef upon a hook and strong fortified line, which the Crocodile seizing and swallowing, is drawn along, floundering and struggling till its strength is quite exhausted, when it is pierced in the belly, which is its tenderest part; and thus after numberless wounds is drawn ashore. In this part of the world also, as well as at Siam, this animal makes an object of savage pomp near the palaces of their monarchs. Philips informs us, that at Sabi, on the slave coast, there are two pools of wa-

ter near the royal palace, where Crocodiles are bred as we breed carp in our European ponds.

Hitherto we have described the Crocodile as it is found in unpeopled countries, and undisturbed by frequent encounters with mankind. In this state it is fierce and cruel, attacking every object that seems endued with motion: but in Egypt, and other countries long peopled, where the inhabitants are civilized and the rivers frequented, this animal is solitary and timid. Instead of coming to attack a man, it sinks at his approach with the utmost precipitation; and, as if sensible of superior power, ever declines the engagement. We have many instances, in animated nature, of the contempt which at first the lower orders of the creation have for man, till they have experienced his powers of destruction. The lion and the tiger among beasts, the whale among fishes, the albatross and the penguin among birds, meet the first encounters of man without dread or apprehension; but they soon learn to acknowledge his superiority; and take refuge from his power in the deepest recesses of nature. This may account for the different characters which have been given us of the Crocodile and the alligator by travellers at different times: some describing them as harmless and fearful, as ever avoiding the sight of a man, and preying only upon fishes; others ranking them among the destroyers of nature; describing them as furnished with strength, and impelled by malignity to do mischief; representing them as the greatest enemies of mankind; and particularly desirous of human prey. The truth is, the animal has been justly described by both; being such as it is found in places, differently peopled or differently civilized. Wherever the Crocodile has reigned long unmolested, it is fierce, bold, and dangerous; wherever it has been harrassed by mankind, its retreats invaded, and its numbers destroyed, it is there timorous and inoffensive.

Instead of being formidable; this animal in some places is not only inoffensive, but is cherished and admired. In the river San Domingo, the Crocodiles are the most inoffensive animals in nature; the children play with them, ride about on their backs, and even beat them sometimes without receiving the smallest injury. The inhabitants indeed are very careful of this gentle-breed, and consider them as harmless domestics.

It is perhaps the smell of musk, which all these animals exhale, that renders them agreeable to the savages of that part of Africa. They are often known to take the part of this animal which contains the musk; and wear it as a perfume about their persons. Travellers are not agreed in what part of the body these musk-bags are contained; some say in the ears; some, in the parts of generation; but the most probable opinion is, that this musky substance is amassed in glands under the legs and arms. From whatsoever part of the body this odour proceeds, it is very strong and powerful, tincturing the flesh of the whole body with its taste and smell. This animal's flesh is at best very indifferent eating; but unless the musk-bags be separated it is insupportable. The negroes themselves cannot well digest the flesh; but they consider a Crocodile's egg as the most delicate morsel in the universe.

Crocodiles always breed near fresh waters; and though they are sometimes found in the sea, yet that may be considered rather as a place of excursion than abode. They produce their young by eggs; for which purpose the female, when she comes to lay, chuses a place by the side of a river, or some fresh-water lake, to deposit her brood in. She always pitches upon an extensive sandy shore. The shore must also be gentle and shelving to the water,
for

for the greater convenience of the animal's going and returning; and a convenient place must be found near the edge of the stream, that the young may have a shorter way to go. When all these requisites are adjusted, the animal is seen cautiously stealing up on shore to deposit her burden. The presence of a man, a beast, or even a bird, is sufficient to deter her at that time; and if she perceives any creature looking on, she infallibly returns. But if nothing appears, she begins scratching up the sand with her fore paws, and making a deep hole in the shore. There she deposits from eighty to an hundred eggs, of the size of a tennis-ball, and of the same figure, enclosed in a tough white skin like parchment. She takes above an hour to perform this task; and then covering up the place so artfully that it can scarcely be perceived, she goes back to return again the next day. On her return, she lays about the same number of eggs; and as many the day following. Thus having deposited her whole quantity, and having covered them close up in the sand, they are soon vivified by the heat of the sun; and at the end of thirty days, the young ones begin to break open the shell. The female is then instinctively taught that her young ones require relief; she therefore goes up on land to scratch away the sand, and set them at liberty. They soon avail themselves of their liberty; a part run unguided to the water; and another part ascend the back of the female, and are carried thither in greater safety. But the moment they arrive at the water, all natural connection ceases: when the female has introduced her young to their natural element, she and the male become among the number of their most formidable enemies, and devour as many of them as they can. The whole brood scatters into different parts at the bottom; and by far the greatest number are destroyed.

It is not the Crocodile alone, however, that is thus found to thin their numbers; the eggs of this animal are not only a delicious feast to the savage, but are eagerly sought after by every beast and bird of prey. The ichneumon was erected into a deity among the ancients, for its success in destroying the eggs of these monsters: at present that species of the vulture called the gallinazo is their most prevailing enemy. All along the banks of great rivers; for thousands of miles; the Crocodile is seen to propagate in numbers that would soon over-run the earth, but for the vulture, which seems appointed by Providence to abridge its fecundity. These birds are ever found in greatest numbers where the Crocodile is most numerous; and hiding themselves within the thick branches of the trees that shade the banks of the river, they silently watch the female, and permit her to lay all her eggs without interruption. When she has retired, they encourage each other with cries to the spoil; and flocking together upon the hidden treasure, tear up the eggs, and devour them in less time than they were deposited. They are equally diligent in attending the female while she is carrying her young to the water; for if any one of them happens to drop by the way, it is sure to receive no mercy.

To what age the Crocodile lives we are not certainly informed; Aristotle says, it lives the age of man: but the ancients so much amused themselves in inventing fables concerning this animal, that even truth from them is suspicious. What we know for certain from the ancients is, that among the various animals that were produced to fight in the amphitheatre at Rome, the combat of the Crocodile was not wanting. Marcus Scaurus produced them living in his unrivalled exhibitions; and the Romans considered him as the best citizen, because he furnished them with the most expensive entertainments.

NATURAL HISTORY of the SALAMANDER.

AS the ancients saw the earth, the air, and water inhabited, fancy was set to work to form an inhabitant of fire; and thus to people every part of nature. They have described a lizard that is bred from heat, that lives in the flames, and feeds upon fire as its proper nourishment. It is universally known, however, that there is no such animal existing.

The modern Salamander, as already observed, is an animal of the lizard kind, and a large tribe is comprehended under this name. Seven sorts of Salamanders have been described by Seba; and if we suppose the tail of a lizard applied to the body of a frog, we shall form a tolerable idea of their figure. The common lizard is long, small, and taper; the Salamander, like the frog, has its eyes towards the back of the head; but it differs more from the lizard tribe in its nature and conformation than in its figure. The Salamander is an heavy torpid animal; the lizard tribe are active, restless, and ever in motion.

The Salamander, and many others of the lizard tribe, are said to have venom; but it is certain that all with which we are acquainted in this country, are perfectly harmless; and it is equally true, that, for a long time, till our prejudices were removed, we considered not only the newt, but the snake and the blind-worm, as fraught with the most destructive poison. At present we have got over these prejudices; and, it is probable, that, if other nations made the same efforts for information, it would be found, that the malignity of most, if not all, of the lizard tribe, was only in the imagination.

The whole tribe of Salamanders, from the moron to the gekko, are said to be venomous to the last degree; yet, when experiments have been tried, no arts, no provocations, could excite these animals to the rage of biting. They seem timid and inoffensive, feeding only upon worms and insects; quite destitute of fangs, like the viper; their teeth are so very small, that they are hardly able to inflict a wound. But as the teeth are thus incapable of offending, the people of the countries where they are found have recourse to a venomous flaver, which, they suppose, issues from the animal's mouth; they also tell us of a venom issuing from the claws: even Linnæus seems to acknowledge the fact; but thinks it a probable supposition, that this venom may proceed from their urine.

The gekko is the most notorious for its powers of mischief: yet, we are told by those who load it with that calumny, that it is very friendly to man, and though supplied with the most deadly virulence, is yet never known to bite. It would be absurd in us, without experience, to pronounce upon the noxious or inoffensive qualities of animals: yet it is most probable, from an inspection of the teeth of lizards, and from their inoffensive qualities in Europe, that the gekko has been unjustly accused; and that its serpent-like figure has involved it in one common reproach with serpents.

The Salamander best known in Europe, is from eight to eleven inches long; usually black, spotted with yellow; and when taken in the hand feeling extremely cold. There are several kinds. Our black water newt is reckoned among the number. The idle report of its being incombustible in fire, has caused many of these poor animals to be burnt; but we cannot say as philosophical martyrs; since scarce any philosopher could think it necessary to make the experiment. When thrown into the fire, the animal is seen to burst with the heat of its situation, and to eject its fluids. We are gravely told, in the Philosophical Transactions, that this

is a method the animal takes to extinguish the flames.

The Salamander differs very little internally from other animals of the lizard kind. It is furnished with lungs that sometimes serve for the offices of breathing; with a heart that has its communications open, so that the animal cannot easily be drowned. But what deserves particular notice is the manner of this animal's bringing forth its young alive. "The Salamander begins to show itself in spring, and chiefly during heavy rains. When the warm weather returns, it disappears; and never leaves its hole, during either great heats or severe colds, both which it equally fears. When taken in the hand, it appears like a lump of ice; it consequently loves the shade, and is found at the feet of old trees, surrounded with brush-wood at the bottom. It is fond of running along new-ploughed grounds; probably to seek for worms, which are its usual food. One of these," says our author, "I took alive some years ago in a ditch that had been lately made. I laid it at the foot of the stairs upon coming home, and there it disgorged from the throat a *worm* three inches long, that lived for an hour after, though wounded as I suppose by the teeth of the animal. I afterwards cut up another of these lizards, and saw not less than fifty young ones, resembling the parent, come from its womb, all alive, and actively running about the room." It were to be wished the author had used another word beside that of *worm*; as we now are in doubt whether he means a real worm, or a young animal of the lizard species: had he been more explicit, and had it appeared that it was a real young lizard, which we take to be his meaning, we might here see a wonder of nature, brought to the proof which many have asserted, and many have denied. We mean the refuge which the young of the shark, the lizard, and the viper kinds, are said to take, by running down the throat of the parent, and there finding a temporary security. The fact, indeed, seems a little extraordinary; and yet it is so frequently attested by some, and even believed by others, whose authority is respectable, among the number of whom we find Mr. Pennant, that the argument of strangeness must give way to the weight of authority.

There is no doubt, however, of the animal's being viviparous, and producing above fifty at a time. They are produced in full perfection, and quickly leave the parent to shift for themselves. These animals, in the lower ranks of nature, want scarce any help when excluded; they soon complete the little circle of their education; and in a day or two are capable of practising all the arts of subsistence and evasion practised by their kind.

They are all amphibious, or at least are found capable of subsisting in either element, when placed there; if those taken from land are put into water, they continue there in seeming health; and, on the contrary, those taken from the water will live upon land. In water, however, they exhibit a greater variety in their appearance; and what is equally wonderful with the rest of their history, during the whole spring and summer this water lizard changes its skin every fourth or fifth day; and during the winter every fifteen days. This operation they perform by means of the mouth and the claws; and it seems a work of no small difficulty and pain. The cast skins are frequently seen floating on the surface of the water: they are sometimes seen also with part of their old skin still sticking to one of their limbs, which they have not been able to get rid of. This also often corrupts, and the leg drops off; but the animal does not seem to feel the want of it, for the loss of a limb to all the lizard kind is but a trifling calamity. They can live several hours even after the loss of their head; and for some time,

under dissection, all the parts of this animal seem to retain life; but the tail is the part that longest retains its motion. Salt seems to be much more efficacious in destroying these animals, than the knife; for, upon being sprinkled with it, the whole body emits a viscous liquor, and the lizard dies in a few minutes, in great agonies.

The lizard kind are also tenacious of life in another respect, and the Salamander among the number. They sustain the want of food in a surprising manner. One of them, brought from the Indies, lived nine months, without any other food than what it received from licking a piece of earth on which it was brought over: another was kept by Seba in an empty vial for six months, without any nourishment; and Redi talks of a large one, brought from Africa, that lived eight months without taking any nourishment whatever. Indeed, as many of this kind, both Salamanders and lizards, are torpid, or nearly so, during the winter, the loss of their appetite for so long a time is the less surprising.

NATURAL HISTORY of the SCALY LIZARD.

THE length of this animal, from the nose to the hind legs, is about three inches; and from thence to the end of the tail, three inches and three quarters. It has a black list along the back, and a brown one on each side; beneath that it has a broad black one. The belly is yellow, and the scales large and even. The scales on the back are small, varied with black and brown. The legs and feet are dusky, each foot having five toes furnished with claws. This species is extremely nimble: in hot weather it is frequently seen basking on the sides of dry banks or old trees; but, on being observed, it immediately retreats to its hole. The food of this and every other species of English Lizards, is insects. All the Lizards of this country are perfectly harmless; it is their form only that disgusts us, and has occasioned them to be represented in an unfavourable light.

The WARTY LIZARD.

This animal is six inches and an half in length, of which the tail is about three inches and a quarter. The iris of the eye is yellow. The head and part of the back is flat, of a dark dusky colour, and covered with small pimples or warts: the sides are covered with white warts: the belly is of a bright yellow, spotted with black. The fore-feet are divided into four toes; the hind feet with five; they are all dusky, spotted with yellow, and without nails. The pace of this Lizard is slow and crawling.

The GREEN LIZARD.

The Green Lizard is so called from its colour, and it is larger than the common sort. It delights in warm countries, and is very common in Italy. They are found on trees in the summer-time, where they make a noise like the croaking of frogs.

The BROWN LIZARD.

This species is about three inches long; the body is slender; the tail long, small and taper. The upper part of the body is of a pale brown, marked on each side of the back with a narrow black line, extending to the end of the tail. The belly is of a pale yellow, marked with small dusky spots.

There is a species called the snake-shaped Lizard, which seems to be of that kind which connects the serpent and Lizard genus, having a long slender body, and very small legs.

The

The TARANTALA LIZARD.

This animal is very common near Naples and Rome: it has a rough skin of an ash colour, and is thicker and more fleshy than other Lizards. It usually haunts the ruins of old buildings, and walls; and has a very disagreeable aspect, striking the beholders with a kind of dread. When Mr. Ray first saw one, he says he shuddered as it were by instinct. It is however said, that it is perfectly harmless, and the horror with which it affects mankind, is principally owing to its ugliness and filthy aspect.

NATURAL HISTORY of the TARAQUINA.

THIS animal, which is a Brazilian Lizard, is about a foot in length. The body is round, and covered with triangular ash coloured scales. It delights in gardens, and to be near houses: when it sees any thing, it nods the head in a very surprising manner; and runs nimbly from place to place, making strange motions with its body. It is said, that when this animal sees a man sleeping, and a serpent, or any other venomous animal coming near him, it never fails to wake him that he may avoid the danger.

The Ameiva, which is a Lizard of South America, is in all respects like the former, except that it has a forked tail.

NATURAL HISTORY of the IGUANA.

THE length of this animal is about five feet, and the body is about as thick as a man's thigh: the skin is covered with small scales, like those of a serpent; and the back is furnished with a row of prickles, that stand up, like the teeth of a saw: the eyes seem to be but half opened, except when the animal is angry, and then they appear large and sparkling: both the jaws are full of very sharp teeth, and the bite is dangerous though not venomous, for it never quits its hold till it is killed. The male has a skin hanging under his throat, which reaches down to his breast; and, when displeased, he puffs it up like a bladder: he is one third larger and stronger than the female; tho' the strength of either avails them little towards their defence. The males are ash coloured, and the females green.

The flesh of the Iguana may be considered as the greatest delicacy of Africa and America; and the sportsmen of those climates go out to hunt it as we do in pursuit of the pheasant or the hare. In the beginning of the season, when the great floods of the tropical climates are past away, and vegetation starts into universal verdure, the sportsmen are seen, with a noose and a stick, wandering along the sides of the rivers, to take the Iguana. This animal, though apparently formed for combat, is the most harmless creature of all the forest; it lives among the trees, or sports in the water, without ever offering to offend; there, having fed upon the flowers of the mahot, and the leaves of the mapou, that grow along the banks of the streams, it reposes upon the branches of the trees that hang over the water. Upon land the animal is swift of foot; but when once in possession of a tree, it seems conscious of the security of its situation, and never offers to stir. There the sportsman easily finds it, and as easily fastens his noose round its neck: if the head be placed in such a manner that the noose cannot readily be fastened, by hitting the animal a blow on the nose with the stick, it lifts the head, and offers it in some measure to the noose. In this manner, and also by the tail, the Iguana is dragged

from the trees, and killed by repeated blows on the head.

NATURAL HISTORY of the CAMELEON.

THIS little animal, like the crocodile, proceeds from an egg; and it also nearly resembles that formidable creature in form; but it differs considerably in its size and its appetites; it is not above eleven inches long, and delights to sit upon trees, being afraid of serpents, from which it is unable to escape on the ground. The head of a large Cameleon is almost two inches long; and from thence to the beginning of the tail, four and an half; the tail is five inches long, and the feet two and an half; the thickness of the body is different at different times; for sometimes, from the back to the belly, it is two inches, and sometimes but one; for it can blow itself up, and contract itself, at pleasure. This swelling and contraction is not only of the back and belly, but of the legs and tail.

These tumours do not proceed from a dilatation of the breast in breathing, which rises and falls by turns, but are very irregular, and seem adopted merely from caprice. The Cameleon is often seen, as it were, blown up for two hours together; and then it continues growing less and less insensibly; for the dilatation is always quicker and more visible than the contraction. In the contracted state, the animal appears extremely lean; the spine of the back seems sharp, and all the ribs may be numbered, the tendons of the legs and arms may also be seen very distinctly.

This method of puffing itself up is similar to that in pigeons, whose crops are sometimes greatly distended with air. The Cameleon has a power of driving the air it breathes over every part of the body, but it only gets between the skin and the muscles; for the muscles themselves are never swollen. The skin is very cold to the touch: and tho' the animal seems so lean, there is no feeling the beating of the heart. The surface of the skin is unequal, and has a grain not unlike shagreen, but very soft; because each eminence is as smooth as if it were polished. Some of these little protuberances are as large as a pin's head, on the arms, legs, belly and tail; but on the shoulders and head they are of an oval figure, and a little larger: those under the throat are ranged in the form of a chaplet, from the lower lip to the breast. The colour of all these eminences, when the Cameleon is at rest in a shady place, is of a bluish grey; and the spaces between are of a pale red and yellow.

But the wonderful part of this animal's history, is when it is removed into the sun. At first it appears to suffer no change of colour, its greyish spots still continuing the same; but the whole surface soon appears to imbibe the rays of light; and the simple colouring of the body changes into a variety of beautiful hues. Wherever the light comes upon the body, it is of a tawny brown; but that part of the skin on which the sun does not shine, changes into several brighter colours, pale yellow, or vivid crimson; which form spots of half the size of a man's finger; some of these descend from the spine half way down the back; and others appear on the sides, arms, and tail. When the sun ceases to shine, the original grey colour returns by degrees, and covers all the body. Sometimes the animal becomes all over spotted with brown spots, of a greenish cast. When wrapped up in a white linen cloth for two or three minutes, the natural colour becomes much lighter; but not quite white, as some authors have pretended: however, from hence it must not be concluded, that the Cameleon assumes the colour of the objects which it approaches; this

S E R P E N T S .

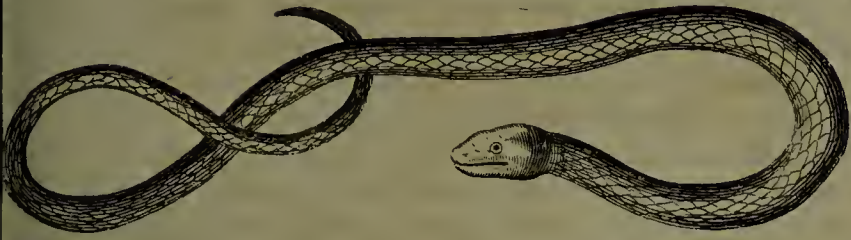
AMERICIMA or Brazilian Lizard



ASP



BOYUNA



CAMELEON



LACERTA Squamosa



LACERTA Chalcidica or SEPS



Lacerta Palustris

SALAMANDRA aquatica or warty Lizard



LACERTA viridis



LACERTA vulgaris or Brown Lizard



NATRIX or Ringed Snake



SIREN



SLOW worm or Blind worm



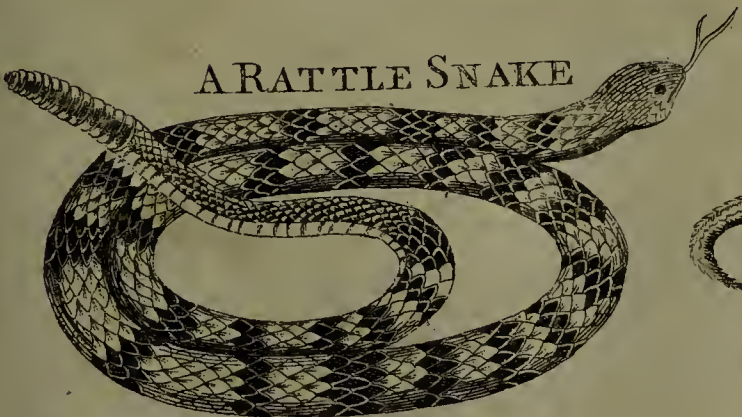
Blood SNAKE or Hemorrhoids



Coriaceous TORTOISE



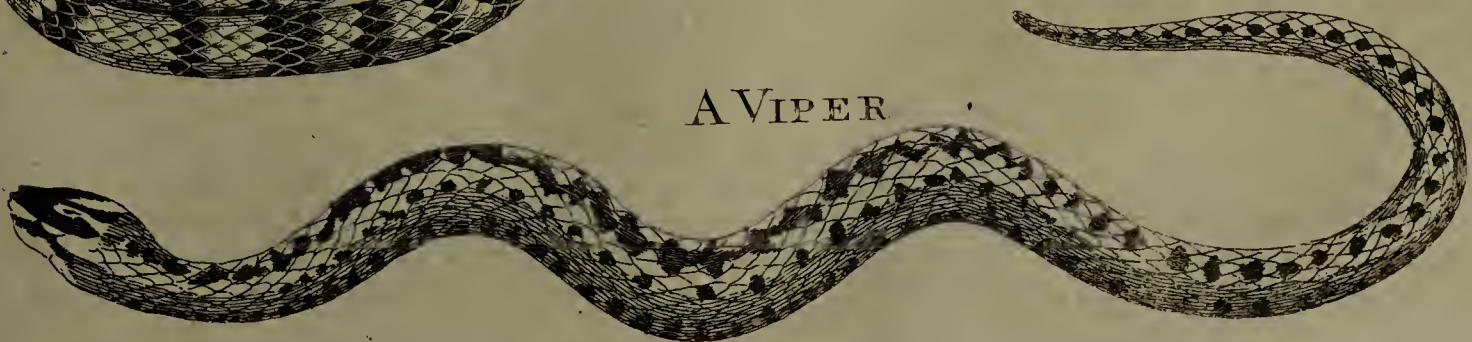
A RATTLE SNAKE



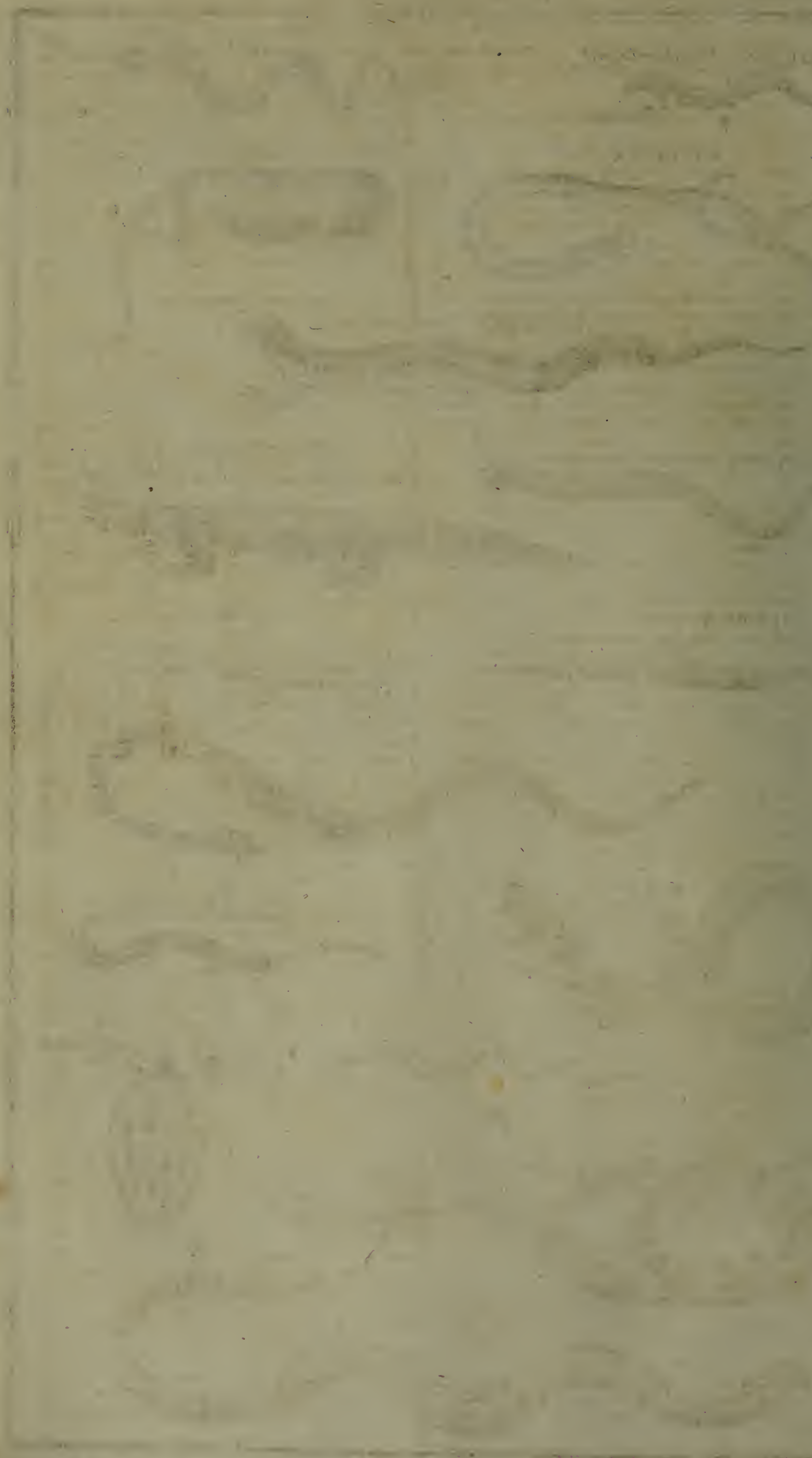
TARANTULA



A VIPER



Eastgate sculp.



is entirely an error, and probably has taken its rise from the continual changes it appears to undergo.

An ample description of the Cameleon is given us by Le Bruyn, in his voyage to the Levant. During his abode at Smyrna, he bought several of this kind, and, to try how long they could live, kept four of them in a cage, permitting them at times to run about the house. The fresh sea breeze seemed to give them most spirits and vivacity; they opened their mouths to take it in: he never saw them eat any thing, except now and then a fly, which they took half an hour to swallow: he observed their colour frequently change, three or four times successively, without being able to find out any cause for such alterations: their common colour he found to be grey, or rather a pale mouse-colour; but its most frequent changes were into a beautiful green, spotted with yellow: sometimes the animal was marked all over with dark brown; and this often changed into a lighter brown: some colours, however, it never assumed; and, contrary to what was said above, he found red to be among the number.

Tho' he was particularly careful, he was unable to preserve any of them alive above five months; and many of them died in four. When the Cameleon changes place, and attempts to descend from an eminence, it moves with the utmost precaution, advancing one leg very deliberately before the other, till securing itself by holding whatever it can grasp by the tail. It seldom opens the mouth, except for fresh air; and when that is supplied, discovers its satisfaction by its motions, and the frequent changes of its colour. The tongue is sometimes darted out after its prey, which is flies; and this is as long as the whole body. The eyes are remarkably little, though they stand out of the head: they have a single eye-lid, like a cap with a hole in the middle, thro' which the sight of the eye appears, which is of a shining brown; and round it there is a little circle of a gold colour: but the most extraordinary part of their conformation is, that the animal often moves one eye, when the other is entirely at rest; nay, sometimes one eye will seem to look directly forward, while the other looks backward; and one will look downwards, while the other looks into the air.

NATURAL HISTORY of the VIPER.

THIS animal differs from other serpents, in moving more slowly, in never bounding or leaping, and in bringing its young to perfection before they are excluded. The females of other serpents lay eggs, which are either hatched by the heat of the sun, or in the place of the retreat.

Vipers are found in many parts of this island, particularly in the dry, stony, and chalky countries. Providence is extremely kind in not suffering this species to be prolific, more than ten or eleven eggs being seldom found in one Viper: these are about the size of a blackbird's egg, and appear as if they were chained together.

The Viper seldom exceeds two feet in length, though they are sometimes found very little short of three feet. The ground colour is a dirty yellow; that of the female of a deeper yellow. Its back is marked with a kind of chain of black spots, touching each other at the points. A little below is another row of blackish spots, and on the lower part of the sides there is a line consisting of little white spots, and then another of black, which are larger. The head is inflated, which distinguishes it from the common snake. The tongue is forked; the teeth small; the four canine teeth are placed two on each side of the upper jaw; the instruments of poison are

long, crooked, and moveable; and can be raised and depressed at pleasure: they are hollow from near the point to their base, and the action which gives the wound, forces the fatal juice into it, thro' the tooth.

Vipers generally cast their skins twice a year, and the succeeding ones always appear brighter and more beautiful, than those which they have quitted. Soon after this another skin begins to be formed; so that it may be said always to have a double skin. When the skin is taken off, and the Viper cut into several pieces, it will remain alive for several hours, and the head is always ready to bite; nor will the bite be less dangerous than at another time. Vipers do not, like other serpents, make holes in the earth; but usually hide themselves under stones, or the ruins of old houses. In fine weather, however, they are frequently found in tufts of grass, and among bushes.

This animal is said not to arrive at its full growth, in less than six or seven years; but it is capable of engendering at three.

The tongue of the Viper consists of two long fleshy round bodies, which terminate in sharp points, and are very pliable. It is about an inch and an half in length, and its root is strongly connected to the neck by two tendinous bodies, near a quarter of an inch in length. The tongue of some Vipers has three or four points; and, though they are often darted out, they do no injury, except that of terrifying those that behold them; for they principally serve to catch the small animals on which the Viper feeds.

We are assured, from good authority, that the young of the Viper, when terrified, will run down the throat of the parent, and seek shelter in its belly, in the same manner as the young of the opossum, retire into the ventral pouch of the old one. Hence it has been imagined by some, that the Viper is so unnatural as to devour its own young.

These animals, when at liberty, remain torpid throughout the winter; but when they have been confined, they have never been observed to take their annual repose.

Aretæus, says Dr. Mead, who has most accurately described the elephantiasis, commends, as Craterus did, the eating of Vipers, instead of fish, in the same diseases. And to this purpose we remember, that as Lopez, in his relations of the kingdom of Congo, in Africa, takes notice how greedily the negroes eat adders, roasting them, and esteeming them as the most delicious food; so Dampier, also, informs us, that the natives of Tonquin, in the East-Indies, treat their friends with arrack, in which snakes and scorpions have been infused, accounting this, not only a great cordial, but also, an antidote against the leprosy, and all other sorts of poison.

The physicians in Italy and France, very frequently prescribe the broth and jelly of Vipers flesh, for much the same uses, that is, to invigorate and purify the mass of blood exhausted with diseases, or tainted with some vicious and obstinate ferment.

From all this it appears, that the main efficacy of the Viperine flesh, is, to quicken the circulation of the blood, promote its due mixture, and by this means cleanse and scour the glands of those stagnating juices, which, turning to acidity, are the origin of many, at least, of those troublesome distempers in the surface of the body, which go under the names of scrophulous, and leprous.

These good effects are owing to that penetrating, strong salt, with which the substance of these creatures, in a very great proportion, abounds; and the reason of this is from the food they live on, which are lizards, moles, &c. whose nature every one knows to be such as must necessarily, when they are dissolved

dissolved in the stomach, supply the blood with a great quantity of active and volatile parts. And herein lies the difference between the flesh of Vipers, and that of other innocent serpents, which, feeding upon grass and herbs, do not recommend themselves to us by any of those properties, which are in so eminent a degree found in the former.

Whoever reflects on what has been said on this head, will very readily acknowledge, that our physicians deal too cautiously or sparingly with a remedy, which may be applied to very good purposes, when they prescribe a few grains of the powder of dried Vipers, or make up a small quantity of their flesh in troches; whereas, if service be really to be done this way, the patient ought to eat frequently of Viper jelly, or broth; or rather, as the ancient manner was, to boil Vipers, and eat them like fish; if this food will not go down, (though really very good and delicious fare) to make use at least of wine, in which Vipers have for a long time been infused, by which we know a very obstinate lepra has been removed; or, lastly, in some cases, especially where wine is not convenient, to take good quantities of their volatile salt, in which alone the virtue of the before-named medicines principally reside.

It is worthy our observation, continues Dr. Mead, that the Viper can move the jaw-bones on one side, without moving those of the other; for they are not joined together at the extremes, as in other animals; which contrivance is very beneficial to it in the swallowing its prey; for while the teeth on one side stand unmoved; and fixed in the flesh to hold it, those on the other side are brought forward, to draw it in farther; then they keep it fast till the former jaws advance again in their turn: thus they act successively, and force the animal entire into the oesophagus, whose muscular fibres are very weak, and can help but little in the business.

The symptoms which follow upon the bite of a Viper, when it fastens either one or both its greater teeth, in any part of the body, are an acute pain in the place wounded, with a swelling, at first red, but afterwards livid, which, by degrees, spreads farther to the neighbouring parts with great faintness, and a quick, though low, and sometimes interrupted pulse, great sickness at the stomach, with bilious convulsive vomitings, cold sweats, and sometimes pains about the navel; and if the cure be not speedy, death itself, unless the strength of nature proves sufficient to overcome these disorders; and though it does, the swelling still continues inflamed for some time; nay, in some cases, more considerably upon the abating of the other symptoms, than at the beginning; and often, from the small wound, runs a sanious liquor, and little pustules are raised about it; the colour of the whole skin is changed yellow, as if the patient had the jaundice.

These mischiefs, although different climates, season of the year more or less hot, the greater or lesser rage of the Viper, the beast itself, of a larger or smaller size, and, consequently, able to communicate more or less venom, and the like circumstances, may variously heighten or abate them, yet usually discover themselves much after the same manner in all; unless the bite happen not to be accompanied with the effusion of that liquor, which is the main instrument and cause of this violent and shocking disturbance.

But before we proceed to enquire into the nature and manner of acting of this juice, it may be proper to take notice, that this is not made on purpose to be deadly and destructive to mankind; but that the true design of it is (though authors have not regarded it) to perform an office and service of so great moment to the preservation of the individual, that without it this creature could not subsist.

For Vipers live principally upon lizards, frogs,

toads, mice, moles, and the like animals, which they do not chew, but swallow down whole, and they lie in the stomach; or if that be not large enough to receive them, partly in that, and partly in the oesophagus, which is membranous, and capable of great distention, till by the salival juices of those parts, together with the help of the fibres of the stomach, and the contraction of the muscles of the abdomen, they are gradually dissolved into a fluid substance, fit for the nourishment of their bodies, which is the work of many days: this is one reason why these creatures can live so long without taking any fresh food, which they have been known to do three or four months; another is, that their blood is a grosser and more viscid fluid than that of most other animals; so that there is but a very little expence of it, by transpiration, and, consequently, less need of recruit; this not only microscopes discover, but reason teaches; because there is but very little muscular force in the stomach to comminute the food, and make a chyle of fine parts; and therefore the blood must accordingly be of a tough and clammy consistence. Besides, the heart of a Viper has properly but one ventricle, and the circulation of the blood is performed after the same manner as it is in a frog and tortoise, in which not above one-third of it passes through the lungs; on which account its communication in them by the air is proportionably lesser than in other animals. Now such a manner of feeding as this, necessarily requires that the prey should, upon the first catching, be immediately killed, otherwise it were by no means fit to be let into the stomach; for we are not to think, that the force of this part would be alone sufficient to destroy it, the subtlety of a living creature (besides the consideration of the weakness of the fibres) being in a great measure able to elude that, as indeed we every day find live animals in the stomachs of others; and therefore to do this, is the proper use both of the teeth and their poison; for which being designed and adapted, it is no wonder if the Viper, the same way by which it destroys its prey, proves sometimes mischievous to any other creature besides, when it happens to be enraged, or by any provocation stirred up to bite.

It is worth the while, says Dr. Mead, in the next place, to consider the cure of this mischief, which, without all doubt, ought to be by such external management of the wound as may immediately destroy the infused venom.

Boyle experienced an hot iron, held as near the place as the patient could possibly endure it, very effectual to this purpose: but the same method did not answer expectation, in the famous case related by Charas.

An extraordinary virtue against this and other venomous bites, is ascribed to the snake-stones brought from the East-Indies, one of which is to be presently applied to the part, and let stick till it drop off: these are said to be taken out of the head of the serpent, called by the Portuguese, cobra de capello, and to suck the poison out of the wound. Redi made trials with several of them, but found no service from any: yet Baglivi tells us of a terrible bite of a scorpion cured this way. Monsieur Charas's pigeons all died, though these were immediately clapped on, and stuck close to the wound: but Havers saw a good effect of one upon a dog, who, though severely bitten, suffered no harm; nor any farther mark of the poison, than a livid circle round the place.

In plain truth, as these celebrated stones do not seem to be what it is pretended they are, but rather factitious bodies, compounded, perhaps, of calcined bones, and some testaceous matters mixt together; so, by reason of their spongy and porous texture, they very readily adhere to any moistened part of the

the flesh, and imbibe whatsoever humidity they meet with: this their quality any one may experience, by holding one of them to the roof of his mouth: and it is upon this score that, when put into water, bubbles are raised by the air in their interstices, which some have too fondly thought to be the effects of their throwing out the venom they had sucked in.

Their make being thus, some part at least of the poisonous juice may easily be drawn out of the wound, by such an application; and yet so much of it may sometimes happen to remain in the flesh, as may make the bite however to prove mortal. And thus it fared with a pigeon, to the thigh of which, first bitten by a Viper, one of the stones was applied; for though it stuck fast to the wound, and thus saved the life for about four hours (whereas others usually died in about half an hour), yet, after this, the mortification of the part prevailed to that degree as to become fatal to the tender creature.

But our Viper catchers have a remedy far beyond all these, in which they place so great confidence, as to be no more afraid of a bite than of a common puncture, immediately curing themselves by the application of their specific.

This, though they keep as a great secret, we have, however, upon strict inquiry, found out to be no other than the *axungia viperina* presently rubbed into the wound. And to convince ourselves of its good effects, a Viper was enraged to bite a young dog in the nose; both the teeth were struck deep in; he howled bitterly, and the part began to swell. We diligently applied some of the *axungia* that was ready at hand, and he was very well the next day.

But because some gentlemen who saw this experiment were apt to impute the cure rather to the dog's spittle (he licking the wound) than to the virtue of the fat, we caused him to be bit again in the tongue, forbearing the use of our remedy, and he died within four or five hours.

At another time a like trial was made with the same success.

As this *axungia* consists of clammy and viscid parts, which are withal more penetrating and active than most other oily substances, so these, without all doubt, involve, and as it were, sheath the volatile salts of the venomous liquor, and thus prevent their shooting out into those crystalline spicula, which we have observed to be the main instruments of that deadly mischief which attends the bite.

By this means it comes to pass, that this cure, if rightly managed, is so easy and certain, as not to need the help of any internal medicines to forward it; but these however must take place where, through want of the other, the poison is spread farther, and has tainted the whole mass of blood.

Nor yet is it necessary, even in this case, to fatigue the patient with a farago of theriacs and antidotes; for the volatile salt of Vipers is alone sufficient to do the work, if given in just quantities, and duly repeated; provided moderate sweats be encouraged in bed: thus it succeeded with Monsieur Charas, and in some others we could relate; in one of which the mischief had gone so far as to induce an universal icterus.

We must remark, that since Dr. Mead wrote the treatise of poisons, from which some of these particulars relative to the Viper are extracted, a man and his wife, who made it their business to catch Vipers, came from Bath to Oxford, and from thence to London; and, after having shewn a great number of experiments, with respect to the bite of this animal, at last discovered an effectual remedy, which consists in nothing more, than chafing the part wounded with olive oil, before the fire; and, if the case should be extremely bad, wrapping the entire

affected limb in a cerate, made of white-lead, and the same oil.

We must further observe, that as the viperine poison acts by inducing a coagulation of the blood, which spreads gradually from the wounded part to the heart, of which we have seen an hundred incontestible instances; and as rubbing in the oil, prevents the coagulation, and resolves the blood already coagulated; hence, perhaps, we may account for the efficacy of unctions, so much practised by the antient physicians, especially those of the methodic sect.

The JAVAN VIPER.

This animal is covered with scales of a sea green colour, and surrounded with stripes of a dark tawny; running transversely round the body, from the head to the tail. The head is defended with large reddish scales, with two transverse stripes over the eyes. It has a red circle round the neck, and the scales on the belly are of a bright yellow, bordered on the sides with a small black line.

The VIPER of CEYLON.

It has two small eyes seated over the nostrils, and the appearance of two others, but they are only two whitish spots over the jaws, that resemble eyes. The nose is covered with large black scales, which are adorned with an undulated black and red streak. The belly is of a bright yellow, spotted with red, and furnished with whitish scales.

NATURAL HISTORY of the AMMODYTES of CEYLON.

THIS is a very large and dangerous serpent, and its mouth is furnished with a great number of sharp teeth. The eyes are large and sparkling, and on the forehead are small round scales of various colours, some of which are yellow, others red, and others of a mixture of red and black: the body, above and below, is of a whitish ash colour; and on the back are angular spots, variegated with white and brown. The scales on the upper part of the body are placed like net-work, with large meshes; and the tail is spotted with brown, ending in a bony point.

NATURAL HISTORY of the GERENDA.

THIS serpent inhabits the East Indies, where divine honours are paid to it. The skin is finely spotted, and covered with very thin scales of a yellowish ash colour, and encircled with red bands, which appear like ribbands. The head is oblong, resembling that of a hound, and is of a pale ash colour: the eyes are lively and sparkling; the teeth small and slender; and the nostrils large: the transverse scales on the belly are of a yellowish ash colour, and the small scales of a bright ash colour, spotted in the middle with a deep red. This serpent generally lies folded up. It is held in the highest veneration in Calicut and Japan, but the inhabitants of Malabar are greatly afraid of it.

NATURAL HISTORY of the GIBOYA.

THIS is the largest of all the Brazilian serpents: Leguat informs us, he has seen one fifty feet in length; and we have the concurrent testimony of missionaries and historians as a further proof. The largest of this kind that has been brought into Europe

rope did not exceed thirty-six feet in length. The most usual length, however, of this animal, is about twenty feet, and the thickness in proportion. The teeth are very small in proportion to the body, and this serpent is without venom. It lies in wait for wild animals near the paths, and when it throws itself upon one of them, it winds about it so closely, and with so much strength, that it breaks all its bones; then moistening the whole body over with its slaver, it renders it fit for swallowing whole.

NATURAL HISTORY of the BOIGUACU.

THIS serpent is the next in magnitude to the giboya, and has often been seen to swallow a goat whole. It is thickest in the middle of the body, and grows shorter and smaller towards the head and the tail. A chain of small black spots runs along the middle of the back, and extend the whole length of the animal; on each side there are large round black spots, at some distance from each other, which are white in the centre. Between these, near the belly, are two rows of smaller black spots, which run parallel to the back. In each jaw it has a double row of sharp teeth: the head is broad, and there are two prominences over the eyes. This serpent has two claws, resembling those of birds, near the extremity of the tail. It is observed by Pifo, that these serpents lie hid in the thickets, from whence they fall out unawares, and raising themselves upright on their tails, will attack both men and beasts. When exasperated, they make a loud hissing noise, and sometimes dart from the trees upon travellers, and twist themselves so closely round their bodies, as to dispatch them in a very few minutes. Condaminel, however, makes no mention of this, but he affirms that their bite is not dangerous; for though the teeth are so large as to create terror in the mind of the beholder, their bite is not attended with any other consequence, than what may proceed from an ordinary wound. This serpent is called *Cobra de Veado* by the Portuguese.

NATURAL HISTORY of the AMPHISBÆNA, or DOUBLE-HEADED SERPENT.

THIS animal is remarkable for moving along with either the head or the tail foremost, as the Greek name imports: many authors have therefore affirmed that this serpent has two heads; which cannot possibly be true, there being no such animal in nature. It is probable that this error took its rise from the thickness of its tail; for this serpent is equally thick at each end, and the colour of the skin is like that of the earth. It is rough, hard, and variously spotted. It is an inhabitant of Lybia and the island of Lemnos.

NATURAL HISTORY of the DEPONA.

THIS is a very large serpent, and is a native of Mexico. The head and jaws are very large: the mouth is armed with cutting crooked teeth. There is a broad scaly border round the mouth; and the eyes are so large as to give it a very terrible aspect. The forehead is covered with large scales, on which others, which are smaller, are curiously ranged. Each side of the belly is marbled with large square spots, of a chestnut colour, in the middle of which is a round yellow spot. This serpent avoids the sight of man, and therefore cannot do much injury.

NATURAL HISTORY of the RATTLE-SNAKE.

THIS serpent is bred only in America: the usual length is from four to five feet, but they are sometimes seen six feet in length, and as thick as a man's leg. It resembles the viper in many particulars: like that animal, it has a large head, and a small neck: it is of a dusky colour, and is furnished with fangs capable of inflicting the most terrible wounds. It has a large scale, which hangs like a pent-house over each eye. The Rattle-Snake is of an orange, tawny, and blackish colour on the back; and of an ash colour on the belly. The male may be readily distinguished from the female, by a black velvet spot on the head, and by the head being smaller and longer. But what principally distinguishes this serpent is the rattle, an instrument lodged in its tail, by which it makes such a loud rattling noise when it moves, that its approach may be known, and the danger avoided. This rattle is composed of several thin hard hollow bones, linked to each other, and rattling upon the slightest motion.

Some have asserted that this serpent acquires an additional bone every year; from whence its age may be precisely known: it is certain, however, that snakes of only a year or two old have no rattles at all, but some old ones have been found with twelve or thirteen joints.

The certain death which accrues from the terrible bite of this creature, makes a solitude wherever it is heard. It moves along with majestic rapidity; but never unprovoked attacks any thing but its prey; but when accidentally trod upon, or pursued for its destruction, it makes a most dreadful and desperate defence. It erects the tail, throws back the head, and instantly inflicts its wound: then parts, and inflicts a second wound; after which, some travellers assure us, that the animal becomes torpid and inactive, and never even attempts to make its escape.

The very instant the puncture is made, it is more painful than the sting of a bee, and this pain grows every moment more excruciating and dangerous: the limb swells; the venom reaches the head, which swells to an enormous size; the eyes are red and fiery; the heart beats quick; the pain becomes insupportable, and some expire under it in five or six hours: those of strong constitutions may endure the agony a few hours longer, and at last sink under a general mortification.

A gentleman in Virginia trod accidentally upon a Rattle-Snake, which had been lurking in a stony place: the enraged animal reared up, bit his hand, and shook its rattles. The gentleman, unwilling to die unrevenged, killed the snake, and carrying it home in his hand, threw it on the ground before his family, crying out, "I am killed, and there is my murderer!" His arm, which was beginning to swell, was immediately tied up near the shoulder, the wound was anointed with oil, and every means employed to stop the infection. His arm, below the ligature, appeared of several colours; all the muscles were in motion; a fever ensued; after that the loss of his hair, giddiness, drouth, weakness, and nervous faintings; till, by slow degrees, a very strong constitution overpowered the latent malignity of the poison, and he recovered; but not without feeling the most various and dreadful symptoms for several weeks afterwards.

Many have affirmed that the Rattle-Snake has the power of charming squirrels, hares, birds, and other animals, in such a manner as to make them run directly into its mouth. In Pennsylvania, this serpent is often seen basking at the foot of a tree. There, coiled upon its tail, its jaws extended, and its eyes shining like fire, it levels its dreadful glare upon

SERPENTS, LIZARDS & TORTOISES.

AMPHISBÆNA



CÆCILIA

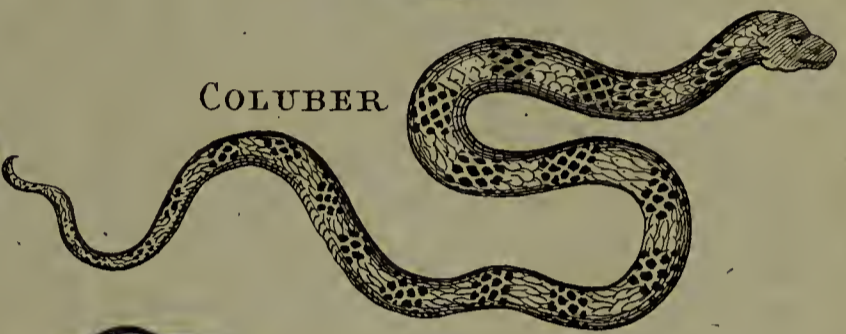
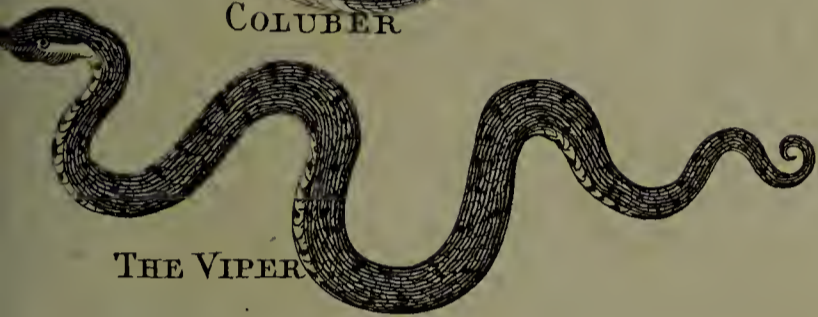


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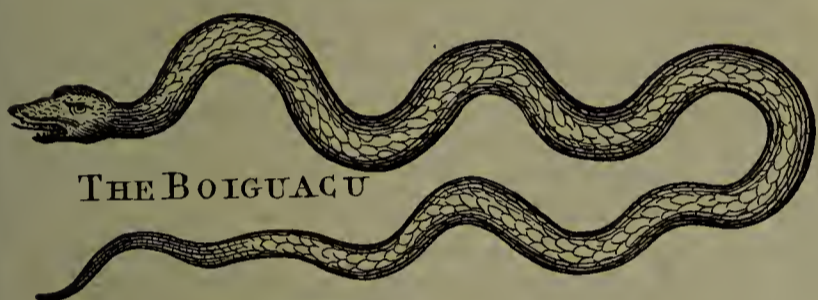


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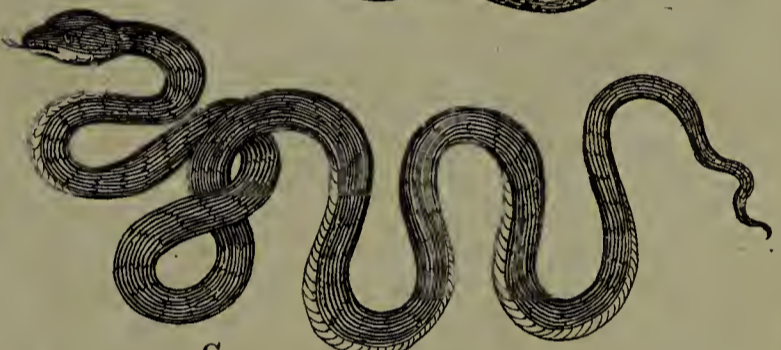
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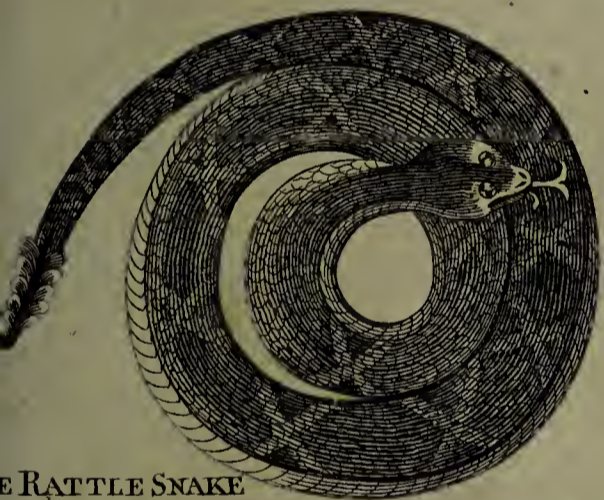
THE VIPER



THE BOIGUACU



CENCHRIS



THE RATTLE SNAKE



LACERTA



LACERTA



THE LION LIZARD



THE FROG



LACERTA



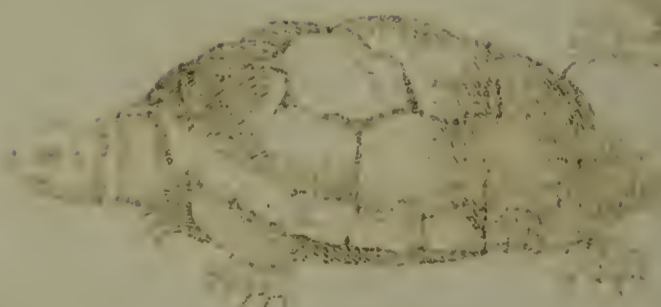
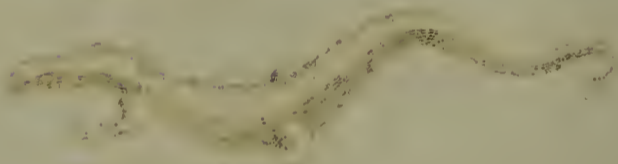
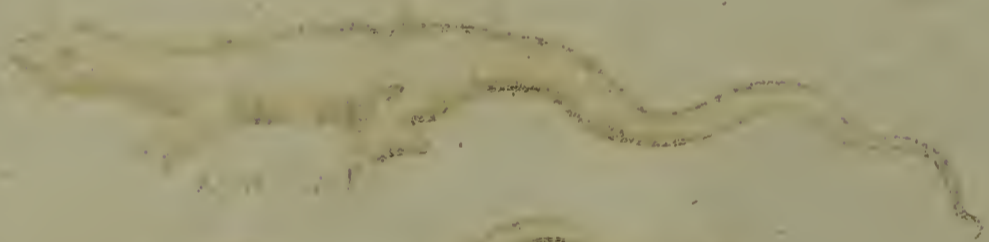
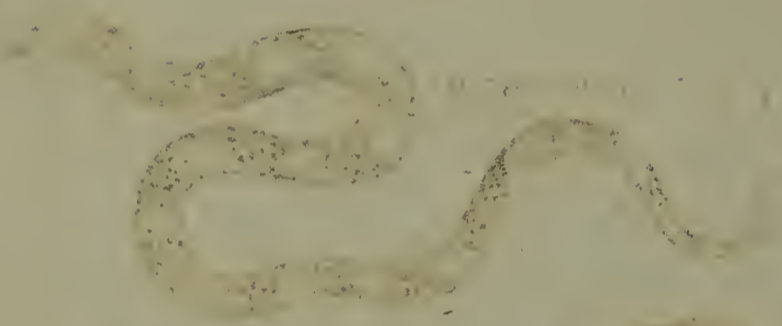
THE TOAD



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upon its prey: the little animal is incapable of breaking through the fascination, it advances towards the serpent with seeming reluctance; at length, as if overcome by the potency of its fears, it jumps into the throat of its frightful destroyer.

The *whip-snake* is still more venomous than the rattle-snake. It is a native of the East, and is about five feet in length, though it is not much thicker than the thong of a coachman's whip; from whence it has its name.

The *asp* is also a very formidable serpent, but its bite is not attended with those drowsy symptoms which the ancients ascribed to it.

The *jaculus* of Jamaica is one of the swiftest of the serpent kind.

The *seps* inflicts a very venomous wound, and causes the part affected to corrupt in a very short time.

The *coral* serpent is red, and its wound is said to be fatal.

The *cobra di capello*, or *hooded serpent*, inflicts the most deadly and incurable wounds: there are five or six different kinds of this formidable creature, which are all equally dangerous; a speedy death being the certain consequence of their bite. It is said the patient will die in about an hour after the wound is given; the whole frame being dissolved into one putrid mass of corruption. This animal is from three to eight feet long, with two large fangs hanging out of the upper jaw.

NATURAL HISTORY of the SNAKE.

THIS is the largest of the English serpents, and is sometimes found upwards of four feet in length: the neck is slender; the middle of the body thick; the back and sides covered with small scales; the belly with oblong narrow transverse plates. The back and sides of the Snake are of a dusky brown: on the middle of the back are two rows of small black spots, extending from the head to the tail; and the sides are crossed with multitudes of lines consisting of spots. The plates on the belly are

dusky; the scales on the sides are of a blueish white. The teeth are small and ferrated, lying on each side of the jaw in two rows. This species has a spot of pale yellow on each side of the neck; it is perfectly inoffensive, taking shelter in dunghills, and among bushes in moist places. It will readily take the water, and swims very well, its whole length generally appearing on the surface of the water. In summer the Snake is invited out by heat to bask itself in the sun. If disturbed, they move swiftly away among the brambles; and, if too closely pursued, will hiss and threaten, and though incapable of offending, will thus render themselves formidable. The Snake preys upon frogs, insects, worms, and mice. During winter it lies torpid under old trees, or in the banks of hedges.

NATURAL HISTORY of the BLIND WORM.

LIKE the snake, the Blind Worm is a very inoffensive reptile, with a formidable appearance. The usual length of this species is about eleven inches; the iris of the eye is red, the head small, the neck very slender; the body grows suddenly from the neck, and continues of an equal bulk to the tail, which is blunt at the end. The back is ash coloured, marked with very small lines composed of minute black specks; the sides are reddish and the belly dusky, marked in the same manner as the back. This serpent is slow in its motions, on which account, (together with the smallness of its eyes) it obtained its names: some calling it the *slow*, and others the *blind* worm. Like other serpents in our climates, it lies torpid during winter, and many of them are sometimes found twisted together. Like the viper this animal brings forth its young alive. Dr. Borlase mentions a Blind Worm with a pointed tail, by the bite of which a man lost his life. It is probable that the dusky viper was mistaken for one of this kind; for it is generally agreed that the viper is the only poisonous serpent in these kingdoms.

C H A P. II.

Containing the NATURAL HISTORY of INSECTS in GENERAL, viz. the SPIDER, the TARANTULA, the FLEA, the LOUSE, the BUG, the WOOD-LOUSE, the SCORPION, the SCOLOPENDRA and GALLY WORM, the LEACH, the LIBELLA, the ANT-LION, the GRASSHOPPER and LOCUST, the CRICKET, the EARWIG, the EPHEMERA, the CATERPILLAR, BUTTERFLY, and MOTH, the SILKWOLM, the BEE, the WASP and HORNET, the ICHNUMON FLY, the ANT, the BEETLE, the GNAT and TIPULA, the WORM and its Kind, the STAR-FISH, the POLIPUS, the CORAL PLANTS, and all the Varieties of the SEA-NETTLE.

INSECTS may be defined to be little animals without red blood, bones, or cartilages, furnished either with a trunk, or a mouth opening lengthwise, with eyes which they are incapable of covering, and with lungs which have their openings on the sides. The whole class of insects is comprehended in this definition.

Swammerdam, Reaumur, and Linnæus, have each endeavoured to abridge the task of description, by throwing a number of similar animals into distinct classes, and thus making one general history answer for all. We shall, in some degree, follow their example, and throw the whole class of insects into four separate distributions.

The first which offer themselves are those which are destitute of wings, that appear crawling about on plants or on the earth. Some of these never obtain wings, but creep on the vegetable, or the spot of earth where they are stationed for their whole lives. Others indeed are candidates for a happier situation, and only wait for the growing of their wings, when they may be said to arrive at their state of full perfection. Those which remain without wings, may be considered as constituting the first class of insects. All these are produced from an egg, the flea and the wood-louse only excepted; and after they are excluded from the shell, they never suffer any further change of form; thus the louse and the spider are produced.

produced from an egg; and, therefore, like the chicken or the duck, remain entirely the same from their birth to their dissolution.

The second order of Insects are composed of such as have wings, but their wings are cased up in such a manner as not to appear, when produced from the egg. These animals, however, are not prevented by the casing up of the wing, from running, leaping, and moving with its usual celerity; but, when the case bursts, the wings expand, all the creature's motions become more extensive, and it arrives at full perfection. The grasshopper, the dragon-fly, and the ear-wig, have their wings at first bound down; but when the skin bursts, they are expanded, and the animal pursues the purposes for which it was produced.

The moth or butterfly kind form the third order of Insects. These have four wings, covered with a mealy substance of various colours, which comes off upon the fingers when they are handled. These are produced in a manner peculiar to themselves. They are first hatched from an egg, from whence proceeds a caterpillar that eats, and often casts its skin: at length it assumes a new covering, which is called a chrysalis, in which it remains concealed, till it comes forth a moth or butterfly.

The fourth order of Insects consists of such as have wings, which come from a worm instead of a caterpillar, and pass through changes similar to those of moths and butterflies. They are excluded from the egg as a worm, and then become a chrysalis: at length they burst their prison, and come out perfect animals, some being furnished with two, and others with four wings. These wings, however, are very different from those of the butterfly and moth kind, as they have none of those mealy particles which are always to be found on the wings of the former. The numerous tribe of gnats, beetles, bees, and flies, are comprehended in this class.

As a fifth order may be added a numerous tribe lately discovered, called zoophytes by the naturalists. These do not go through the ordinary forms of generation, but may be propagated by dissection. If some are cut into an hundred parts, each part retains life, and is endued with such a vivacious principle, that it will in a short time become a perfect animal. To this class belong the polypus, the earth-worm, and all the varieties of the sea-nettle.

NATURAL HISTORY of the SPIDER.

THE most subtle of all insects is the Spider. Formed for a life of rapacity, all its habits are calculated to deceive and surprize. In this island, where all the insect tribes are kept under by human assiduity, the Spiders are small and inoffensive. The chief of our native Spiders are the *house* Spider, which weaves its web in neglected rooms; the *garden* Spider, which extends its web from tree to tree, and reposes in the center; the *wandering* Spider, that has no fixed abode, and the *field* Spider, which sometimes mounts web and all into the clouds. These are all reputed venomous, but they are perfectly harmless. In Africa and America, the tribe of Spiders are much more terrible. The bottom of a Martinico Spider's body is as large as a hen's egg, and covered with hair; its web is strong, and its bite is dangerous. We are happily placed at a distance from these formidable creatures, and are satisfied with the history of them, without wishing to approach them.

Every Spider has two divisions in its body: the fore part contains the head and the breast, and is separated from the belly, or hinder part, by a very slender thread, which however forms a connection between the two parts. The fore part is furnished

with a hard shell, as well as the legs, which adhere to the breast. They have brilliant eyes all round the head; some are possessed of eight, and others only six; two are placed before, two behind, and the rest on each side. As these animals procure their subsistence by the most watchful attention, so many eyes are necessary to give it the earliest information of the capture of its prey. On the fore part of the head they have two pincers, strong pointed, and ferrated, and terminating in claws. A small hole is seen below the point of the claw, through which it emits a poison, which, though harmless to us, instantly destroys their prey. They have all eight legs, jointed like those of lobsters, and, like them, if a joint is lost, they are quickly supplied with a new one. Besides the eight legs already mentioned, Spiders are furnished with two others, which may not improperly be called arms, as they do not serve to assist motion, but are used in managing their prey.

As the Spider lives wholly upon flies, and is destitute of wings to pursue them, it becomes an experienced hunter, and spreads a net to catch those animals it is unable to pursue. Its web is generally laid in those places where flies usually resort: there it remains in patient expectation for days and weeks together, seldom changing its situation.

To fabricate this web, Nature has supplied the Spider with a large quantity of glutinous matter within its body, and five teats for spinning it into thread. The threads which we see spun from these teats, and which appear so fine, are nevertheless composed of five joined together, and these are many times doubled when the web is in formation.

The female Spider generally lays from nine hundred to a thousand eggs in a season; they are of a bluish colour, speckled with black, and are large or small, in proportion to the size of the animal that produces them. An hour or two after the exclusion of the eggs, the female prepares to make them a bag, where they are to be hatched. For this purpose she spins a web much stronger than that made for catching flies, and lines it with a down which she plucks from her own breast. Within this she deposits the eggs, and sticks it to the end of her body, by means of her glutinous fluid: thus loaded, the animal appears as if she had one body placed behind another, and this treasure she seldom abandons but with her life.

When the young are excluded from their shells, the female bites open their prison, and sets them free; she then receives them upon her back, till they have strength to provide for themselves.

Of this animal there are several slightly differing from each other, either in habits or conformation, but varying considerably in size. The *Bermudas* Spiders are of a very large kind. The *streaked* Spider is speckled with black all over its body and legs. The *Carter*, or long-legged Spider, has legs of an extraordinary length, and there is no distinction of the back and belly part; for the whole body appears to be nearly round.

NATURAL HISTORY of the TARANTULA.

THIS animal has some resemblance to the house spider; but is the largest yet known in Europe. It is a native of that part of Italy, called Apulia. The body is about three quarters of an inch in length, and about the thickness of a man's little finger: it is generally of an olive brown, variegated with a dusky colour: it has eight legs, eight eyes, and sharp nippers; between these and the fore legs, there are two little horns or feelers, which it moves very briskly when it approaches its prey.

Its body is covered with a kind of soft down; and it propagates, like other spiders, by laying eggs. In the summer month, the Tarantula creeps along the corn, and bites the passengers and mowers; but in winter it lurks in holes, and is very seldom seen. Though the bite of this animal is attended with no dangerous symptoms, and will easily cure of itself, wonderful stories are reported concerning its virulence. The person bit, it is said, does nothing but laugh, dance and skip about, putting himself into the most extravagant postures; this is succeeded by a most frightful melancholy, and at length the symptoms terminate in death. Some travellers into Italy affirm, that this extraordinary malady is only to be cured by music, and particularly by the violin. The medical musician begins with a particular tune, celebrated for the cure: the patient begins to dance, and continues dancing, till he is all over in a strong perspiration, which forces out the venom that appeared so dangerous. Swammerdam, however, assures us, that even in Apulia, this story is looked upon as entirely fabulous, and is kept up as a vulgar error by some strolling musicians, who obtain a livelihood by playing the supposed venom away.

NATURAL HISTORY of the FLEA.

VERY few are ignorant of the agility and blood-thirsty disposition of the Flea. It is not only the enemy of mankind; but of the dog, cat, and several other animals, and is found in every part of the world. The Flea has a small head; large eyes, and a roundish body. It has feelers, or horns, which are short, and composed of four joints; between which its trunk is situated, which it buries in the skin, and through which it sucks the blood in large quantities. When beheld through a microscope, it appears to be curiously adorned with a suit of polished sable armour, elegantly jointed, and beset with great numbers of sharp pins, resembling the quills of a porcupine. It has a piercing round black eye: it is furnished with six legs, which are so contrived, that it can fold them up one within another, and, when it leaps, they all spring out at once; whereby its whole strength is exerted, and it can raise itself to an extraordinary height.

NATURAL HISTORY of the LOUSE.

THE Louse is the enemy of man in the most odious degree; for whether wretchedness, disease, or hunger seize upon him, the Louse seldom fails to add itself to the tribe, and to increase in proportion to the number of his calamities. In examining the Louse with a microscope, its external deformity strikes us with disgust; but as the learned and elaborate Dr. Swammerdam has given us a very minute description of this insect, we cannot withhold it from our readers, though we wish it had been less scientific and less prolix. It is, however, exceedingly curious and entertaining.

"Before I exhibit," says he, "the internal parts visible in this small and despised animal, I shall describe its external parts, and shall shew every thing remarkable in the head, thorax and abdomen. The shape of the fore part of the head is somewhat oblong, that of the hind part somewhat round; the skin is hard, and being stretched, is transparent like parchment, and has here and there bristly hairs. At the extremity of the fore part is the proboscis, or sucker, seldom visible, since it is always drawn to the inside; I shall therefore describe it when I come to the throat and stomach. On each side of the head are the antennæ, or horns, which are also covered with a skin like parchment. Each of these is divided into five joints, elegantly covered with bristly hair, and several white vessels are seen through these

No. 30.

horns. Behind these are the eyes, which seem to want those hexagonal divisions observable in other insects, and they appear to be encompassed with some few hairs.

"The neck is very short, the breast is divided, as it were, into three parts; in the middle of which, on the back-side, appears, as it were a small shield. On each side are placed six legs; each of which consists of six joints, some larger than others: they are very delicately adorned with bristly hairs, and many whitish vessels are seen through them. The ends of their legs are armed with a smaller and larger ruddy and pellucid claws, serving these insects instead of a finger and thumb; for by the former they take hold of a person's hair, and by the latter, they are able to ascend, and run nimbly. Under, at, and upon the breast, where it is joined to the legs, and, as it were, in the very centre of it, there appears a short whitish groove or channel; which is conspicuous through the middle of the abdomen, appears of a brownish colour, and has very strong motions. On either side of this groove or channel are two bright little parts, like the larger before described; whose appendages they are, and which rise considerably on the inside of the breast, and are there also transparent.

"The abdomen is divided into six parts, and at the end of it, on the under part, the body terminates as it were in a cloven tail. Besides these in the middle of the lower part of the belly, there is to be observed a whitish spot like a point, which is also transparent, and moves distinctly up and down. On the sides and extremities of the belly, which is all over hairy, are observed some pellucid, ruddy, little bodies; and over the whole belly, a great number of white vessels are visible. The like are discernible in the back and breast. The skin of the abdomen is made like the ends of our fingers, consist of small grooves, but this structure does not hold through the whole, and not at all at the extremities of the abdomen; for there, as well as in the whole body, it is somewhat firm, like clear parchment, and when roughly pressed, it makes a noise and breaks.

"To obtain a perfect knowledge of all those parts, which I have hitherto mentioned in general; there is no other method than to dissect the creature. I shall therefore now give an exact description of all the minutiae relating to the internal parts; for by this means we shall have a complete idea of the external also.

"If we begin the dissection in the upper part of the abdomen, and cautiously open the skin there; blood immediately issues from the wound, and this being received into a small glass tube, and viewed with a powerful microscope, is seen to consist of transparent globules, as cow's milk: the same has been likewise discovered in the human blood for several years; it is found to consist of ruddy globules swimming in a clear liquor.

"It is, however, a matter of doubt, whether the blood in its vessels has any globules; for when drawn from them it may easily acquire that figure; this may at least be asserted of the ruddy part of the blood. I have therefore often resolved to put a small glass tube into the artery of a dog, and with a microscope to view the flowing blood. For thus, by analogy, it may be possible to determine with some certainty, whether the human blood, before it is taken out of its vessels, contains any globules. I am the more in doubt concerning this matter, because there are vessels discovered in the body, which appear much finer than the globules themselves visible in the blood. By this means also may be known the true difference between the arterial and venal blood; for in the latter only, I have hitherto observed these globules, having never examined the former: nor

I positively assert, that there are original globules in the Loufe's blood, for they may be easily formed by the intermixture of the blood with the fat, and some wounded particles of the viscera or bowels, which consist of a congeries, or heap, as it were, of globular parts; as I shall shew in its proper place. Wherefore, more time ought to be spent in this anatomy, than I can devote to it at present, being engaged in many other studies.

"Immediately under the skin are certain muscular fibres, which move the annular divisions of the abdomen. I have observed three distinct kinds of these muscles, some a little broader, others narrower, and a third sort with two bodies. One may see that these muscles extend themselves from one annular division to another, and that some are much shorter than others. This little animal is very full of muscles, particularly at the extremities of the abdomen; since the motion is strongest in that place, and the respiratory points, or orifices for respiration are placed there; by the assistance of which the Loufe takes in the air, and by a manifest act of inspiration and expiration, draws it into the body, and again discharges it. When these muscles are drawn from the body, they seem as if they consisted of but one fibre, but if they are dried upon a thin and clear glass, and washed with spirits of wine, which takes off the impure fat that adheres to them, their fibres and joints appear distinctly to be made up of globules.

"Under these muscles the fat and the trachiaë, or air vessels, come in view; nor could I ever hitherto discover any vestige of a heart in this upper part of the abdomen, as is usual in other insects, wherein the heart is always placed in this upper part of the abdomen and back; but I found clearly by this dissection that the Loufe otherwise agrees in all its parts with other insects, as will hereafter plainly appear; therefore I have more diligently sought for the heart, but in vain: this may probably be owing to its extreme smallness, since it is very difficult to find it in the larger insects, as in the house-fly. There is also another impediment, which is, the strong and continual agitation of the stomach in this insect, being hardly a moment at rest; from which there arises an unavoidable inconvenience in investigating the heart.

"The particles which I take to be the fat of the Loufe, are for the most part very small, but extremely numerous, though we may discover it in a larger species or kind of fat particles; the figure of the smallest kind of particles is usually globular, but that of the greater is more irregular. They are of a clear transparent colour, like jelly; but all the other parts of this animal are not of that colour.

"The ramifications of the trachea, aspera arteria, or wind-pipe, constitute the principal part of this insect; a very considerable number of them are found in the head, breast, belly, legs; nay, and in the antennæ or horns. We may likewise observe, that they are connected and supported by the fat, as I have found in other insects; and these are the white vessels, which are seen through the transparent body, as I have observed in the history of the external parts. The reason that these pulmonary pipes are seen through the skin, is, that they are of a silver colour, or light bright mother-of-pearl, and therefore afford a very agreeable sight, whilst the animal lives. They constantly keep this colour, nor will they ever fade, for their structure is such, that they remain always open.

"As to their composition, it consists of a double matter; a part is composed of rings, which resemble the cartilages of the trachea, or wind-pipe, in man. It appears very distinctly by the microscope, that these rings often bend themselves round, in or-

der to form a cavity and open pipe, but this does not happen so often as in other insects, because the rings of the Loufe are shorter: they are also more curled and twined, in the likeness of a serpent, and seem every where interrupted. It may also be observed, that where the aspera arteria, or wind-pipe, is divided into branches, these rings are largest, but they are afterwards insensibly divided into smaller. The other part of these vessels is membranaceous, and is situated in the interstices of those rings; and by its assistance the rings may conveniently bend and turn themselves, as is known to happen, particularly in those wonderful motions of the stomach, which is surrounded by a great number of air-pipes.

"I have hitherto omitted examining whether these pulmonary pipes within the body, likewise shed a little skin at the time the Loufe casts its coat, as I have observed to have happened in the bombyx, or silk-worm, and in almost all other insects. However, the smaller these pulmonary pipes are, the fewer rings they have, until at length they appear like more membranaceous threads.

"I may venture to affirm, that the pulmonary pipes cannot be more conveniently viewed in any species of animals that I have hitherto known, without dissection, so that we cannot contemplate their situation and course, with greater admiration, in any animal than in the Loufe. But I have by me a very curious and famous apparatus, by the assistance of which, I can at any time demonstrate it with the greatest certainty.

"The orifices of the pulmonary pipes are seen in the outward skin of the Loufe; one of which is on either side of the breast; and on each side, on the extremities of the abdomen are placed six. I have also thought I sometimes saw one pair of air orifices between the second and third pair of legs; however, I will not be positive in this matter. These orifices are the respiratory points, one of which is situated on one side, between the first and second pair of legs, and six on the extremity of the belly; these points swell a little there, like a small nipple, and in their circumference, seem to have a slight rim or border, which appears somewhat ruddy and transparent, as the place itself wherein they are fixed is also of a light red and bright colour; they are a little bent towards the inside, and immediately after the tegument of the extremity of the abdomen swells out. All the joints are like that which I have observed to be placed in the breast.

"From every respiratory point there issues a branch of the trachea, which soon after forms a visible anastomosis or inosculation with some branch of the trachea, that proceeds from another point, and both close into one canal: the same holds also in all the fourteen apertures of the lungs; so that the air, which is drawn into the body by one respiratory point, may be spread through the whole. Nor is it there only that the pulmonary pipes unite, but this holds equally in those which are in the back, belly, and breast; which last is distinguished by three manifest ramifications that are joined together underneath. This matter hath been already elegantly delineated by Dr. Hooke, in his incomparable micography; however, he could have no knowledge of these ramifications by any other means, but that they appear visible through the body.

"I am further instructed by the dissection, that the pulmonary pipes may be discovered not only in the head, breast, and abdomen, but they reach also to the intestines, the ovary, spinal marrow, brain, and, in fine, to all the internal parts of the body of this animal; all which, as I have distinctly seen, so I can demonstrate them to others, with the assistance of certain experiments which God enabled me to invent in the study of anatomy, that the miracles of

his works might be known: for we have not even the least thing from ourselves, for it is God that giveth us ingenuity.

“ These things being well understood, I might proceed to describe the other parts, as first, the ovary, which appears next after the former, being a part placed upon the stomach itself: but since method requires us to treat, before these, of those parts which assist digestion, and tend to the nourishment and preservation of the body, and afterwards of those which serve for generation, I shall now describe the proboscis, or sucker, the throat, stomach, intestines, and other adjacent parts. I shall, after these, treat of the ovary, brain, and nerves. and then add something concerning the outward skin, with which I shall conclude this anatomical description.

“ The Louse has neither beak, teeth, nor any kind of mouth, as Dr. Hooke described it, for the entrance into the gullet is absolutely closed: in the place of all these, it has a proboscis or trunk, or, as it may be otherwise called, a pointed and hollow aculeus or sucker, with which it pierces the skin, and sucks the human blood, taking it for its food into the body. But this proboscis cannot be shewn, on account of its extreme smallness; nor can it be distinguished, unless a person happens to see it by chance.

“ At the extreme point of the head, when pressed out artificially, and with a particular attention, there appears an obtuse prominence, which being hollow in the middle of the inside, bends back into itself, and goes into the body, but has no aperture or opening. From this the proboscis, or sucker, is observed sometimes to proceed, and wherefore this part is, as it were, the sheath or case of it, wherein it is laid up.

“ I cannot illustrate this structure or machinery by a more proper example, than by that of the horn of a snail, which is likewise turned into itself on the inside, and is again stretched out, but there is no perforation: wherefore, if the proboscis or sucker was placed at the end of it in this insect, instead of the real eye which we see in the snail, one might in some measure form an idea how the proboscis, or sucker, is wrought in this insect, and worked up with admirable art by the supreme architect of the universe.

“ If the whole little sheath or case be afterwards examined, it is observable, that the upper end of it is thicker than the lower, and is swollen like a mushroom; so that it appears from hence, that the little foot on which it stands is smaller than its top. When one presses the proboscis, or sucker, and its sheath on the outside, we shall find that the end of the latter is absolutely blunt, and resembles the head of a pollard willow-tree, having all its branches cut off; we see also, that there are here and there certain pointed parts or claws in it, which, as well as the sheath, and the proboscis or sucker, are of a light brown colour, and are transparent. I shall presently shew the use of these claws; there is also a crooked proboscis or sucker in the middle of them. The outward skin of the sheath which is annexed to the proboscis, and from which its head is prominent, is of the same texture with the rest of the skin that covers the Louse; for it consists of grooves and pellucid globules, as I shall explain hereafter, when I treat of the skin.

“ If we examine that part of a Louse's head at the time when it is seeking out some pore of sweat in the hand, wherein to fix its proboscis or sucker, a small line of a pale brown colour is then presented to us, which appears visible through the head, and has its fore part more deeply coloured. This little line is nothing else but the sheath itself, with the proboscis hidden in the inside.

“ But before I explain the use of this proboscis or sucker, and its manner of rising, it seems necessary to describe the figure, situation, colour, texture, and motion of the gullet, stomach, and intestines; for thus the method, whereby the proboscis performs its function, will be more easily understood. The œsophagus, or throat, is a very small canal, which one cannot see at any other time, but when the blood ascends through the proboscis, or sucker, into the mouth, and passes through this into the stomach. It is situated a little behind the eyes, and seems to be carried up above the brain: the reason that I think so is, because it appears there very clearly at the time of suction; so that it probably runs immediately under the skin of the head. In the neck it is somewhat enlarged, and afterwards it grows small again in the back, until it terminates in the stomach, near which I have observed it, like a very small, clear, and transparent thread, wherein a person that dissects it sometimes observes blood, and some other substance, which appears like the contents of the stomach. I discovered the whole gullet, in the action of sucking, as before described; for it is a very difficult matter to discover it in any other manner, because, in the upper part of the back, and also in the head and neck, it is very strongly connected with the adjacent parts.

“ The stomach is lodged partly in the breast and back, but the greatest portion of them is in the abdomen. When swollen with blood, it appears of a dark brown colour, which is visible through the skin, and is either a faint red, or a full or bright brown, as the contents of the stomach are more or less changed. Where the stomach joins the breast above, its figure resembles a fork with two teeth; these are two hidden appendages of the stomach, which go deep into the breast, and on either side near the gullet and spinal marrow, and reach to the first pair of legs. These are those two blackish, transparent and coloured parts, which I have mentioned in general in the history of the external parts.

“ The part of the stomach connected with the abdomen, deserves particular consideration; it is formed like an oblong bag, which is here and there continually contracted and again extended: When it is empty, it is colourless, and the stomach and its appendages are transparent. But as the stomach fills, the colour is seen plainly through the outward skin. It manifestly consists of two coats, the outward is thicker, the inner very thin, as it is in all insects. Nay, it is probable that it has three coats, and that the third is muscular.

“ The outward coat of the stomach is furnished with so great a number of pulmonary pipes as can hardly be expressed in words. The longer branches are very conspicuous in it, but the smallest cannot be discovered, except by the assistance of the best microscopes. On the contrary, the inward coat is very thin; the third, which I suppose to be situated between the two former, comprehends, without doubt, the muscular fibres of the stomach, by the help of which it performs its wonderful motions. The coats of the stomach, especially the outmost, appear to consist of very many globular little grains, which are very irregular in form; but whether these little grains properly belong to the texture of the stomach, or whether they are rather particles of the fat, which cover the stomach, whereby the pulmonary pipes are gently moved, I could not well discern; only this I know, that the greatest part of them, when often touched, retire from the stomach.

“ Underneath, in the abdomen, on a little rising, or prominence, nearly in the middle of the stomach, there is seen a certain little part, which Doctor Hook apprehends may be the liver; but I should rather take it to be the pancreas, or sweetbread,

though there want sufficient arguments to prove it. Its colour is not properly whitish, but somewhat inclining to yellow; and it is so strongly connected with the stomach, that it cannot be easily separated from it. If this be laid before the microscope, it may easily be divided into many little grains, like glands, but these are not very transparent. When it is accurately viewed by the microscope, the pulmonary pipes also appear in it. The substance of this little part is more firm than that of the rest, for when it is extracted from the body and dried, it is but little diminished. It is of a very irregular figure, and is formed divers ways in almost every Louse, being sometimes greater and sometimes less; but it is always finished in the same general manner, by reason of its bendings and situation over the stomach.

“ At the lower region of the stomach is seen the pylorus, and immediately from this, the intestinum tenue, or small gut, which is extended on each side, and formed like the stomach: this is also provided with a great many pulmonary pipes. At the end of this small gut, which is for the greatest part bent in a serpentine manner, or like the letter S, are discovered four small vessels, which the sagacious and excellent anatomist Marcellus Malpighius, has called the swollen vessels in silk-worms; but these are straighter and less inflected than the Louse; they are considerably long, and of the same texture with the intestines. These four little vessels are properly four intestina cœca, or blind guts, which I have found in all insects; wherefore, by inference, I call them here by this name, though I never have had the fortune to see their extremities. They open into the intestine, from whence they arise at the place just mentioned. After these appears the little intestine colon, and at the end of that, there is a manifest dilatation or extention, which is the cloaca, or place where the excrements acquire their figure; for they are very irregular, and not like those of other insects, which are usually formed in a singular and regular manner. Within this dilatation appears the intestinum rectum, which shews its aperture, as the anus situated upon the belly, between the division of the tail; and just under this the skin is very bristly.

“ As to the motion of the stomach, it is truly admirable; insomuch that one might suppose it an animal within an animal, by reason of the strong agitations, contractions, dilatations, corrugations, and expansions, all which belong to it, and strike one with amazement, the whole being plainly seen through the body. These appear plainly at the time when the stomach is full of food, but they are best of all seen, when the blood passes into it at the time of sucking; for then it is sometimes observed, that the remainder of the old aliment is mixed with the new, and is shaken and agitated up and down, and on every side, in the stomach. This may be seen the more distinctly, as the colour of the contents is more dark.

“ Hence one may easily conceive what strange changes and emotions the pulmonary pipes on the stomach undergo at that time, and after what various ways the air contained in them is pressed, moved, propelled, and so purified; changed from its first nature, and rarified within the creature. But who can discover, by the most diligent researches, the use of the air in that place? surely no one. Yet, very wonderful motions are observed on this occasion, particularly in that little part which I called the pancreas, or sweet-bread; for this being connected with the stomach, must obey all its motions. These motions are continually repeated by turns, and undergo an infinite number of variations.

“ As to the method whereby the Louse sucks the blood, and conveys that nourishment into the sto-

mach; it is performed thus, by the assistance of the proboscis, and its aculeus or point. First, if the Louse has abstained from food two or three days, it becomes very hungry, which is discoverable from the empty stomach, and because the creature is then wholly transparent; in this case, immediately as soon as he is placed on the hand, he seeks for food, which he will the sooner and more readily find, if the hand be first rubbed until it grows red. Then the Louse turns its head, which lies between the two fore legs; to the skin, and diligently searches for some pore of sweat: when he finds it, he fixes his aculeus or sucker therein; a little after this, the blood is observed, through the microscope, to ascend to the head, in a very rapid; and, as it were, frightful stream:

“ The Louse has at that time matter enough to feed on in any pasture; for if it finds any hairs on the hand, by which it does not desire to descend, it stays in that pasture, and sucks with its head down, and its tail elevated. I have likewise observed, that it sometimes sucked with its belly upward, that is, when the hair it took hold of was bent down; and then the motion of the stomach, and pancreas, or sweet-bread, might be seen most beautifully by the help of a microscope.

“ But I should think the principal use of the claws, which I have described to be situated at the end of the sheath or case of the aculeus or sucker, is to assist the creature in sucking, and that the aculeus serves for this purpose; for whilst these are strongly fixed in the superficies of the inner skin, and in the extremities of the pores, they enable the Louse to use its aculeus the more freely, and to move it at discretion, when the end of its sheath is placed firm and immoveable.

“ Sometimes, whilst the Louse was sucking, I have strongly pulled the skin of my hand aside, that by this means the sheath, or rather its claws, together with the aculeus or sucker, might be bound fast in the skin, and the Louse could not disengage itself. This affords, indeed, a very agreeable sight. This I did with a design, that if I could thrust the Louse out of its place, I might the more plainly see the aculeus: but I could never accomplish my desire in this particular, though I had then almost wished to have three hands, that I might the better find what I wanted. There are some speculations and researches in anatomy that will not bear writing, since they almost distract the mind.

“ When the Louse is employed in sucking, a very small rivulet of blood immediately appears behind the aculeus or sucker, which is seen through the transparent head. Between and before its eyes, on the middle of the head, there is observed also a considerable dilatation, for the jaws are there remarkably expanded, by the blood continually ascending. These parts are so swiftly contracted again, that there scarce remains the least sign of blood after a moment, and both are performed with such velocity, that the dilatation can hardly be distinguished from the contraction; wherefore I do not know how to explain this matter more properly, than by the sudden oscillation of the pendulum of a clock. Behind the eyes, a small rivulet of blood is likewise observed to run down within the head: this passage may be properly called the œsophagus or gullet, which lies behind the jaws, and grows wide again in the Louse's neck, as has been shewn before. I have chosen to exhibit all these as one continued canal, that my description may be the more clear.

“ After the blood has ascended to the jaws, and comes to the gullet, we observe that it is immediately conveyed to the stomach, and that the bifurcated appendages, as well as the stomach itself, are at once filled with it. The motions of the stomach are then remarkably increased, its muscular parts being

being distended; for as these muscular parts are then stretched, they have an opportunity of contracting themselves again. Wherefore it is immediately observed, that the excrements in the large guts begin likewise to move; nay, it usually happens, that the Louse discharges them during the sucking.

“The food being thus received into the stomach, is agitated about in a wonderful manner; it is moved up and down, and by contractions and dilatations, which are not to be described, then performed by the stomach, is, as it were, sifted. After this, it is seen, that the contents first begin to divide into parts in the back, or hinder portion of the stomach, and they then appear like raisins preserved in jars, and are thus distributed through the body. However, this is a false appearance; it arises from hence, that the skin being divided into many grooves, is not equally transparent every where, and that some difference is in this respect seen through it, because the grooves are not equally transparent with the intermediate parts. Nay, the particles of the internal fat not being uniformly visible through the skin, and obscuring the brightness of the skin, conduce likewise to deceive the sight, as if the retreating blood entered into many peculiar vessels. To this may be added, that the blood has not at that time a homogeneous or equal colour, for its parts separate from each other. From these appearances, before I had accurately examined things, I thought that the blood was distributed out of the stomach, through various vessels, into the other parts of the body; but I afterwards observed that the phenomenon arose, as well from the blood itself, as from the different colours of the parts through which it was seen, and which I then took to be vessels. Perhaps others, especially Dr. Hooke, who first prejudiced me in favour of this opinion, have split on the same rock. I have not as yet made this experiment on the smallest Lice, in which more peculiarities may probably be seen, than in the larger kind.

“I have likewise resolved to receive the blood, when changed in the stomach, into a glass tube, and then to view it in the open air, or in some dark place by candle-light; but this I have not hitherto done, being hindered from making this, as well as many other experiments which I had a mind to try. In some hours after feeding, the contents of the stomach are observed to become insensibly more brown or blackish, and to diminish slowly; wherefore the intestines are afterwards seen to be more and more distended with excrements, which sometimes lie in them regularly divided, as it were, into globules. The reason of this is, that the intestines do not, at one and the same time, contract themselves about the fœces, and therefore they cast or extrude them out of the body at different times. I have already treated of the muscles of the abdomen in this insect, I shall now proceed to the parts of the breast.

“In this part, and in the back, are seen several muscles, which move the legs and head; and herein are also visible the appendages of the stomach, and a great number of pulmonary pipes and particles of fat. In the same view is also seen the gullet and spinal marrow, together with the nerves arising from thence, of which I shall now speak distinctly.

“In the middle of the back is seen a certain tendinous point, under the small shield there situated, where the skin does not appear to be so transparent as in the rest of the body. This shield seems there to be hollow, being thrust down into a little pit. At this point almost all the muscular fibres are seen to concur, and their motion and contraction are here very visible. As to the appendages of the stomach, and other parts of the breast and back, we have before treated of them at large.

No. 31.

“The spinal marrow is properly situated in the breast, and therein reaches to the insertion of the last pair of legs. When this is discovered, it is easy to judge what that short whitish groove is, which appears through the breast, between the appendages of the stomach; for these appendages are placed on both sides of the spinal marrow. The structure of the spinal marrow itself, does not differ much from that found in the worm, from which the *Scarabæus Nasicornis*, or Horned Beetle, by the ancients consecrated to Mercury, is produced, as is manifest from the history and figures of the latter. It consists of three remarkable swellings, expansions, or dilatations, from which, on either side, we observe three nerves to arise, which reach to the muscles of the six legs; but underneath, or in the hinder part of it, I distinguished six nerves issuing, which doubtless are distributed through the rest of the viscera, to give them life, sense, and motion. The lowest of those little knots, whereof the spinal marrow is composed, is formed in a different manner from the upper ones, which are alike. The membrane which covers the marrow is interwoven with a great many pulmonary pipes, and seems to be composed of irregular and globular little parts, in the same manner as we have shewn in respect of the coat and stomach; and this texture, together with the great number of pulmonary pipes belonging to the part, afford a very agreeable sight in the living insect.

“I could discover no fibres in the nerves, which arise from the posterior part of the marrow, though I viewed them fresh with the microscope; they seemed indeed to be made up of a homogeneous, bright and transparent matter, and at their sides were hung a great many pulmonary pipes, with particles of fat. The origin of the marrow, where it is connected with the brain, is seen like a fine thread. But in all other insects this beginning of the marrow is perforated, and through its aperture or cavity the gullet passes.

“The brain of the Louse is shaped like a pear, and is divided into a right and left part. The dura mater, surrounding it, is formed like the membrane which covers the marrow, and is provided with pulmonary pipes and particles of fat. I can very easily at any time shew the marrow, but the demonstration of the brain must be obtained rather by chance, than with any premeditated design or art; it is clearly seen, when by any accident it happens to be stript of the parts wherewith it is covered.

“The optic nerves are short, and the eyes, which are connected to them, are so small, that I could not dissect them to my satisfaction; as well because this operation is but awkwardly performed under microscopes, which magnify objects so much, that all instruments are too coarse for this purpose. Thus much, however, I distinctly saw, that this black part in the eyes might be separated or lifted up from them; which part in other insects I call the tunica uvea, not being situated at the bottom, but on the superficies of the eye; after this appears the tunica cornea; this seemed divided, as it were, into hexagons, as it is in other insects, though the other was not; but that I would not affirm for certain, for we are not to suppose or imagine, but to pursue by our senses, and discover the actions and productions of nature. This opinion, however, does not please some anatomists, who therefore esteem all comments on the brain merely as ingenious fancies. The younger Bartholinus, who, speaking of the fiction that silk-worms had no brain, expresses himself thus: “Behold, how many are pleased with their own blindness! who, altho’ they are blind, and shall for ever remain so, yet cry aloud they can see, since these their contemptible works, which ought to be removed from their eyes, and buried in oblivion, are lasting monuments of their cloudy arrogance; for

by this means they might afterwards seek for the light of the truth."

"Whether Lice are distinguished by the parts of generation, into males and females, as other insects are, I could not discover. Heretofore, indeed, I had sometime remarked, that Lice get upon each other; but this I could not observe while employed in this dissection. I found an ovary in every one of forty, which I dissected; this almost inclined me to think, that these little animals are hermaphrodites; and perhaps they really have in each animal the generative parts in the same body, as I have found in snails. Whether, indeed, it be so, is still a secret to me; for though I saw the ovary very distinctly, I could discover that only, notwithstanding the great hopes I had of finding it, from having observed, that all kinds of insects have very large organs of generation.

"The ovary is extended through the whole cavity of the abdomen, so that with its appendages it reaches even to the breast. It has an opening distinct from the end of the intestines, for as the upper part of the fundament is placed in the division of the tail, in which the abdomen ends; so, on the contrary, the vagina or mouth of the ovary opens into the lower part of the abdomen, where the body is divided, as it were, into two parts. The ends or extreme appendages of the oviduct, or egg-passage, are like two tubes, naturally joined in one point. In the oviduct are seen at once perfect eggs, and their rudiments or principles; so that in one ovary I have counted ten larger and forty-four smaller eggs, together making fifty-four. In the uterus I saw one perfect egg, which was fallen down ready for birth: at that time these little eggs are called nits.

"The ovary is double in all Lice, and every part of it is subdivided into five oviducts, which on each side end in one common canal; next comes in sight the uterus, in which the egg acquires its full perfection. Where the uterus ends, is seen a sacculus or bag full of a glutinous matter, opening in that part into the uterus; this is designed for fastening the eggs, whilst they are laying; the same may be likewise observed in many other insects, and particularly in bees. I must acknowledge that I have not seen the glutinous matter contained in this bag; but I infer, from the situation and structure of the part, that the bag was designed for keeping such a substance. After this appears the neck of the uterus, and therein is a small dilatation or expansion; by means of which, the ovary immediately opens itself into the outward womb.

"The oviducts embrace the eggs so closely, that scarce any difference is observed between them, nor can we separate the oviducts from the eggs, without great labour; when we do this, a great many bags of fat issue from thence, which obstruct the sight. It therefore has appeared to me, that the structure of the oviduct is the same with that of the stomach and intestines; though the texture of this part is nevertheless more delicate, and that the globular particles proceed from thence with greater ease, than in the other viscera. The oviducts are provided with many pulmonary pipes, of which, as we have already observed, this little animal has a very large number, though no bigger than a point; its structure and viscera, which excel all human art, the greatest geniuses ought to be amazed at, as I have here, though briefly, yet clearly explained and demonstrated. I am persuaded that I might make many more discoveries in it, if I had more time for that purpose, since I have completed this dissection, and discovered these remarkable miracles in this microcosm, or little world, in the space of six days. If the learned Daniel Heinsius had searched for these things in nature herself, and not in his own fancy, and in books, he would not have written so poor an encomium on this insect.

"As to the structure of the external skin of the Louse, it affords many particulars worthy of observation, nor is there any thing that bears a greater likeness to it, than stiff and transparent parchment: it is in several places marked with small grooves or channels, in the same manner as the ends of our fingers; which, when viewed with the best microscopes, really seem to be so many divisions of pulmonary pipes. But the lens of the microscope must, for this purpose, be carefully managed; for as it is turned one way or another, different things are seen: one cannot bring the lens nearer, or remove it further, by the least distance, but something is immediately perceived by the sight, which was not observed before. Globular particles, sometimes appear in the place of channels, or oblong pipes, tho' the eye is always fixed on the same part; then between the grooves themselves, where the skin is simply membranaceous, globular particles are likewise observed. In other places, as in the extremities of the abdomen, the structure of the skin is different; for there it seems to be composed, as it were, of irregular squares; wherein circular grooves may be seen in one part; in another globules; in a third, both globules and grooves, nay, sometimes the plain transparent skin only is seen full of points; all which, as we have before observed of the oblong grooves, are represented according to the transparency of the parts, which have not been yet totally separated from the inner surface of the skin; or just as the microscope is moved, somewhat nearer to, or farther from the skin."

NATURAL HISTORY of the BUG.

THIS also is a nauseous insect, which intrudes upon the retreats of mankind. The night is usually the season when the wretched have rest from their labour; but this seems the only season when the Bug issues from its retreats to make its depredations. It cunningly avoids the light; but when darkness promises it security, it issues from every corner of the bed, and greedily attacks its prey. Happily, however, for Great-Britain, they multiply less in that island, than in any part of the continent: in France and Italy the beds swarm with them; and in those countries they grow larger, and bite with a more cruel appetite than they do with us.

This animal consists of three principal parts; the head, the corselet, and the belly. It has two feelers, with three joints; beneath these there is a crooked trunk, which is its instrument of torture, and which lies close upon the breast when it is in motion: the breast is a kind of ring, and the belly consists of nine rings. It has six legs: its body is smooth, except that it has a few short hairs near the vent, which may be seen by the microscope: its motion is slow and unwieldy. The smell of this insect, when killed, is insupportable.

Linnæus reckons up forty of the Bug kind; but the principal are the common Bug; the green and yellow Bug; the plant Bug; and the grass Bug.

NATURAL HISTORY of the WOOD-LOUSE.

THIS insect seldom exceeds half an inch in length, and a quarter of an inch in breadth. Those found about dunghills, and on the ground, are usually of a livid black; but those found under timber, tiles, and in drier places, are of a lighter colour. Of this insect Linnæus makes three species; that with seventy feet on each side; that with fifty; and that with twenty: it has two short feelers, and the body is of an oval shape. When touched, it rolls itself up into a kind of ball; and the sides, near the

I N S E C T S .

DRAGON Fly



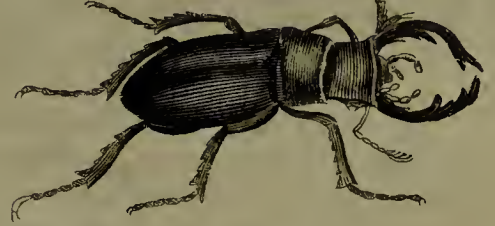
LANTERN Fly



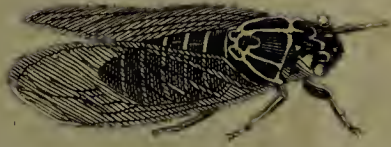
A LOCUST



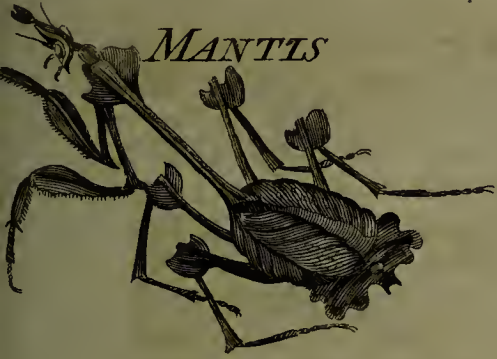
CERVUS volans



CICADA



MANTIS



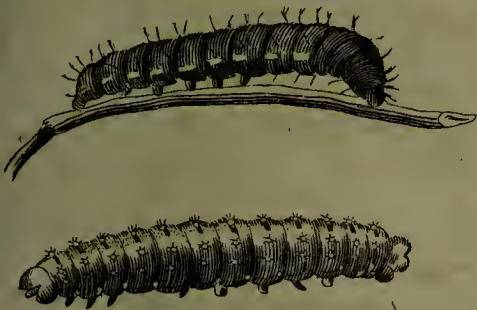
Gryllotalpa, or Mole CRICKET



SCORPION



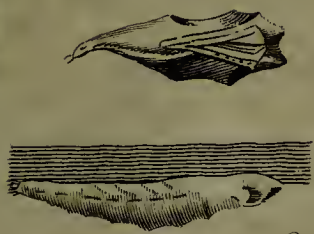
CATERPILLAR



P A P I L I O



A U R E L I A



Leaf Insects

of the Oak



of the Honeysuckle.



of the Trefoil



of the Ranunculus



of the Sow Thistle



T Æ N I Æ

of the Elm their Cases Worms & Flies



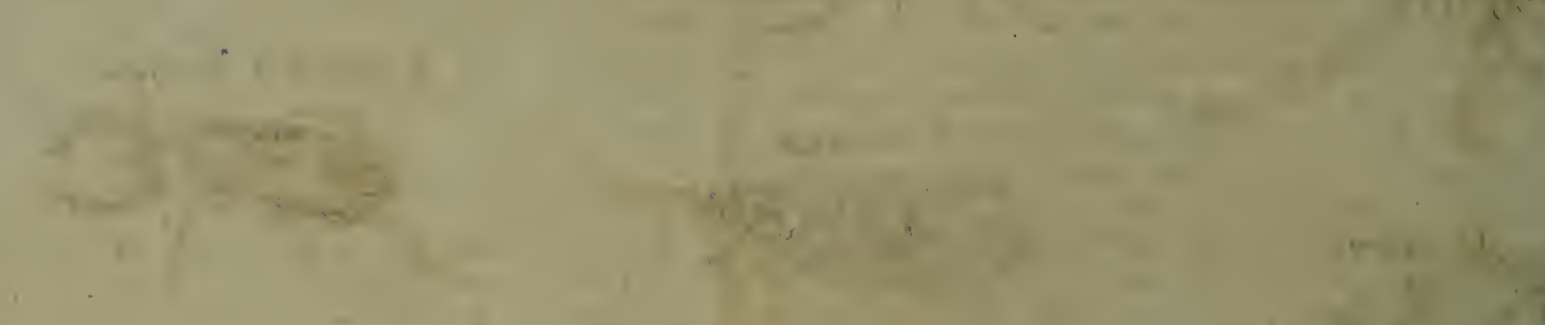
of the Lychens



of Cloaths their Cases Worms & Flies.



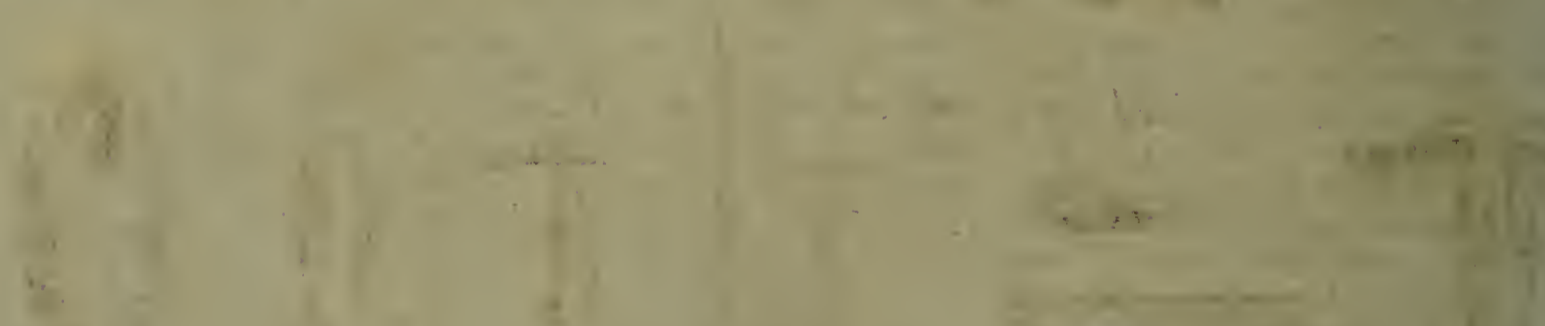
1. *Amphibia* (Frog)



2. *Amphibia* (Salamander)



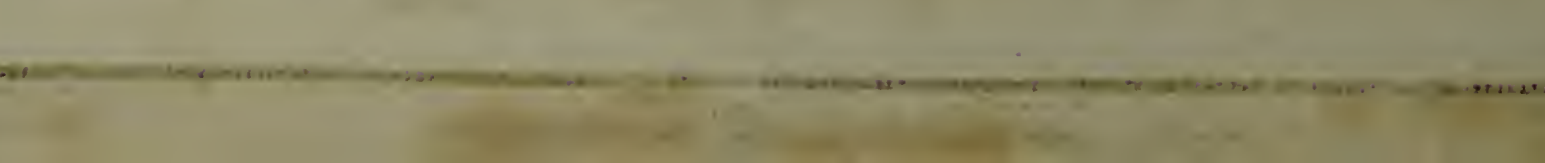
3. *Amphibia* (Tadpole)



4. *Amphibia* (Newt)



5. *Amphibia* (Toad)



the feet are dentated like a saw. Wood-Lice have great medicinal virtues, being impregnated with a saline quality, which is diuretic and stimulating.

The MONOCULUS, or WATER FLEA.

Water Fleas are of a blood colour, and are sometimes seen in such multitudes on the surface of standing water, that many people have taken it for blood. It is peculiar to the water, and has the legs before divided into branches, with which it either swims or leaps, and the body is covered with a crust or shell. It appears to have but one eye.

NATURAL HISTORY of the SCORPION.

THIS is one of the largest of the insect tribe, and is not less terrible from its size than its malignity. Its shape somewhat resembles that of a lobster, but is infinitely more hideous. Nine different kinds of this dangerous insect have been enumerated; but they are principally distinguished by their colour: some are yellow, others brown; some are of an iron grey; and others are black, red, and white. The head of the Scorpion seems to be joined to the breast; in the middle of which are seen two eyes, and two others are placed more forward in the fore part of the head: these eyes are so small as to be almost invisible. On each side of the head are two arms, each composed of four joints; the last of which is large and strong, and resembles a lobster's claw. Below the breast are eight articulated legs, each divided into six joints, the two hindmost of which are each provided with two crooked claws. The belly is divided into seven little rings; and the tail is composed of six joints, which are bristly, and appear like little globes; the last being armed with a crooked sting: this is that fatal instrument which renders this insect so truly mischievous and formidable. As it generally takes shelter in houses, it frequently stings those among whom it resides. In some of the towns of Italy, and in the province of Languedoc, in France, it is one of the greatest pests that torment mankind: but by the natives of Africa and the East, their malignity is woefully experienced. In Batavia, where they grow twelve inches long, a piece of furniture cannot be moved in the house without the utmost danger of being stung by them. We are assured by Bosman, that, along the Gold Coast, they are frequently seen larger than a lobster; and that their sting is inevitably fatal. In Europe, however, they are neither so plenty, so large, nor so venomous. There it seldom exceeds two or three inches in length, and its sting is not often fatal.

NATURAL HISTORY of the SCOLOPENDRA and GALLY WORM.

WE know little except the figure and the noxious qualities of these insects. We have some in this country that resemble them in form, but we are placed at a happy distance from such as are really formidable. With us they seldom exceed the length of an inch, but in the tropical climates they are sometimes found nine inches long. The Scolopendra, from the number of its feet, is also called the centipede. Those of the East Indies are about six inches long, of a ruddy colour, and as thick as a man's finger: they consist of many joints, and have a leg on each side of every joint: they are covered with hair, and seem to have no eyes: the head is round, and furnished with two small teeth, with which they inflict wounds that are painful and dangerous.

The Gally Worm differs from the Scolopendra in having double the number of feet: some of them are smooth and others hairy; some are black, others yellow, and others brown. When touched, they all roll themselves up in a ball. In Europe they are perfectly harmless. All these, as well as the scorpion, are produced perfect from the parent or the egg, and suffer no changes after exclusion.

NATURAL HISTORY of the LEACH.

THE common Leach is a water insect: it has the general figure of a worm, and is about as long as a man's middle finger. Its skin is composed of rings, by means of which it swims with some agility in the water. When out of the water it contracts itself in such a manner, that, when touched, it is not above an inch long. It has a small head, and a black skin, edged with a yellow line on each side: the belly is of a reddish colour, marked with whitish yellow spots. It is remarkable, that the mouth of this animal can assume whatever form it finds convenient. When at rest, however, the opening is usually triangular, and within it are placed three very sharp teeth. These animals are very useful in medicine, and when they are applied, they should be taken from the water, in which they are contained about an hour before, for they thus become more voracious, and fasten more readily. The most remarkable particular of this animal is, that tho' it takes a large quantity of food, it has no passage to eject it from the body when it has been digested: it is supposed to go off thro' the pores of the body.

The *horse-leach* is larger than the former, and grows to four inches in length. It has a smooth glossy skin, black on the back, spotted with grey. It is of no use, as it will not stick to the skin.

The *snail-leach* is about an inch in length, and of a very flat shape: its skin is smooth and glossy, and of a whitish colour. This leach will stick, tho' it is not large enough to extract a sufficient quantity of blood from the patient.

The *broad-tailed* Leach grows to an inch and an half in length, and has a smooth glossy skin, of a dusky brown colour. The back is raised into a kind of ridge. It will stick but on very few occasions. It is common on stones in shallow running waters.

NATURAL HISTORY of the LIBELLA, or DRAGON FLY.

THESE insects are called by different names in different parts of the kingdom: they are of all colours, blue, green, crimson, white, scarlet, or a union of the most agreeable tints. They are distinguished from all other flies, by the length of their bodies, the largeness of their eyes, and the beautiful transparency of their wings, which are four in number. Though there are three or four different kinds of Dragon Flies, they all agree in the most striking parts of their history. The largest are from two to three inches long; their tail is forked: their body divided into eleven rings; and their wings are of a beautiful glossy transparency. They have two teeth, covered with a beautiful lip; they bite fiercely when they are taken; but their bite is perfectly harmless. These animals are produced from eggs, deposited in the water; they afterwards become worms, and have six legs; they continue in their reptile state for a year; at length their wings expand, and they enter upon the flying state.

NATURAL HISTORY of the ANT-LION.

THIS insect in its reptile state, is of the size of a common wood-louse, but somewhat broader. It has a longish head, and a roundish body, which becomes a little narrower towards the tail. The colour is a dirty grey, speckled with black. The body is composed of several flat rings, which slip one upon another. It has six feet, four fixed to the breast, and two to the neck. It is generally produced in autumn, and in about a year afterwards it assumes a winged form, and becomes a large and beautiful fly of the libellular kind, with a long slender body of a brown colour; with large bright eyes, long slender legs, and four large transparent wings.

NATURAL HISTORY of the GRASS-HOPPER, and the LOCUST.

THERE are a tribe of little animals, which, though differing in size and colour, strongly resemble each other in figure, appetite, and nature. Of this variegated tribe, the common Grass-Hopper, that is found in such plenty in every meadow, and that continues chirping through the summer, is best known to us; and a history of that will contain a history of all the rest. The colour of this animal is green, with a line of brown which streaks the back, and two pale lines under the belly and behind the legs. The head is oblong, in some degree resembling that of a horse. The mouth is armed with teeth of a brown colour, hooked at the point. The corset is elevated, narrow, armed above and below by two ferrated spines. The back is armed with a strong buckler. The last pair of legs are longer and stronger than the first two pair, fortified by thick muscles, and admirably formed for leaping. It has four wings; the belly is composed of four rings, and terminated by a forked tail.

The Grass-Hopper, though seemingly without wings; is in reality possessed of them from the first, but it cannot break the bonds by which they are folded up, till it has been excluded above twenty days. When arrived at their winged state they are still vocal, and in the midst of summer, are heard much louder at sun-setting than during the heat of the day. Though slow in flight, they are sometimes seen to fly to considerable distances.

The larger kinds differ from this only in size, rapidity of flight, and the powers of injuring mankind, by swarming upon the productions of the earth. The grass which is destroyed by a few Grass-Hoppers which sport in our fields can be of no great consequence; but when a swarm of Locusts, two or three miles in length, and several yards in depth, settle upon a field, the consequences are frightful.

Europe is seldom visited by them in this manner. Those which were seen in several parts of England in the year 1748, were the great brown Locusts, and dreadful consequences were apprehended from their appearance. They were about three inches long.

Locusts are eaten by the natives in many kingdoms of the East. They certainly were a common food with the Jews, as Moses, in the book of Leviticus, permits them to eat four different kinds of this animal, which he particularly specifies.

The great West Indian Locust is the most noxious of this tribe of animals. It is armed with a sting, and those who touch it are sure to be stung by it: a little palm-oil, however, is a certain cure for it.

NATURAL HISTORY of the CRICKET.

THIS insect resembles the grass-hopper in its shape, its voice, and its leaping; but its colour is uniformly of a rusty brown. Its residence is most usually in the warmest chinks behind a country hearth. It is of a most chilly nature, seldom quitting the fire side. It is a voracious little animal, and will eat sugar, bread, meat, or flour. Except in the very coldest weather, they never cease their chirping.

There is a species of this insect that lives entirely in the woods and fields.

The Mole-Cricket is a very large insect, being two inches and an half in length, and three quarters of an inch in breadth. It chiefly resides under the surface in soft garden grounds, and is very injurious to gardeners.

NATURAL HISTORY of the EARWIG and the FROTH INSECT.

THE Earwig is so common as hardly to require a description: it is equally remarkable for its swiftness in the reptile state, and its velocity when it has arrived to its winged state. It is very prolific, and very harmless. The name, and the deformity of its figure, have subjected it to an imputation which has often procured its destruction. It is said that it often enters into the ears of people sleeping; thus causing madness from the intolerable pain, and soon after death itself; these reproaches, however, are entirely groundless: it were to be wished, that the accusations which gardeners bring against the Earwig were as slightly founded. At length the wings of this animal burst from their confinement, and when it becomes a winged insect it flies in pursuit of the female, ceasing to feed, and is wholly employed in the business of propagation. After having lived a few days in its winged state, and taken care for the continuance of posterity, it dries up and expires.

To this order of insects belong the Cuckow-Spit or Froth-Worm, that is often found in the frothy matter on the surface of plants. The Water Tipula, the common Water Fly may be classed in the same order. To these may be added the Water Scorpion, which is near an inch in length, and half an inch in breadth. The Water Scorpion lives in the water by day, out of which they rise into the air in the dusk of the evening, and often betake themselves to other waters in quest of food.

NATURAL HISTORY of the EPHEMERA.

THERE are several kinds of Ephemeræ, which are of various colours, as brown, yellow, and cream-coloured. It appears surprizing that there should be a tribe of flies whose duration extends but to a day; but some of this kind seem to be born and to die in a much shorter time: the reptile, however, from which they are bred, are sometimes known to live two or three years. They are produced from the egg in the form of worms, from whence they change into the form of aurelias; and from thence they take their last mutation, which is into a beautiful fly, of a shorter or longer duration, according to its kind. In its fly state, it is a beautiful winged insect, and strongly resembles the butterfly. But though the usual date of these flies is five or six hours, there are some kinds that live several days.

NATURAL HISTORY of the CATERPILLAR, BUTTERFLY, and MOTH.

CATERPILLARS are readily distinguished from worms or maggots by the number of their feet, and by their producing Butterflies or Moths:

WINGED INSECTS.

FLIES



The Breeze
or Gad Fly

The Gray
or Trumpet Fly

Æstrus Sp.7

Æstrus Sp.5.

The Wasp Fly

The Hornet Fly



The little Oval Beetle

BEETLES



The Staghorn'd Beetle

The Rhinoceros Beetle



The Unicorn Beetle



The Sawwort Beetle



The Shining Beetle Sp.3.



Dermestes
Sp.1.



Dermestes
Sp.11.



Cassida
Sp.3.



The Green
Tortoise Beetle



Cassida Sp.2.



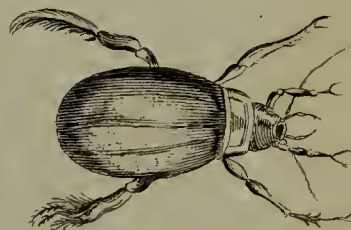
Cerambyx Sp.7.



Cerambyx Sp.8.



Dytiscus Sp.5



The great Water Beetle



Mordella
Sp.1.



Mordella
Sp.2.



Cicindela
Sp.1.



Cicindela
Sp.5.



Buprestis Sp.2.



Dytiscus Sp.2.



Dytiscus Sp.6.



Elater Sp.2.



Elater
Sp.6.



Cantharis Sp.4.



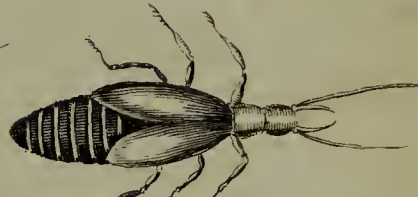
Cantharis Sp.5.



The Mill Beetle



Negydalis Sp.2.



The Oil Beetle

LOCUSTS



Staphylinus
Sp.3.



The Mole Cricket



The Spanish Locust



The great Green Locust



The Long-bodied Mantis



The Common Mantis



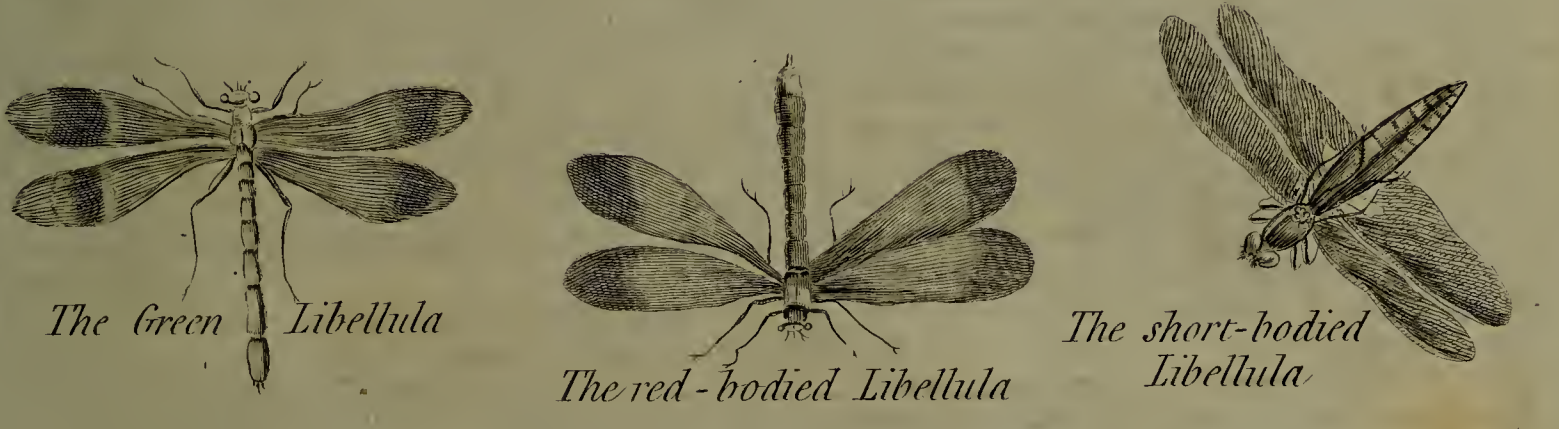
The House Cricket



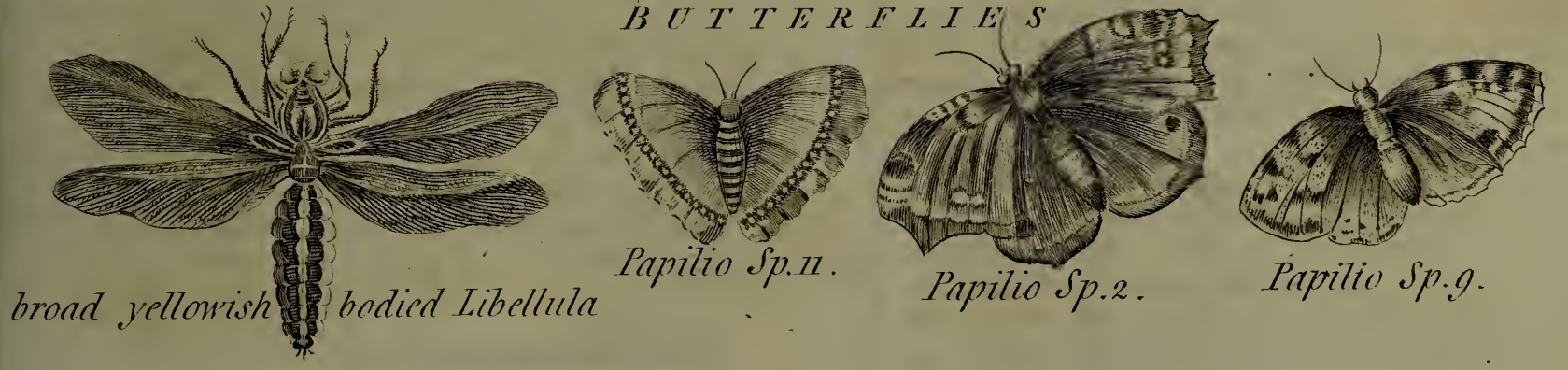
The Field Cricket

The main body of the page contains several lines of handwritten text, which are extremely faint and difficult to decipher. The text appears to be organized into paragraphs or sections, but the specific words and sentences are not legible.

WINGED INSECTS



BUTTERFLIES



MOTHS



BEE





Moths. All this class have from eight to sixteen feet; and the animal into which they are converted is always a Butterfly or a Moth. It is well known, that all these little animals are hatched from the eggs of Butterflies, and, during winter, the greatest number of Caterpillars are in an egg state. When it has strength to break its shell, it always finds its favourite aliments provided in abundance before it.

The body of a Caterpillar is composed of rings, which are generally twelve in number; by which they may be distinguished from any other insects that resemble them. The head is connected to the first ring by the neck: the jaws are placed rather vertically, and each jaw is armed with a large thick tooth. With these the animals devour their food in amazing quantities. A single Caterpillar will eat double its own weight of leaves in a day, without appearing to be disordered by the meal.

With regard to their external figure, Caterpillars are either smooth or hairy; they have in general six small black spots on the circumference of the fore ring; three of which are larger than the rest, which Reaumur supposes to be eyes. This insect has nine holes on each side of the body, through which it is supposed to breathe; they are called the stigmata.

The life of the Caterpillar seems to be one continued succession of changes, and, before the great metamorphosis, changes its skin eight or ten times. At length it becomes an aurelia; and one would imagine, that they were conscious of the precise time of their continuance in their aurelia state; their little sepulchres, with respect to their solidity, being proportioned to such duration. At length the Butterfly bursts from its aurelia skin, and decorates our fields with its symmetry and beauty.

The number of Butterflies is very great: Linnæus has reckoned up above seven hundred and sixty different kinds, and the catalogue is still very incomplete. Those of the warmer climates, however, are larger and more beautiful than such as are bred at home.

It is not by day alone that these animals are seen fluttering wantonly from flower to flower, as the greatest number of them fly by night, and expand the most beautiful colouring, at those hours when there is no spectator. They are therefore divided into diurnal and nocturnal flies; or Butterflies and Moths. They may be readily distinguished from each other by their horns or feelers: those of the Butterfly being clubbed or knobbed at the end: and those of the Moth tapering finer and finer to a point. The female Moth lays its eggs soon after it leaves the aurelia, but many of the Butterflies do not think of providing for posterity till the summer is far advanced.

NATURAL HISTORY of the SILKWORM.

THIS little animal, which only works for itself, has been of infinite service to the human race, and furnishes them with a more beautiful covering than can be supplied by any other animal. It is imagined, that Silkworms were not brought into Europe till the beginning of the twelfth century; when Roger of Sicily brought some manufacturers in silk from Asia Minor, on his return from his expedition to the Holy Land, and settled them in Sicily and Calabria. From these this manufacture was taught to the other kingdoms of Europe.

The Silkworm is a large caterpillar of a whitish colour, with twelve feet, and is afterwards transformed into a butterfly of the moth kind. The cone on which it spins, is formed for covering it while it remains in the aurelia state; and several of these, when properly wound off, and united together,

form those strong and beautiful threads, which are woven into silk: and, as our luxuries are increased, the silk manufacture is become one of the most lucrative of any in the southern provinces of Europe.

Previous to spinning its web, the Silkworm seeks for a convenient place to erect its cell, without any obstruction. Having found a leaf, or a chink fitted to its purpose, it begins to writhe its head in every direction; and fastens its thread on every side to the sides of its retreat.

In the course of a fortnight or three weeks the aurelia is changed into a moth: no sooner is the winged insect completely formed, than having divested itself of its aurelia skin, it prepares to burst through its cone, or outward prison, and by repeated efforts becomes emancipated. This animal, in its fly state, seems produced for no other purpose than to transmit a future brood. It neither flies nor eats; the male only seeking the female; their union continues for about four days without interruption; the male then dies, and the female survives him only till she has laid her eggs; which in the ensuing spring, are hatched into worms.

NATURAL HISTORY of the BEE.

THE Bee is a small and well known insect, famous for its industry.

This useful and laborious insect is divided by two ligaments into three parts or portions, the head, the breast, and the belly. The head is armed with two jaws and a trunk; the former of which play like two jaws opening and shutting to the right and left. The trunk is long and taper, and, at the same time, extremely pliant and flexible, being destined by nature for the insect to probe to the bottom of the flowers, through all the impediments of their chives and foliage; and drain them of their treasured sweets: but were this trunk to be always extended, it would prove incommodious, and be liable to be injured by a thousand accidents, it is therefore of such a structure, that, after the performance of its necessary functions; it may be contracted, or rather folded up; and besides this, it is fortified against all injuries by four strong scales, two of which closely sheathe it, and the two others, whose cavities and dimensions are larger, encompass the whole. From the middle part or breast of the Bee grow the legs, which are six in number: and at the extremity of the paws are two little hooks, discernible by the microscope, which appear like sickles, with their points opposite to each other. The wings are four, two greater and two smaller, which not only serve to transport them through the air, but, by the noise they make, to give notice of their departure and arrival, and to animate them mutually to their several labours. The hairs with which the whole body is covered, are of singular use in retaining the small dust that falls from the chives of the flowers, of which the wax is formed. The belly of the Bee consists of six rings, which slide over one another, and may be lengthened or contracted at pleasure; and the inside of this part of the body contains the intestines, the bag of honey, the bag of poison, and the sting. The office of the intestines is the same as in other animals. The bag of honey is transparent as crystal, containing the sweet juices extracted from flowers, which the Bee discharges into the cells of the magazine for the support of the community in winter. The bag of poison hangs at the root of the sting, through the cavity of which, as through a pipe, the Bee ejects some drops of this venomous liquor into the wound, and so renders the pain more excessive. The mechanism of the sting is admirable, being composed of two darts, enclosed within

within a sheath that tapers into a fine point, near which is an opening to let out the poison. The two darts are ejected through another aperture, which, being armed with several sharp beards like those of fish-hooks, are not easily drawn back again by the Bee; and indeed she never disengages them, if the wounded party happens to start and put her into confusion; but if one can have patience to continue calm and unmoved, she clinches those lateral points round the shaft of the dart, by which means she recovers her weapons, and gives less pain to the person stung. The liquor which at the same time she infuses into the wound, causes a fermentation, attended with a swelling, which continues several days; but that may be prevented by immediately pulling out the sting, and enlarging the puncture, to let the venomous matter have room to escape.

Let us now consider the generation, polity, and labours of these insects, the true knowledge of which is very much owing to the modern invention of glass hives, through which all the secrets of the community are laid open to a curious observer. Any person who carefully examines a hive at different seasons of the year will distinguish three sorts of Bees; of which the far greater number are the common working Bees, who do all the business of the hive, and seem to be neither male nor female. The working Bee. The second sort, called drones, are the males, and somewhat larger than the former; they have no sting, nor ever stir from the hive, but live upon the honey prepared by the others. The third sort is a much larger and longer bodied Bee, of which there are often but one in every swarm or colony of young Bees, who are from time to time detached from the hive in search of another habitation. This large Bee is what the ancients called the king, from the respect they always saw paid to it by the other Bees; but being the female, the moderns more properly give the title of queen, or mother of the swarm.

When these industrious insects begin their works, it is observed they are divided into four parties, one of which is destined to the fields to provide materials for the structure; the second works upon those materials, and forms them into a rough sketch of the dimensions and partitions of the cells; the third examines and adjusts the angles, removes the superfluous wax, polishes the work, and gives it its necessary perfection; and the fourth is employed in bringing provisions to the labourers that build them, because polishing is not so laborious. They begin their work at the top of the hive, continuing downwards to the bottom, and from one side to another; and to make it the more solid, they use a sort of tempered wax, resembling glue. The form of the cells of the honey-comb is hexagonal, which figure, besides what is common with a square and equilateral triangle, has the advantage of including a greater space within the same surface.

The expedition of the Bees in their labour, is almost incredible; for notwithstanding the elegance and just proportions of the work, they are so indefatigable, that they will, in one day, finish a honey-comb a foot long, and six inches broad, capable of receiving three thousand bees.

When the cells are completed, the queen takes possession of those she likes best to deposit her eggs in, and the rest are left to be filled with honey. She lays one egg in each cell, and sometimes more than an hundred of those eggs in a day; but what is still more remarkable, she lays those eggs which are to produce common Bees, in cells of the common shape and size; those that are to become drones or males, in the cells of a larger size; and deposits those which are to become females, like herself, in the spheroidal cells already described.

These eggs, after lying some time in the cells, are

hatched into maggots, and fed with honey ten or twelve days, after which, the other bees close up the cells with a thin piece of wax; and under this covering they become gradually transformed into Bees, in the manner as silk-worms are into butterflies. Having undergone this change, the young Bees pierce through their waxen doors, wipe off the humidity from their little wings, take their flight into the fields, rob the flowers of their sweets, and are perfectly acquainted with every necessary circumstance of their future conduct. As to the males or drones, which are destined only to propagate their species, they live very comfortably for about three months after they are hatched; but when that time is over, and the females are impregnated, the common Bees either kill them, or drive them from the hive, as burthensome to the community, and not a drone is to be found till the next season.

It is an excellent observation of a modern author, that the hive is a school to which numbers of people ought to be sent; prudence, industry, benevolence, public spiritedness, œconomy, neatness, and temperance, are all visible among the Bees. These little animals are actuated by a social spirit, which forms them into a body politic, intimately united, and perfectly happy. They all labour for the general advantage; they are all submissive to the laws and regulations of the community: having no particular interest, no distinction but those which nature or the necessities of their young have introduced amongst them. They are free, because they only depend on the laws; they are happy, because the concurrence of their several labours inevitably produces abundance, which contributes to the riches of each individual. Let us compare human societies with this, and they will appear altogether monstrous. Necessity, reason, and philosophy, have established them for the commendable purposes of mutual aid and benefits: but a spirit of selfishness destroys all; and one half of mankind, to load themselves with superfluities, leave the other destitute of common necessities.

When the hive is become too much crowded, by the addition of the young brood, a part of the Bees think of finding themselves a more commodious habitation, and with that view single out the most forward of the young queens. A new swarm is, therefore, constantly composed of one queen at least, and of several thousand working Bees, as well as of some hundreds of drones. The working Bees are some old, some young.

The usual method of uniting swarms is very easy. Spread a cloth at night upon the ground close to the hive in which the two casts or swarms are to be united; lay a stick across this cloth; then fetch the hive with the new swarm, set it over the stick, give a smart stroke on the top of the hive, and all the Bees will drop down upon the cloth in a cluster. This done, throw aside the empty hive, take the other from off the stool, and set this last over the Bees, who will soon ascend into it, mix with those already there, and become one and the same family. Others, instead of striking the Bees down upon the cloth, place with its bottom upmost the hive in which the united swarms are to live, and strike the Bees of the other hive down into it. The former of these hives is then restored to its natural situation, and the Bees of both hives soon unite. If some Bees still adhere to the other hive, they may be brushed off on the cloth, and they will soon join their brethren. Or one may take the following method, which gives less disturbance to the Bees. Set with its mouth upmost the hive into which the young swarm has been put, and set upon it the other hive. The Bees in the lower hive, finding themselves in an inverted situation, will soon ascend into the upper.

Columella directs, that the apiary, or Bee-garden, face the south, in a place neither too hot, nor too much exposed to the cold; that it be in a valley, in order that the loaded Bees may with the greater ease descend to their homes; that it be near the mansion-house, on account of the conveniency of watching them, but so situated as not to be exposed to noisome smells, or to the din of men or cattle; that it may be surrounded with a wall, which, however; should not rise above three feet high; that, if possible, a running stream be near them, or, if that cannot be, that water be brought near them in troughs, with pebbles or small stones in the water, for the Bees to rest on whilst they drink; or that the water be confined within gently declining banks, in order that the Bees may have safe access to it; they not being able to produce either combs, honey, or food for their maggots, without water. That the neighbourhood of rivers or basons of water with high banks be avoided, because winds may whirl the Bees into them, and they cannot easily get on shore from thence to dry themselves; and that the garden in which the apiary stands be well furnished with such plants as afford the Bees plenty of good pasture. The trees in this garden should be of the dwarf kind, and their heads bushy, in order that the swarms which settle on them may be the more easily hived.

We come now to explain the most inhuman method commonly practised of taking Bees, which consists in wantonly destroying the whole swarm, in order to enjoy the fruits of their labours.

Were we to kill the hen for her egg, the cow for her milk, or the sheep for the fleece it bears, every one would instantly see how much we should act contrary to our own interest: and yet this is practised every year in regard to Bees. Would it not argue more wisdom in us to be contented with taking away only a portion of their wax and honey, as is the practice of many countries? The common method here is, that when those which are doomed for slaughter have been marked out (which is generally done in September) a hole is dug near the hive, and a stick, at the end of which is a rag that has been dipped in melted brimstone, being stuck in that hole, the rag is set on fire, the hive is immediately set over it, and the earth is instantly thrown up all around, so that none of the smoke can escape. In a quarter of an hour, all the Bees are seemingly dead; and they will soon after be irrecoverably so, by being buried in the earth that is returned back into the hole: they will soon be absolutely killed by this last means; because it has been found, by experiment, that all the Bees which have been affected only by the fumes of the brimstone, recover again, excepting such as have been singed or hurt by the flame. Hence it is evident, that the fume of brimstone might be used for intoxicating the Bees, with some few precautions. The heaviest and the lightest hives are alike treated in this manner; the former, because they yield the most profit, with an immediate return; and the latter, because they would not be able to survive the winter. Those hives which weigh from fifteen to twenty pounds, are thought to be the fittest for keeping.

The practice of the ancients was, however, very different from this: they were content to share with these industrious insects the produce of their labours; and some very laudable attempts have been made in our own country, to attain the desirable end of getting the honey and wax, without destroying the Bees. John Geddy, Esq. published in the year 1665, his invention of boxes for preserving the lives of Bees. These were improved by Joseph Warder, physician, at Croydon, who at the same time embellished his account of the structure and use of

these boxes, with several other curious circumstances concerning Bees, in his work, intitled, *The True Amazons; or the Monarchy of Bees*. Two very worthy clergymen, the Rev. Mr. John Thorley, of Oxford, and the Rev. Mr. Stephen White, M. A. Rector of Holton, in Suffolk, have brought the method of preserving the lives of Bees to still greater perfection.

The indefatigable Mr. Wildman, so universally known for his curious experiments with Bees, has obliged the world with the following method of taking the wax and honey, without destroying the Bees:

Remove, says he, the hive from which you would take the wax and honey, into a room, into which admit but little light, that it may at first appear to the Bees as if it were late in the evening. Gently invert the hive, placing it between the frames of a chair, or other steady support, and cover it with an empty hive, keeping the side next the window of the empty hive raised a little, to give the Bees sufficient light to get into it. While you hold the empty hive steadily supported on the edge of the full hive, between your side and your left arm, keep striking with your other hand all round the full hive from top to bottom, in the manner of beating a drum, so that the Bees may be frightened by the continual noise from all quarters; and they will in consequence mount out of the full hive into the empty one. Repeat the strokes rather quick than strong round the hive, till all the Bees are got out of it, which will generally be in about five minutes. It is to be observed, that the fuller the hive is of Bees, the sooner they will have left it. As soon as a number of them have got into the empty hive, it should be raised a little from the full one, that the Bees may not continue to run from the one to the other. As soon as all the Bees are out of the full hive, the other, in which the Bees are, must be placed on the stand from which the former hive was taken, in order to receive the absent Bees as they return from the fields.

If this be done early in the season, the operator should examine the royal cells; for if any of them contain young Bees, they must, as well as all the combs that have young Bees in them, be saved in the hive. Take out the other combs with a long broad and pliable knife; cutting them from the sides and crown as clean as possible, to save the future labours of the Bees, who must lick up the honey spilt, and remove every grain of wax: the sides of the hive should then be scraped with a table-spoon, to clear away what was left by the knife.

Having thus finished taking the wax and honey, let a table covered with a clean cloth, be placed near the stand, and giving the hive in which the bees are a sudden shake, striking it at the same time pretty forcibly, the Bees will be shaken on the cloth. Put their own hive over them immediately, raised a little on one side, that the Bees may the more easily enter, and when all are entered, place it on the stand as before. If the hive in which the Bees are, be turned uppermost, and their own hive placed over it, the Bees will immediately ascend into it, especially if the lower sides be struck to alarm them: for the effects of fear impressed on the Bees, by the continual noise, renders them for a considerable time so mild and tractable, that they will bear any handling, which does not hurt them, without any shew of resentment.

NATURAL HISTORY of the WASP and HORNET.

THOUGH the bee and the Wasp resemble each other very strongly, yet they differ very widely in their manner and duration. The Wasp is well known to be a winged insect with a sting: it is longer

longer in proportion than the bee, and is marked with bright yellow circles round the body: it is the swiftest and most active insect of all the fly kind. It has a long tooth on each side of the mouth, with which it is enabled to cut almost any substance, and carry it to its nest.

Like bees, these insects live in community, and sometimes upwards of ten thousand are found inhabiting one nest. Among bees every community is composed of females, or queens, drones or males, and neutral or working bees. The occupations of Wasps are similar; the two first are for propagating the species, the last for defending and nursing the rising progeny. Bees, however, have seldom more than a queen or two in an hive; among Wasps there are two or three hundred. The nest of the Wasp is very curious, the construction of which is not very different from that of the bee; and each cell is hexagonal, like that of the bee.

The Wasps of Europe are very mischievous, but they are innocent when compared to those of the tropical climates, where all the insect tribes are not only numerous, but large, voracious, and formidable. In some of the islands, no precautions can prevent their attacks, and their sting is sometimes as terrible as that of a scorpion.

The Hornet is about twice as large as the Wasp, but strongly resembles it in shape. It has four wings, those above being double the size of those below. It makes a greater noise in flying than a Wasp, and is a very troublesome and dangerous insect.

NATURAL HISTORY of the ICHNUMON FLY.

THERE are many different kinds of this insect, but that which is the most formidable, is called the common Ichnumon. The body is long, slender, and black: the head, breast, feelers, and weapon at the tail, are of the same colour: it has four wings, like the bee, which are transparent, with a black spot near the edge of each. The weapon at the tail is longer than the body, and consists of three parts like hairs. Ray calls it the Wasp Ichnumon. This creature is a dreadful enemy to the insect tribe, but a particular friend to mankind. The millions it destroys in a summer are inconceivable; and without such a destroyer, the fruits of the earth would only furnish a banquet for the insect race.

NATURAL HISTORY of the ANT.

THESE insects are famous from all antiquity for their social and industrious habits: they are offered as a pattern of parsimony for the profuse, and of unremitting diligence to the sluggard. It is, however, surprising that all the writers of antiquity should describe this insect as labouring in the summer, and feasting upon the produce during the winter; it being well known that they require no supply of winter provisions, as they are actually in a state of torpidity during that season. But this may not, perhaps, be the case in some of the warmer climates, where the winter is mild.

The common Ants are of two or three different kinds; some are red, others black; some have stings, others have none. Such as have stings, inflict their wounds with them; such as have not, spirt from their hinder parts an acid pungent liquor. The body of an Ant is divided into the head, breast, and belly. The eyes are black, and under them are two small horns or feelers. The breast is covered with a fine silky hair, from which project six legs, the extremities of each have two small claws. The body is of a brown chestnut colour, somewhat reddish about the belly. Like bees, they are divided into

males, females, and the neutral or working tribe. The females are larger than the males, and the working Ants are the smallest of all. The former, in general, have wings, the latter never have any; and upon them are devolved all the labours that tend to the welfare of the community. The males and females mix with the working multitude, but seem no way to partake in the common drudgeries of the state.

The fond attachment which the working Ants shew to the rising progeny is amazing: in cold weather they convey them in their mouths to the very depths of their habitation, where they are less subject to the severity of the season. In a fine day they remove them nearer the surface, where their maturity may be assisted by the warm beams of the sun.

The Ants of Africa are of three kinds; the red, the green, and the black; the latter is a very formidable insect, and above an inch in length. Their sting produces great pain, and their depredations are sometimes extremely destructive. From their hills, which are from six to twelve feet high, they fall out in a body in quest of adventures, and sometimes sheep, fowls, and even rats, are killed and devoured by these merciless insects.

NATURAL HISTORY of the BEETLE.

THERE are various kinds of the Beetle, all concurring in one common formation of having cases to their wings. Such a covering is the more necessary to these insects, as they sometimes live under the surface of the earth, in holes which are made by their own industry. The May-bug or dorr-beetle is so well known as to require no description. The elephant Beetle is the largest of this kind hitherto known; it is found in South-America, particularly Surinam, and about the river Oroonoko. It is black, and the whole body is covered with a hard shell. Its length from the hinder part to the eyes, is about four inches. The cantharis is of the Beetle kind, from whence come cantharides, well known by the name of Spanish flies, and for their use in blisters. Some are of a pure azure colour, others of pure gold, and others of a mixture of both. They are chiefly natives of Spain, Italy, and Portugal. The cochineal is an insect of a scarlet colour within, and without of a blackish red; sometimes of a white reddish or ash-colour, which are accounted the best, and are brought us from Mexico. These insects are used both in dying and in medicine.

NATURAL HISTORY of the GNAT and the TIPULA.

THE Tipula, or long legs, and the larger kind of Gnat, have frequently been mistaken for each other; they are both mounted on long legs, both furnished with two wings and a slender body: the principal difference is, that the Tipula wants a trunk, and the Gnat has a large one, which it often exerts to very mischievous purposes; but the Tipula is peaceful and innocent. The Gnat of Europe, indeed, gives but little uneasiness; but it is very different in America, where the waters stagnate, and the climate is warm, and where they are produced in multitudes beyond expression. There they are found from six inches in length to a minuteness that requires even the microscope to perceive them. Tho' the suffering inhabitants destroy millions daily, still millions more succeed, and produce unceasing torment.

INSECTS without WINGS.

The Hair Worm



The Leach



WORMS



Julus Sp. 4.



Scolopendra Sp. 5.

S P I D E R S



Aranea Sp. 4.



Aranea Sp. 9.



Aranea Sp. 8.



Aranea Sp. 7.



Aranea Sp. 13.



Aranea Sp. 1.



The long-leg'd Acarus



Acarus Sp. 7.



Aranea Sp. 2.

S C O R P I O N S



The Barbary Scorpion



The Italian Scorpion



The black African Scorpion

C R A B S



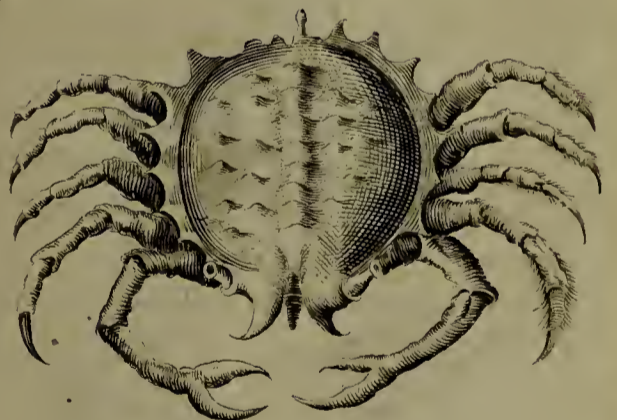
The Great Crab



The Wart Crab



The little Squall Crab



The Frog Crab



The little Woolly Crab



The round-bodied Crab



The Hermit Crab



The long-clawed Crab



The long-armed Dutch Crab

Fig. 1. *Ascaris* (larva) - 10x magnification.

Fig. 2. *Ascaris* (larva) - 10x magnification.

Fig. 3. *Ascaris* (larva) - 10x magnification.

Fig. 4. *Ascaris* (larva) - 10x magnification.

Fig. 5. *Ascaris* (larva) - 10x magnification.

Fig. 6. *Ascaris* (larva) - 10x magnification.

Fig. 7. *Ascaris* (larva) - 10x magnification.

Fig. 8. *Ascaris* (larva) - 10x magnification.

Fig. 9. *Ascaris* (larva) - 10x magnification.

Fig. 10. *Ascaris* (larva) - 10x magnification.

Fig. 11. *Ascaris* (larva) - 10x magnification.

Fig. 12. *Ascaris* (larva) - 10x magnification.

Fig. 13. *Ascaris* (larva) - 10x magnification.

The native Indians, who anoint their bodies with oil, and who have from their infancy been used to their depredations, find them much less inconvenient than those who are newly arrived from Europe; they sleep in their cottages, covered all over with thousands of the Gnat kind upon their bodies, and yet do not seem to have their slumbers interrupted by their cruel devourers. If a candle happens to be lighted in one of those places, a cloud of insects at once light upon the flame, and extinguish it; they are therefore obliged to keep their candles in glass lanthorns; a miserable expedient to prevent an unceasing calamity!

The Gnat proceeds from a little worm, which is usually seen at the bottom of standing waters. The manner in which the insect lays its eggs, is particularly curious; after having laid the proper number on the surface of the water, it surrounds them with a kind of unctuous matter, which prevents them from sinking; but at the same time fastens them with a thread to the bottom, to prevent their floating away, at the mercy of every breeze, from a place the warmth of which is proper for their production, to any other, where the water may be too cold, or the animals its enemies too numerous. Thus the insects, in their egg state, resembles a buoy which is fixed by an anchor. As they come to maturity, they sink deeper, and at last, when they leave the egg as worms, they creep at the bottom. They now make themselves lodgments of cement, which they fasten to some solid body at the very bottom of the water, unless, by accident, they meet with a piece of chalk, which being of a soft and pliant nature, gives them an opportunity of sinking a retreat for themselves, where nothing but the claws of a cray-fish can possibly molest them. The worm afterwards changes its form. It appears with a large head, and a tail invested with hair, and moistened with an oleaginous liquor, which she makes use of as a cork, to sustain her head in the air, and her tail in the water, and to transport her from one place to another. When the oil with which her tail is moistened begins to grow dry, she discharges out of her mouth an unctuous humour, which she sheds all over her tail; by virtue whereof, she is enabled to transport herself where she pleases, without being either wet or any-ways incommoded by the water. The Gnat, in her second state, is, properly speaking, in her form of a nymph, which is an introduction, or entrance into a new life. In the first place, she divests herself of her second skin; in the next, she resigns her eyes, her antennæ, and her tail; in short, she actually seems to expire. However, from the spoils of the amphibious animal, a little winged insect cuts the air, whose every part is active to the last degree, and whose whole structure is the just object of our admiration. Its little head is adorned with a plume of feathers, and its whole body invested with scales and hair, to secure it from any wet or dust. She makes trial of the activity of her wings, by rubbing them either against her body, or her broad side-bags, which keep her in an equilibrium. The furbelow, or little border of fine feathers, which graces her wings, is very curious, and strikes the eye in a most agreeable manner. There is nothing, however, of greater importance to the Gnat, than her trunk, and that weak implement may justly be deemed one of nature's master-pieces. It is so very small, that the extremity of it can scarcely be discerned through the best microscope that can be procured. That part which is at first obvious to the eye, is nothing but a long scaly sheath under the throat. At near the distance of two-thirds of it, there is an aperture, through which the insect darts out four stings, and afterwards retracts them. One of which, however sharp and active it may be, is no more than the case in which the other

three lie concealed, and run in a long groove. The sides of these stings are sharpened like two edged swords; they are likewise barbed, and have a vast number of cutting teeth towards the point, which turns up like a hook, and is fine beyond expression. When all these darts are stuck into the flesh of animals, sometimes one after another, and sometimes all at once, the blood and humours of the adjacent parts must unavoidably be extravasated; upon which a tumour must consequently ensue, the little orifice whereof is closed up by the compression of the external air. When the Gnat, by the point of her case, which she makes use of as a tongue, has tasted any fruit, flesh, or juice, that she has found, if it be a fluid, she sucks it up, without playing her darts into it; but in case she finds the least obstruction by any flesh whatever, she exerts her strength, and pierces through it, if she possibly can. After this, she draws back her stings into their sheath, which she applies to the wound in order to extract, as through a reed, the juices which she finds enclosed. This is the implement with which the Gnat performs her work in the summer, for during the winter she has no manner of occasion for it. Then she ceases to eat, and spends all that tedious season either in quarries or in caverns, which she abandons at the return of summer, and flies about in search after some commodious ford, or standing water, where she may produce her progeny, which would be soon washed away and lost, by the too rapid motion of any running stream. The little brood are sometimes so numerous, that the very water is tinged according to the colour of the species, as green, if they be green, and of a sanguine hue, if they be red.

These are circumstances sufficiently extraordinary in the life of this little animal, but it offers something still more curious in the method of its propagation. However similar insects of the Gnat kind are in their appearance, yet they differ widely from each other in the manner in which they are brought forth, for some are oviparous, and are produced from eggs, some are viviparous, and come forth in their most perfect form; some are males, and unite with the female; some are females, requiring the impregnation of the male; some are of neither sex, yet still produce young, without any copulation whatsoever. This is one of the strangest discoveries in all natural history! A Gnat separated from the rest of its kind, and inclosed in a glass vessel, with air sufficient to keep it alive, shall produce young, which also, when separated from each other, shall be the parents of a numerous progeny. Thus, down for five or six generations, do these extraordinary animals propagate, without the use of copulation, without any congress between the male and female, but in the manner of vegetables, the young bursting from the body of their parents, without any previous impregnation. At the sixth generation, however, their propagation stops, the Gnat no longer produces its like, from itself alone, but it requires the access of the male, to give it another succession of fecundity.

NATURAL HISTORY of WORMS.

ANIMALS of the Worm kind are the first in the class of the zoophytes: being entirely destitute of feet, they trail themselves upon the ground, and find themselves a retreat under the earth or in the water. Like most other insects, Worms have breathing-holes along the back, adjoining each ring, but they are without bones, without eyes, and without ears. Some animals live without their limbs, but the earth-worm, and all the zoophyte tribe, continue to live in separate parts when cut

into pieces; and one animal, by the means of cutting, is divided into two distinct existencies, and sometimes into a thousand. This is the most astonishing phenomenon in all natural history, that man should have a kind of creative power, and out of one life make two, each completely formed, with all its apparatus and functions. This obtains also in the Sea-Worm, the Water-Worm, and in many other of the vermicular species.

When Des Cartes first started the opinion, that brutes were machines, the discovery of this surprising propagation was unknown, which might, in some measure, have strengthened his fanciful theory. What is life, in brutes, he might have said, or where does it reside? In some we find it so diffused, that every part seems to maintain a vivacious principle, and the same animal appears possessed of a thousand distinct irrational souls at the same time. But let us not, he would say, give so noble a name to such contemptible powers, but rank the vivifying principle in these with the sap that rises in vegetables, or the moisture that contracts a cord, or the heat that puts water into motion! Nothing, in fact, deserves the name of soul, but that which reasons, that which understands, and by knowing God, receives the mark of its currency, and is minted with the impression of its great Creator.

Such might have been the speculations of this philosopher; however, to leave theory, it will be sufficient to say, that we owe the first discovery of this power of reproduction in animals, to Mr. Trembley, who first observed it in the polypus; and after him, Spalanzani and others found it taking place in the Earth-Worm, the Sea-Worm, and several other ill-formed animals of a like kind, which were susceptible of this new mode of propagation. This last philosopher, has tried several experiments upon the Earth-Worm, many of which succeeded according to his expectation; every Earth-Worm, however, did not retain the vivacious principle with the same obstinacy; some, when cut in two, were entirely destroyed; others survived only in the nobler part; and while the head was living, the tail entirely perished, and a new one was seen to burgeon from the extremity. But what was most surprising of all, in some, particularly in the small red-headed Earth-Worm, both extremities survived the operation; the head produced a tail with the anus, the intestines, the annular muscle, and the prickly beards; the tail part, on the other hand, was seen to shoot forth the nobler organs, and, in less than the space of three months, sent forth a head, heart, with all the apparatus and instruments of generation. This part, as may easily be supposed, was produced much more slowly than the former, a new head taking above three or four months for its completion, a new tail being shot forth in less than as many weeks. Thus two animals, by dissection, were made out of one, each with their separate appetites, each endued with life and motion, and seemingly as perfect as that single animal from whence they derived their origin.

The Sea-Worm, the White Water-Worm, and many of those little Worms with feelers, found at the bottom of dirty ditches; in all these, the nobler organs are of such little use, that if taken away, the animal does not seem to feel the want of them; it lives in all its parts, and in every part, and by a strange paradox in nature, the most useless and contemptible life, is of all others the most difficult to destroy.

As Worms, like serpents, have a creeping motion, so both, in general, go under the common appellation of reptiles; a loathsome, noxious, malignant tribe, to which man by nature, as well as by religion, has the strongest antipathy. But though Worms, as well as serpents, are mostly without feet,

and have been doomed to creep along the earth on their bellies, yet their motions are very different. The serpent having a back-bone, which it is incapable of contracting, bends its body into the form of a bow, and then shoots forward from the tail; but it is very different with the Worm, which has a power of contracting or lengthening itself at will. There is a spiral muscle, that runs round its whole body, from the head to the tail, somewhat resembling a wire wound round a walking-cane, which, when slipped off, and one end extended and held fast, will bring the other nearer to it; in this manner the Earth-Worm, having shot out, or extended its body, takes hold by the slime of the fore part of its body, and so contracts and brings forward the hinder part; in this manner it moves onward, not without great effort, but the occasions for its progressive motion are few.

As it is designed for living under the earth, and leading a life of obscurity, so it seems tolerably adapted to its situation. Its body is armed with small stiff sharp burs or prickles, which it can erect or depress at pleasure; under the skin there lies a slimy juice, to be ejected as occasion requires, at certain perforations, between the rings of the muscles, to lubricate its body, and facilitate its passage into the earth. It has a mouth, and also an alimentary canal, which runs along to the very point of the tail. In some Worms, however, particularly such as are found in the bodies of animals, this canal opens towards the middle of the belly, at some distance from the tail. The intestines of the Earth-Worm, are always found filled with a very fine earth, which seems to be the only nourishment these animals are capable of receiving.

The animal is entirely without brain, but near the head is placed the heart, which is seen to beat with a very distinct motion, and round it are the spermatic vessels, forming a number of little globules, containing a milky fluid, which have an opening into the belly, not far from the head: they are also often found to contain a number of eggs, which are laid in the earth, and are hatched in twelve or fourteen days into life, by the genial warmth of their situation; like snails, all these animals unite in themselves both sexes at once, the reptile that impregnates, being impregnated in turn; few that walk out, but must have observed them, with their heads laid against each other, and so strongly attached, that they suffer themselves to be trod upon.

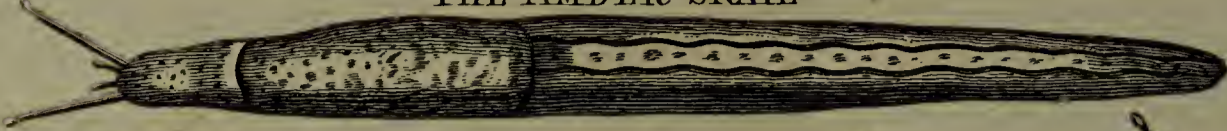
When the eggs are laid in the earth, which, in about fourteen days, as has been said, are hatched into maturity, the young ones come forth very small, but perfectly formed, and suffer no change during their existence: how long their life continues, is not well known, but it certainly holds for more than two or three seasons. During the winter, they bury themselves deeper in the earth, and seem, in some measure, to share the general torpidity of the insect tribe. In spring, they revive with the rest of nature, and on those occasions, a moist or dewy evening brings them forth from their retreats, for the universal purpose of continuing their kind. They chiefly live in a light rich and fertile soil, moistened by dews or accidental showers, but avoid those places where the water is apt to lie on the surface of the earth, or where the clay is too stiff for their easy progression under ground.

Helpless as they are formed, yet they seem very vigilant in avoiding those animals that chiefly make them their prey: in particular, the mole, who feeds entirely upon them beneath the surface, and who seldom ventures, from the dimness of its sight, into the open air; him they avoid, by darting up from the earth, the instant they feel the ground move; and fishermen, who are well acquainted with this, take

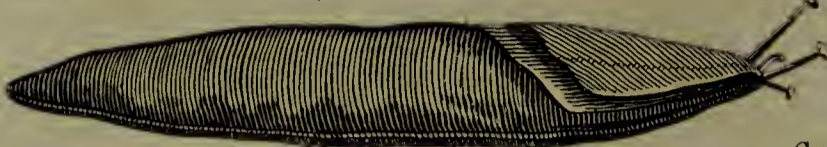


NAKED INSECTS .

THE AMBER SNAIL



THE RED NAKED SNAIL

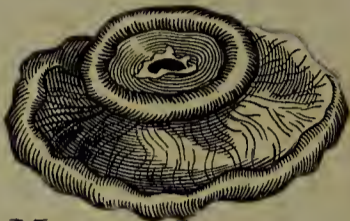


SEA INSECTS

THE BLACK NAKED SNAIL



MEDUSA SP. 4



MEDUSA SP. 2



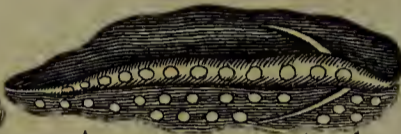
MEDUSA SP. 1



LERNÆA



AMPHITRITE SP. 1



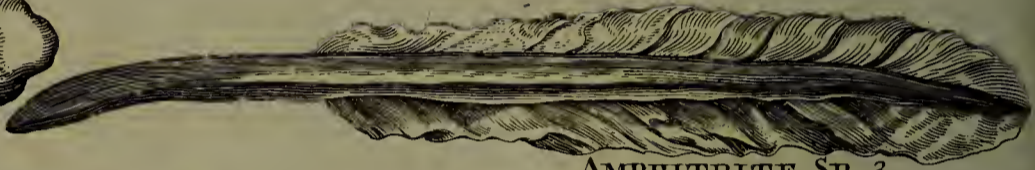
APHRODITA SP. 4



APHRODITA SP. 1



AMPHITRITE SP. 8



AMPHITRITE SP. 3



SALACIA SP. 3



NEREIS



TETHYS SP. 7



TETHYS SP. 2



ACTINIA SP. 1



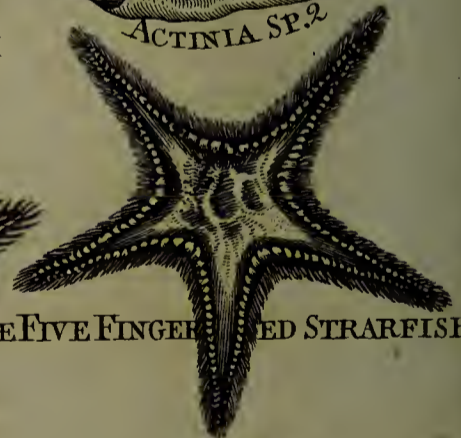
ACTINIA SP. 2



THE CUTTLE FISH



ASTERIAS SP. 1



THE FIVE FINGERED STARFISH



ASTERIAS SP. 6



THE SEA COMET



ASTERIAS SP. 3

take them in what numbers they chuse, by stirring the earth where they expect to find them. They are also driven from their retreats under ground, by pouring bitter or acid water thereon, such as that water in which green walnuts have been steeped, or a lye made of pot-ashes.

Such is the general outline of the history of these reptiles, which, as it should seem, degrades them no way beneath the rank of other animals of the insect creation; we have mentioned a part of their history, which proves the imperfection of their organs, from the easiness with which these little machines may be damaged and repaired again. It is well known in mechanics, that the finest and most complicated instruments are the most easily put out of order, and the most difficultly set right; the same also obtains in the animal machine. Man, the most complicated machine of all others, whose nerves are more numerous, and powers of action more various, is most easily destroyed: he is seen to die under wounds which a quadruped or a bird could easily survive; and as we descend gradually to the lower ranks, the ruder the composition, the more difficult it is to disarrange it.

NATURAL HISTORY of the STAR-FISH, the POLYPUS, the CORAL PLANTS, and all the Varieties of the SEA-NETTLE.

NATURALISTS have given to the worm, and all these animals, the name of zoophytes. These are not produced by the ordinary forms of generation, but are propagated by dissection. Some of these, as already observed, though cut into an hundred parts, still retain life in each; and are endued with such a vivacious principle, that every part becomes a perfect animal in a very short time. They are a set of creatures placed between animals and vegetables, and form the shade that connects animal and insensible nature. Such are the Cuttle-fish, the Sea-Star, the Sea-Nettle, and Coral Plants. Numbers of what seem plants at sea, are not only the receptacles of insects, but also entirely of insect formation. Hence some philosophers have been led into opinion, that all nature was animated, and that the most inert mass of matter was endued with life and sensation, and only wanted organs to make those sensations perceptible to the beholder.

All of the Star-Fish kind are formed of a semi-transparent gelatinous substance, covered with a thin membrane; and, to an inattentive spectator, often appear like a lump of inanimate jelly, floating at random upon the surface of the sea, or thrown by chance on shore at the departure of the tide: but upon a more minute inspection, they will be found possessed of life and motion; they will be found to shoot forth their arms in every direction, in order to seize upon such insects as are near, and to devour them with great rapacity. Worms, the spawn of fish, and even muscles themselves, with their hard resisting shell, have been found in the stomachs of these voracious animals; and what is very extraordinary, though the substance of their own bodies be almost as soft as water, yet they are no way injured by swallowing these shells, which are almost of a stony hardness. They increase in size, as all other animals do. In summer, when the water of the sea is warmed by the heat of the sun, they float upon the surface, and, in the dark, they send forth a kind of shining light, resembling that of phosphorus. Some have given these animals the name of Sea-Nettles, because they burn the hands of those that touch them, as nettles are found to do. They are often seen fastened to the rocks, and to the largest sea-shells, as if to derive their nourishment from them. If they be taken and put into spirit of wine, they

will continue for many years entire, but if they be left to the influence of the air, they are, in less than twenty-four hours, melted down into limpid and offensive water.

In all of this species, none are found to possess a vent for their excrements, but the same passage by which they devour their food, serves for the ejection of their sœces. These animals take such a variety of figures, that it is impossible to describe them under one determinate shape; but, in general, their bodies resemble a truncated cone, whose base is applied to the rock to which they are found usually attached. Though generally transparent, yet they are found of different colours, some inclining to green, some to red, some to white, and some to brown. In some, their colours appear diffused over the whole surface; in some, they are often streaked, and in others, often spotted. They are possessed of a very slow progressive motion, and in fine weather, they are continually seen, stretching out and fishing for their prey. Many of them are possessed of a number of long slender filaments, in which they entangle any small animals they happen to approach, and thus draw them into their enormous stomachs, which fill the whole cavity of their bodies. The harder shells continue for some weeks indigested, but at length, they undergo a kind of maceration in the stomach, and become a part of the substance of the animal itself. The indigestible parts are returned by the same aperture by which they were swallowed, and then the Star-Fish begins to fish for more. These also may be cut in pieces, and every part will survive the operation; each becoming a perfect animal, endued with its natural rapacity. Of this tribe the number is various, and the description of each would be tedious and uninteresting; the manners and nature of all, are nearly as described.

Of all other animals, the Cuttle-fish, though in some respects superior to this tribe, possesses qualities the most extraordinary. It is about two feet long, covered with a very thin skin, and its flesh composed of a gelatinous substance, which, however, within-side, is strengthened by a strong bone, of which such great use is made by the goldsmith. It is possessed of eight arms, which it extends, and which are probably of service to it in fishing for its prey: while in life, it is capable of lengthening or contracting these at pleasure; but when dead, they contract and lose their rigidity. They feed upon small fish, which they seize with their arms; and they are bred from eggs, which are laid upon the weeds along the sea-shore.

The Cuttle-Fish is found along many of the coasts of Europe, but are not easily caught, from a contrivance with which they are furnished by nature; this is a black substance, of the colour of ink, which is contained in a bladder generally on the left side of the belly, and which is ejected in the manner of an excrement from the anus. Whenever, therefore, this fish is pursued, and when it finds a difficulty of escaping, it spirts forth a great quantity of this black liquor, by which the waters are totally darkened; and then it escapes, by lying close at the bottom. In this manner the creature finds its safety, and men find ample cause for admiration, from the great variety of stratagems with which creatures are endued for their peculiar preservation.

The Polypus lives in fresh water, and is found at the bottom of wet ditches, or attached to the under surface of the broad-leaved plants, that grow and swim on the waters. The same difference holds between these and the sea-water Polypus, as between all the productions of the sea, and of the land and the ocean. The marine vegetables and animals grow to a monstrous size. The eel, the pike, or the bream, of fresh waters, is but small; but in the sea they
grow

grow to an enormous magnitude. The herbs of the field, are at most but a few feet high; those of the sea, often shoot forth a stalk of a hundred. It is so between the Polypi of both elements. Those of the sea, are found from two feet in length, to three or four; and Pliny has even described one, the arms of which were no less than thirty feet long. Those in fresh waters, however, are comparatively minute; at their utmost size, seldom above three parts of an inch long, and when gathered up into their usual form, not above a third even of those dimensions.

It was upon these minute animals, that the power of dissection was first tried in multiplying their numbers. They had been long considered as little worthy the attention of observers, and were consigned to that neglect in which thousands of minute species of insects remain to this very day. It is true, indeed, that Reaumur observed, classed, and named them. By contemplating their motions, he was enabled distinctly to pronounce on their being of the animal, and not of the vegetable kingdom; and he called them Polypi, from their great resemblance to those larger ones that were found in the ocean. Still, however, their properties were neglected, and their history unknown.

Mr. Trembley was the person to whom we owe the first discovery of the amazing properties and powers of this little vivacious creature: he divided this class of animals into four different kinds; into those inclining to green, those of a brownish cast, those of flesh colour, those which he calls the polype de panache. The differences of structure in these, as also of colour, are observable enough; but the manner of their subsisting, of seizing their prey, and of their propagation, is pretty nearly the same in all.

Whoever has looked with care into the bottom of a wet ditch, when the water is stagnant, and the sun has been powerful, may remember to have seen many little transparent lumps of jelly, about the size of a pea, and flatted on one side; such also as have examined the under side of the broad-leaved weeds that grow on the surface of the water, must have observed them studded with a number of these little jelly-like substances, which were probably then disregarded, because their nature and history was unknown. These little substances, however, were no other than the living Polypi, gathered up into a quiescent state, and seemingly inanimate, because either undisturbed, or not excited by the calls of appetite to action. When they are seen exerting themselves, they put on a very different appearance from that when at rest: to conceive a just idea of their figure, we may suppose the finger of a glove cut off at the bottom; we may suppose also, several threads or horns planted round the edge like a fringe. The hollow of this finger will give us an idea of the stomach of the animal; the threads issuing forth from the edges, may be considered as the arms or feelers, with which it hunts for its prey. The animal, at its greatest extent, is seldom seen above an inch and a half long, but it is much shorter when it is contracted and at rest: it is furnished neither with muscles nor rings, and its manner of lengthening or contracting itself, more resembles that of the snail, than worms, or any other insect. The Polypus contracts itself more or less, in proportion as it is touched, or as the water is agitated in which they are seen. Warmth animates them, and cold benumbs them; but it requires a degree of cold approaching congelation before they are reduced to perfect inactivity; those of an inch have generally their arms double, often thrice as long as their bodies. The arms, where the animal is not disturbed, and the season not unfavourable, are thrown about in various directions, in order to seize and entangle its little prey; sometimes three or four

of the arms are thus employed, while the rest are contracted like the horns of a snail, within the animal's body. It seems capable of giving what length it pleases to these arms; it contracts and extends them at pleasure, and stretches them only in proportion to the remoteness of the object it would seize.

These animals have a progressive motion, which is performed by that power they have of lengthening and contracting themselves at pleasure; they go from one part of the bottom to another; they mount along the margin of the water, and climb up the side of aquatic plants. They are often seen to come to the surface of the water, where they suspend themselves by their lower-end. As they advance but very slowly, they employ a great deal of time in every action, and bind themselves very strongly to whatever body they chance to move upon as they proceed; their adhesion is voluntary, and is probably performed in the manner of a cupping-glass applied to the body.

All animals of this kind, have a remarkable attachment to turn towards the light, and this naturally might induce an enquirer to look for their eyes; but however carefully this search has been pursued, and however excellent the microscope with which every part was examined, yet nothing of the appearance of this organ was found over the whole body; and it is most probable, that, like several other insects which hunt their prey by their feeling, these creatures are unfurnished with advantages which would be totally useless for their support.

In the centre of the arms, as was said before, the mouth is placed, which the animal can open and shut at pleasure, and this serves at once as a passage for food, and an opening for it after digestion. The inward part of the animal's body seems to be one great stomach, which is open at both ends; but the purposes which the opening at the bottom serves, are hitherto unknown, but certainly not for excluding their excrements, for those are ejected at the aperture by which they are taken in. If the surface of the body of this little creature be examined with a microscope, it will be found studded with a number of warts, as also the arms, especially when they are contracted; and these tubercles, as we shall presently see, answer a very important purpose.

If we examine their way of living, we shall find these insects chiefly subsisting upon others, much less than themselves; particularly a kind of millepedes, that live in the water, and a very small red worm, which they seize with great avidity. In short, no insect whatsoever, less than themselves, seems to come amiss to them: their arms, as was observed before, serve them as a net would a fisherman, or perhaps, more exactly speaking, as a limetwig does a fowler. Wherever their prey is perceived, which the animal effects by its feeling, it is sufficient to touch the object it would seize upon, and it is fastened without a power of escaping. The instant one of this insect's long arms is laid upon a millepede, the little insect sticks, without a possibility of retreating. The greater the distance at which it is touched, the greater is the ease with which the Polypus brings the prey to its mouth. If the little object be near, tho' irretrievably caught, it is not without great difficulty that it can be brought to the mouth and swallowed. When the Polypus is unsupplied with prey, it testifies its hunger by opening its mouth; the aperture, however, is so small, that it cannot be easily perceived; but when, with any of its long arms, it has seized upon its prey, it then opens the mouth distinctly enough, and this opening is always in proportion to the size of the animal which it would swallow; the lips dilate insensibly by small degrees, and adjust themselves

elves precisely to the figure of their prey. Mr. Trembley, who took a pleasure in feeding this useful brood, found that they could devour aliments of every kind, fish and flesh, as well as insects; but he owns they did not thrive so well upon beef and veal, as upon the little worms of their own providing. When he gave one of these famished reptiles any substance which was improper to serve for aliment, at first it seized the prey with avidity, but after keeping it some time entangled near the mouth, it let it drop again with distinguishing nicety.

When several Polypi happen to fall upon the same worm, they dispute their common prey with each other. Two of them are often seen seizing the same worm at different ends, and dragging it at opposite directions with great force. It often happens, that while one is swallowing its respective end, the other is also employed in the same manner, and thus they continue swallowing each his part, until their mouths meet together; they then rest, each for some time in this situation, till the worm breaks between them, and each goes off with his share; but it often happens, that a seemingly more dangerous combat ensues; when the mouths of both are thus joined upon one common prey together; the largest Polypus then gapes and swallows his antagonist; but what is very wonderful, the animal thus swallowed seems to be rather a gainer by the misfortune. After it has lain in the conqueror's body for about an hour, it issues unhurt, and often in possession of the prey which had been the original cause of contention: how happy would it be for men, if they had as little to fear from each other!

These reptiles continue eating the whole year, except when the cold approaches to congelation; and then, like most others of the insect tribe, they feel the general torpor of nature, and all their faculties are for two or three months suspended; but if they abstain at one time, they are equally voracious at another, and like snakes, ants, and other animals that are torpid in winter, the meal of one day suffices them for several months together. In general, however, they devour more largely in proportion to their size, and their growth is quick exactly as they are fed; such as are best supplied, soonest acquire their largest size; but they diminish also in their growth, with the same facility, if their food be taken away.

Such are the more obvious properties of these little animals, but the most wonderful still remain behind: Their manner of propagation, or rather multiplication, has for some years been the astonishment of all the learned of Europe. They are produced in as great a variety of manners as every species of vegetable. Some Polypi are propagated from eggs, as plants are from their seed; some are produced by buds issuing from their bodies, as plants are produced by inoculation, while all may be multiplied by cuttings, and this to a degree of minuteness, that exceeds even philosophical perseverance.

With respect to such of this kind as are hatched from the egg, little curious can be added, as it is a method of propagation so common to all the tribes of insect nature; but with regard to such as are produced like buds from their parent stem, or like cuttings from an original root, their history requires a more detailed explanation. If a Polypus be carefully observed in summer, when these animals are chiefly active, and more particularly prepared for propagation, it will be found to burgeon forth from different parts of its body, several tubercles or little knobs, which grow larger and larger every day; after two or three days inspection, what at first appeared but a small excrescence, takes the figure of a small animal, entirely resembling its parent, furnished with feelers, a mouth, and all the apparatus for seizing and

digesting its prey. This little creature every day becomes larger, like the parent, to which it continues attached; it spreads its arms, to seize upon whatever insect is proper for aliment, and devours it for its own particular benefit; thus it is possessed of two sources of nourishment, that which it receives from the parent by the tail, and that which it receives from its own industry by the mouth. The food which these animals receive, often tinctures the whole body, and upon this occasion the parent is often seen communicating a part of its own fluids to that of its progeny that grows upon it; while, on the contrary, it never receives any tincture from any substance that is caught and swallowed by its young. If the parent swallows a red worm, which gives a tincture to all its fluids, the young one partakes of the parental colour; but if the latter should seize upon the same prey, the parent Polypus is no way benefited by the capture, but all the advantage remains with the young one.

But we are not to suppose that the parent is capable of producing only one at a time, several young ones are thus seen at once, of different sizes, growing from its body, some just budding forth, others acquiring their perfect form, and others come to sufficient maturity, and just ready to drop from the original stem, to which they had been attached for several days. But what is more extraordinary still, these young ones themselves, that continue attached to their parent, are seen to burgeon, and propagate their own young ones also, each holding the same dependence upon its respective parents, and possessed of the same advantages that have been already described in the first connection. Thus we see a surprising chain of existence continued, and numbers of animals naturally produced without any union of the sexes, or other previous disposition of nature.

This seems to be the most natural way by which these insects are multiplied; their production from the egg being not so common; and though some of this kind are found with a little bladder attached to their bodies, which is supposed to be filled with eggs, which afterwards come to maturity, yet the artificial method of propagating these animals, is much more expeditious, and equally certain: it is indifferent whether one of them be cut into ten, or ten hundred parts, each becomes as perfect an animal, as that which was originally divided: but it must be observed, that the smaller the part which is thus separated from the rest, the longer it will be in coming to maturity, or in assuming its perfect form. It would be endless to recount the many experiments that have been tried upon this philosophical prodigy; the animal has been twisted and turned into all manner of shapes; it has been turned inside out; it has been cut in every division, yet still it continued to move; its parts adapted themselves again to each other, and in a short time, it became as voracious and industrious as before.

Besides these kinds mentioned by Mr. Trembley, there are various others which have been lately discovered by the vigilance of succeeding observers, and some of these so strongly resemble a flowering vegetable in their forms, that they have been mistaken by many naturalists for such. Mr. Hughes, the author of the Natural History of Barbadoes, has described a species of this animal, but has mistaken its nature, and called it a sensitive flowering plant; he observed it to take refuge in the holes of rocks, and when undisturbed, to spread forth a number of ramifications, each terminated by a flowery petal, which shrunk at the approach of the hand, and withdrew into the hole from whence before it had been seen to issue. This plant, however, was no other than an animal of the Polypus kind, which is not only to be found in Barbadoes, but also on many parts

parts of the coast of Cornwall, and along the shores of the Continent.

NATURAL HISTORY of LITHOPHYTES and SPONGES.

IT is very probable that the animals we see, and are acquainted with, bear no manner of proportion to those that are concealed from us. Although every leaf and vegetable swarms with animals upon land, yet at sea, they are still more abundant; for the greatest part of what would seem vegetables growing there, are in fact nothing but the artificial formation of insects, palaces which they have built for their own habitation.

If we examine the bottom of the sea along some shores, and particularly at the mouths of several rivers, we shall find it has the appearance of a forest of trees under water, millions of plants growing in various directions, with their branches entangled in each other, and sometimes standing so thick as to obstruct navigation. The shores of the Persian gulph, the whole extent of the Red Sea, and the western coasts of America, are so choaked up in many places with these coraline substances, that though ships force a passage through them, boats and swimmers find it impossible to make their way. These aquatic groves are formed of different substances, and assume various appearances. The coral plants, as they are called, sometimes shoot out like trees without leaves in winter; they often spread out a broad surface like a fan, and, not uncommonly, a large bundling head, like a faggot; sometimes they are found to resemble a plant with leaves and flowers; and often the antlers of a stag, with great exactness and regularity. In other parts of the sea are seen Sponges of various magnitude, and extraordinary appearances, assuming a variety of fantastic forms, like large mushrooms, mitres, fonts, and flower-pots. To an attentive spectator, these various productions seem entirely of the vegetable kind; they seem to have their leaves and their flowers, and have been experimentally known to shoot out branches in the compass of a year. Philosophers, therefore, till of late, thought themselves pretty secure in ascribing these productions to the vegetable kingdom; and count Marfigli, who has written very laboriously and learnedly upon the subject of corals and Sponges, has not hesitated to declare his opinion, that they were plants of the aquatic kind, furnished with flowers and seed, and endued with a vegetation entirely resembling that which is found upon land. This opinion, however, some time after, began to be shaken by Rumphius and Jussieu, and at last by the ingenious Mr. Ellis, who by a more sagacious and diligent enquiry into nature, put it past doubt, that corals and Sponges were entirely the work of animals; and that, like the honey-comb, which was formed by the bee, the coral was the work of an infinite number of reptiles of the polypus kind, whose united labours were thus capable of filling whole tracts of the ocean with those embarrassing tokens of their industry.

If, in our researches after the nature of these plants, we should be induced to break off a branch of the coraline substance, and observe it carefully, we shall perceive its whole surface, which is very rugged and irregular, covered with a mucous fluid, and almost in every part studded with little jelly-like drops, which when closely examined, will be found to be no other than reptiles of the Polypus kind. These have their motions, their arms, and their appetites, but they soon expire when taken out of the sea, and our curiosity is at once stopped in its career, by the animals ceasing to give any make of their industry; recourse therefore has been had to

other expedients, in order to determine the nature of the inhabitant, as well as the habitation.

If a coraline plant be strictly observed, while still growing in the sea, and the animals upon its surface be not disturbed, either by the agitation of the waters, or the touch of the observer, the little Polypi will then be seen in infinite numbers, each issuing from its cell, and, in some kinds, the head covered with a little shell, resembling an umbrella, the arms spread abroad, in order to seize its prey, while the hinder part still remains attached to its habitation, from whence it never wholly removes. By this time it is perceived that the number of inhabitants is infinitely greater than was at first suspected; that they are all assiduously employed in the same pursuits, and that they issue from their respective cells, and retire into them at pleasure. Still, however, there are no proofs that those large branches which they inhabit, are entirely the construction of such feeble and minute animals. But chemistry will be found to lend a clue to extricate us from our doubts in this particular. Like the shells which are formed by snails, muscles and oysters, these coraline substances effervesce with acids, and may therefore well be supposed to partake of the same animal nature. But Mr. Ellis went still farther, and examined their operations, just as they were beginning. Observing an oyster-bed, which had been for some time neglected, he there perceived the first rudiments of a coraline plantation, and tufts of various kinds shooting from different parts of this favourable soil. It was upon these he tried his principal experiment. He took out the oysters, which were thus furnished with coralines, and placed them in a large wooden vessel, covering them with sea-water. In about an hour, he perceived the animals, which before had been contracted by handling, and had shewn no signs of life, expanding themselves in every direction, and appearing employed in their own natural manner. Perceiving them therefore in this state, his next aim was to preserve them thus expanded, so as to be permanent objects of curiosity. For this purpose he poured, by slow degrees, an equal quantity of boiling water into the vessel of sea-water in which they were immersed. He then separated each Polypus with pincers from its shell, and plunged each separately into small crystal vases, filled with spirit of wine mixed with water. By this means, the animal was preserved entire, without having time to contract itself, and he thus perceived a variety of kinds, almost equal to that variety of productions which these little animals are seen to form. He has been thus able to perceive and describe fifty different kinds, each of which is seen to possess its own peculiar mode of construction, and to form a coraline that none of the rest can imitate. It is true, indeed, that on every coraline substance there are a number of Polypi found, no way resembling those which are the erectors of the building; these may be called a vagabond race of reptiles, that are only intruders upon the labours of others, and that take possession of habitations, which they have neither art nor power to build for themselves. But in general, the same difference that subsists between the honey-comb and the bee, and the paper-like cells of the wasp, subsists between the different habitations of the coral-making Polypi.

With regard to the various forms of these substances, they have obtained different names from the nature of the animal that produced them, or the likeness they bear to some well-known object, such as coralines, fungimadrepores, sponges, astroites, and keratophytes. Though these differ extremely in their outward appearances, yet they are all formed in the same manner by reptiles of various kinds and nature. When examined chemically, they

V E S I C U L A T E D



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they all discover the marks of animal formation; the corals, as was said, dissolve in acids, the sponges burn with an odour strongly resembling that of burnt horn. We are left somewhat at a loss with regard to the precise manner in which this multitude of cells, which at last assume the appearance of a plant or flower, are formed. If we may be led in this subject by analogy, it is most probable, that the substance of coral is produced in the same manner that the shell of the snail grows round it; these little reptiles are each possessed of a slimy matter, which covers its body, and this hardening, as in the snail, becomes an habitation exactly fitted to the body of the animal that is to reside in it; several of these habitations being joined together, form at length a considerable mass, and as most animals are productive, in proportion to their minuteness, so these multiplying in a surprising degree, at length form those extensive forests that cover the bottom of the deep.

Thus all nature seems replete with life; almost every plant on land has its surface covered with

millions of these minute creatures, of whose existence we are certain, but of whose uses we are entirely ignorant; while numbers of what seem plants at sea, are not only the receptacles of insects, but also entirely of insect formation. This might have led some late philosophers into an opinion, that all nature was animated, that every, even the most inert mass of matter, was endued with life and sensation, but wanted organs to make those sensations perceptible to the observer: those opinions, taken up at random, are difficultly maintained, and as difficultly refuted; like combatants that meet in the dark, each party may deal a thousand blows without ever reaching the adversary. Those perhaps are wiser who view nature as she offers; who without searching too deeply into the recesses in which she ultimately hides, are contented to take her as she presents herself, and storing their minds with effects rather than with causes, instead of the embarrassment of systems, about which few agree, are contented with the history of appearances, concerning which, all mankind have but one opinion.

C H A P. III.

DIRECTIONS FOR ANGLING:

CONTAINING

The whole ART of FLOAT and FLY-FISHING,

The best RULES for the CHOICE of TACKLE,

And a Description of NATURAL and ARTIFICIAL BAITs.

Collected from PRACTICE and OBSERVATION, as well as from the WRITINGS of the most Experienced Authors on the Subject.

OF ANGLING in GENERAL.

THOUGH much has been said by many writers, concerning the antiquity of Angling, and in which they have introduced a great deal of fable, we shall content ourselves with mentioning only two authorities, such as cannot be disputed. It is certain, that angling is much more ancient than the incarnation of our Saviour; for, in the prophet *Amos*, mention is made of fish-hooks; and in the Book of *Job*, which was long before the days of *Amos*, mention is also made of fish-hooks, which must imply anglers in those times.

No diversion is perhaps better calculated to raise the mind, to calm and compose the troubled passions of the soul, to inspire health, content, and ease, than that of Angling. While the great lawyer is swallowed up in business, and the statesman is preventing or contriving plots, the angler is perhaps sitting on a bank enamelled with cowslips, listening to the enchanting voices of the little feathered songsters, while the silver stream at his feet with pleasing murmurs glides gently along. Hunting, as well as many other dangerous diversions, may have its charms to allure some people to the pursuit of it; but it cannot be so natural as that of angling: the one is all noise and tumult, the other peace and serenity. The angler leisurely surveys the wonderful works of the creation, and adores that Being, from whom he receives all his pleasures. His retirement and solitude

are physic for his soul, and delivers it from the hurry and various passions, in which other pursuits are too much involved. As exercise is its necessary companion, and a pure and clear air one of its constant attendants, health always follows in its train. In short, the various objects which continually offer themselves, as subjects for the angler's contemplation, inspire the mind with that innocent cheerfulness, ease and tranquillity, that is hardly to be expected from any other diversion, and never to be found amidst noise and tumult.

With respect to the qualifications of an angler, Mr. *Markham*, in his book entitled *Country Contentments*, says, that he should be a good scholar, and master of the liberal sciences; as a grammarian, to know how to talk or write of his art in correct language; he should have sweetness of speech, to entice others to delight in an exercise so laudable; and should have strength of argument to defend and maintain his profession against ridicule and slander: he must be bold and resolute, neither to be afraid of storms, nor affrighted at thunder. If he is not possessed of that excellent virtue, patience, and cannot endure a little fasting, he loses all the delight which contributes to make this pastime pleasing.

Of the ANGLER'S RODS and LINES.

THE choice of the Angler's ROD is a matter of no small importance. For fishing at the bottom,

tom, whether with a running line or float, the reed or cane rod is, on account of its lightness and elasticity, to be preferred to the hazel, especially if you angle for those fish, which bite but tenderly, as the Roach and Dace: of these, some are put up in the form of a walking stick. There are others, which are composed of many joints, and put up all together in a bag, and are therefore called bag-rods. These last are very useful to travel with, as they take up but little room.

Next to these is the hazel rod; but that is more apt to warp than the cane. These, as well as excellent fly-rods, are to be had at every fishing-tackle shop, and therefore need no particular description. Be careful, however, when you bespeak a rod of reed or cane, that the workman does not rasp down into the bark, which grows round the joints. This is a fault, of which rod-makers are too often guilty, and thereby make the rod weaker at the joints than in any other part; for, there being no bark to repel the wet, it soon rots, by which fault you may lose a good fish, and break your rod.

It may not, however, be improper to give some directions for making rods, as many anglers live in those parts of the country, where they are not always to be bought.

When the sap is gone down into the roots of trees, which is generally between the latter end of November and Christmas, gather the straightest hazels you can find, in order to use them for stocks: these, at the larger end, must be about an inch, or more, in diameter. At the same time, gather shoots of a less size for middle pieces and tops. Tie them together in a bundle, and let them lie on a dry floor.

At the end of fifteen months match them together; and to the slender ends of the tops, after cutting off about eight or ten inches, whip a fine taper piece of whalebone of that length. Then cut the ends of the other pieces with a long slant, so that they may join exactly to each other, and spread some shoemaker's wax very thin over the slants: after this, bind them neatly with strong waxed thread. Lastly, fix a strong loop of horse-hair to the whalebone, and let the rod, so made, lie a week to settle before you use it. In this manner also you may make a fly rod; but observe, that the latter must be much more slender from the end of the stock than the former.

To make a very neat fly-rod, you must proceed in the following manner. Get a yellow whole deal board, which is free from knots; cut off about seven feet from the best end, and saw it into square breadths: let a joiner plain off the angles, and make it perfectly round, a little tapering: this will serve for the stock. Then piece it to a fine straight hazel, of about six feet long, and then a delicate piece of fine-grained yew, plained round like an arrow, and tapering, with whalebone, as before, of about two feet in length. There is no absolutely fixing the length of a fly-rod; but one of fourteen feet is as long as can well be managed. To colour the stock, dip a feather in aqua fortis, and chafe it into the deal, which will then become of a cinnamon colour.

Rods for Barbel, Carp, and other large fish, should be of hazel, and proportionably stronger than those for Roach and Dace. However, the following portable rod is so neat and useful, that no angler, who has once tried it, will be without it.

Let there be four joints, made of hickory, or some such very tough wood, and two feet four inches in length. The top must be bamboo shaved; and the stock of ash, full in the grasp, of an equal length with the other joints, and with a strong ferrel at the smaller end, made to receive the large joint, which must be well shouldered, and fitted to it with the

utmost exactness. This rod will go into a bag, and lie very well concealed in a pocket, in the lining of your coat on the left side, made on purpose to receive it.

The angler's LINE, whether it be a running-line, or for float-fishing, had best be of hair, unless you fish for Barbel, and then it must be of strong silk; but remember, that the single hair is to be preferred for Roach or Dace fishing. The fly line must be very strong; and, for the greater facility in throwing, should be eighteen or twenty hairs at the top, diminishing gradually to the hook. Lines are sold at the fishing shops, which have no joints, but are wove in one piece. But, notwithstanding this and other improvements, as some may perhaps still chuse to make their own lines, we shall endeavour to give some directions for that work.

Your hair must be round and clear, and free from galls or frets; for a well chosen, even, clear, round hair, of a kind of glass colour, will prove as strong as three that want those perfections. You will seldom find a black hair which is not round; but many white ones are flat and uneven; for which reason, if you get a lock of round, clear, glass coloured hair, you ought to make much of it.

In making your lines observe this rule: first let your hair be well washed before you set about twisting it; and then chuse not only the clearest hair for it, but such as are of an equal size; for then they generally stretch and break all together, which hairs of an unequal size never do, but break singly, and thereby deceive the angler in the strength of his line. When you have twisted your links, lay them in water for a quarter of an hour at least, and then twist them over again before you tie them into a line.

Though many prefer twisting hairs with the fingers, yet we would rather recommend a little engine for that purpose, which is sold at all the fishing tackle shops in London, with proper directions for using it.

When you use the fly, you will find it necessary to continue your line to a greater degree of fineness: in order to which, supposing your line to be ten yards in length, let your upper link consist of nine or twelve hairs, diminishing the number in the succeeding links, till you come to the size of a fine grass, and to the end of this fix your hook-link, which should be either of very fine grass, or silkworm gut. A week's practice will enable a learner to throw out one of these lines; and he may lengthen it, by a yard at a time, at the greater end, till he can throw fifteen yards neatly; till when, he is to reckon himself but a novice.

As to the colour of your line, you must be determined by that of the river in which you fish; but we have generally found, that a line of the colour of pepper and salt (which is made by mixing a black hair among the white ones in twisting) will suit any water.

Indian or sea grass makes excellent hook-links; and, though some object to it, as being apt to grow brittle and snap in using, yet with proper management, it is the best material for the purpose yet known, especially if ordered in the following manner.

Take as many as you please of the finest you can get, put them into any vessel, and pour therein the scummed fat of a pot, wherein fresh (but by no means salt) meat has been boiled. When they have lain three or four hours, take them out one by one, and stripping the grease off with your finger and thumb, stretch each grass as long as it will yield, coil them up in rings, and lay them by. You will then find them become nearly as small, full as round, and much stronger, than the best single hairs you can get. To preserve them moist, keep them in a piece

of bladder well oiled, and, before you use them, let them soak about half an hour in water, or in your walk to the river side, put a length of it into your mouth. If your grass is coarse, it will fall heavily on the water, and scare away the fish; on which account gut has the advantage. After all, if your grass is fine and round, it is the best thing you can use.

Silk must never be mixed with hair lines; and, though silk lines are very apt to rot and break, yet they may serve in some places, where good hair is not easily to be come at. In this case a good angler will always make the lowest part of such lines of the smallest lute or viol strings.

The next thing to be considered is the FLOAT, which, for river fishing, should be of cork; but, for ponds and standing waters, quills will do very well, as also in slow rivers, when you angle near the top with tender baits or pastes. Let your cork be the finest, and free from flaws; bore it through with a small hot iron, and thrust it on to a sizeable quill, after having shaped the former with a penknife to the likeness of a pyramid, egg, or pear, of a proportionable bigness, and finely smoothed on a pumice stone. Run your line through the quill, and wedge it in with the uppermost hard part of the quill, the smaller end of the cork being towards the hook, and the bigger towards the rod. Let the cork be so poised with lead on the line, that the quill standing directly upright, the least bite or nibble may sink the cork.

A cork float, for one hair, must be no bigger than a pea; for three, as big as a bean; for six, as a small walnut; and for twelve hairs, as big as a French walnut.

Quill floats may be bought every where; and, if it chance to be bruised or split, save the plug, and it will serve another. If the water gets in at the top, cover it with sealing-wax; or if your plug be loose, take bees-wax bruised small, chalk scraped fine, and powdered black rosin, of each an equal quantity. Melt them in a spoon, and mix them well as they melt, which will be a proper cement to fasten it, by dipping the plug in, and immediately putting it into the float; for it cools as soon as sealing wax.

In choosing HOOKS, mind that they are sharp at the point, the beards not broken, of proper length, and the wire well tempered and firm: a short-shanked hook is esteemed best.

Those hooks, which are now known by the name of Kerby's hooks, for shape and temper, exceed all others. The size of your hook must be regulated by the fish for which you intend to angle. Barbel and Chub require large hooks; Carp, Eels, Tench, Pearch, and Bream, a moderate sized hook; Smelts, Roach, Dace, and Gudgeons, require a small one. To sharpen a dull hook, you should carry a whetstone about two inches long, and a quarter square, that being much better than a file, which rather leaves it rough than sharp.

Of the other Sorts of TACKLE necessary in ANGLING.

THE angler who pursues his sport at any distance from home, must be supplied with many articles, such as a rod with a spare top; lines coiled up, and neatly laid in round flat boxes; spare links, single hairs, and waxed thread and silk; plummets of various sizes, floats of all kinds, and spare caps; worm bags, and a gentle-box; hooks of all sizes, and some whipped to single hairs; shot, shoemaker's wax, in a very small gallipot covered with a bit of leather; a clearing ring, a landing net, a sharp knife, and a pair of scissers. All these things, however, may be contained in a wicker panier of about twelve

inches wide, and eight high. But let us proceed to examine some of the angler's materials more particularly.

The PLUMMET, which is used in order to try the depth of the water, in which you intend to angle, should be made of sheet lead, that, by opening it, you may at any time the more easily fix it on the hook without any fear of losing it.

The LANDING NET must be deep, with a round iron rim at top, made to fasten to the end of a long stick, in order to land such fish, as are too heavy for your tackling. At the other end of the stick should be a large hook, which you may thrust into the mouths of Salmon, and such other fish as are too bulky for your net, and by that means bring them safe to shore.

The CLEARING RING is used to disengage your hook, when it has caught hold of a weed, &c. It must be thick and heavy, but not wider than the round part of your hook, and is thus to be used. Take off the thick joints of your rod, and slip the ring over the remaining small ones, and holding a cord fastened to the ring, let it fall gently. This, as soon as it reaches the hook, will disengage it, by the assistance of your gently pulling the cord.

The GORGER is a small piece of cane, of five inches long, and a quarter of an inch wide, with a notch at each end. With this, when a fish has gorged your hook, you may, by putting it down his throat till you feel the hook, and holding the line tight while you press it down, easily disengage it.

It would be needless to give any description of the use of knives, scissers, wax, thread, &c. as these materials of themselves explain the various purposes they are intended to serve.

Of FLOAT FISHING, and of LIVE and DEAD BAITS.

WITH respect to FLOAT FISHING, there are some rules, with which the young angler ought to be acquainted. Let the rod be light and stiff, and yet so smart in the spring, as to strike at the tip of the whalebone: from fourteen to fifteen feet is a good length for the rod.

In places where you sometimes meet with Barbel, the line should be six or seven hairs at top: then diminishing gradually for two yards, let the rest be strong Indian grass, to within about half a yard of the hook, which may be whipped to a fine grass, or silk-worm gut. This line will kill a fish of six pounds weight.

For mere Roach and Dace fishing accustom yourself to a single hair, with which an artist may kill a fish of a pound and a half weight.

For your float, in slow streams, a neat round goose quill is proper; but for deep or rapid rivers, or in an eddy, the cork, shaped like a pear, is indisputably the best, which should not, in general, exceed the size of a nutmeg. Let not the quill, which you put through it, be more than half an inch above and below the cork; and this float, though some prefer a swan's quill, has great advantage over a bare quill; for the quill, being defended from the water by the cork, does not soften; and the cork enables you to lead your line so heavily, that the hook sinks almost as soon as you put it into the water; whereas, when you lead but lightly, it does not get to the bottom till it is near the end of your swim. In leading your lines, be careful to balance them so nicely, that a very small touch will sink them. Some use, for this purpose, lead shaped like a barley-corn; but there is nothing better to lead with than shot, which you must have ready cleft always with you, remembering, that when you fish fine, it is better to have on

your line a great number of small than a few large shot.

Whip the end of the quill round the plug with fine silk, well waxed, which will keep the water out of your float, and preserve it greatly.

In fishing with a float, your line should be about a foot shorter than your rod; for, if it is longer, you cannot so well command your hook when you come to disengage the fish.

Pearch and Chub are caught with a float, and also Gudgeons, and sometimes Barbel and Grayling. For Carp and Tench, which are seldom caught but in ponds, use a very small goose or duck quill float; and for ground bait, you may every now and then throw in a bit of chewed bread. For Barbel, you may bait the place, the night before you fish, with graves, which are the sediments of melted tallow, and may be had at the tallow-chandlers: use the same ground bait, while you are fishing, as for Roach and Dace. In fishing with a float for Chub, in warm weather, fish at mid-water; in cool weather, lower; and, when it is very cold, at the bottom.

Having thus given some necessary rules for float fishing, we shall proceed to a particular description of baits in general for that purpose.

The **ASH GRUB** is a soft, white insect, found, bent head to tail, under the bark of any decayed ash, oak, or alder, that has been some time felled. It is to be preserved in bran.

Of **BEES**, the black ones that breed in clay walls, at the top of the water, and the humble bees, which breed in long grass, at the bottom, are good baits for the Chub.

BOBS are of two colours, yellow and red. The former are gathered in the furrows of fresh-ploughed lands; the latter under cow dung. They are summer baits only, and must be scoured in bran, dry moss, or meal.

BRANDLINGS are worms usually found in old dung-hills, or places near them, as also in tanners bark, when thrown up in heaps after use. They must not be put in water above an hour before use, and then into fennel for immediate use. If you intend them for long keeping, put them into an earthen pot with plenty of moss, fresh shifted every three or four days in summer, and every week in winter; or, at least, the moss must be clean washed and squeezed. The point of the hook must be put in at the end of his tail, and run up to the belly, and very near the head, which must be left hanging down. Some call this worm by the name of the Gilt-tail.

CADEWS, CADIS, or CASE WORMS, are of various sorts, and in their maggot state thus house themselves: one sort in straws, called from thence **Straw-Worms**; others in two or more sticks, laid parallel to one another, creeping at the bottom of brooks; others, with a small bundle of pieces of rushes, duck-weed, sticks, &c. glued together, with which they float on the top, and can row themselves therein about the water, with the help of their feet: both these are called **Cad-Baits**.

All these animals have a wonderful faculty in gathering such bodies as are fittest for their purpose, and then glueing them together, some being heavier than water, that the animal may remain at the bottom, where its food is, (for which purpose they use stones, with sticks, rushes, &c.) and some being lighter than water, to float on the top, and gather its food from thence. These little houses look coarse, and outwardly shew no great artifice; but are well secured, and made within of a hard tough paste, into which the hinder part of the maggot is so fixed, that it can draw its shell after it any where, without danger of leaving it behind, as also to thrust out its body to reach what it wants, or to draw it into its cell, to guard it against injuries.

The **PIPER** is a Cadis, whose husk or case is a

piece of reed, about an inch long, and nearly as big round as a silver two-pence. These worms, being kept three or four days in a woollen bag, with sand at the bottom of it, and the bag wet once a day, will in three or four days turn yellow, when they are an excellent bait for the Chub, or indeed for any great fish, being a large bait.

There is also a smaller Cadis worm, called a **COCK-SPUR**, being in shape like the spur of a Cock, sharp at one end, and the case or house, in which it dwells, is made of small husks, gravel, and slime, in a most curious manner, so as not to be imitated by the art of man.

There is another Cadis, called by some a **ROUGH-COAT**, whose house or case is made of little pieces of rushes, straws, and water-weeds, which are so knit together with condensed slime, that they stick about the husk or case not unlike the bristles of a hedge-hog.

These three Cadis are commonly taken in the beginning of summer, and are good for any kind of float fishing. These at particular times of the year turn into flies; but to pursue this subject further, would be leading the young angler into a very difficult pursuit, highly improper upon this occasion.

DOCK-WORMS are found by plucking up the plants of that name, and washing their roots from the earth. In their fibres are little cases of a red or yellow colour, which upon being opened with a pin, will discover the worm; they are kept in bran, like the gentle.

EARTH BOBS, or GRUBS, are the brood of a beetle found in the furrows of fresh ploughed land. Gather a number of them, and put them, with a peck or two of their own earth, into a tub, and cover them from frost or cold. Thus you may keep them all winter, and kill fish with them at all times. Put them into earth and honey a day before used, and they will be an excellent bait for Bream or Carp.

GENTLES, or MAGGOTS, are easy to be got or bred by putrefaction, and scoured well with wheat bran. They are sometimes added to a worm on the hook, often to a dub-fly; but oftener by themselves, two or three on a hook. You may breed and keep them thus. Take a piece of the liver of any beast, and, with a cross stick, hang it in some corner, over a pot or barrel half full of dry clay; and as they grow big, they will fall into the barrel, where they will scour themselves, and be ready for use whenever you want them. In this manner they may be produced till after Michaelmas. If you desire to fish with them all the year, get a dead cat or kite, let it be fly blown, and when the gentles begin to stir, bury it and them in moist earth, but as free from frost as you can, and you may dig them up whenever you want to use them. They will last till March, when they will turn to flies.

LOB WORMS are found in gardens or in meadow grounds, after rain, by the help of a lanthorn at night. The best are those, which have a red head, a streak down the back, and a broad tail. They may be scoured in fennel or moss washed clean, wetted, squeezed dry, and often changed: but the best way is to take a piece of very coarse cloth, washed clean and dried, and then soaked in fresh beef liquor, in which there has been no salt; wring it, but not too dry; lay it in a broad, deep, glazed earthen pan, and your worms in it, to creep through and scour themselves in. Rinse it out in the same sort of liquor every two days, and your worms will keep a month, if set in a cool place, and be in excellent order. Put what you want for present use in wetted moss squeezed.

RED WORMS are found in rotten earth, or dung-hills, chiefly of cow or hog's dung; but the best are found among tanners bark.

WATER FROGS, which, about February or March,

March, breed in ditches, are not venomous; and are a good bait for some fish, Pike in particular. Put the hook through his mouth, and out of one of his gills. Then sew the upper part of his leg, with only one stitch, to the arming wire of your hook, and he will live a long time.

Of SNAILS, the little white one is a bait for the Roach, and the black one slit for a Chub.

WASPS, when dried in an oven, or boiled, are good baits.

PASTES are of various sorts; and, though some of them have been mentioned before, it may not be improper to bring them into one general view.

Old cheese and turpentine, and a bit of fat rusty bacon, compose an excellent bait for the Chub in winter.

Take some of the finest flour, drop a little milk or water upon it, and work it well in the palm of your hand, till almost dry. Then temper it with a small quantity of the finest honey, make it into a round ball, and keep it in a moist linen cloth; or it will grow dry and hard. If you would have it yellow, mix turmeric with it; if of a flesh colour, vermilion, and knead it well.

Take some old Cheshire cheese, the crumb of a French roll, and some sheep's kidney-suet, beat them in a mortar into a paste, adding as much clarified honey as will soften it. This is excellent for a Chub.

Take Shrimps and Prawns, pull off the shells, and skins; and beat the clear meat in a mortar, with a little honey, till it comes to a paste: with this cover the point of the hook.

Grate fine bread in a little clear water, in which gum ivy has been soaked, and you will find it a good bait for Roach and Dace.

For Carp or Tench, you may mix crumbs of bread with honey, and you will often find it answer your wish.

With respect to the use of pastes, observe these general rules: Proportion the quantity of paste you put upon your hook to the size of the fish, for which you angle. Pastes must not be angled with in rapid streams; but on small hooks, in pits, ponds, lakes, or slow running rivers.

WHEAT. A handful or two of the best wheat, boiled in a little milk till soft, and fried leisurely with honey, and a little beaten saffron dissolved in milk, is a good bait for Roach, Dace, Chub, or Grayling.

OF FLY FISHING.

FLY FISHING, or fishing at the top of the water, is of two sorts; with a natural and living fly, or with an artificial and made fly.

Of the natural flies, those mostly in use are the Green-Drake and the Stone-Fly, and these in the two months of May and June only; but there are others, of which, as well as of these, we shall give a short history at the end of this account of Fly-Fishing.

These are to be used with a short line, not more than half the length of your rod, if the wind is still; but, if you have a wind that will carry it from you, it may then be longer. This way of fishing is called Dapping, Dabbling, or Dibbling, wherein you are always to have your line flying before you up or down the river, as the wind serves, and to angle as near as you can to the bank of the same side on which you stand; though, when you see a fish rise near you, you may guide your fly over him, whether in the middle, or on the contrary side, and if you are pretty well out of sight, either by kneeling, or the interposition of a bank or bush, you will be always sure to take him, provided you are quick in your motions: your fish may otherwise remove to some other place,

if it be in the still deeps, where he is always in motion, and roving up and down for prey; but in a stream you may generally, especially if there is a large stone near, find him in the same place. Your line, in this case, ought to be of three good hairs next your hook; because in this kind of angling you are to expect the largest fish, and that, wanting length to give him line after he is struck, you must be forced to tug for it. However, not an inch of your line being suffered to touch the water in dibbling, it may be allowed to be stronger on that account.

We come now to the second way of angling at the top of the water, which is with an artificial fly. In this kind of sport, you are to angle with a line longer by a yard and a half, and sometimes two yards, than your rod; and with both this and the other, in a calm day in the streams, in a breeze that curls the water in the still deeps, you are likely to strike the best fish.

For the length of your rod, you are always to be determined by the breadth of the river in which you intend to angle. For a Trout river, one of five or six yards is long enough. If it is longer, be it ever so neatly and artificially made, it will soon become tiresome, and change your sport into toil and labour.

The length of the line, to a man that knows how to handle his rod, and cast it properly, is no manner of incumbrance, excepting in woody places, and in landing of a fish, which every one, who can afford to angle for pleasure, has somebody to do for him; and the length of line is a great advantage in fishing at a distance: to fish fine, and far off, is a principal matter in Trout angling.

Your line in this case should never be less, nor ever exceed two hairs next the hook; for one, whatever some may pretend, is not sufficient, as the least accident, even with the finest hand, may break it. However, he that cannot kill a Trout of twenty inches long with two hairs, in a river clear of wood and weeds, deserves not the name of an angler.

To have your whole line as it ought to be, two of the first lengths, nearest the hook, should be of two hairs each, the next three lengths above them of three, the next three above them of four, and so of five, six and seven, to the very top; by which means your rod and tackle will, in a manner, be taper from your very hand to your hook, your line will fall much better and straighter, and cast the fly to any certain place, to which the hand and eye shall direct it, with less weight and violence, which would otherwise circle the water, and fright away the fish.

In casting your line, do it always before you, and in such a manner, that your fly may first fall upon the water, and as little of your line with it as possible; though, if the wind be very brisk, you will then of necessity be obliged to sink part of your line to keep your fly in the water. In casting your fly you must aim at the further, or nearer bank, as the wind serves your purpose, which will be with and against you several times, on the same side, in an hour, as the river winds in its course, and you will be forced to angle up and down by turns accordingly; but you must endeavour, as much as you can, to have the wind on your back, and always be sure to stand as far off the bank as your length of line will give you leave, when you throw to the contrary side. When the wind will not permit you so to do, and that you are forced to angle on the same side on which you stand, you must then go to the very brink of the river, and cast your fly, at the utmost length of your rod and line, up or down the river as the gale serves.

Having now done with both ways of fishing at the top of the water, and the length of your rod and line for those purposes, we shall proceed to mention what materials the angler should be supplied with, in order

order to make artificial flies. As to the making them, many writers on angling have attempted to give directions for that purpose; but it is certain, if the angler is supplied with proper materials, and has the opportunity of seeing expert artists make flies, he will learn more from one week's practice and observation, than he possibly can in a twelve-month from the perusal of any book that was ever wrote on that subject.

First, you must be provided with bear's hair of different colours, as grey, dun, light, and dark-coloured, bright brown, and that which shines. Also camel's hair, dark, light, and of a colour between both. Badger's hair, or fur. Spaniel's hair from behind the ear, light and dark brown, blackish and black. Hog's down, which may be had about Christmas of butchers, or rather of those that make brawn: it should be plucked from under the throat, and other soft places of the hog. These should be either black, red, whitish, or sandy. If you want them of any other colour, you may send them to the dyer's.

Seal's fur is to be had at the trunk-maker's. This you may get dyed of the colour of calves and cows hair, in all the different shades, from the lightest to the darkest brown. You will then never need cows or calves hair, both which are harsh, and will never work kindly, nor lay handsomely.

Get also mohairs, black, blue, purple, white, and violet; camlets, both hair and worsted, blue, yellow, dun, light and dark brown, red, violet, purple, black, pink, and orange colours.

A piece of an old Turkey carpet will furnish excellent dubbing: untwist the yarn, and pick out the wool, carefully separating the different colours, and lay it by.

Get also furs of the following animals, viz. the squirrel, particularly from his tail, fox cub, from the tail where it is downy, and of an ash colour: an old fox, an old otter, a hare, from the neck, where it is of the colour of withered fern; and above all, the yellow fur of the martern, from off the gills or spots under the jaws. All these, and almost every other kind of fur, are easily got at the furriers.

Hackles are a very important article in fly making. These are the long slender feathers, which hang from the head of a cock down his neck. Fine ones may be also taken from near his tail; but be careful that they are not too rank, which they always are when the fibres are more than half an inch long. Be provided with these of the following colours, red, dun, yellowish, white, orange and perfect black; and whenever you meet, alive or dead, with a cock of the game breed, whose hackle is of a strong brown red, never fail to buy him. Observe, however, that the feathers of a cock chicken, be they ever so fine for shape and colour, are good for little; for they are too downy and weak to stand erect after they are once wet; and so are those of the bantam cock.

Feathers are absolutely necessary for the wings, and other parts of flies: get therefore feathers from the back and other parts of the wild mallard, or drake; the feathers of a partridge, especially those red ones that are in the tail; feathers from a cock pheasant's breast and tail; the wings of a blackbird, a starling, a jay, a fieldfare, and a water coot; feathers from the crown of the pewit, plover, or lapwing, and feathers from a heron's neck and wings.

Be provided with marking silk of all colours, fine, but very strong; gold and silver flatted wire or twist, a sharp knife, hooks of all sizes, hog's bristles for loops to your flies, shoemaker's wax, &c.

Remember, with all your dubbing, to mix bear's hairs, and hog's wool, which are stiff, and not apt to imbibe the water, as the fine furs, and most other kinds of dubbings do; and remember also, that martern's fur is the best yellow you can use.

The angler, who possesses these materials, and observes the manner in which skilful fly makers use them, will soon be enabled to form any fly whatever; for this art, like every other, is to be acquired only by practice. We might form an entire volume of nothing but lists of artificial flies for the use of every month in the year, which, instead of improving the young angler, would only contribute to dishearten and perplex him; we shall therefore content ourselves with mentioning only the twelve following:

1. The **DUN FLY**, in March: the body is made of dun wool, and the wings of the partridge's feathers.

2. Another **DUN FLY**, the body of which is made of black wool, and the wings of the black drake's feathers, particularly those under his tail.

3. The **STONE FLY**, in April, whose body is made of black wool, coloured with yellow under the wings and tail. For this fly you must use the wings of the drake.

4. The **RUDDY FLY**, in the beginning of May. Make his body of red wool, wrapt about with black silk. The feathers to be used are the wings of the drake, and the feathers of a red capon, which hang down on his sides next to the tail.

5. The **YELLOW or GREENISH FLY**, in May. Make the body of yellow wool, and the wings of the red cock's hackle or tail.

6. The **BLACK FLY**, in May, whose body may be made of black wool: the wings are made of those of a brown capon.

7. The **YELLOW FLY**, in June. His body is made of black wool, with a yellow list on each side. The wings should be formed of feathers taken from the wings of a buzzard, bound with black hemp.

8. The **MOORISH FLY**, whose body is made with darkish wool, and the wings of the same coloured mail of the drake.

9. The **TAWNY FLY**, which is good till the middle of June. The body is made of tawny wool, and the wings of the whitish mail of the wild drake.

10. The **WASP FLY**, in July. Make his body of black wool wrapped about with yellow silk: the wings must be made of the feathers of the drake or buzzard.

11. The **SHELL FLY**, which is useful in the middle of July. The body is made of greenish wool, wrapped about with the hurle of a peacock's tail, and the wings with feathers from those of a buzzard.

12. The **DARK DRAKE FLY**, which is good in August. The body is made with black wool, wrapped about with black silk. His wings are made with the mail of the black drake, with a black head.

Having said thus much of artificial fly-making, it may not be improper to give the young angler a short account of a few of the most material natural flies, in imitating which he may employ himself at home, when the weather will not permit him to pursue his sport abroad; and he may be assured, that, in collecting and arranging the materials, and imitating the various shapes and colours of these admirable creatures, he will soon find little less pleasure than even in catching fish.

The **GREEN DRAKE FLY** comes in about the middle of May; but are never properly fit for use till the end of that month, or the beginning of June, though they are sooner or later, according to the season of the year.

The **STONE FLY** comes much sooner, so early as the middle of April, but is not properly in season till the middle of May. He continues to kill much longer

longer than the green drake remains with us, even so long as almost to the end of June.

Both these flies, and perhaps many others, are certainly bred in the very rivers where they are taken. Our cadis, which lie under stones, in the bottom of the water, turn into these two flies; and, being taken in their husk near the time of their maturity, are very easily known and distinguished, being the largest of all others.

The green drake never discloses from his husk till he is there first grown to full maturity, body, wings, and all; and then he creeps out of his cell, but with his wings so cramped and ruffled, by being pressed together in so narrow a compass, that they are for some hours totally useless to him. Hence he is compelled either to creep upon the flags, sedges, and blades of grass, if his first rising from the bottom of the water be near the banks of the river, till the air and sun stiffen and smooth them. If his first appearance above water happens to be in the middle of it, he then lies upon the surface of the water; for his feet are totally useless to him there, as he cannot, like the stone-fly, creep upon the water, until his wings have acquired the necessary stiffness. In the mean time, it is a chance, if he does not fall a prey to some trout or grayling. If he escapes these fish, his wings soon get strength, which stand on his back like those of a butterfly, and his motion in flying is the same.

The body of this fly is, in some, of a paler, in others, of a darker yellow; for they are not in all exactly of a colour. They are ribbed with rows of green, long, slender, and growing sharp towards the tail, at the end of which they have three small whisks of a very dark colour, almost black, and their tails turn up towards their back like a mallard, from whence undoubtedly they have the name of Green Drake.

With these the angler must dabble; and, having gathered a sufficient quantity of them into a draw-box, with holes in the cover to give them air, where they will continue vigorous and fresh a night or two, he may take them out thence by the wings, and bait them upon the hook in the following manner:

First take out one, (for you must fish with two of them at a time) and, putting the point of the hook into the thickest part of his body under one of his wings, run it directly through, and out at the other side, leaving him spitted cross upon the hook. Then, taking the other, put him on after the same manner; but with his head the contrary way. In this posture they will live upon the hook, and play with their wings for more than a quarter of an hour. You must take care to keep their wings dry in playing them on the water, and that your fingers are not wet when you take them out to bait them; for then your bait will be spoiled.

With respect to this fly, it remains only to acquaint the angler, that it is taken at any time of the day.

We must now be a little more particular concerning the stone-fly, which has not the patience to continue in his crust or husk till his wings are full grown; but as soon as they begin to put themselves out, he feels himself strong, squeezes himself out of his prison, and crawls to the top of some stone, where, if he can find a chink that will receive him, or can creep between two stones, the one lying hollow upon the other, he there lurks till his wings are full grown: that is your only place to find him, and from thence he undoubtedly derives his name. For want of such a convenience, he will make shift with the hollow of a bank, or any other place, where the wind cannot come at him to force him away.

His body is long, and pretty thick, and almost as broad at the tail as in the middle. His colours

No. 32.

are a very fine brown, ribbed with yellow, and much yellower on the belly than the back. He has also two or three whisks at the tag of his tail, and two little horns upon his head. His wings, when full grown, are double, and flat down his back, of the same colour, though rather darker than his body, and also longer. He makes but little use of his wings; for he is seldom seen flying, though often swimming and paddling in the water with the several feet he has under his belly, without stirring a wing: whereas the drake will mount steeple high into the air, though he is to be found every where high and low near the river.

The stone-fly is to be used much in the same manner as before directed for the drake; but the trout is found to take the latter more greedily than the former.

The **LITTLE YELLOW MAY FLY** is in shape exactly as the green drake; but is very little, and of as bright a yellow as can be seen.

The **CAMLET FLY** is in shape like a moth, with fine watered wings, and is an excellent bait for the grayling. This fly, though it comes in May, continues all the month of June.

The **PALMER FLY** is a caterpillar, or worm, which never continues long in one state, though their colours are very elegant and beautiful. The following is a description of one of them in their most brilliant dress. His lips and mouth are a little yellow, his eyes black as jet, his forehead purple, his feet and hinder parts green, his tail two-forked and black, the whole body stained with a kind of red spots, which run along the neck and shoulder blade, not unlike the form of a St. Andrew's cross, and a white line drawn down his back to his tail. At a fixed age, this caterpillar ceases to eat, and towards winter is covered over with a strange shell or crust, called an Aurelia, and in that manner remains in a state of total inaction during the whole winter; but in the spring following, he commences a painted butterfly. To pursue this curious insect through all its various changes, would be useless here, as it is sufficiently described in other parts of this work.

The **OAK FLY** is also known by the name of the **ASH FLY** and the **WOODCOCK FLY**. Bowkler, in his Art of Angling, says, "This fly, as I have lately been informed by a gentleman of veracity, is bred in those little balls, which grow on the boughs of large oaks, commonly called oak apples, which he accidentally discovered by opening several of these balls, which had been gathered in the winter, and brought into the house. In each of them he found a fly, some of which, being enlivened by the warmth of the room, immediately took flight, and fixed in the window, with the head downwards, the position they observe on the trees."

This fly is found on the body of an oak or ash, from the beginning of May to the end of August. It is of a brown colour, and is easily taken.

The **ANT FLY** is often found in June, though it is in its highest perfection in July, and lasts till August and September. They must be taken from their hills, with a handful of their earth, and roots of the grass about them, and put all together in a large glass bottle. If they are not bruised in taking, nor their wings hurt, they will live above a month. If you would keep them longer, put them into a barrel, first washing it with honey and water. They are very good baits for roach, dace, or chub, fishing near the ground.

Of **ROCK ANGLING, NIGHT ANGLING, &c.**

ROCK-FISHING is practised chiefly in the South and South-West parts of England, and in some parts of Ireland. When you fish from rocks,

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your line must be very strong, and consist at least of five or six hairs in a link. A float is necessary, and two hooks, one to reach the bottom, and the other to keep in mid-water. The best time for this sport is, when the tide is half spent; and till within two hours of high water. Morning and evening are the most preferable times, if the tide answers. The cockle, lob, and marsh-worms are the general baits used, and a hairy worm found on the sea shore. The prizes of this fishing are only Sea Bream, Flounders, Whiting-Pollock, and Rock-Whittings.

With respect to NIGHT ANGLING, few other fish are taken at that time but Trout and Eels. In the night, the best Trout come out of their holes, when they are taken on the top of the water with a great lob or garden worm, or rather two, which you are to fish with in a place, where the water runs quietly; for in a stream the bait will not be so well discerned.

In a dead place, near a current, draw your bait over the top of the water, backwards and forwards, and, if there is a Trout in the hole, he will take it, especially if the night is dark; for then he is bold, and lies near the top of the water, watching the motion of every frog, or any thing else, that swims between him and the sky. He hunts after his prey, if he sees the water but wrinkle, or move in one of these dead holes, where the large old Trouts usually lie, near to their holds; for he is both subtle and fearful, and does not usually stir out of his hole, but lies in it as close in the day, as the timorous hare does in her form. The chief feeding of either is seldom in the day, but usually in the night, and then the large Trout feed very boldly.

You must fish for him with a strong line and a large hook, and let him have time to bite; for he does not usually forsake the hook at night, though he does frequently in the day. If the night is not dark, you must in that case fish with an artificial fly of a light colour, and at the snap; indeed, in the night, he will rise at almost any thing.

Night angling is not, however, to be recommended, as it is in some measure dangerous, and very unwholesome.

The safest method of catching fish by night, particularly Eels, is by lines left in the water from the evening till the next morning. For this purpose, your line must be fifteen or twenty yards long, according to the width of the place in which you intend to throw it. To this, at equal distances, tie five or six hempen lines, of a moderate thickness. To each of these whip a hook, and bait with a Minnow, or any small fish; but, if they are not to be had, you may make use of a large lob-worm, or even a piece of beef. If you bait with a fish, put the point of the hook in at the tail, and out at the mouth, and cover the point of the hook with a small worm. At the hook end of the cord, fasten a weight about two pounds, and throw it across the river into some still deep, or at the tail or side of a deep current, first taking care, however, to fasten the other end of the line round a tree, or to some other secure place. When you go in the morning, it will be a chance if you do not find fish ensnared on the hooks.

There are other methods of catching fish, such as bobbing, dabbling, snigging, snapping, trolling, and fishing at hand. Of the three first, we have already made mention; we shall now proceed to describe the three last.

SNAPPING is a method of catching Pike with a rod sixteen or seventeen feet long, a stout whalebone top, as thick as the upper part of your little finger, and a strong line not quite so long as your rod. The snap-hook may be thus made. When it is to be placed at the end of your line, take twelve inches of gimp, and two large Salmon hooks, and turn them back to back. In the middle place the

gimp, and whip them together with silk well waxed: then place a Pearch hook between the other two, and fasten it towards the upper part of the shanks with waxed silk. At about eighteen inches from the bottom of your line, put on a large float of cork, and under it as much lead as will poise it. Fix your bait to the small hook, by running it under the back fin, (the best are Gudgeons, Dace, and small Roach) and let it swim down the current. When your float is drawn under water, give a strong jerk, and when you find you have hooked your fish, play him properly, and use the landing net.

TROLLING differs from snapping, in this, that the head of the bait fish must be at the bent of the hook, and that you must give the fish time to pouch or swallow the bait. Trolling hooks, which differ much from those for the snap, are to be bought ready made at the tackle shops, and therefore need no description.

ANGLING BY HAND is of three sorts, which we shall proceed to describe separately.

The first, with a line about half the length of the rod, a good weighty plumb, and three hairs next the hook, which is called a Running Line, and with one large brandling, or a dew worm of a moderate size, indeed, with almost any worm whatever; for, if a Trout is in the humour to bite, there is hardly any worm he will refuse. If you fish with two worms, you are then thus to bait your hook. First run the point of your hook in at the very head of your first worm, and so down through his body till it be past the knot, and then let it out. Slip the worm above the arming, that you may not bruise it with your finger till you have put on the other, by running the point of the hook in below the knot, and upwards through his body towards his head, till it be just covered with the head, which being done, you are then to slip the first worm down over the arming again, till the knots of both worms meet together.

The second way of angling by hand, and with a running line, is with a line something longer than the former, and with tackle made in this manner. At the extremity of your line, where the hook is always placed in all other methods of angling, you are to have a large musket bullet, into which the end of your line is to be fastened with a peg or pin even and close with the bullet. About half a foot above that, must be a branch of line, of about half a yard long for a swift stream, with a hook at the end, baited with worms; and, at about half a foot above that, another branch of line, armed and baited after the same manner, but with another sort of worm. Both these ways of angling at the bottom are most proper for a dark and muddy water, because in such a condition of the stream, a man may stand as near as he will, and neither his own shadow, or that of his tackle, will hinder his sport.

The third way of angling by hand, with a ground bait, and by much the best of all others, is with a line full as long, or a yard and a half longer than your rod, with no more than one hair next your hook, and for two or three lengths above it. There must be no more than one small pellet for your plumb, your hook little, your worms of the smaller brandlings well scoured, and only one upon your hook at a time, which is thus to be baited. The point of your hook is to be put in at the tag of his tail, and run up his body quite over all the arming, and still stripped on an inch at least upon the hair, the head and remaining part hanging downwards. With this line and hook thus baited, you are to angle in the streams, always in a clear rather than a troubled water, always up the river, throwing out your worm before you, with a light one-handed rod, like an artificial fly, where it will be taken sometimes at the top, or within a very little of the surface of the water,

water, and almost always before the light plumb can sink it to the bottom. Provided the rod is light and pliant, and true and finely made, a skilful hand will do wonders; and in a clear stream, it is undoubtedly the best method of angling for a Trout or Grayling.

Some PARTICULARS not generally known by
YOUNG ANGLERS.

THERE are particular methods of making baits more agreeable to fish than what are commonly practised; and, though the use of oils, ointments, &c. are by many anglers treated with contempt, it is nevertheless certain, from repeated experiments, that the following have been known to contribute greatly to the sport; at the very time, and on the same spot, when others, who despised the use of them, could catch nothing.

Anoint a little box with two or three drops of the oil of ivy berries, made by expression or infusion. Put your worms into this box about an hour or two before you use them, and they will acquire a smell, which is irresistibly attractive, and will force any fish within the smell of them to bite.

Some have dissolved gum of ivy in oil of spike, and therewith anointed a dead bait for a Pike, when the fish has followed it with more than common eagerness. And others affirm that any bait anointed with the marrow of the thigh bone of a herne is a great temptation to any fish.

Camphire put with moss into your worm bag with your worms, makes them, if many anglers are not very much mistaken, a tempting bait.

The roe of a Salmon or Trout is said to be an excellent bait. You may preserve it, by sprinkling it with a little salt, and laying it upon wool in a pot, one layer of wool, and another of spawn.

To know at any time what bait fish are apt to take, open the belly of the first you catch, and take out his stomach very tenderly: open it with a sharp pen-knife and you will discover what he fed on.

RULES and CAUTIONS to be observed by
YOUNG ANGLERS.

WHEN you have hooked a fish, never suffer him to run out with the line; but keep your rod bent, and as nearly perpendicular as you can. By this method, the top will ply to every pull he

shall make, and you will prevent the straining of your line.

For the same reason, never raise a large fish out of the water, by taking the hair to which your hook is fastened, or indeed any part of the line into your hand; but either put a landing net under him, or, for want of that, your hat. You may, indeed, in fly-fishing, lay hold of your line to draw a fish to you; but that must be done with great caution.

Your silk, for whipping hooks, and other fine work, must be very small. Use it double, and wax it, and indeed any other kind of binding will do with shoe-makers wax, which of all wax is the toughest and holds best. If your wax is too stiff, temper it with tallow.

Inclose the knots and joints of your lines in a small pill of wax, pressed very close, and the superfluties pinched off. This will soon harden, and prevent the knots from drawing.

If for strong fishing you use grass, which, when you can get it fine, is to be preferred to gut, remember always to soak it about an hour in water before you use it: this will make it tough, and prevent its breaking.

When you begin fishing, wet the ends of the joints of your rods, which, as it makes them swell, will prevent their loosening.

If you happen, with rain or otherwise, to wet your rod, so that you cannot pull the joints asunder, turn the ferrel a few times round in the flame of a candle, and they will easily separate.

Before you fix the loop or bristle to your hook, in order to make a fly, to prevent its drawing, be sure to singe the end of it in the flame of a candle. Do the same by a hair, to which at any time you whip a hook.

Make flies in warm weather only; for in cold your waxed silk will not draw.

In rainy weather, or when the season for fishing is over, repair whatever damage your tackle has sustained.

Never regard what bunglers and slovens tell you; but believe that neatness in your tackle, and a nice and curious hand in all your works, especially in fly-making, are absolutely necessary.

Never fish in any water, that is not common, without leave of the owner, which is seldom denied to any but those who do not deserve it.

If at any time you happen to be overheated with walking, or other exercise, avoid small liquors, especially water, as you would poison; but rather take a glass of rum or brandy, the instantaneous effects whereof, in cooling the body, and quenching drought, are amazing.



NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;
 Being a Grand, Accurate and Extensive
Display of Animated Nature.

B O O K V.

Containing the Natural History of **VEGETABLES,**
As well **FOREIGN** *as* **INDIGENOUS,**
 WITH AN ACCOUNT OF
 Their **ROOTS, BARKS, WOODS, LEAVES, FLOWERS, FRUITS,**
SEEDS, RESINS, GUMS, and Concreted **JUICES;**

A S A L S O

Their Properties, Virtues, and Uses in **MEDICINE;** together with the Method of
 Cultivating those planted in **GARDENS:**

INCLUDING LIKEWISE

OBSERVATIONS on HOT-BEDS, and WATERING of PLANTS.

I N T R O D U C T I O N.

THE science of Vegetables may, with propriety, be divided into three classes: the first consists of the order of their arrangement in the botanical nomenclature; the second, of their culture; and the third of their properties. The two first, while they serve to amuse and delight us, enable us more readily to comprehend the last, which is the only one of real importance, and which claims our most serious attention.

However necessary the proper arrangement of the various species of Vegetables may appear, it is very certain, that the immense labours, which some late botanists have undergone, to give us a list of the names of plants, can contribute very little to the discovery of their properties. We should be led to suppose, from the repeated endeavours to systematise this science, that the whole of the student's pursuit was directed to acquire the names of plants. More time has been consumed in making catalogues of this nature, than, if properly applied, would have been sufficient to acquire a tolerable knowledge of the science, and perhaps have enabled the botanist to discover several new properties in the vegetable world, as yet unknown.

Numberless efforts have been made to impress distinct ideas of each plant, without fully describing

them; but every botanical system has hitherto failed in this particular, since nothing but a perfect description of each can give an adequate idea. For this reason, leaving such systems to the speculative, we shall, in the following work, pursue the common method, and give a perfect account of every Vegetable in use, its roots, leaves, stalk, height, flower, and seeds. Such complete distinctions are absolutely necessary to distinguish one object from another, throughout every department of Natural History, but particularly in this, where the objects are so numerous. The deviations of Nature are not to be reduced into systems: almost every plant, even of the same species, has its variations, this year differing, in some respects, from what it was the last.

Let us then, without paying any regard to systematical arrangement, treat this subject in the manner of the ancients, such as Pliny and Aristotle. Those, that have been already useful to mankind, we shall take particular care minutely to describe, and leave posterity and chance to find out the uses of others now unnoticed. But, before we proceed in this undertaking, it may not be improper to take a survey of Vegetables in general.

In every vegetable production, we may consider either the seed, the root, the leaf, the bark, the stalk, the

the pith, and the flower: all which are necessary in carrying on the business of vegetation, and transmitting the species, from season to season, without interruption. Though the principles of vegetation reside in every part of the plant, yet we generally find greater proportions of oil in the more elaborate and exalted parts of Vegetables, that is, in the seed. As this contains the rudiments of the future Vegetables, it was necessary that it should be well stored with principles, that would preserve the seed from putrefaction, and tend to promote vegetation. When the seed is sown, in a few days, it imbibes so much moisture as to swell, and thus it produces the radicle, or incipient root, with some force, which, when shot into the ground, imbibes nourishment from thence, and what it receives becomes, in a short time, the chief supply of future growth. When the root is thus far grown, it supplies the plume with nourishment, till this, by expanding and growing thinner, turns to green leaves, which are of such importance to the incipient plant, that it perishes, and will not thrive, if they are pulled off; but when the plant is so far come to maturity, as to have branches and expanded leaves to draw up nourishment, the feminal leaves, being no longer useful, soon perish, their perspiration being immediately impeded by the newly produced leaves that overshadow them, and their sap being drawn away by the larger channels of the upper foliage.

As the plant advances in stature, the first, second, third, and fourth order of lateral branches shoot out, each lower order being larger than those immediately above them, not only on account of their having a longer time to grow, but because, being inserted in larger parts of the trunk, and nearer the root, which is the grand supply, they are provided with greater plenty of sap: hence we frequently see trees beautifully tapering to the top.

As soon as the circulation of the blood in animals was discovered, botanists began to think, from the analogy there was between all the works of Nature, that the same circulation must also prevail in Vegetables; and some have actually undertaken to prove, that the sap first rises to the tops of trees by means of the pith, and then descends to the root by the bark, with the swiftest motion. That great naturalist, Dr. Hales, undertook by experiments, to confute this opinion; but, without entering into a detail of that gentleman's opinion, or that of Mr. Du Hamel, thus far we may venture to conclude, as a certain fact, that there is a constant flow of juices through every plant, the root furnishing it with great quantities, while the leaves, spreading an extended surface to the sun, have their moisture attracted in very large quantities; and, when the influence of his beams no longer continue, they at night act as sponges, and imbibe the humidity of the air. Thus we see, that the leaves are absolutely necessary in the works of vegetation: they, like young animals, are furnished with instruments to suck it from thence, and, besides this, they separate and carry off the redundant watery fluid, which, by being long detained, would turn rancid, and become fatal to the plant.

As the leaves are found to exhale moisture, so they are known to imbibe nourishment from the air. The acid and sulphureous spirit, with which the air abounds, is thence extracted by the leaves of plants: so that it is probable, the most exalted and aromatic principles of Vegetables are derived from this source, rather than from the grosser watery fluid of the sap. Leaves are found to perform, in some measure, the same office for the support of vegetable life, that the lungs of animals do for the support of animal life; but, as plants have not the power of contracting or dilating the chest, their inspirations will depend wholly on the alternate changes of the air. The

vine is known, from repeated experiments, to draw but little watery nutriment from the earth by its roots, and therefore it imbibes greater quantities of dew, impregnated with air by night, from whence it derives its richness of flavour. It is probable, that this may be the reason, why plants in hot countries abound more with fine aromatic principles, than northern Vegetables: the former chiefly extract their juices from the air by the leaf, the latter theirs from the earth by the root.

Nothing can exceed the regularity, with which leaves are placed on every plant; but the care which Nature seems to take of the young shoots when budding, still deserves greater admiration; for the most tender shoots are ever nourished by those, which have acquired a greater degree of strength. Besides this, the leaf, as every one knows, has two different surfaces: the upper, which seems more smooth and polished; the lower, in which the ribs are more prominent, and of the colour of a paler green. The cause of this difference has not a little puzzled the botanists of every age: perhaps, the upper polished surface, from its position, being more exposed to the external injuries of the air and rain, is thus formed rather to defend the lower part, in which, probably, the attractive powers may reside. In this manner, the leaves of trees contribute to improve the flavour of the fruits, and regulate the vegetation.

The assiduity of Nature in the production of growing plants, is not greater than her care to preserve the seeds, which are to propagate the future Vegetables. The curious expansion of blossoms and flowers seem to be appointed by Nature, not only to protect, but also to convey nourishment to the embryo seed, and the fruits in general serve to supply the seeds with moisture.

When trees stand thick together in woods or groves, the lower branches, being shaded by those of the neighbouring trees, can perspire little, and imbibe less, on which account they perish; but the top branches, being exposed to a free air, perspire plentifully, and by this means drawing the sap to the top, advance in height rather than extent. Dr. Hales compares a tree to a complicated engine, which has as many different powers of attraction, as it has arms or branches, each drawing from their common fountain of life, the root. The younger the plant, the greater is its power of attraction; but, as it grows older, the vessels of circulation become more rigid, it ceases to push out its tender branches, and the whole plant, from the rigidity of age, acquires its greatest degree of hardness, when it ceases to vegetate.

Though fruits in general are the most inconsiderate agents in promoting the work of vegetation, being, as is commonly supposed, only destined to supply the seed with proper moisture and nourishment; yet, with respect to man, they make the most useful and pleasing part of vegetable productions. Their general properties, as constituting a part of our food, may be considered as arising from their different degrees of maturity. In general, while unripe, they may be considered as astringent, and in some measure partaking of the qualities of the bark of their respective trees: when come to a sufficient degree of maturity, they cool and attenuate; but, from too great a power in these respects, they often bring on disorders that are fatal in warm climates, where their juices are possessed of those qualities much more than with us. In our climates, however, this seldom happens, and they probably do not make a sufficient part of our diet.

As to the increase of plants, some proceed from seeds only, others from seeds and suckers; as tulips, for instance, which have seeds in their pistils, and a large quantity of small suckers, which rise, in a numerous progeny, round the parent plant. Some

are propagated and brought to perfection by grafts, which are no more than small branches of the finest sort artfully inserted in an aperture, made in the wood or bark of some wild or ordinary plant; while others are multiplied by slips. The strawberry plant throws out two long fibres on each side, the knots whereof take root in the earth, and become so many new stems. The branch of a vine bowed down, and thrust into the earth, shoots out fibres through the knots that lie buried and concealed; cut the branch off where it joins with the stock, and the other end, which rises out of the ground, becomes a new vine. In short, there are plants, which proceed from little slips or twigs of trees, when set in the ground, without any other manual operation.

There is no difficulty in accounting for the two first; because a seed, or a seed and a sucker, contain in them a shoot, or a minute plant complete. The graft, likewise, containing its buds for leaves, as well as fruits, the sap, when it flows into it, not only gives, but discovers what the graft contains. Let us now proceed to what at first sight seems more difficult to be accounted for, the increase from slips of trees. When we set a slip into the ground, the sap, which overflows it, puts some of those shoots in motion, which are to produce new branches. The little suckers, which expand themselves on each side, are, by the pressure of the earth upon them, prevented from rising with ease into the air. The juice, which ascends into the stem, coming afterwards to flow back, and descend upon the same suckers in the earth, take their course downwards instead of upwards, and become roots instead of branches. From whence we may conclude, that the stem gives only a passage to the sap and the air, and that the sap and air give nutriment and motion to all the shoots; that these shoots are produced before-hand, and are perhaps wrapped up in one another, as they were from the beginning of the world, for the benefit and advantage of mankind, through the succession of all ages.

We must not quit our considerations on Vegetables, without paying particular respect to flowers, which are formed to please us, and for our delight have received their amiable appearances: no eye but ours can enjoy their beauties: common animals never seem to be affected with pleasure when they behold them, nor do they ever stop to contemplate their wonders. They confound them with the common herbage of the field, they trample on the most beautiful of the tribe, and are perfectly insensible of this ornament of the earth. Whereas man, amidst a crowd of objects and riches that surround him, distinguishes and pursues the flowers with a peculiar complaisance.

Flowers have likewise an agreeable correspondence with our eyes, and a set of powerful attractions that invite us to approach them. Whenever we gather them, they present us with new perfections, in proportion to our regarding them with nearer attention. The greatest part of them not only regale our view with the beauty and arrangement of their colours, but gently delight our smell with an exquisite perfume; and, when they have gratified our senses with an innocent satisfaction, the mind still discloses wonders in them, which ravish its faculties.

When we carefully survey the structure of a flower, in order to discover its relation with the seed, we always find one or more inclosures appointed for the reception of the semen. Around that inclosure is a set of chives sustaining several packets of powder, which they scatter on all parts. The whole is encompassed with an empalement, or soft robe, that unfolds and closes, with a kind of precaution, according to the disposition of the air.

All these things convince us, that these parts, which are disposed with so much art and regularity, and wither round the inclosure, when the seed is formed, are instrumental in the generation of that seed.

It is difficult to conceive, how far the design, to delight man with the beauty and profusion of flowers, has been extended. Their multitude is a real prodigy, and we are led to imagine, that they had been commanded to spring beneath every step we take. They rear their heads on the lofty tops of trees, and are diffused through the herbage that creeps along the earth; they embellish the valleys and the mountains, and the meadows are enamelled with their colours; they are gathered from the skirts of woods, make their appearance even in deserts, and the earth is a garden entirely covered with their bloom. The prospect they afford us is so pleasing, that the generality of those arts, which are ambitious to please, seem most successful when they borrow the assistance of flowers: sculpture imitates them in its softest ornaments, architecture courts the embellishments of leaves and festoons on those columns and fronts, which would otherwise be too naked: the richest embroideries are little more than foliage and flowers; the most magnificent silks are almost covered with these charming forms, and are thought beautiful in proportion as they resemble the lively tinge of natural flowers.

Flowers are not only intended to beautify the earth with their shining colours, but the greatest part of them, in order to render the entertainment more exquisite, diffuse a fragrance that perfumes all the air around us; and it should seem as if they were solicitous to reserve their odours for the morn and evening, when walking is most agreeable; but their sweets are very faint during the heat of the day, when we visit them the least. Let us endeavour to account for this.

The sap is perpetually transpiring through the flowers, in proportion to the sun's warmth. These fine spirits, which are the essence and aromatic parts of the flowers, are easily dispersed through an air rarified by heat, and affect the smell but faintly at that time; but their dissipation is much abated, when the air is condensed by the return of night. The action of the sun, by which they are diffused, is too weak, in the morning and evening, to scatter them to any considerable distance, and it is then that the reunion of these spirits affect us with the strongest impressions. The evaporation of these minute particles forms an atmosphere around the flower, which is dissipated or condensed, as the action of the sun is more or less intense.

This is a demonstration, that the spirit of flowers are dispersed in proportion to the sun's action upon them; but we will not confine ourselves to this particular: in the study of natural things, true philosophy is never limited to the contemplation of their mechanism, but extends its curiosity to the benefits they produce. We are easily sensible of the intercourse that appears between the flowers, the air, and the sun beams; and can we possibly be unacquainted with that goodness, which is so attentive to make this correspondence advantageous to man? Providence has not only enamelled his way with flowers, for the entertainment of his view, but has taken care to embalm and purify the air he breathes, by shedding the noblest perfumes in his passage.

Their services, however, are not limited to the sight and smell, for other senses may derive advantages from them. They supply us with pastes to enrich our deserts, and present us with powders to perfume our wardrobes; they afford us delicate syrups, and even remedies to relieve us, when we are indisposed; violets, jonquils, and peach-blossoms,
roses,

roses, jessamines, carnations, and especially orange-flowers, accommodate us with conserves, and a variety of confections, together with essences and distilled waters, that continue to us the enjoyment of the odours, and other useful qualities of flowers, when they have long ceased to be in season.

Upon the whole, we may undoubtedly draw this conclusion, that every Vegetable and flower, how-

ever lightly and insignificantly custom and taste may have taught us to behold it, affords us an ample field of admiration, and cannot fail to inspire us with the highest esteem and veneration for the great Author of Nature, who has created and formed so many things for our use and amusement.

C H A P. I.

Containing the NATURAL HISTORY of FOREIGN VEGETABLES, and their ROOTS, BARKS, WOODS, LEAVES, FLOWERS, FRUITS, SEEDS, RESINS, GUMS, and CONCRETED JUICES.

NATURAL HISTORY of ROOTS.

THE CALAMUS AROMATICUS or *Acorus Verus*, is a sweet smelling flag. It has a long, oblique, knotty root, about as thick as a man's finger, and a little compressed; when fresh, it is of a whitish green colour; but afterwards turns of a reddish yellow. It is white and spongy within; has a sharp bitterish aromatic taste, with a distant relish of that of garlick, and a fragrant aromatic smell.

From the root that lies near the surface of the earth, there arise leaves, some of which are a cubit in length, others half as much, and its peculiar characteristic is a simple elegant iulus, with leaves like the aromatic flower de luce. They are sharp at the point, of a pleasant green, smooth, and above a quarter of an inch broad. They have six petals, which are blunt, hollow, loose, thick above, and truncated below. There are six thickish filaments, a little longer than the corolla. The antheræ are thickish, and join to the dedymæ. The germen is gibbous, longish, and there is no style; but the stigma is a prominent point. The capsula is short, triangular, and consists of three cells. The seeds are of an oblong oval.

The INDIAN ACORUS, by some called the true *Asian Calamus Aromaticus*, has a root not unlike the former, but more tender and of a pleasanter smell; the taste is bitterish, but not disagreeable. It is found both in the East and West Indies, and is in shape much like the former. It is recommended for inciding cold gross humours, and some pretend it is good against poisons.

ANGELICA is placed by Ray among the umbelliferous herbs with a shorter seed. The flower, according to Linnæus, is a large convex umbella, and the universal corolla is uniform; but the proper consist of five oval concave petals, that are nearly equal to each other. There are five simple filaments, and roundish antheræ. The germen is beneath the receptacle; there are two simple erect styles of the length of the corolla, and the stigmata are capitated. The fruit is oval, oblong, streaked, and may be separated into two parts. There are two oval, oblong seeds, convex and streaked on the one side, and the other plain. The root is three digits thick, with many fibres, black and wrinkled on the outside, but within, white, soft, juicy, sharpish and bitterish. The stalk grows to two cubits and upwards in height, and is hollow, full of branches, with large leaves like those of meadow smallage, but much sharper. The dried root is brought to us from Bohemia, the Alps, and the Pyrenees. The best is thick, of a dusky colour without, whitish within, and with a most fragrant smell, a little in-

clining to musk, and of an acrid aromatic taste. The roots brought from Spain, are now very seldom prescribed upon any occasion. Our own candied Angelica roots are well known to every one as a sweetmeat.

ANTHORA, in English, *Monk's-blood*; or *wholesome Wolf's Bane*, is the *Aconitum* of Tournefort. The flower has five unequal petals set opposite to each other in pairs, the uppermost of which is galeated with its back turned upward, the point sharp, and reflected towards the base. The two on the sides are broad, roundish, and connivent; but the lowermost two are oblong, and turned downwards. The colour is of a palish yellow, and the pistil turns to a fruit, in which are collected, as into a head, corniculated membranaceous sheaths, full of angular wrinkled blackish seeds. The plant is generally about nine inches high, and sometimes it is above a cubit, with a singular stiff angular hairy stalk, on which the leaves are set alternately, are whitish below, and have a bitterish taste. The virtues of this plant are uncertain, and some think the use of it is dangerous.

ARISTOLOCHIA is of several kinds, as the round, the long, the clematitis, and the slender. *Aristolochia Rotunda*, or *Round Birthwort*, according to Linnæus, has a single unequal petal, with a ventricous base, and consists of an oblong tube of a hexagon cylindrick shape, and a broad edge, extended downwards like a long tongue. There are six antheræ joined to the lower part of the stigmata, and the germen is oblong, angular, and under the receptacle. There is scarce any style, and the stigma is roundish, concave, and divided into six parts. The capsula is large, hexangular, and consisting of six cells. There are many flat seeds, and the fruit is round. It consists of a great number of stalks proceeding from a single root, which are a cubit high, and the leaves are placed alternately on the stalks, almost without any pedicle. They are roundish, of a dusky green colour, and, as it were, embrace the stalks. The flowers proceed from the wings, the root is tuberose, solid, three inches thick, roundish, wrinkled, with a few fibres dusky on the outside, of a palish yellow within, and covered with a thick bark: the taste is acrid, aromatic, and bitterish.

ARISTOLOCHIA LONGA, *Long Birthwort*, has the same sort of flower as the former, only it is of a whitish green colour within, and outwardly of an herbaceous colour. The fruit is terminated like a top, and when it is ripe it gapes, shewing a broad reddish seed, which at length turns to a dusky colour. The root is oblong, and about an inch thick, though sometimes it grows to the thickness of a man's arm; it is wrinkled, and of a dusky colour without,

without, but within it is yellowish, and the taste is somewhat more faint than the former.

ARISTOLOCHIA CLEMATITIS has a long creeping root, divided into several fibres; it is seldom thicker than a goose quill, is dusky without, and yellowish within; and has a bitter taste, with a smell stronger than the former. The stalks are a cubit in length, and are rounder, harder, and stronger than those of the former; likewise the leaves are larger, full of veins, and of a pale green colour, with longer pedicles than the rest. The flowers are pale, shaped like those of *round Birthwort*, but less, and the fruit is like that of *long Birthwort*, but bigger, they being of the size of small apples; likewise the seeds are larger.

ARISTOLOCHIA TENUIS, *slender Birthwort*, otherwise called *Pistilochia*, has a root which consists of long slender filaments, meeting in one head of a yellowish colour, with an aromatic smell, and an acrid bitter taste. The stalks are about nine inches high, and slender. They are angular and streaked, and full of branches, with the leaves more pointed than the *round Birthwort*, but less wrinkled, and a little sinuous on the edges. The flowers are like those of the *round Birthwort*, but less, and sometimes black; but at others they are of an herbaceous yellowish colour, with fruit like those of the round. When they are ripe, they gape at the part next the pedicle, and the seeds are like those of the *round Birthwort*.

All the kinds are reckoned to be opening and a little cleansing, and some esteem the round sort as best. They are said to be good against catarrhs and disorders of the breast from gross humours; as also against wind, pains of the cholic, and obstructions of the viscera.

BEHEN ALBUM, *white Behen*, is a root which is brought to us in pieces about as thick as a man's finger; of an ash colour without, with a contracted wrinkled surface, but pale and pulpy within, and of an acrid taste.

BEHEN RUBRUM, *red Behen*, is a root brought to us in pieces like jalap, and is dry, thick, and of a blackish red colour, with a taste and smell like the former, but more faintish. They are both brought from Syria and other places. It has a long geniculated root without hairy fibres, and is creeping like Liquorice, which it resembles both in shape and thickness; but it is whiter on the inside.

BUTUA, or *Pareira brava*, is a Brazilian plant, and the root is woody, hard, contorted, dusky, and wrinkled without, as well lengthways as circularly; within it is of a dusky yellow, and seems to be interwoven with various fibres; so that when it is cut transversely, they appear like so many concentric circles, with several rays or fibres reaching from the center to the circumference. It is without smell, but of a bitterish taste, with a sweetness not unlike liquorice. It is as thick as a man's finger, and sometimes as a child's arm.

It is good in ulcers of the bladder and kidneys, and, when mixed with a little balsam of capivi, it will certainly cure them. Some say it is an excellent remedy in a moist asthma, and the yellow jaundice. The dose is from twelve grains to thirty in substance; and from two drachms to three in decoction.

CARLINA, or *Chamaelion albus* of the shops, is a root a palm or two in length, and of the thickness of a man's thumb; it is red without, and has a surface which seems to have been corroded; it is white within, with an acrid aromatic taste, and a fragrant smell. It is brought from the Alps and Pyrenees, and should be chosen fresh, dry, and not carious.

CASUMUNAR is an East Indian root, and is tuberose. It is thicker than a man's thumb, and is cut into transverse pieces; it is marked on the sur-

face with circles like galangal, and is a little geniculated. It is ash coloured without, yellowish within, with a subacid, bitterish, aromatic taste. What plant this belongs to is uncertain; however it is said to strengthen the nerves, refresh the spirits, corroborate the stomach, and repel wind. It is given in substance from ten grains to thirty, and the tincture from twenty drops to thirty. The extract is also given from six grains to fifteen; but the chief use made of it is to help digestion and dispel wind.

CHINA is a long root, and is so called from the place it is brought from. However, there are now two sorts, one of which is brought from the East, and the other from the West Indies. It is a thick arundinaceous, geniculated, heavy, woody root, beset with unequal tubercles, and the colour without is of a dusky red, but within of a reddish white. The taste while fresh is a little acrid, but when dry it has a small degree of an earthly astringent taste, and without smell; if it is good, it seems to be fat and unctuous when chewed. The plant to which it belongs is called the rough Chinese smilax; or bind weed. The medicinal use of this root is now but little regarded. The American China differs from the former, only it being of a darker colour without, and redder within.

CONTRAYERVA is a root an inch or two in length, and about half an inch thick, and is knotty on the outside; it is hard, thick, reddish or blackish without, wrinkled, and the protuberances are, as it were, covered with scales; it has also many slender filaments, or threads, but within it is pale, and has a somewhat astringent bitterish taste, with a sweet sort of acrimony when it has been held long in the mouth. The tuberose part is only to be chosen; for the filaments are of no value. It grows in several parts of the West Indies, and is brought to us from Spain. It is a mild alexipharmic, and has been counted excellent against all sorts of coagulating poisons. It strengthens the stomach, helps digestion, and discusses wind; it is also used by some in malignant fevers. The dose is generally a scruple; but it may be given to a drachm and upwards. It is certainly very good to promote a diaphoresis.

COSTUS is by authors said to be of various kinds; but that in use with us is the sweet Costus of the shops, and is brought from the East Indies. It is cut into oblong pieces, which are about the thickness of a man's thumb; which are light and porous, but hard and brittle, and a little resinous. Sometimes it is whitish, and sometimes of a yellowish ash colour; with an acrid aromatic bitterish taste; but the smell is fragrant, and not unlike that of violets. It is said to attenuate viscid humours, to promote expectoration, and is by some reckoned a cephalic, as well as to be good for promoting a diaphoresis and urine; but it is very seldom used.

CURCUMA, *Turmeric*, is a root brought from the East Indies, and is oblong, slender, tuberose, knotty, and of a yellow or saffron colour; the taste is subacid and bitterish, with a smell like that of ginger, but weaker. It is a very useful root to the dyers; and, as it is very much in request, there is scarce a garden in the East Indies where it is not cultivated: they use it with their victuals as a sort of spice. It is recommended against obstructions of the lungs, liver, spleen, mesentery, and womb; but its principal virtue is against the jaundice, in which it is looked upon as a specific. It is given in substance from a scruple to a drachm, and in infusion to two drachms.

CYPERUS LONGA, *long Cyperus*, is a long slender knotty contorted root, not easily broken; it is blackish without, and whitish within; and of a sweet subacid aromatic taste, with a fragrant smell like that of nard. It is generally brought to us from Italy, and care should be taken that it has a lively smell, and is not carious. There is another root called

round *Cyperus*, which has been brought from the Levant, and is a roundish and turbinated root, of the size and shape of an olive. It is rough, streaked, reddish without, and sometimes black; but it is white within, and there are several fibres depending from a single head. The smell and taste are the same as the former. Many virtues have been attributed to it; but in the present practice it is seldom used.

DICTAMNUS CRETICUS, *Dittany of Crete*, is a kind of Origany, and is now only used in Venice treacle; it is brought to us from Candy, and is said to grow on mount Ida. There is another sort called *white Dittany*, which is a sort of *Fraxinella*, now of some use in many parts of Europe. The root, or rather bark of the root, is thickish, white, and is generally brought to us wrapped up in the same manner as cinnamon; it is of a bitterish taste with a little acidity, and has a fragrant, and pretty strong smell when fresh. It is said to be an alexipharmic, to promote sweat and urine, to kill worms, and to resist putrefaction. The dose is from half a drachm to two drachms in substance, and in infusion to an ounce.

DORONICUM ROMANUM, *Roman Wolfsbane*, is a tuberose root full of knots and tubercles, which are hardly so big as small hazel nuts; it is yellowish without, and whitish within, and the taste is sweetish, clammy, and a little styptic. It is brought to us from the Alps. As the qualities of this root are not perfectly known, it is not adviseable to admit it into practice.

GALANGA MINOR, *the lesser Galangal*, is a tuberose, knotty, geniculated root, and is divided into branches, as well as encompassed with circular rings; is uneven, hard, solid, and about as thick as the little finger; of a dusky colour without, and reddish within; with an acrid, aromatic, bitter, pungent taste, burning the mouth like pepper or ginger, and has an aromatic or fragrant smell while it is fresh: it is used in the East Indies as a spice. It is a warm stomachic bitter, and is given to promote digestion. It is good to discuss wind, and in all disorders that proceed from a weak stomach. The dose is from fifteen grains to thirty in substance, and from half a drachm to two drachms in infusion.

GENTIANA, *Gentian*, is a root sometimes a foot in length, and near an inch in diameter, but sometimes more; it is dusky on the outside, but of a yellowish red within, and a taste intensely bitter; likewise the substance is a little spongy. It grows among the Alps, Pyrenees, and other mountains, and is brought to us from Germany. Not many years ago there was a poisonous root sold instead of Gentian; but it may be readily distinguished from it, it being of a whitish colour within, and without its bitter taste. Gentian is usually prescribed as a bitter to strengthen the stomach, and to help digestion. The dose is from half a drachm to two drachms.

GLYCYRRHIZA, *Liquorice*, is a root extremely well known almost to every body. The stalks rise to three or four cubits in height, and are divided into several branches, with roundish leaves of a faint green colour. They stand upon the stalks by pairs, that is, one on each side, but at the end there is one that is single. The flowers are papilionaceous, small, blueish, and at the top disposed as it were into a spike. The pistil that rises from the calyx turns into a reddish pod, half an inch long, which has two valves and a single cell containing the seeds, which are small, hard, flat, and in the shape of kidneys.

Liquorice grows spontaneously in Spain, Italy, France, and Germany, and is also common with us in England. The root temperates salt acrid humours, and is good in diseases of the breast. It is often prescribed in decoctions, as well to appease the heats of the fluids as to abate their acrimony. As

for the dose, it is not easily determined; for it is usually chewed by children in large quantities without any bad consequence. The inspissated juice, which is brought from Spain, is of a blackish colour, and is commonly called Spanish liquorice: it has the same virtue as the root, but stronger.

HELLEBORUS ALBUS, *white Hellebore*, is an oblong tuberose root, sometimes as thick as the thumb, dusky without, and white within, with a great number of whitish fibres; the taste is acrid, a little bitterish, subastringent, disagreeable and nauseous. The inward use is not very safe; nor indeed the outward; for when the powder is applied to an issue it will occasion violent purging. When taken inwardly, it is a strong emetic, and has been observed sometimes to occasion convulsions and other terrible disorders. However, in desperate cases, it may be sometimes ventured upon, particularly against madness; and the dose in this disease is a scruple: it ought always to be used with the utmost caution.

HELLEBORUS NIGER, *black Hellebore*, is a tuberose, knotty root, from which as a head many fibres hang, which are thick and black without, but white within, and of an acrid bitterish taste; the smell while fresh is exceeding strong. The inward use of this is much safer than the former, and is accounted a proper purge against melancholic and atrabilarious disorders. It acts particularly on the strait gut, for which reason it promotes the piles.

HERMODACTILUS, *Hermodactyl*, is a hard tuberose triangular root, or rather in the shape of half a heart, it being flat on one side, and tuberose on the other, terminating as it were in a point; it is reddish without, white within, and is easily reduced into a meal by pounding; it is of a clammy sweetish taste, with a slight acrimony. Hermodactyls are always dried when they are brought to us, and have been thought to purge gross humours, particularly of the joints, whence they have been esteemed as excellent in the gout; however, their purgative quality is but weak. It is given in substance from half a drachm to two, and in decoction to an ounce; but it is seldom or never used alone.

JALAPA, *Jalap*, is an oblong turbinated thick dense root, cut into transverse pieces, and is heavy and blackish without, but within dusky or ash coloured. It is resinous, hard to be broken, and has a taste that is something acrid and nauseous. It is the root of an American convolvulus, and is called by some Mexican night-shade with a large flower. It is in great use as a purge, and is of the stronger sort, though it seldom or never produces any bad consequences. It is best given in substance, because then it operates best; for the resin is apt to occasion gripes, and the watery extract is too weak. It is very useful in a cold phlegmatic habit of body; but is not at all proper in feverish disorders, nor in hot and dry constitutions, nor yet in melancholic, or scorbutic disorders. A scruple is the usual dose to grown persons.

IMPERATORIA, *Master-wort*, is not the same plant called by that name with us, for it is brought from the Alps and Pyrenean mountains; and is an oblong root as thick as a man's thumb, and wrinkled: it is somewhat geniculated, is dusky without, and white within, with a very acrid aromatic taste, violently vellicating the tongue, and heating the mouth; it has a most fragrant smell, but inclinable to what is commonly called physicky. It has been reckoned an alexipharmic, and has been recommended by Casper Hoffinan as a divine remedy in the cholic and windy disorders; but it is not now much in use with us.

IPECACUANHA is brought from America, and is of two kinds, the Peruvian and the Brasilian. The Peruvian is not a quarter of an inch thick, is

crooked, and as it were rough with circular rings; it is of a light brown or ash colour, and is dense, hard, brittle, resinous, with a small nerve which runs thro' its heart the whole length of the root; the taste subacrid, bitterish, and with little smell. The Brazilian *Ipecacuanha* is of a brownish colour, and is crooked and rough, with rings like the former, but more rugged, and is little more than the twelfth of an inch in thickness; it is brown or blackish without, but white within, and of a slightly bitterish taste. The *white Ipecacuanha* is a bastard sort, and is slender, woody, without wrinkles or bitterness. It is sometimes imported by the merchants for the true *Ipecacuanha*, but may be readily distinguished from it; for, besides the marks already mentioned, it is of a whitish yellow colour, neither will it work upwards or downwards like the two former. These last are now of great use in the beginning of dysenteries and other fluxes of the belly; but the Peruvian is accounted the best. Eight ounces of the root will yield ten drachms of resin, when the extract is made with spirits of wine. It has formerly been given to the quantity of a drachm; but now from six to ten grains are judged to be sufficient. In a confirmed dysentery, if the doses are so small as not to be strong enough to purge, and given several times a day, it will cure the ulcers of the intestines. It is now more generally used as an emetic than for any other purpose.

IRIS FLORENTINA, *Florentine orris*, is a root which is brought to us in oblong pieces, and it is geniculated, a little flat, white, with a yellow reddish bark, which being taken off, the root has a bitter acrid taste, with a fragrant violet smell. It is sometimes twice as thick as a man's thumb. The *Iris nostras purpurea*, the *common purple flower de luce*, is of the same kind as the former; for the roots, leaves and flowers, are of the same shape, though the colour is different. Florentine orris attenuates and incises the thick lymph lodged in the breast, and promotes its expectoration; whence it is good in the asthma, shortness of breath, and coughs; but it is chiefly used as a perfume, and is often mixed with snuffs. The dose is from a scruple to a drachm. When the juice is snuffed up the nose, it brings away a great quantity of serum; and, mixed with bean meal, it is said to take away freckles.

MECHOACANNA, *Mechoacan*, is a root brought from South America in white pieces, and is covered with a wrinkled bark. The substance is softish with scarce any fibres, and the taste is sweetish, with a little acidity, which sometimes causes a nausea. It has rings somewhat like briony; but differs from it in being compact, and in having no bitter taste, nor a strong disagreeable smell. It was looked upon at first as a most excellent purge, but is not so much cried up now since jalap became in use.

MEUM ATHAMANTICUM, *Spignel*, is an oblong root about as thick as the little finger and branched; it is covered with a bark of a ferruginous colour; but it is pale within, a little gummous, and contains a whitish pith. It smells almost like parsnips, though more aromatic, and the taste is not disagreeable, though it is acrid and a little bitter. It grows among the Alps and the Pyrenean mountains. It is said to attenuate thick gross humours, and is recommended in the humoral asthma; but it is now but seldom used.

NARDUS-CELTICA, *Celtick-Nard*, is a fibrous, capillary, reddish root, covered with small scales, of a yellowish green colour; with an acrid bitterish aromatic taste, and a fragrant strongish smell. It is said to be a carminative, to strengthen a weak stomach, and to help digestion; but it is now chiefly used in venice treacle and mithridate. The dose is from half a drachm to two drachms.

NARDUS INDICA, *Indian Spikenard*, is a hairy

root, or rather a congeries of slender capillaments adhering to a head, which is about as thick as the finger, and as long, and of the colour of rusty iron; the taste is bitter, acrid, aromatic; and the smell agreeable. It is said to strengthen the stomach, and to disperse wind; but its principal use now is in venice treacle and mithridate.

NINZIN, and **GIN-ING**, are generally taken for the same roots, but they are distinct from each other; however, their outer appearance and virtues are much the same, though Gins-ing bears the much greater price. The root of Ninzin is in the shape of a parsnip, is three inches in length, and about as thick as the little finger, with a few fibres proceeding from it. It is pulpy, whitish, and has some faintish cracks on the outside; but below it is divided into two branches. It has the smell of the yellow parsnip, and the taste of skirrets; but it is not quite so sweet, and there seems to be a little bitterish taste. It grows in Korea, from whence it is brought to Japan, and is in high esteem in those parts; for they pretend it is endowed with extraordinary virtues. However, it is of no use with us. Gins-ing is a root of an inch long, and about as thick as the little finger; it is slightly wrinkled, and generally divided into two branches, but sometimes into more, and at the small ends there are slender fibres. It is a little reddish without, but yellowish within, and the taste is subacrid, a little bitterish and aromatic, with an aromatic smell. On the top there are a row of knots placed in an irregular order, which seem to tell the years of its growth. It was thought only to grow in China and Tartary, between thirty-nine and forty-seven degrees of north latitude; but it is now found in Maryland and other parts near it, from whence it is brought to London, and sent to the East Indies, where it bears a great price; for it is confidently affirmed, that in China they will give three pounds of silver for a pound of this root. It is looked upon by the inhabitants as a panacea, and is their last refuge in all kinds of disorders.

PYRETHRUM, *Pellitory of Spain*, is about the length and thickness of a man's finger, and without it is of a blackish red, but it is white within, and has a most acrid burning taste, though it is without smell. This is brought from the kingdom of Tunis; but there is another kind which is more slender, and not so acrid. This root is remarkable for opening the salival ducts, and for procuring plenty of spittle; hence it is by some looked upon as a specific in the tooth-ach, from obstructions and catarrhs. It is likewise good in sleepy diseases, and the palsy of the tongue, when chewed and held in the mouth. It is seldom or never given inwardly except in clysters against sleepy diseases.

RHABBARBARUM VERUM, *true Rhubarb*, is a root brought to us in thick unequal pieces, from four inches to five or six in length, and three or four thick. It is a little heavy, and of a dusky yellow on the outside, but within it is of a saffron colour, and variegated with yellow in the same manner as a nutmeg; it is a little fungous, of a subacrid bitterish and somewhat astringent taste, with an aromatic smell, but somewhat strong. It grows in China, and though we have had several figures of the plant, it is not certain that any of them are like it, which is somewhat strange, since it grows in all parts of that country, though principally near the great wall; it was formerly brought from China through Tartary to Aleppo, and from thence to Alexandria, and at length to Venice; but we have it now from the East Indies and Russia. There is a sort that was sent to Jussieu, and called *Rhubarb with an oblong curled undulated leaf*. It was said to be the true China rhubarb, and is now growing in the physick garden at Paris; there is also some of it in the physick garden at Chelsea. It was brought to Mr. Rand, the then gardener,

gardener, and was called by him the Rhubarb, with an undulated smooth leaf, like burdock. These were generally thought to be the right sort; but Mr. Miller, the late gardener, affirms, that it was nothing else than the *Rhaponticum*. The faculties of Rhubarb are well known for both its purging quality, and for its general astringency of the stomach and intestines. It is supposed to open obstructions of the liver, and it is excellent in loosenesses. It is so mild, that it may be given to all ages and sexes at all times. However, it is not proper when the intestines are very hot, and there is a feverish heat. It is good in the jaundice, that proceeds from a clammy thick bile, which stops up the biliary ducts. Some chew it in a morning, before breakfast or dinner, to help digestion. It is given in substance from half a scruple to a drachm, and in infusion to two drachms.

The true RHAPONTIC is the *Rhubarb* of *Dioscorides*, and of the ancients, and is by some called the *English Rhubarb*. The impalement of the flower is composed of three small leaves, which are turned back; and the flower itself has three leaves, which are larger than those of the impalement, and are coloured. In the center of the flower is seated the three cornered pointal, supporting three small styles, and attended by six stamina; the pointal afterwards becomes a triangular seed, inclosed by the petals of the flower. It is frequently cultivated in gardens, and of late years the first stalks of the leaves have been used for making of tarts in the spring of the year; but they must have their outward skin peeled off, otherwise they will be very stringy: they have an agreeable acid flavour. When they are propagated for use, they should be planted three feet asunder, and in rich ground.

SARSAPARILLA root is made like a rod of several ells in length, whose twigs are of the thickness of a goose-quill, and are tough, flexible, and streaked lengthways. The bark is thin, and the colour without is reddish, but ash-coloured within; under this there is a white mealy substance, which is so soft, that it may be reduced to powder between the fingers; the taste is bitterish and clammy, but not disagreeable. Under this, in the middle, there is a woody bright tough substance, which is not easily broken. All these twigs or strings proceed from a single head as thick as a man's thumb, and scaly. It is brought from New Spain, Peru, and Brasil. It is sudorific, and attenuates gross humours. It has been reckoned a specific against a well known disease, the gout, the palsy, and other chronic disorders; but its virtues are now most approved against the first. The method of using it is this; to three ounces of the strings, which are good and not spoiled with age or other accidents, three quarts of river-water must be added, and it must be made to boil as soon as possible, in an open vessel, till two pints of the strained liquor remain. This quantity is enough for twenty-four hours, and may be given at two or three times, either warm or cold. It must be made fresh every other day, and the patient's diet should be slender while he takes it. Some have given it from half a drachm to two drachms in substance, and to half an ounce in decoction; but the former method is best. After all, it is not to be wholly depended on for the before-mentioned purpose, unless it receives the assistance of mercury, and that properly prepared by a very skilful hand.

SENEKA is the root of a plant called *Polygala Virginiana*, with oblong leaves and white flowers; but it is known to us by the name of the Rattle Snake root. It is usually about the thickness of the little finger, and is variously bent or contorted; it is divided into many branches with lateral fibres, and has a prominent membranaceous margin, running length-

ways; it is yellowish without, but white within, and has an acrid bitterish taste, but somewhat aromatic. It is thought to be good in all other disorders proceeding from a thick blood, particularly in the pleurisy and inflammation of the lungs, first letting the patient bleed. It has likewise been prescribed in nervous disorders, and slow fevers, with success. The usual dose of the powder is about thirty grains. It will sometimes vomit and purge; but if the patient cannot bear it, it may be prevented by mixing a testaceous powder with the tincture, or by giving twelve grains of salt of tartar in weak cinnamon water.

SERPENTARIA VIRGINIANA, *Virginian Snake-root*, is slender, fibrous, light, brown without, and yellowish within, with a subacid bitterish taste, and a fragrant aromatic smell, not unlike that of zedoary. It is now reckoned a species of the *Arifolochia*, and is brought from Virginia and Carolina. It consists of a great number of strings or fibres matted together, that proceed from a single head. It is accounted a great alexipharmic, and is frequently given in malignant fevers, and epidemical diseases. It may be given in substance from ten to thirty grains, and in infusion to two drachms.

TURPETHUM, *Turbeth*, is a root, or rather the bark of a root, cut into oblong pieces about as thick as the finger, and is brown or ash coloured without, but whitish within, with a subacid nauseous taste. It is best when it is fresh, resinous, not wrinkled, and easily broken. It belongs to an Indian *Convolvulus*. It has been thought a proper remedy to purge off thick and gross humours from the remote parts of the body, and has been commended in cold chronic diseases, especially in the gout, palsy, and dropsy. The dose is from fifteen grains to a drachm; but an extract made of spirits of wine is best, of which a scruple is a dose: it is now not much in use.

ZEDOARY is a tuberose root that is dense, solid, from three to six inches in length, and about as thick as a man's finger, terminating both ways in a blunt point. It is ash coloured without, and white within, with an acrid, bitterish, aromatic taste, and fragrant smell, which is most remarkable when it is chewed or pounded, and is somewhat like camphire. There is another sort, called round Zedoary, that is in substance, weight, solidity, smell, and taste, like the former; for it only differs in the shape, which is roundish, and only an inch in diameter. They are both brought from China; but the latter is seldom found in the shops. It has been greatly celebrated for its virtues: it promotes sweat, incides gross phlegm in the lungs, as well as in the stomach and intestines; it discusses wind, and cures the cholic proceeding from thence; it raises the spirits, and has been given in several chronic disorders. The dose in substance is from six grains to thirty, and two drachms will serve as an infusion to be drank in the manner of tea.

ZERUMBETH is a tuberose geniculated root, with an unequal surface, and is from the thickness of a man's thumb to that of his arm; it is a little flattish, and of a whitish yellow colour, with an acrid taste, not unlike ginger, and a fragrant smell: it is seldom or never kept in the shops.

ZINGIBER, *Ginger*, is a well known tuberose root, knotty, branched, and flattish, the substance is a little fibrous, of a pale or yellowish colour, and covered with a brownish skin, which is commonly taken off before it is brought to us. The taste is very acrid, hot, and aromatic, with a very fragrant smell. It is brought both from the East and West Indies, where it is looked upon, while fresh, as an excellent remedy against the cholic, loosenesses of the belly, and windy disorders. It strengthens the stomach, helps digestion, and is said to strengthen the

the memory. It is often added to purges, to correct them; but it should not be given in hot constitutions, for then it will do more harm than good. It may be taken in substance from five to fifteen grains, but it is oftener taken in infusion or decoction from half a drachm to half an ounce. The dose of that which is brought over candied, is from a drachm to an ounce.

NATURAL HISTORY of BARKS.

CINNAMOMUM, *Cinnamon*, is a well known spice, it being a bark that is sometimes exceeding thin, and sometimes pretty thick, and rolled up into a sort of tubes or pipes of different lengths. The substance is leginous and fibrous, but brittle; the colour is of a yellowish red, with an acrid, pungent, pleasant, agreeable taste, and a most delightful smell. It is the second and inward bark of a tree called *Canella Zeylanica*. It is commonly taken from trees that are three years old, in the spring or autumn; the ash coloured outside is taken off, and then it is cut into pieces, and exposed to the sun, and, when it is drying, it rolls itself up in the manner it is brought to us. When the tree is stripped of its bark, it continues naked for two or three years, and then another grows again, which serves for the same purpose. When it is distilled fresh, it yields plenty of oil, but when old and dry, very little; however, it is of two sorts, one of which sinks to the bottom of the water, and the other swims on the surface. This last is pale, but the former is of a reddish yellow colour, though they are both limpid, and of a most fragrant smell; but when they are tasted, they are exceedingly pungent. When the bark of the root is distilled, it yields an oil, with a volatile salt, or camphire, which is lighter than water, limpid, yellowish, and soon flies away. It has a strong smell between camphire and cinnamon, and has a very pungent taste. The camphire got from it is exceedingly white, and has a much finer smell than the common sort, but it is extremely volatile, and takes fire immediately, whose flame leaves nothing behind it. The fruit of this tree is an oblong roundish berry, somewhat above a third of an inch long, and is smooth, green at first, but afterwards turns to a dusky blue, sprinkled with whitish specks. Under the green pulp there is a thin brittle shell, containing a roundish kernel. It is common in the island of Ceylon, where it is in as great plenty as hazel trees with us. Cinnamon is heating, drying, aperient, discutient, and alexipharmatic; it strengthens the viscera, recreates the spirits, helps digestion, and discusses wind. It is given in substance from a scruple to a drachm, and in infusion from one drachm to two. The oil is so hot and burning, that it is never prescribed alone; but it may be mixed with sugar, and then given with any fluid. The dose is from one drop to three. A single drop on a lump of sugar, is an excellent remedy against hiccoughing. Likewise, if a drop of it be put with cotton into a hollow tooth, it cures the tooth-ach by drying and burning the nerve. Cinnamon, though commonly used as a spice, should be avoided when the stomach is inclinable to an inflammation, for then it does more harm than good; nor is it proper for hot and dry constitutions.

CASSIA LIGNEA, *Woody Cassia*, is a bark brought to us in rolls like cinnamon, and has somewhat of the smell and taste, but weaker, for which reason it may be easily distinguished from it, besides which it is clammy when tasted; however, the best is that which approaches nearest to cinnamon. It has much the same virtues as cinnamon, though in a smaller degree; and when given as an astringent, it is preferred to it, on account of its glutinous qua-

lity; it is good in loofenesses, and to strengthen the viscera. The dose in substance is two scruples, and, when infused in half a pint of white wine, an ounce.

CASSIA CARYOPHYLLATA is the bark of a tree called the *Clove-berry-tree*, and is found in the island of Cuba, and other parts of the West Indies. It is as thin as cinnamon, and of a dusky yellow. It is brought in rolls like cinnamon, and has a taste between cloves and that bark; but that of cloves is the most predominant. It grows stronger by length of time, and at length becomes so acrimonious, that the tongue is affected as though it was burnt with a slight caustic. It has the same virtues as cloves, but fainter.

CANELLA ALBA, by some called *Winter's-bark*, and by others *wild Cinnamon*, is rolled up in oblong tubes, in the same manner as cinnamon, but larger. It is thicker than cinnamon, and has an acrid, pungent, aromatic taste, as if it had been mixed with cinnamon, ginger, and cloves. It is accounted a good remedy against the scurvy; it discusses wind, and is sometimes used in disorders proceeding from catarrhs. The dose is from half a scruple to a drachm in substance, and to two drachms in infusion.

CORTEX WINTERANUS VERUS, *true Winter's-bark*, is brought over in tubes like the former, and has a covering of an ash colour, that is soft, fungous, unequal, and full of chinks; but within it is solid, dense, and of the colour of rusty iron, with an acrid, aromatic, pungent, burning taste, but the smell is extremely fragrant. It was brought from the Straits of Magellan, by William Winter, in 1567. It has been accounted excellent against the scurvy, for which some reckon it a specific. However, it is seldom or never to be met with in the shops, the *Canella Alba* being now used instead of it.

CORTEX PERUVIANUS, *Peruvian or Jesuits bark*, is generally from the sixth part of an inch to the fourth of an inch thick, and is rough on the outside, it being of a brownish colour; but sometimes is covered with a hoary moss: it is smooth within, a little resinous, and of a reddish rusty colour, with an intensely bitterish taste, and somewhat of astringency. Sometimes it is brought in large pieces, three or four inches in length or upwards, and an inch broad, and not rolled up, because it is taken from the trunk of the tree; sometimes inclining to tubes like cinnamon, though but slightly, and is marked with shallow circular chaps or fissures: this is taken from the slender branches. There is likewise a lesser sort, which is yellowish within, and hoary without, which is said to be obtained from the roots, and is in high esteem in Spain. It grows in South America, and particularly in Peru. It was at first greatly celebrated for its febrifuge qualities, and is still in the highest esteem upon that account. However, it has many other virtues, which have been discovered one after another; but that which was first remarked was its power in stopping mortifications. It is given, in various forms, for agues of every kind, and its tincture with saffron and snake-root is excellent in nervous as well as in spotted fevers. It is good in the measles, and cures the strumous ophthalmia and hectic fever, and has been found excellent in the epilepsy, as well as the whooping cough, and spitting of blood. It is of great use in a consumption, and in the intermitting putrid fevers of that disease, as also in the hysteric passion. It is good in the king's evil, cures a pimpled face, and malignant ulcers. It is excellent for hemorrhages in general, and for hysteric convulsions. It is useful in tremblings, in languors, against the worms, as well as in a diabetes, and colliquative sweats, in which last case it performs wonders: in short, there is no single remedy yet found out that is endowed with so many

many excellent qualities. However, there is one not yet mentioned, which must not be forgotten, and that is its being an excellent preservative in sickly aguish countries, in all parts of the world, and in sickly seasons. The dose of the bark in powder is half a drachm, though some have given it to two drachms; and if an ounce is infused in a pint of generous red wine, six ounces is a dose; however, it is certain, that when it is given in substance; it is much more efficacious than either in infusion or decoction; but when patients refuse to take it in substance, the infusion in wine is undoubtedly the best. In whatever form this medicine is given, it must always be repeated every third or fourth hour, and in agues must be repeated again in eight days time from the cure. It will be still better to give it a second or a third time, that is, a few doses of it every eight days, and this process is generally necessary for autumnal agues; besides, it must be observed, that no evacuations of any kind must be made after taking the bark for some weeks, or even months after a cure is performed.

CORTEX ELUTHERIÆ is known abroad by the name of *Cascarilla*, has been sold for the Jesuits bark, and it is still called by some the grey Peruvian bark. It is rolled up in tubes of the thickness of the finger, and from two to four inches in length. It is thinner than the Peruvian bark, and is of a white ash colour without, but within of the colour of rusty iron, with a bitter aromatic taste, and a fragrant smell when burnt. It is thought to be good in diseases of the breast, particularly the pleurisy and inflammation of the lungs, as also in loosenesses attending acute fevers. By its sedative quality, it is useful in inflammations, though it is bad in the quinsy. It has produced good effects in internal hemorrhages, and in enormous vomiting, as well as in all fluxes of the belly. The dose is from six grains to a scruple, though it has been given to a drachm three or four times a day.

NATURAL HISTORY of WOODS.

A GALLOCHUM, or LIGNUM ALOES, *Aloes Wood*, is of three kinds, and the first, which is best, is called Calambac by the East Indians. It is light, resinous, and as soft as mastick, for it will stick to the teeth and nails, and will melt over the fire with a very sweet smell; but the taste is bitterish and aromatic. The *Agallochum* of the shops is brought to us in fragments of various sizes, which are heavy, dense, and of a bay colour, variegated with blackish and resinous streaks: sometimes there are holes in it, as if it was rotten; but they are filled with a sort of reddish resin, and then the colour of the wood is of a purplish black. The taste of this is subacid, bitter, and aromatic, and the smell is very agreeable. It grows in the island of Sumatra, in Cambaya, and more especially in Cochin China. It is oftener met with in the shops than the former, because the price of that is exceeding great.

AGALLOCHUM, or LIGNUM ALOES OF MEXICO, is more light, porous, and not so resinous as that of the shops; the colour is of a brownish green, and the smell is sweet and fragrant, not unlike that of the true lignum aloes, but the taste is bitter. It is not only met with in Mexico, but in the islands of Solor and Timor in the East Indies. It is seldom or never taken notice of as a medicine, but is used in making boxes, chests of drawers, and other things of that kind.

LIGNUM RHODIUM, *Rhodium Wood*, is a name given to woods of several kinds. It had its name from the island from whence it was brought, and was also called Cyprinum, because it was had from the

island of Cyprus. This wood is of a pale yellow at first, but in time grows reddish; it is thick, hard, and solid, and marked with fat resinous knots, smelling like a rose. There is another sort of *Rhodium* brought from the island of Jamaica, and, though it smells like the true, it appears to be different on a careful examination.

GUAIAACUM, otherwise called *Lignum Sanctum* and *Lignum Vitæ*, the wood of *Guaiaac*, is solid, dense, heavy, and resinous, whose middle part or heart is of a blackish green, and variegated with pale green, and black colours; but the external part is of a palish yellow like box; it is of a bitterish and somewhat aromatic taste, with a mild acrimony, and the smell, when burnt, is somewhat fragrant, and not disagreeable. The bark is woody, thin, dense, smooth, and somewhat resinous, and consists as it were of several thin plates laid one upon another; the outside is of an ash coloured green, or blackish, variegated more or less with green spots, intermixed with a livid or lead colour; it is pale within, of an acrid taste, and disagreeably bitter. It grows in the West Indies, and particularly Mexico and New Spain: This wood is full of resin, inasmuch that a pint of rectified spirit of wine will extract at least two ounces thereof. When it is boiled in water for a considerable time, and afterwards gently evaporated, it will leave a mass that looks something like resin, which is balsamic, of an agreeable smell, and a somewhat acrid taste; when it is quite dry, reduced into powder, and taken as snuff, it will bring a large quantity of serum from the nose; besides which it is very friendly to the nervous parts of the head. *Guaiaac* incises and attenuates gross humours, opens obstructions, promotes sweat and urine, strengthens the stomach, as well as all the rest of the viscera, cures inveterate obstructions of the liver and spleen, and is prevalent against the jaundice, dropsy, and other disorders thence arising. It is also good in the gout, rheumatism, and all sorts of pains in the joints. It is a great friend to the nerves, brings all cold hard swellings to suppuration, and yet it is never attended with the least bad consequence. The bark has the same virtues as the wood. Twelve ounces of the wood, macerated in three quarts of water for a day, and then boiled over a gentle fire till half or more is evaporated, and strained off, is called the cream of *guaiaac*. We might here enlarge on its uses in venereal cases, and give the proper method of using it; but as this work is undoubtedly read by the young and inexperienced, such directions might lead the unguarded part of them into experiments destructive of their health and constitutions, since the best medicines, when improperly applied, may tend to hasten death rather than a cure; and, as the learned know where to look for informations of this kind, they will readily excuse an omission, which properly does not belong to Natural History.

LIGNUM TINCTILE CAMPECHENSE, *Logwood*, is well known as a dye; and is commonly brought from Campeachy in the Bay of Honduras. It is but lately used as a medicine, and that in loosenesses, in which it is very efficacious; for if two ounces of the chips are boiled in a quart of milk, and a quart of water to one quart, and a tea-cup full of this decoction be given every three hours, it seldom fails to cure a common diarrhoea.

LIGNUM NEPHRITICUM, *Nephritic wood*, is whitish or of a palish yellow colour, and is solid and heavy, with a subacid and a little bitterish taste; the bark is blackish, and the heart reddish or brownish. The wood has been recommended against disorders of the kidneys, and difficulty of urine.

SANTALUM RUBRUM, *red Sanders*, is a solid, dense, heavy wood; brought over from the East Indies, sometimes in strait and sometimes in crooked pieces.

pieces. It is the heart of the tree, and has no remarkable smell, but it has a slight astringent, and austere taste. The virtues of these woods is not agreed upon by authors: however, they generally agree, that they are inciding, attenuating, astringent, and strengthening. But the yellow is the most powerful incider, and is more astringent than the red.

SASSAFRAS is the root of a large American tree, and is brought to us in long strait pieces, which are very light and of a spongy taste. It is of a whitish red colour, and the bark is spongy, ash coloured without, but within of the colour of rust of iron. The taste of the wood is acrid, sweetish, and aromatic, with a fragrant smell, not unlike that of fennel. Its virtues are sudorific and inciding, and it is good in the cachexy, green sickness, and dropsy. The oil of Sassafras is good in disorders of the breast, and particularly in coughs, pains, and spasms. It may be taken alone or dropped upon sugar, or a drop or two may be mixed with a powder good for the same purposes. It is a medicine not very commonly known, but exceedingly useful: *Sassafras* is also made use of like tea.

NATURAL HISTORY of LEAVES and FLOWERS.

CORALLINA, *Sea moss*, is a small marine plant, divided into a great number of sprigs, which are slender, brittle, and consist of several joints. Without it seems to be covered with a sort of a whitish stony substance, and the colour is various; for it is either white, reddish, yellowish, ash coloured or black, and sometimes of the colour of grass. It has a nauseous fishy smell, with a saltish disagreeable taste, and crackles between the teeth; it may readily be reduced to powder by rubbing it between the fingers. It is seldom above an inch and a half, or two inches long, and is found growing on rocks in the sea, as well as on stones, shells, coral, and the like. It has no root, and is very plentiful on the shore of the Mediterranean sea. That is esteemed the best, which is whitish or ash coloured. It is greatly cried up for its virtue in killing worms, and is given in powder from half a drachm to a drachm.

SCHOENANTHUS, *Camels Hay*, is brought in sprigs with the leaves, and sometimes with the flowers from Arabia; they are dry, stiff, round, shining, geniculated, and about a foot in length; it is full of a spongy pith, and is of a pale yellowish colour at the root, but near the top it is green or purplish; the taste is hot, subacid, bitterish, aromatic, and not disagreeable. It is now out of use, except as an ingredient in venice treacle and mithridate.

MALABATHRUM, *the Indian leaf*, is like that of the cinnamon tree, and differs nothing from it except in smell and taste. The tree, to which this leaf belongs, is called the white cinnamon tree of Malabar. It is now only made use of in venice treacle and mithridate.

SENNA, or SENA, consists of small dry, flattish, firm, and sharp leaves of a yellowish green. The smell is not very strong, but the taste is subacid, bitterish, and nauseous. It is of two sorts, the Alexandrine and that of Tripoly; which last is the worst, and the leaves are green and large, with a blunt point and rough to the touch. This medicine is in great use as a purge, being seldom or never attended with the bad consequences of drastic purges. It is apt to gripe; for which reason physicians have endeavoured to correct it in various manners; some with ginger, others with cinnamon, and others again with spikenard. Some mix it with prunes, jujubs, raisins, violets, marsh mallows, and polypody of the oak; others with things that discuss wind, and in-

clude gross glutinous humours, such as fennel-seeds, anniseeds, coriander-seeds, and salt of tartar. Senna is not good in those disorders, in which the fluids are hot, and the solids tend to an inflammation, particularly in hemorrhages, all inflammations whatever, and diseases of the breast. In an infusion, or gentle decoction, it is prescribed from a drachm to half an ounce, either alone or with other purging medicines. Some have endeavoured to correct its disagreeable taste by various additions, which however have not succeeded extremely well; particularly, they have recommended the greater water fig-wort for that purpose; but as it has a strong smell, and a nauseous bitter taste, it can do little good this way; while others have recommended bohea tea with as little success.

DICTAMNUM CRETICUM, or DICTAMNUS CRETICA, *Dittany of Crete*, is a leaf, of a roundish shape, about an inch long, and of a greenish colour, and covered with a thick white down. It is generally brought over with the stalks, from whose tops a sort of spike of scaly leaves depend, of a purplish colour. The smell is fragrant and not disagreeable, and the taste is acrid, aromatic, and hot. The dose in powder is from half a drachm to a drachm, and in infusion from a drachm to half an ounce; but it is only used with us in venice treacle and mithridate.

THEA, *Tea*, is a small dried curled leaf, with a taste bitterish in a small degree, and slightly astringent; the smell is very agreeable, and by some is likened to that of new hay, or violets. It is brought from China, and has variety of names; but it may principally be divided into three kinds, namely, the green, the imperial, and the bohea. The green is of several sorts, and is of various degrees of goodness, from the common coarse green tea to the hyson, which is now the dearest and accounted the best of all. The imperial tea is so called, because it is chiefly used by the emperor and great men in China and Japan. The leaf is large, and not so much rolled up as in the other kinds: the colour is greenish, lively, and of a fine smell, with an agreeable taste. This, not many years ago, was in great request with us; but now we either have it not at all, or it is sold under a different name. The bohea is of a reddish brown colour, and the leaf is small, rolled up, and tinges the water of a brownish colour; but the difference of taste of these teas are so well known they need not be insisted on. Some authors assure us there is no difference between the green and bohea teas, but what arises from the manner of curing them; for the bohea is said to be higher dried, or rather burned, from which it receives its different taste and colour. The natives throw the bohea into a brass vessel full of water, and boil it over a slow fire, where they keep it the whole day, and it serves for their usual drink; but these are the common sort, for others are much more nice and careful in preparing it. The Japanese grind their tea into a small powder, and then put a spoonful of it into one of their cups, pouring hot water thereon, and then they beat them together with a sort of a brush composed of long bristles, till a foam arises thereon; but the Chinese make use of it in the same manner as we do. Tea is certainly of some use in abating the acrimony of the humours, and in keeping people awake, but more especially in those who drink it but seldom; however, when others take it late at night, it very often prevents their sleeping sound. It is gently astringent; for which reason it hinders the water from weakening the stomach, and in those that take it but seldom it will prevent the operation of a purge. It has indeed some power in preventing the gravel, but then it does not arise from the tea, for hot water alone will do the same. In general it may be observed, that tea has different effects on different people,

people, and therefore, though it may be good for some, it is hurtful to others.

STOECHAS ARABICA, *French Lavender*, consists of the florid tops of the plant, which, when dried, are called *Stoechas*; they are oblong, scaly, and of a purplish colour, with a subacid bitterish taste, and a fragrant pleasant smell. Though it is called the Arabian *Stoechas* it is brought from the southern parts of France, where it grows spontaneously. It is now cultivated with us by sowing the seeds upon a bed of light dry soil in March. When the plants are come up they should be carefully cleared from weeds, till they are two inches high, at which time they should be removed into a light dry level ground prepared for that purpose, and set at about five or six inches distant from each other, observing to water and shade them well till they have taken root. It has a labiated flower, consisting of one leaf, whose upper lip is upright and cut into two; but the under lip, or beard, is cut into three parts; and both are so divided as at first to appear like a flower cut into five segments, out of whose flower cup rises the pointal, attended by four embryoes, which afterwards become so many roundish seeds inclosed in the flower cup. The flowers are ranged in various rows with scaly heads, out of the top of which peep some small leaves which look very beautifully. The *Stoechas* used in the shops is still brought from the south parts of France; but as it is apt to contract a mouldiness in its passage, it is not near so good as that gathered fresh in England. It is recommended in cold disorders of the head and nerves; however, it is rarely met with in prescription, but is used in venice treacle and mithridate.

CROCUS, *Saffron*, grows in various parts of the world, but it is no where better, if so good, as in England. At present it grows plentifully in Cambridge-shire, and in all that large tract of ground between Saffron-Walden and Cambridge. They begin to plough the ground in the beginning of April, and about five weeks after they lay between twenty and thirty loads of dung upon each acre of ground, but the shortest rotten dung is best; and this they plough into the ground. Soon after Midsummer they plough it again, and the time of planting is the latter end of July; the method of which is this: one man with a shovel raises between three and four inches of earth, and throws it before him about six inches; two women follow him with the heads of saffron, and place them in the farthest edges of the trench, which is made at three inches distance from each other. As soon as the digger has gone once the breadth of a ridge, he begins again at the other side, and digging before covers the root last set, and makes room for the setters to place a new row; and thus they go on till a whole ridge is planted. The quantity of roots planted in one acre is generally about a hundred and twenty-eight bushels. When the leaves are ready to show themselves above ground, they pare the ground with a short hoe, and take off the weeds. Some time afterwards the saffron flowers appear, which are gathered before, as well as after, they are full blown, and the most proper time is early in the morning. They carry them home in baskets, spread them on a large table, and pick out the chives with a pretty large part of the style itself; but the rest of the flower they throw away as useless. They then dry them on a kiln, which is built on a thick plank, supported by four short legs, that it may be removed from place to place. It is set in the lightest part of the house, and they begin by laying five or six sheets of white paper on a hair cloth, upon which they spread the wet saffron between two and three inches thick; this they cover with other sheets of paper, and over all they lay a coarse blanket five or six times doubled. At first they give the kiln a pretty strong heat to make the chives sweat. When it has been

dried about an hour, they turn the papers and saffron upside down, covering them as before. The same heat is continued for an hour longer, and then they take off the papers, cover the saffron as before, and lay on a weight. Then they have nothing more to do than to keep a gentle fire, and turn the cakes every half hour till thoroughly dried, which is generally performed in twenty-four hours.

Saffron has a flower consisting of one leaf, which is shaped like a lily, and fistulous underneath, the tube widening into six segments, and resting on a foot stalk; the pointal rises out of the bottom of the flower, and is divided into three headed and crested capillaments; but the impalement afterwards turns to an oblong triangular fruit, divided into three cells, and is full of roundish seeds. It has a tuberose root, and long grassy leaves, with a longitudinal white furrow thro' the middle of each. The parts of the flower used in medicine are the long stamina or chives, of a reddish flame colour. Saffron is endowed with great virtues, for it refreshes the spirits, and is good against fainting fits and the palpitation of the heart; it strengthens the stomach, helps digestion, cleanses the lungs, and is good in coughs. It is said to open obstructions of the viscera, and is good in hysteric disorders. However, the use of it ought to be moderate and seasonable; for when the dose is too large it produces a heaviness of the head and a sleepiness; some have fallen into an immoderate convulsive laughter, which ended in death. A few grains of this is commonly a dose, though some have prescribed it from half a scruple to a scruple and a half.

NATURAL HISTORY of FRUITS and SEEDS.

DACTYLI, *Dates*, are oblong fruit of a roundish shape, of the thickness of a thumb and the length of a finger. They are in the form of acorns, and composed of a thin dusky yellow skin, with a fat, firm, sweet pulp, and a thick, oblong, hard stone, furrowed longways. Those are best that are large, soft, yellowish, with few or no wrinkles, and full of pulp. Dates are distinguished according to their degrees of ripeness: the first is when the end begins to grow ripe; the second when it is ripe to the middle, and the third when it is ripe in every part. With regard to the virtues of Dates, they are said to strengthen the stomach, stop loosenesses, and corroborate the intestines; they are also good in diseases of the breast, and promote the expectoration of gross humours. The tree that produces them grows in several parts of the world, particularly in Arabia, Syria, Persia, Africa, as well as in Greece, Italy, and the southern parts of France; but they do not thrive so well in these last places, and the fruit seldom comes to perfection.

SEBESTEN is a fruit not unlike small plumbs, which are blackish, turbinated, pointed at the top, and wrinkled. They consist of a dusky clammy pulp of a sweetish taste, which adheres firmly to the stone. It is in common use in some parts of Europe to abate the acrimony of the humours, and to appease coughs proceeding from a soft phlegm, as well as in hoarsenesses and heat of urine. They are out of use with us, and consequently are not kept in the shops.

UVÆ PASSÆ, *Raisins*, are the ripe fruit of the vine dried in the heat of the sun, and are universally known. There are several sorts, though not all known to us, as the raisins of Damascus, which are the largest; the raisins of Provence, which are of a middle size; and the raisins of Corinth, with us commonly called currants. Those of Damascus are most in use with us, and are named raisins of the sun. There is also another sort brought from Spain,

Spain, which are pretty much in use, called *Malaga* raisins. The vine that produces the larger raisins is like other vines, only the leaves are bigger, and not divided so much on the edges. The common use and taste is known to every one, and as to their physical use, they are said to attenuate gross humours, and to abate their acrimony. Those called *jar* raisins, being stoned and eaten frequently, are excellent in obstinate hoarsenesses. They are sometimes used in decoctions, to abate the disagreeable taste of other medicines.

CARICÆ, dried Figs, are so well known that they need no description. The flowers, which are always inclosed in the middle of the fruit, consist of a single leaf, and are male and female in the same fruit; the male flowers are seated towards the crown of the fruit, and the female, which grow nearer the stalk, are succeeded by small hard seeds. The entire fruit is for the most part turbinated and globular, or of an oval shape, and is fleshy, and of a sweet taste. Fresh figs, as well as those which are dried, serve among other things for food in some distant countries; and when they are ripe, they are easy of digestion, and perhaps more so than any common fruit whatever. They are moderately nourishing, soften the belly, and are good in disorders of the lungs, kidneys, and bladder; however, the too frequent use of them is hurtful, because they generate wind. When they are dried they have the same qualities, but are better for medical purposes. They are sometimes used in pectoral decoctions, and six figs are enough for every pint of liquor. Externally they are sometimes applied in the form of a cataplasm, to discuss or ripen swellings. Some roast them, and apply them to swellings of the gums, and others to ease the pains of the piles.

MYROBALANI, *Myrobalans*, are of several sorts; but the yellow are principally used in medicine, and are a dried fruit, of an oblong roundish turbinated shape, an inch and a quarter in length, and three quarters of an inch in breadth; they are blunt at both ends, and of a yellowish or citrine colour. They are marked generally with five larger streaks, and as many that are small between them; under the glutinous and as it were gummous bark, or rind, half a quarter of an inch thick, which is bitter, austere, and subacid, there is a stone of a lighter colour, that is angular and oblong, with several pits or cavities; the kernel is whitish, and covered with an exceeding thin dark yellow membrane. The rind or pulp, for they are both together, is the only part in use. They proceed from a tree like that of wild plumbs, whose leaves are set by pairs, like those of the ash tree.

The *CHEBULE MYROBALANS* are the largest, and are oblong, angular, and said to purge phlegm. They are like the former, but bigger, and more turbinated, and have likewise five high ribs made by the streaks or furrows; but they are of a darker colour, and more inclinable to brown; within they are of a blackish red, but taste as the former, though the pulp is thicker, and the kernel is fat, oblong, and of the same taste. They grow on a tree not unlike a peach tree.

Indian, or black MYROBALANS, are less than the yellow, and are marked with nine oblong lines: they are rather wrinkled than streaked, and are blunt at both ends. They are black on the outside, and within are of a shining black, like pitch. The taste is subacid, bitterish, and a little acrid; they adhere to the teeth, and provoke spittle. The tree grows to the size of a wild plumb-tree, which has leaves like those of willows.

The *BELLIRIC MYROBALANS* are a roundish fruit, of the colour and shape of a nutmeg, but a little more yellow, and almost an inch in length; the rind is bitter, austere, and astringent; under which

lies a stone of a lighter colour, containing a kernel like that of a hazel nut.

EMBLIC MYROBALANS are a dried fruit, of a round shape, but marked with six angles, and of a blackish ash colour. They are half an inch in diameter, and under the rind, which when ripe opens in six places, there is a white lightish stone of the size of a hazel nut divided into three cells. Generally speaking, there is nothing but the dried segments of the pulp or rind brought over, which are of a blackish colour, and of a tartish austere taste. They grow on a tree higher than any of the former, but we have no accurate description thereof, nor indeed of any of the former. They have been looked upon to have a purgative faculty, without producing the least weaknesses, and by their astringency they strengthen the bowels. The dose is from an ounce to an ounce and a half, but the present practice has laid them aside.

COLOCYNTHIS, *Coloquintida, or the bitter apple*, is about the size of an orange, of a roundish shape; the pulp when dried is spongy, and, as it were, full of cells; it consists of small membranaceous leaves, which are dry, white, and exceeding light when brought to us. It is of a very bitter, acrid, nauseous taste, and it has small, flat, hard, white or reddish seeds, of the size of those of a cucumber, but rounder and harder; it is brought from Aleppo.

It is now in use as a medicine, and is a most strong violent purge; therefore only proper to be used in desperate cases, and in obstinate inveterate diseases. It has sometimes very dangerous effects, for it greatly injures the stomach, viscera, nerves, and even the whole body. It is often mixed with other purgatives, to render the operation more quick, and particularly with aloes and scammony. The dose of it, when given alone, is from five grains to twenty, when reduced to a fine powder. It has such a purging faculty, that when laid to the navel with oxes gall, it not only purges but kills worms.

CASSIA FISTULARIS, *the pudding pipe tree*, is an exotic fruit contained in pods, sometimes half a yard long, and about an inch in diameter; it consists of a woody shell, of a dark brown colour, but though it is hard it is thin. It is divided into several cells with partitions transversely placed, and parallel to each other; the pulp is soft, black, sweetish, and of the consistence of honey, containing oblong, roundish, flattish seeds, that are hard, shining, and of a dusky yellow. Those pods are best that are fresh, full, and will not rattle when shaken. The pulp only is in use, which is taken from the pods, and is passed through a sieve. It is looked upon as a mild, gentle, harmless purge, agreeing with all sexes and ages. The tree from whence it proceeds, has been planted in the West-Indies, but as it does not grow naturally there, it does not succeed very well; for it has a thicker shell, and the pulp is acrid and nauseous. As a cathartic it must be given in a large dose, but a small one is sufficient to keep the body open. Some have complained of its bad effects, and say it produces wind in the stomach and intestines; but by mixing it with cream of tartar, or boiling it with tamarinds, this may be prevented.

TAMARINDI, *Tamarinds*, are a fruit with a thick clammy pulp, brought to us in masses of a blackish colour, with an acrid taste, and mixed with the rinds of the pods, as well as membranes, nerves, and filaments; as also with the hard seeds or stones. That pulp is best that is clammy, of a blackish red, acrid and moist. It is to be cleansed from the membranes, filaments, and seeds, before it is used. It is brought from Egypt, and the East and West-Indies.

The flower consists of several leaves, which are so placed as to resemble, in some sense, one that

is papilionaceous; but they expand circularly, and from the many leaved flower cup there arises a pointal, which afterwards becomes a flat pod, containing many flat angular seeds, surrounded with an acrid blackish pulp. The pods of the tamarind-tree in the East-Indies, contain six or seven seeds in each; whereas those of the West-Indies have seldom more than three or four. They may be propagated in England, by sowing the seeds on a hot bed in the spring, and when the plants are come up, they should each be set in a separate small pot, filled with light rich earth, and plunged into a hot bed of tanner's bark to bring them forward, observing to water and shade them till they have taken root. They must be constantly kept in the bark stove both winter and summer. When rightly managed, they will grow to the height of three feet in one summer from the seed. Tamarinds, besides their purging quality, temperate the acrimony of the humours, abate the heat of the bile and blood, quench thirst, and are good in acute burning fevers. They serve to correct the faults of violent purgatives, and to quicken those that are sluggish. The dose is from one drachm to an ounce, and in decoction from one drachm to three ounces.

CARDEMOMUM, *Cardomum*, is of several kinds, of all which some account will be given. The seeds of the greater Cardomum are contained in a dried oblong fruit, about the size of a fig, and much of the same shape, with a broad circular navel at the top, divided in the middle into three parts, and including in a thin, membranaceous, tough, fibrous, wrinkled, brown or reddish colour, a great number of seeds in three cells, which are uneven, shining, reddish, and lodged in a sort of membranes that lie between them.

The *middle-sized* **CARDOMUM** of *Matthiolum*, or the greater *Cardomum* of *Bontius*, is an oblong fruit, of the length of an inch or an inch and a half, but slender, triangular, streaked and blunt at the top; it is of an ash colour, not easily broken, and divided into three cells that contain a great number of seeds, wrapped up in thin white membranes. It is oblong, angular, thin, and on one side divided by a sort of small pipe, and there are several transverse lines run across it. It is of a reddish white colour, with an acrid aromatic taste. This sort is very common.

The *lesser* **CARDOMUM** of *Matthiolum* is the *Cardomum* of the ancient Greeks, and is a dried fruit with a short membranaceous pod, not half an inch in length, of a triangular shape, but sharpest at the pedicle, and blunt at the extremity; it is of a reddish colour, streaked, and has a much thinner shell than the middle-sized Cardomum. When it is fully ripe the three corners gape, and discover three cells, containing a double row of angular, wrinkled, reddish yellow seeds, but white within, and of an acrid, bitterish, aromatic taste, somewhat like camphire. It is brought from the East-Indies. In the places where they all grow they are used as spices, and are said to help digestion, to strengthen the stomach and brain; and to promote urine. The dose is from ten grains to a scruple in substance, and in decoction to half an ounce. They are much used in the present practice, that is the greater sort, and are a very warm grateful spice.

AMOMUM VERUM, the true *Amomum*, brought from the East Indies, is a dried fruit growing in small bunches, consisting of ten or twelve berries or membranaceous bladders, which are fibrous, and brittle, lying close to each other without pedicles. The bunch is supported by a woody sprig, which is fibrous, round, and the length of a man's thumb. It is adorned with leaves, as well as a row of small scales, where there are no berries, and there are six long leaves surrounding each berry or grape like a

flower cup. Three of the longest leaves are half an inch in length, but the other three are smaller, and scarce shew themselves above the grapes. The thickness and shape of the berries are like that of a middle sized grape; each contains three rows of seeds, separated from each other by a thin membrane, and each row consists of several angular seeds, wrapped up in the same thin membrane, and lying so closely together, that they appear to be only three long seeds. The whole bunches are of a wood colour, but paler in some than others. The seeds are solid but brittle, and the smell is fragrant, not much unlike that of lavender, but sweeter; however, when they are taken out of their shells, the smell is more acrimonious, and they have an acrid taste. They are said to contain many virtues, but at present are only used in venice treacle.

CUBEBÆ, *Cubebæ*, of the *shops*, are a fruit, or round dried grains like pepper, and sometimes bigger, with a long slender pedicle, and a wrinkled, darkish ash-coloured shell, containing a single seed of a roundish shape, blackish without, and white within, with a sweet, acrid, aromatic taste, but not so hot as pepper. They are said to be good in diseases of the head, to create an appetite, to strengthen the stomach, and to disperse wind. The dose is from three grains to a scruple, and infused in wine, from a drachm to two drachms.

PIPER, *Pepper*, is of several kinds, as *black pepper*, *white pepper*, *long pepper*, and *Jamaica pepper*.

PIPER NIGRUM, *black pepper*, is a dried fruit or grain, of the size of a small pea, with a wrinkled, brown or black rind, which taken off, a hardish compact substance appears of a yellowish green colour, but white within; the taste is acrid and hot, and seems, as it were, to bite the tongue. It grows on a shrub, with a small, fibrous, tough, blackish root, which sends out many shoots that are tough, flexible, green, and woody, which lie on the ground like hops, unless they are propped up; there are several knees, or knots, which when they lie upon the ground will send out shoots; and at each knot there are leaves alternately disposed, and opposite to each other, that are roundish, two or three inches broad, and four long, terminating in points; the texture is thick and firm, and on the upper part they are of a shining dusky green; but beneath of a light green, and have short, thick, green pedicles. The flowers grow in bunches, and are monopetalous, but divided into three parts at the edges, to which succeed the grains, which are ten, twenty, or thirty in number upon one pedicle, and are green at first, but red when ripe; but in drying they grow black and wrinkled. When the rind of black pepper is taken off, it becomes white, and is the only sort brought to us by the name of white pepper. Black pepper is met with in Java, Sumatra, and on all the coasts of Malabar.

Long **PEPPER** is an unripe dried fruit, about an inch or an inch and a half long. It is oblong, round, cylindraceous, and, as it were, streaked with spiral lines, with tubercles placed in the form of a net; within it is divided into several small cells, containing each a small round seed, scarcely the twelfth of an inch in breadth, blackish without, but whitish within, with an acrid, hot, bitterish taste.

Long pepper is commonly pickled, and is in high esteem among some. It is very good in cold phlegmatic constitutions. They have all much the same virtues; for they heat, dry, attenuate, resolve, open and strengthen relaxed fibres of the viscera; and by exciting an oscillation therein, refresh the spirits, divide gross humours, and increase the circulation of the blood.

PIMENTA, *Jamaica pepper*, by some called all-spice, because it has somewhat of the taste of every one, is a dried unripe fruit, of a roundish shape, and

generally somewhat larger than black pepper; the skin is brown and wrinkled, with a navel on the top, which is divided into four parts, and contains two black kernels covered with a greenish black membrane. The taste is a little acrid, aromatic, and somewhat like that of cloves. It grows in several parts of the West-Indies, is gathered while green, and dried in the sun for many days; but they are taken in night and morning, to avoid the dew. It is used as a spice, strengthens the stomach, helps digestion, and refreshes the spirits.

CARYOPHYLLI AROMATICI, *Cloves*, are a dried unripe fruit, somewhat in the shape of a nail, and a little quadrangular, wrinkled, and of a blackish red. On the top there is a head, much about the bigness of a very small pea, which is composed of scales wrapped one into another, and round about it there are four small leaves, not unlike a flower cup, and disposed like a star, between which, in a cavity, there is a small quadrangular style of the same colour. The taste is acrid, bitterish, and agreeable, with a most fragrant smell. Cloves are the flower cups and embryos of the fruit before the flowers are expanded, and are gathered from the month of October to February. When fresh, they are of a dark red, for they come blackish by being dried in the sun and by smoke. They grow in several islands of the East-Indies, which are all now in the hands of the Dutch. Its principal use is as a spice, though it is said to be good against all cold disorders of the brain, swimming of the head, and weakness of sight; it is also good for a cold stomach, and hysterical disorders. The dose in substance, is from three grains to a scruple; but in infusion, from thirty grains to two drachms.

ACAJOUS, or CAJOUS, by some called the occidental anacardium, and by the French the *nut of Acagous*, but by the English the *cashew-nut*, is a fruit, or rather a nut, of the shape of a kidney, and of the size of a chestnut; it is covered with an ash-coloured, or brown skin, about a twelfth part of an inch thick, hard and tough; it seems to consist of a double membrane with a fungous substance, which in its cells contains a sort of oily fluid of the consistence of honey; it is of a reddish colour, extremely acrid, bitter, and biting; for if a drop of it falls on the skin, it seems to burn it like a caustic; and if any one through ignorance should bite the nut, the lips and tongue are immediately affected with a very sharp pain. Under this is the kernel, which is covered with another brown skin of the thickness of paper, whose substance is extremely white, compact, oily, and of a more agreeable taste than almonds. The tree that produces this nut is one of the best fruit trees in all America, some of which are of the size of standard apricot-trees; and sometimes are pretty regular, but generally the branches are crooked, knotty, and are strangely contorted among each other. The wood is greyish, pretty strong, tough, and heavy; the bark is thin, smooth, and of a dirty white, a little variegated with brown specks and lines. The leaf is large, firm, well fed, pretty thick, and more round at the top than at the bottom. The flowers are small and grow in tufts, and when they are opened they are divided into five leaves, which form a flower cup of small stamina of a yellow golden colour, that surround a pistil of the same colour but longer; the leaves that compose the flower are whitish at first, and afterwards turn to a purple mixed with white lines; but they are of small duration, for the pistil soon changes to a fruit. The tree, either spontaneously or cut, yields plenty of gum, that is reddish, transparent, and solid; it will dissolve in water like gum-arabic, and supplies the place of glue; when the juice is expressed from the fruit and fermented, it becomes a sort of heady wine, which greatly promotes urine, and the spirit dis-

tilled from it is very good. The thick fluid above-mentioned tinges linen of a rusty iron colour, which can hardly be got out. Some get an oil out of it, which will stain linen with a black colour that can never be got out, and if any wood be smeared with it, it preserves it from rotting. The oily fluid first taken notice of is used for taking off warts and corns, when mixed with the black wax of Gaudaloupe, or warm water. The ladies make use of it to take off freckles, for it soon destroys the cuticle, which is succeeded by one that is fair and of a good colour. When the kernels are put into water, the skin will readily come off, and then they are fit to eat; but when they are dry, they open it a little with a knife, and then lay them over the fire, by which means the skin may be easily taken off. They are in very high esteem among the inhabitants of the West Indies, not only to eat by themselves, but to make mackaroons and marchpains; besides which, they give to rosa solis and other liquors a very fine flavour. They may be transported to any distant country, and will continue good for many years.

BEN, is the *Balanus Myrepica of the shops*, and is a nut of the size of a hazel-nut, but of different shapes, for it is sometimes oblong, roundish, or triangular; it is covered with a whitish shell, which is pretty thick and brittle, and contains a kernel covered with a fungous skin as white as snow, and of the same consistence as an almond; it is fat and of a bitterish taste. Eight pounds of the kernels will yield thirty ounces of a yellow limpid oil by expression. This nut is of great use among the perfumers for extracting the fine smell out of flowers, because it will never grow rancid, and has no smell of its own.

CACAO, or COCAO, the chocolate-nut, are oblong, roundish, and of the size of olives; and are covered with a thin, hard, brittle, blackish shell, which being taken off there remains a firm, dense, dry, flattish kernel, of a dusky yellow on the outside, and reddish, or of a bay colour within. They consist of several pieces closely united together, and have a little bitterish and slightly acerb, but not a disagreeable taste. Some take notice of four sorts of the trees, which grow spontaneously and without any cultivation, in many parts of America between the tropics; particularly near the river of the Amazons there are whole forests of them. The wild cocoa-tree is very large, and thick of branches; but those that are planted are cultivated in such a manner, that they never exceed twelve or fifteen feet in height, not only that the fruit may be gathered more easily, but that they may not be too much exposed to the wind. The leaf is generally eight or nine inches long, and sometimes more, but seldom less; and the breadth is one third of the length. It is pointed at both ends, and has a strong stalk two or three inches long. It is of a lively green above, but deeper beneath, and the edges, from the place where it is broadest to the point, is of a very fine flesh colour. The fibres or nerves are like those of the cherry tree. This tree is an evergreen. It bears fruit twice a year, as well as most of the trees in these parts of America; but more properly speaking, it is never without flowers or fruit; however, the produce is most plentiful near both the solstices, but that near Christmas is always the best. The flower is small, and has six leaves when opened, which form a small cup, in the center of which is a longish button, surrounded with five filaments and five stamina. The leaves of the flower are of a pale flesh colour variegated with red spots and specks; the filaments are of a reddish purple, and the stamina are of a fine silver colour; but the button is of a duller white, and it is this that produces the fruit. The flowers do not proceed from the branches, as in the European trees, but from the root up to
one

one third part of the five large branches. The fruit that succeed these flowers resemble cucumbers, and are pointed at the end; but on the sides there are furrows like those on melons, among which are small unequal tubercles, and these contain the nuts before described; besides which they contain a substance or pulp, of a palish colour, which is very light and delicate, and of the same taste as pomegranates. Within this pulp are the nuts, of which there are twenty-five in number in each pod. The trees are in greatest perfection when they are ten or twelve years old, not because they bear more, but the largest fruit. The chief use of these nuts is for making chocolate, which is every where very well known, and is said to have restorative qualities; for which reason it is good in consumptions, prepared with milk, for then it abates the acrimony of the humours.

- **PISTACHIA**, *Pistachio nuts*, are of the size and shape of hazle-nuts, only they are a little angular, and higher on one side than the other. They are covered with a double shell, the outermost of which is membranaceous, dry, thin, brittle, and reddish when ripe; but the other is woody, brittle, smooth, and white, under which is a kernel of a pale greenish colour, and of an oily, bitterish, sweetish taste, and agreeable to the palate; it is covered with a red skin. It grows in Persia, Arabia, Syria, and the East Indies; and is cultivated in Italy, Sicily, and the southern parts of France. They yield good nourishment, and are said to be restorative, causing those that are fallen away to regain their flesh very soon. They have been used to make emulsions in the same manner as almonds.

PINEI NUCLEI, *Pine-apple nuts*, are oblong, round, white, fat, sweet, covered with a reddish coat, and are included in a thick hard shell. These nuts are contained in the pine-apple, or cones, between their hard and woody scales. They contain a great deal of oil, which may be gained by expression; and are said to be very nourishing, but they are not easily digested. Some account them good for consumptive patients, because they destroy the acrimony of the humours; they are also good in heat of urine, and in ulcers of the kidneys and bladder.

COFFEE is a hard seed in an oval form, and somewhat above a third of an inch long, and a quarter of an inch broad; one side is convex and the other flat, marked with a remarkable furrow. It is yellowish or of an ash coloured palish green; it has a farinaceous taste, and before it is roasted has not much smell. The cup of the flower consists of one leaf, which is divided at the top into five segments, and the flower likewise consists of one leaf in the shape of a funnel, and divided into five segments; the flowers are succeeded by berries, which split in the middle. The coffee-tree is propagated by seeds, which should be sown soon after they are gathered, otherwise they will not grow, which is the reason that all other countries, except Arabia, have been so long without it. It was necessary to get trees that were growing, which has been at length done, and there are now many of them as well in Europe as in America; but they succeed best in the Caribbee islands; however, the coffee is not accounted so good as the Arabian. The berries are commonly ripe with us in April, at which time they should be sown in pots of fresh light earth, covering them about half an inch thick with the same; and then the pots should be plunged into a moderate hot bed of tanner's bark, observing to refresh them often with water; as also to raise the glasses in the heat of the day to admit fresh air; and in very hot weather it will be proper to shade the glasses with mats.

The blossoms, or flowers are white, and shoot out just where the stalks of the leaves join the branches; when the blossoms fall off there remains a small fruit,

which is green at first, but as it ripens becomes as red as a cherry, and not unlike one; and it is very good to eat, being strengthening and refreshing; under the flesh of the fruit, instead of a stone, there is the berry, covered with a fine thin skin. When the fruit has been dried by the sun, the pulp becomes a shell of a deep brown colour, under which there is a thick brown liquor extremely bitter. Some direct the taking off the pulp of the berries before they are sowed, but this is a mistake; for they will come up sooner when it is left on, and produce stronger plants. There are two seeds in each berry, which seldom fail to grow; but, when the plants are young, they may be easily parted and set in different pots, and about an inch and a half high. In the winter season they should be placed in a bark stove, and kept up to the heat proper for pine-apples. In Arabia they bear ripe fruit twice or thrice in a year. The use of coffee is now well known every where, and the liquor made with it is generally supposed to be good in weaknesses of the stomach, in want of appetite, and in the flatulent cholic. It prevents sleepiness, and is good in sleepy diseases, for which reason it refreshes the brain and the animal spirits. It is good for those that are fat; and abound with thick gross humours; but with those that are lean, and have hot constitutions, it does not so well agree, nor yet with those of melancholy dispositions.

- **NUX MOSCHATA**, or **NUX MYRISTICA**, the *Nutmeg*, is very firm and compact, and yet is very easily pounded in a mortar. It is wrinkled without, and somewhat of an ash colour; but within it is variegated with a whitish yellow, and a bay colour, running in veins without any regularity. The trees that bear nutmegs are now entirely in the possession of the Dutch, as are all the spice islands; they are like pear trees, and have an ash coloured bark, with a spongy wood. The flowers, or blossoms, are yellowish, with five leaves, not unlike those of cherries; to these succeed the fruit, hanging to a long pedicle. It is somewhat like a walnut, and the kernel, or nutmeg, is covered with three coats, the first of which is fleshy, soft and juicy; about as thick as a man's finger, but villous and red, and variegated with yellow, gold colour, and purple spots, like a peach. When it is ripe it gapes spontaneously, and is of an austere taste. Under this there is another reticular covering, or rather divided into several parts, which is of an oily clammy consistence, and as it were cartilaginous, but thin, of an agreeable aromatic smell, and of an acrid aromatic taste, with a sort of bitterness. It is of a saffron colour, and is what we call **MACE**. Between the clefts of this there is a third covering, which is a hard, woody, thin shell, of a dusky reddish colour, and brittle, and in this the nutmeg is contained. It is soft at first, but grows dry and hard in time. The taste and smell is too well known to need a description. The principal use of nutmegs is as a spice, and they are good to promote digestion, to stop vomiting, to discuss wind, and to ease pains of the cholic. However, the immoderate use is bad, for it will affect the head, and produce sleepy diseases, as they have found by experience in the East Indies. When roasted they have a binding quality, and are good in fluxes of the belly, and are given to the quantity of a drachm.

NUX VOMICA, the *Vomit nut*, is round, flat, depressed, about an inch broad, and a quarter of an inch thick; it is of a hard horny substance, of an ash colour, and a little downy without, with a navel on the middle of each side; but one side is flatter than the other, and the taste is bitter; it is brought from the East Indies with snake-wood. It is of no use in medicine.

CARTHAMUS, *Baslard Saffron*, produces seeds that

that are sometimes used in medicine, but the flowers very seldom, for they are chiefly used as a dye. It agrees with thistles in most of its characters, only the seeds are always without down. It is greatly cultivated in Germany, and is brought into England from thence; for the use of the dyers. It is sown in the open fields in the spring of the year, and when come up they hoe it out thin, as we do turnips, leaving the plants about eight or ten inches distant every way. These plants divide into a great many branches, each of which bears a flower at the top of the shoot, which when fully blown they pull off, and is the part the dyers make use of.

SANTONICUM SEMEN, *Worm seed*, is a gross powder, consisting of oblong, scaly, yellowish, green grains, of a disagreeable bitter taste, with somewhat of an aromatic acrimony; the smell is a little aromatic; but nauseous, and there seem to be diminutive leaves and exceeding small streaked stalks among it. Its chief virtue is against worms, besides which it is said to strengthen the stomach, discuss wind, and excite an appetite; the dose is from a scruple to a drachm.

ANISUM INDICUM STELLATUM is a fruit in the form of a star, which consists of six, seven, or more capsulæ, meeting like rays in the center; it is of a triangular shape, and from near half an inch to an inch in length, and from a quarter to near half an inch broad. It is a little flat and united at the base, being composed of a double rind, the outermost of which is hard, rough, wrinkled, and of a bay or rusty colour; but the inside is hard, smooth, and shining, and has two valves, which gape on the upper part in those that are dry and old. There is in every one a kernel, which is smooth, shining, oblong, flat, and near a quarter of an inch long, and a twelfth broad, of the colour of linseed, which in a slender brittle shell contains a whitish, fat, sweet flesh, or pulp, agreeable to the palate, and of a taste between aniseed and fennel-seed, but stronger. The capsula has the taste of fennel mixed with somewhat of an acidity, and the smell is like it, but more fragrant. It is brought from China, Tartary, and the Philippine islands, and has the same virtues as aniseeds and fennel-seeds; but stronger. They strengthen the stomach, discuss wind, and promote urine.

NATURAL HISTORY of LIQUID RESINS.

THE fluids that flow spontaneously from any plant or tree, or from the wounded bark, either concrete into a resin, or gum, or are somewhat of a middle nature between a gum and a resin, which ought carefully to be distinguished from each other.

A resin is a fat, oleaginous, inflammable substance, that will not dissolve in water, but will in oil or spirit of wine. It is of two sorts, for one is clammy, liquid, and tenacious; and the other dry and brittle, which however will grow soft with heat.

A gum is a concremented juice that readily dissolves in water, but will neither melt nor take fire. A gum resin is that which will dissolve equally in water or oil, or at least for the greatest part, and is composed of resinous and gummous particles.

OPOBALSAMUM, *Balm of Gilead*, is a liquid resin, of a very light yellowish colour, and of a fragrant smell, not unlike that of citrons, but the taste is acrid and aromatic. Authors have long disputed where this balsam is produced; but it is certain, that it is now only to be met with in Arabia Felix, and has different virtues according to its age, for when fresh it has a much greater efficacy than when old. It is given inwardly against putrefaction of the viscera, and abscesses of the lungs, liver, and kidneys. The dose is from two scruples to a drachm.

It also cleanses foul ulcers, and heals them in a short time; but it is hard to be met with genuine, and very little that is so is brought over to us.

BALSAMUM PERUVIANUM, of which there are two or three sorts, as the *Balsamum Peruvianum album*, the *white Balsam of Peru*, that is fluid, and thinner than turpentine, but of a clammy consistence, and is resinous, inflammable, limpid, and of a yellowish white colour. The taste is a little acrid and bitterish, but the smell is sweet and fragrant, approaching to that of storax. It is brought from Spanish America.

BALSAMUM PERUVIANUM FUSCUM, *brown Balsam of Peru*, is fluid, resinous, clammy, and nearly of the consistence of turpentine; the colour is brown or of a reddish black, with a most fragrant smell like that of benjamin; but the taste is subacid, and a little pungent on the tongue. It will readily take fire and flame, the smoke of which smells extremely agreeable. That which is quite black is bad. They both are the juice of the same tree, and the one proceeds from the wounded bark of the tree; but the other is obtained by boiling. They cut the wood, bark, and branches, into very small bits, and then boil them in water for a considerable time; when the water is cold, the balsam will swim on the top, which they put in shells, and keep for use. The dose is from four drops to twelve in an asthma, consumption of the lungs, and fits of the gravel. Outwardly they ease pains proceeding from cold humours, and are excellent in healing wounds.

BALSAMUM TOLUTATUM, *Balsam of Tolu*, is a resinous clammy juice, of a middle consistence between a fluid and a solid; the colour is bay, inclining to that of gold; it has a most fragrant smell, and the taste is sweet and agreeable, for it does not create a nausea like other balsams. It is brought in small gourd shells from South America, and particularly from Tolu. In length of time it becomes dry, hard, and brittle. It has the same virtues as balsam of Peru, and is of great use in consumptions of the lungs, and internal ulcers. It is very efficacious in curing wounds; and serves to make what is called the ladies black sticking plaster now so much in vogue.

BALSAMUM COPAIBA, *Balsam of Capivi*, is a resinous liquid juice, and while fresh is of the consistence of oil, but in time it grows thick and glutinous. It is of a yellowish white colour, with an acrid, bitter, aromatic taste, and of a fragrant smell. It is brought by the Portuguese from Brasil into Europe. It is often adulterated with turpentine, but may readily be known from it when taken; for it does not give the violet smell to urine as that does. It abates the acrimony of the humours, enriches poor blood, and it both inwardly and outwardly heals all manner of wounds. It is also good in disorders of the lungs, and is excellent in appeasing coughs. It is given in a bolus with sugar and powder of liquorice, from five to twenty drops.

LIQUIDUM AMBARUM, *liquid Amber*, is a resinous, liquid, fat juice, of the consistence of turpentine, and of a yellowish red colour; it is of an acrid aromatic taste, with a fragrant smell, not unlike storax. It is brought from New Spain, Virginia, and other parts of America. It was formerly of great use among perfumers, but is now laid aside, and is seldom met with in the shops.

STYRAX LIQUIDUS, *liquid Storax* is a resinous juice, of which there are two sorts in the shops, the one pure, and the other impure or thick. The best is of the consistence of turpentine, and semi-transparent; the colour is brown, or of a reddish brown, and sometimes of an ash coloured brown, with a strong smell like storax; but it being so violent it is disagreeable, and the taste is a little acrid, aromatic,

and oleous. The impure storax is a resinous juice, full of dregs, and of a brownish or ash colour; it is also opaque, fat, and has not so strong a smell. It is the produce of a particular tree, growing near Suez in Arabia, whose bark they strip off every year and boil in sea water to the consistence of bird-lime, and then they take off the resinous substance swimming at the top. It is in like esteem among the eastern people; it is said to have the same virtues as the former balsams, and is given from three drops to twelve to heal internal ulcers; but it is more commonly used outwardly for wounds, bruises, and ulcers.

TEREBENTHINA, *Turpentine*, is of several kinds, and there are four kept in the shops.

TEREBENTHINA CHIA VEL CYPRIA, *Chio Turpentine*, is a resinous liquid juice, of a whitish yellow colour, inclining a little to blue; it is sometimes transparent, and sometimes of a pretty firm consistence, and sometimes soft, thick, and glutinous. The taste is a little bitterish and acrid, and the smell is also acrid but not disagreeable. The best is brought from the islands of Chio and Cyprus. The use of this, as well as of the other turpentines, is both external and internal; externally it is emollient, discutient, resolvent, cleanses ulcers, and heals recent wounds. But it is generally prescribed inwardly, and is remarkable for healing ulcers of the stomach, intestines, liver, kidneys and bladder. It is good in an old cough, for purulent spitting, and the beginning of a consumption. It promotes urine, gives it a violet smell, and is good in heat of urine. The common dose is from half a drachm to a drachm and a half, in the form of a bolus, or dissolved in the yolk of an egg.

TEREBENTHINA VENETA, *Venice Turpentine*, is a resinous, liquid, limpid, clammy substance, thicker than oil, but more liquid than honey; it is a little transparent like glass, and of a yellowish colour; the smell is resinous, fragrant, and acrid, but not disagreeable: the taste is acrid and bitterish. It is called Venice turpentine, because it was formerly brought from Venice; but now from Savoy, and the southern parts of France.

TEREBENTHINA ARGENTORATENSIS, *Strasburg Turpentine*, while fresh is more liquid than the former, and is more transparent, not so clammy, and has a finer smell, something resembling that of citrons; but the taste is more bitter, pretty much resembling that of citron peel; in time it grows yellowish and thick. It flows from the tree called *abies taxifolio*, that is, the fir with the leaf of the yew tree; not only from its trunk and boughs, but also from certain tubercles within the bark. That which proceeds from the trunk is the worst, and when dry it resembles frankincense in colour and smell, but that which proceeds from the incision of the tubercles is best. It has the same virtues as Venice turpentine, though some think it is more efficacious, and it is given in the same manner.

TEREBENTHINA COMMUNIS, *common Turpentine*, is more thick and tenacious than any of the former, and is not so transparent; it has a resinous strong smell, with an acrid, bitterish, nauseous taste. It proceeds from the pine-tree, either spontaneously or from incisions. The white resin, called by the French galipot, is commonly mixed with wax for the making of flambeaux. When the white resin is melted with common turpentine, and oil of turpentine, the composition is called Burgundy pitch. In some places, the trunks of the old pine-trees that are still standing, have a ditch made round them and set on fire, which forces out a fluid well known by the name of tar, of which tar-water is made, lately so much in vogue, for the curing almost all sorts of distempers. All sorts of resins being set on fire, produce soot, which preserved, is known by the

name of lamp black. All sorts of resins, as well liquid as solid, are emollient, digestive, resolvent, and serve to make plasters and ointments for the curing of wounds and ulcers.

NATURAL HISTORY of SOLID RESINS.

ANIME *vel* ANIMUM, *Gum Anime*, is improperly called a gum, for it is nothing but a resin, and is either oriental, or occidental. It is a transparent resin, and is brought in fragments of various colours, for some are white, others reddish, and others brown. When kindled, it has a pleasant smell, and is brought from Arabia to us. We know nothing of the tree that it proceeds from, nor are we certain that this is its proper name.

AMINE OCCIDENTALIS SEU AMERICANA, *American Anime*, is a white resin, a little inclining to the colour of frankincense. It is more transparent than copal, but more oleaginous. It is of a most grateful and sweet smell, and when thrown upon live coals soon burns away. It is brought from New Spain, Brasil, and the American islands. Some apply this outwardly, when dissolved in oil or spirits of wine, to strengthen the nerves.

BENZOINUM, *Benjamin*, is a dry, hard, brittle, inflammable resin, consisting of various bits, some of which are yellowish, others whitish, in the same mass; it has a resinous taste, with a sweet fragrant smell, especially when it is set on fire. There are two sorts, one of which is pale, or of a reddish yellow, containing white grains like almonds; the other is blackish, with few or no spots. It is brought from the kingdom of Siam, and the islands of Java and Sumatra; that of the lightest colour is best. Its principal use is as a perfume, though it is good in disorders of the breast, promotes expectoration, and appeases coughs. The flowers of *Benjamin* promote sweat, and are good in the asthma. The resin is used externally to strengthen the head, stomach, and nervous parts, when made up into a plaster; the tincture is of great use in taking off tubercles and redness of the face.

CAMPHORA, *Camphire*, is a resinous fattish substance, white, light, and transparent, and is brought to us in a sort of loaves or masses, six inches long and one or two thick; it has an acrid, bitterish, aromatic taste, and yet with a sense of coldness: the smell is fragrant, somewhat like rosemary, but much stronger. It is so volatile, that when exposed to the air it will diminish by degrees, and at length fly quite away. It easily takes fire, leaving no earth, or any thing else behind it, when it has done flaming. It is brought from Japan into Holland, and from thence dispersed all over Europe. In the East Indies it is distinguished into two sorts, namely, that which is brought from Japan or China, and that which is produced in the islands of Borneo and Sumatra; but this is very dear and uncommon, and is seldom or never brought to us. It is produced from a tree like a laurel, but of a very large size, for it grows to the bigness of an oak tree. Camphire may be got from any part of it, for it flows through incisions like other resins, but in some places the country people cut the root and wood into small bits, pouring water upon them, and boiling them in an iron vessel, with a head fixed thereto made of straw, to which when it is sublimed it sticks like soot. However, it is coarse when first brought over to Europe, and is cleansed by the Dutch. The virtues of camphire are very great, especially in the hands of a skilful physician: for it is an alexipharmic, and is both anodyne and diaphoretic, without heating the body or disturbing the circulation of the blood; neither does it occasion thirst, nor render the urine of a higher colour, as hot medicines will. It

has also an anodyne and soporiferous quality, and is good in pains, madnefs, and spasms, often producing wonders. The dose is from three grains to a scruple, given in the form of a bolus, or dissolved in oil of sweet almonds. It is used externally, when dissolved in spirits of wine, in rheumatic pains and inflammations; it is also good against burns and scalds.

CARANNA, *Caranna*, is a resinous substance, as ductile as pitch when it is fresh, but when old it is hard and brittle, of a blackish ash colour without, and brown within; it has a resinous bitterish taste, somewhat like myrrh, and when kindled has a fragrant smell. It is brought from America in masses wrapped up in a sort of leaves. It is only of outward use, and is said to resolve tumours, ease pains, and strengthen the nerves. It is made into a plaster and laid to the temples for the tooth-ach, and on the top of the head for the head-ach.

ELEMI, *Gum Elemi*, is a yellowish resin, or of a greenish white, pretty hard on the outside, but within soft and clammy, and is brought to us in masses of a cylindrick form; when set on fire it has a strong but not disagreeable smell, somewhat like fennel. This is the *true elemi* that was brought from Ethiopia, and is now seldom to be met with in the shops.

ELEMI AMERICANUM, *American Elemi*, is sometimes whitish, sometimes yellowish, and sometimes greenish. It is somewhat transparent like resin, and has a strong smell like that; this is very common in the shops, and is only used outwardly for resolving tumours, dissolving ulcers, and easing pains. It is particularly recommended against diseases of the head and tendons, especially the ointment prepared with it, which is called the balsam of Arcæus.

RESINA HEDERÆ, the gum of the ivy tree, is a resinous, dry, hard, compact, brown or rusty coloured substance, somewhat transparent; it is broken into small fragments, among which some are of a reddish colour; the taste is subacid, a little astringent and aromatic, but it has no smell. It is brought from Persia, and other oriental countries.

LADANUM *vel* LABDANUM, *Labdanum*, is a resinous substance, of which two kinds are met with in the shops, one of which is brought in large compact masses, and is of an agreeable smell, with a reddish black colour. It is wrapped up in bladders or skins; but the other sort is without any, and is of a contorted shape, somewhat like a screw, and is dry and brittle; but when heated by the fire is a little soft, and is mixed with a kind of black sand. It is of a black colour, and weaker than the former, but is most commonly met with amongst us. Outwardly, labdanum is emollient, and is used to strengthen the stomach and promote digestion; but it is very seldom used.

MASTICHE, *Mastich*, is a dry resin, of a pale yellowish colour and transparent; it is brought in tears of the size of small peas, and is brittle at first between the teeth, but when warm it sticks thereto; and when thrown upon live coals it takes fire, emits a pretty good smell, and the taste is slightly aromatic, resinous, and subastringent. That is best that is pale, yellowish, transparent, dry, brittle, and has a pretty strong smell; but the black, green, livid, or impure, is good for nothing. Some physicians have commended mastich for strengthening the fibres of the viscera, and abating the acrimony of the humours. Some give from a scruple to half a drachm, in spitting of blood and inveterate coughs. Externally laid to the temples, it is said to cure the tooth-ach.

OLIBANUM, *Olibanum*, is of a resinous substance, of a pale yellowish colour, and transparent, it is brought in tears like mastich, but bigger, and is of

a bitterish taste, and pretty acrid, but not disagreeable, and of a fragrant smell. It readily takes fire, and flames a long while. That is best that is whitish, transparent, pure, shining, and dry. Some have accounted it a specific against a pleurisy, and commend it in disorders of the head and breast, especially coughs and spitting of blood. The dose is from a scruple to two drachms. A drachm of it, put into an apple, roasted under the ashes, and given to the patient, has been observed to cure those who have been given over in a pleurisy; but then they must be well covered in bed in order to sweat. If the first dose does not succeed, another must be given in six hours time. It is accounted a good vulnerary, and therefore is mixed in various plasters.

SANDARACHA, *Gum Sandarach*, is a dry, inflammable, transparent, resinous substance, of a pale yellow colour, and brought in tears like mastich. The taste is resinous, but the smell when it is kindled is fragrant and sweet. That is best that is yellowish, transparent, and shining. It is brought from the coast of Africa, and has much the same virtues as mastich, but is seldom given inwardly; nor is it very often applied outwardly. When powdered it is well known by the name of pounce, which is rubbed over paper to prevent the sinking in of the ink, and to render the writing more fair; it is also an ingredient in some sorts of varnish.

SANGUIS DRACONIS, *Dragons-blood*, is a dry, brittle, resinous substance, melting easily, and as readily taking fire. It is of a dark red, but when powdered is of an elegant crimson; when drawn into thin plates it is transparent, but is without taste or smell, unless when kindled; for then the fumes smell somewhat like storax. There are two sorts in the shops, one of which is hard and in masses, about an inch long, and half an inch thick, and is wrapped up in long narrow leaves. Dragons-blood in tears and drops is generally mixed with bark, wood, earth, or other heterogeneous substances, and then made into masses, or loaves, as some call them. There is another counterfeit sort, that may be readily distinguished from the true, for the masses are of a dusky red colour, and made up of several sorts of gums, tinged with Brasil wood. It will not flame, but when placed over the fire rises in bubbles, and being put into water dissolves therein. That is best that is shining, of a darkish red, wrapped in leaves, and when powdered is of a fine red shining colour. It is brought from the East Indies, and is produced by four different trees; however, that which is genuine will dissolve only in spirits of wine and in oils. It is of an astringent quality, and is excellent in all sorts of hæmorrhages whatever; the dose is from half a drachm to a drachm, and when applied outwardly dries up ulcers, heals wounds, and fastens loose teeth; it is also of use to painters, in making a red sort of varnish.

STYRAX SOLIDUS, *Storax*, is a resinous substance, of which there are two kinds, *Storax Calamite*, and *Common Storax*.

STYRAX CALAMITA, *Storax Calamite*, is a resinous, shining, solid, somewhat fattish substance, which is composed of reddish and whitish grumes or grains, of a resinous, acrid, but not disagreeable taste, and a most fragrant smell, especially when thrown on live coals; it takes fire readily, and emits a very bright flame.

STYRAX VULGARIS, *Common Storax*, is of a yellowish red, or brownish colour, which is shining, fat, and a little clammy, and is brought in masses mixed with whitish grains; it has the same smell and taste as the former. There is also another sort of storax which is mixed with saw-dust, and this is now commonly sold in the shops, and is oftener met with than the true. It is good in diseases of the

breast, and is said to strengthen the brain, refresh the spirits, and restrain their inordinate motions; it has also an anodyne faculty, and is good in pains of the head, and inveterate coughs, by abating the acrimony of the humours. The dose is from half a scruple to half a drachm.

TACAMAHACA, *Tacamabac*, is a resinous, dry, fragrant substance, of which there are two kinds in the shops, but that in shells is the best. It is a little soft, sometimes pale, sometimes yellowish, and at other times greenish. It is brought in shells, which seem to be of the gourd kind, and covered with leaves. It has a most fragrant aromatic and very sweet smell; but it is seldom met with in the shops. The common sort consists of whitish grains, or gleses, but they are sometimes yellowish, reddish, greenish, or variegated with all those colours, and semi-transparent. The smell is much like the former, but not so disagreeable, and it is brought from New Spain. It is seldom or never given inwardly, but is applied outwardly for easing of pains arising from cold flatulent humours; it resolves and ripens swellings, and restrains defluxions on the eyes, and other parts of the face. When laid to the temples, it is much praised by some for curing the tooth-ach, and on being applied to the stomach, it strengthens it, and assists digestion.

NATURAL HISTORY of GUMS.

GUMMI ARABICUM, *Gum Arabick*, is brought over to us in tears, or drops, of different colours, some of which are pale, others yellow, and others red, with a wrinkled surface, and brittle, and which shines like glass when broken. When held in the mouth it sticks to the teeth, and dissolves readily in water, but has no taste. It is produced by a tree called the *Acacia-Vera*, or the *Egyptian Thorn*, and is brought over from Arabia, Egypt, and other parts of Africa. The best is whitish, or of a palish yellow, shining, dry, transparent, and free from filth. When it is brought over in large reddish dirty masses, it is only fit for mechanical uses. It will not dissolve in spirits of wine, or oil, and in the fire it burns to ashes without flaming, whence it appears to consist of a mucilage and earth; whence it is good in hoarsenesses, coughs, salt catarrhs, spitting of blood, the stranguary, and heat of urine. The dose is from a scruple to two drachms. When a powder of this gum is wanted, it must be beaten in a red hot mortar, and then the powder of it may be exhibited for internal use.

GUMMI SENECA, *vel SENICA*, *Gum Seneca*, is not unlike gum arabick, and is called Senega, because it is brought from a province of Negroeland, bordering upon the river Senegal. We now have it in great plenty, and at present the whole trade is in our own hands, but from what tree it is obtained we are uncertain, though perhaps it may be a kind of an acacia. The white and smaller tears of this gum are often sold for the true gum arabick; and there is no great cheat in the matter; for their qualities and properties are much the same.

TRAGACANTHA, **TRAGACANTHUM**, and **DRAGACANTHUM**, *Gum Tragacanth*, is a gummy juice, sometimes brought over in long strings variously contorted and bent, and sometimes in small grumes, or bits; it is white, semi-transparent, and sometimes yellowish, reddish, or blackish. It is dry, but not very hard, and without either smell or taste. It is brought from Cyprus, Asia, and Greece. That in strings like worms or isinglass is best, when it is white and free from filth. It serves for the same purposes as gum arabic; and it is observable that a drachm of it will thicken a pint of water, full as much as an ounce of gum arabick, it being altogether a mucilage without any earthy parts. It is

good in dry sharp coughs, hoarsenesses, and other disorders of the breast, arising from an acrid lymph; as also in the stranguary, and ulcers of the kidneys; it is also of use to abate the heat of the mouth, and tongue, and to heal the painful chaps of the nipples. It is best taken dissolved in some convenient water, and the dose is from half a scruple to two drachms. It is never used externally, but serves the apothecaries for making troches.

MANNA, *Manna*, is a sort of gum, which flows spontaneously from several sorts of trees, and afterwards congeals into grumes in the form of an essential oleous salt; it not only proceeds from the ash and quicken-tree, but also from the larix, pine, fir, oak, juniper, maple, olive, fig-tree, and other plants; for which reason it differs in form and consistence, according to the place and tree from whence it was gathered; for some is liquid, and of the consistence of honey, and another sort is concreted into grains like mastich, and another again into grumes or small masses. *Manna* is also divided into the Oriental and European, the first of which is brought from India, Persia, and Arabia.

MANNA CALABRA, *Calabrian Manna*, is sometimes in grains, sometimes in tears, and sometimes in grumes or small masses; it is brittle and whitish while fresh, and somewhat transparent; but in time grows reddish, and in moist weather turns to the consistence of honey; it is as sweet as sugar, with a kind of an acidity. That is best which is white or yellowish, light and concreted into grains or grumes in the shape of icicles; but that which is fat, like honey, or blackish and dirty, is not good; for sometimes this is counterfeited with coarse sugar, honey, and a little scammony; likewise that which is white, opaque, solid, heavy, and not in the shape of icicles, is bad, because it is nothing but sugar and manna boiled together. This counterfeit sort may easily be distinguished from the true by its density, weight, opacity, and taste. This manna in Calabria and Sicily flows spontaneously from two sorts of ash-trees, and is found on the boughs and leaves in the summer months, unless prevented by rain. When the weather is dry, it flows from the trunk and large boughs of these trees, from the twentieth of June to the end of July, and from noon till evening, in the form of a limpid fluid, which concretes into various grumes, and grows white and dry. They gather it the next day, scraping it off with wooden knives, if the weather is fair; but if it should chance to rain, the manna is lost. When July is past, they make incisions into the bark of the ash and quicken-trees, and from noon till evening a liquid flows out, which concretes into thicker grumes, which are sometimes very large, and require a day or two to bring it to a proper consistence; this is redder than the former, and is sometimes blackish, on account of the earth and other filth mixed therewith.

MANNA DI FRONDE flows spontaneously in July and August, from about the nervous fibres of the leaves, which being dried in the air concrete into whitish grains of the size of wheat; inasmuch that in August the greater leaves of the ash-tree look white, as if they were covered with snow; however, this is very scarce, on account of the difficulty of gathering it. The virtue of manna is well known, it being a mild laxative purge, and is thought to dissolve gross humours, and to abate their acrimony; whence it is good in catarrhs and coughs, proceeding from an acrid phlegm. It is also good in disorders of the breast and lungs, when stuffed with clammy humours. It is also useful in the pleurisy, inflammation of the lungs, and tension of the belly, from a thick hot bile. The dose is from one ounce to three, and Hoffman, in some particular cases, has given to four.

NATURAL HISTORY of GUM RESINS.

AMMONIACUM, *Gum Ammoniac*, is a concreted juice, of a middle nature between a gum and a resin; it is composed of little lumps, or masses, shining here and there with bits that are milk white, or reddish; but the substance itself is a little brownish, and not unlike benjamin; but it is sometimes in tears. It is sometimes yellowish on the outside, and of a yellowish white within; the taste is sweetish at first, but afterwards bitterish, and the smell is fragrant, not unlike that of galbanum, but stronger. When chewed, it grows whiter and whiter by degrees, and when thrown upon burning coals, it will flame; it will dissolve in vinegar or hot water, and is brought from Alexandria in Egypt. The tears are best for internal use, especially when pure, dry, and without mixture. Ammoniac incises gross humours, and is good in the asthma, in crude tubercles of the lungs, and is in general a great aperient. The dose is from half a scruple to a drachm, in the form of an emulsion, electuary, bolus, or pills. Outwardly it is discutient, and is of great use in ripening tumours.

ASSA-FŒTIDA is a kind of gum resin, and is of the consistence of wax; it is frequently bought in large masses, full of shining, whitish, yellowish, reddish, flesh-coloured, or violet spots. It has a very strong smell, somewhat like garlick, and has a bitter, biting, acrid taste. It is brought from Persia, and the East-Indies, and that is best which has the strongest smell, and seems to be composed of tears reduced into masses. It proceeds from the wounded root of a tree, but never from any other part, and at first it is as fluid as cream, and of the same colour; but being exposed to the air and sun, it becomes brownish and thick. It is prescribed in the flatulent cholic, hysterical disorders, and for promoting secretions. It is diaphoretic, and promotes sweat; it is good in disorders of the nerves, and is of some use in a palsy. The dose is from twelve grains to a drachm, and even to two drachms.

BDELLIUM, *Bdellium*, is a gum resin, which is brought to us in masses of several shapes and sizes, and has somewhat of the appearance of myrrh, it being of a rusty reddish colour; but in the inside it is a little transparent. It is brittle, of a bitterish taste, and has no disagreeable smell when kindled; it will flame for a considerable time, with a sort of a crackling noise. It is a good emollient, and is effectual in dispersing tumours of the glands.

EUPHORBIIUM, *Euphorbium*, is a resinous gum, and is brought to us in drops, or tears, of a pale yellowish, or gold colour; are bright, and of different shapes and sizes, with a most acrid, burning, nauseous taste; but without smell. It is brought from the inland parts of Africa to Sallee, from whence it is transported into Europe. It is a most violent and dangerous purge, and often produces fainting and cold sweats; for which reason various methods have been used to correct it, which are not worth mentioning, because in whatever manner it is given it is never safe.

GALBANUM, *Galbanum*, is a fat substance, as ductile as wax, and is shining and semi-transparent, it being of a middle nature between a gum and a resin. It is of a whitish colour while fresh, but afterwards grows yellowish or reddish. It has a bitter acrid taste, with a strong smell. That is best which is fresh, fat, pure, and moderately viscous. When taken inwardly, its virtues are not unlike gum ammoniac, but weaker; however, it dissolves thick phlegm, for which reason it is good in an asthma, and old cough; it discusses wind, is good in the cholic, and opens obstructions of the womb. Externally, it softens and ripens swellings, for which reason it is mixed in various plasters; being applied

to the navel, it mitigates hysterical disorders, and spasmodic motions of the intestines. The dose is from one scruple to two.

MYRRHA, *Myrrh*, is a gum resin, brought to us in grains or masses of various sizes, some of which are as big as a hazel-nut, and some as large as a walnut; the colour is yellow, or rather of a rusty red, and semi-transparent. The taste is bitter, sub-acrid, and aromatic, but nauseous, with a strong smell, which strikes the nose when it is pounded or burnt. The best is brittle, light, of the same colour, bitter, acrid, and of a pretty strong smell. It strengthens the stomach, helps digestion, discusses wind, and is good in all cold cachectic diseases, catarrhs, and all sorts of ulcers. It is given in substance in the form of a bolus, or pills, from half a scruple to half a drachm. Externally it attenuates, discusses, and is an excellent vulnerary; it cleanses old ulcers, preserves them from putrefaction, and cures the caries of the bones. It is bad in all sorts of hæmorrhages, as well as in spitting of blood, and ought not to be given to women with child, except with great caution. The tincture of myrrh is most in use, and is given from five drops to half a drachm. When outwardly applied, it often prevents gangrenes and mortifications; and that, which is improperly called the oil of myrrh, is good against freckles and pimples on the face.

OPOPANAX, *Opopanax*, is a gummy and resinous juice, concreted into grains about the size of a pea, which are reddish without, and within of a whitish yellow; the taste is intensely bitter and acrid, and the smell is strong. The best is in shining, fat, brittle tears, of a saffron colour without, and whitish or yellowish within; it is brought from the East-Indies, but we know not from what plant. It takes fire like resin, and dissolves in water, where it turns it of a milky colour. It incises gross viscid humours, discusses wind, and loosens the belly; it is good in hypocondriacal disorders, obstructions of the viscera, and is an ingredient in the gummy pills of the shops. The dose is from a scruple to a drachm.

SAGAPENUM, *Sagapenum*, is a juice between a gum and a resin, and is sometimes brought in grains, but more frequently in larger masses, which are reddish on the outside, and within are of the colour of horn; it has a biting acrid taste, with a strong smell, and seems to be of a middle nature between assa-fœtida and galbanum. It will flame when held to a candle, and will dissolve entirely in wine vinegar and hot water. That is best which is transparent, reddish without, and within full of whitish or yellowish specks, and which grows soft when handled. It is good in disorders of the breast, arising from a gross phlegm; as also in hard callous swellings, especially of the nervous parts. The dose is from a scruple to half a drachm.

SARCOCOLLA, *Sarcocolla*, is a gummy juice, and somewhat resinous; it consists of small whitish grains, or of a whitish red, that are spongy, brittle, and now and then mixed with shining specks; the taste is subacrid and bitter, with a disagreeable nauseous sweetness. It softens between the teeth, and when held to a candle it first bubbles, but afterwards breaks out into a clear flame, and yet it dissolves in water. It is brought from Persia and Arabia.

NATURAL HISTORY of JUICES extracted by ART from PLANTS.

ALOE, *vel SUCCUS ALOES*, *Alocs*, is of three sorts, the *Succotrine*, the *Hepatic*, and the *Caballine*. The first is brought from the island of Succotora, near Arabia, and is the best and purest

purest of them all; it is of a reddish or saffron colour, and when broken is shining, and, as it were, transparent; the taste is bitter, astringent, and somewhat aromatic, with a strong, but not disagreeable smell. The *Hepatic* is dense, dry, opaque, and of the colour of liver, with a strong smell and taste. *Caballine*, or *Horse Aloes*, is the worst of all, and is heavy, dense, black, and full of sand; it has an exceeding bitter nauseous taste, and a very strong disagreeable smell. The best *Succotrine Aloes* is shining, transparent, fat, and brittle in the winter, but in the summer a little softer, and is of a yellowish or purple reddish colour, but when powdered is of a shining gold colour, with an aromatic bitter taste, and a strong aromatic smell, almost like myrrh. *Succotrine Aloes* is the best for internal uses, and the *Hepatic* for external, but the *Caballine* is only for horses. Aloes in general is not only a purge, but is a remedy against disorders of the bile; but if it be given in too large a dose, or too often, it is apt to create hæmorrhages, and particularly the piles. Aloes has this peculiar property, that a few grains of it will loosen the body as much as a scruple. Some give it from one scruple to two scruples in substance; but the most common way of taking of it is in tinctura sacra.

SCAMMONIUM, *Scammony*, is a concrete resinous and gummous juice, and is a noted purge. There are two sorts, one of which is brought from Aleppo, and the other from Smyrna; the first is light, spongy, brittle, and of a blackish ash colour, shining when broken; when it is pounded it turns to a whitish or ash coloured powder; it has a bitterish acrimonious taste, and a very strong smell. *Smyrna Scammony* is more dense and heavy, and of a black colour. However, that *Scammony* is best, which will readily break and powder, and bites, or burns the tongue very little, but when mixed with spittle turns whitish like milk. The black, heavy, and impure, is bad. All strong purges are in some sense or other dangerous, and this in particular is not without its bad effects; for sometimes it purges too violently, and at other times not at all; it is sometimes attended with sickness, and produces wind, as well as occasions thirst and a fever. Therefore the best way is to grind it with sugar, so as to divide its resinous particles, and then it may be given safely to ten or twelve grains.

GUMMI GUTTA, *Gumboge*, is a concreted juice, partly of a resinous, and partly of a gummous nature; it is inflammable, dense, dry, hard, shining, opaque, and of a yellowish saffron colour; it is brought over in pieces of various sizes, and has very little or no taste. It will dissolve both in wine and water, in which last it will turn a little milky, and yet tinge any thing with yellow. When held to the candle it will flame, and emit a copious smoke. It is reckoned among the violent purges, and brings away ferous humours, as well upwards as downwards, and that speedily, though it will not gripe. It is frequently used in the dropsy, cachexy, jaundice, catarrhs, and other chronic disorders. It has been given from two to fifteen grains, and from two to four grains it will not vomit, but from four to eight grains it will both vomit and purge without violence, especially if plenty of water gruel be drank after it. The best way is to give it either in a bolus or pills; however, it should be used with caution, especially because vomiting will not suit with some patients.

OPIUM, *Opium*, is a concreted resinous and gummous juice, which is heavy, dense, clammy, inflammable, and of a blackish colour. It has a strong soporiferous smell, with an acrid bitter taste, and is usually brought over in roundish cakes about an inch thick, and weighing from half a pound to a pound, which are wrapped up in poppy leaves. It is

brought from Natolia, Egypt, and the East Indies. Authors differ greatly about the effects of Opium; however, it is certain that in a proper dose it will generally procure sleep, and ease pain; we say generally, because it will keep some waking, and prevent sleep; though at the same time it will ease their pains. Too large a dose, that is a few grains, will not only produce sleep, but blunt all the senses, hinder breathing, and prevent the patient from ever waking again. It is doubtless a most useful remedy, and will stop the process of many diseases; but then it is palliative only, and never cures any. It is exceeding hurtful to the weak, and should never be given where the motions of the patient are languid; likewise in some cholics it has often produced paralytic disorders; for which reason it should never be given to infants, and persons weakened with age. When exhibited in a proper dose, it excites an agreeable sensation, and inclines to mirth, like a moderate quantity of wine; for which reason the Turks always take large doses of it when they are going to engage in a battle. It stops all sensible evacuations for a time, except sweating, and enlarges the pulse. When too large a dose has been taken, it will be best to bleed and vomit, if the strength will permit; and then acids must be given, as vinegar, and the juice of lemons, or spirits of vitriol, properly diluted. Some cases will require strong sneezing powders, and blisters or sinapisms applied to the soles of the feet and nape of the neck, with painful frictions, scarifications, or burnings. The dose is generally a grain, but in some cases two may be given.

ACACIA VERA, *True Acacia*, is an inspissated gummous juice, brown or blackish without, and reddish or yellowish within; it is of a hard firm consistence, of an austere astringent taste, and is brought over in round masses, weighing from four to eight ounces. It is brought from Egypt. It is said to strengthen the stomach, stop vomiting and looseness, as well as some sorts of hæmorrhages, by abating the acrimony of the humours, and strengthening the solid parts. The dose is from half a drachm to a drachm, in some convenient liquor.

CATECHU, improperly called Japan earth, is a gummy, resinous, inspissated juice, of a reddish black without, and a brownish red within, with an astringent bitterish taste, but no smell. There are two sorts, whereof one is better than the other, and melts more readily in the mouth. It is brought from the East Indies, is a moderate astringent, strengthens the gums, and is good in small ulcers of the mouth, as also in coughs and hoarseness. It strengthens the stomach, helps digestion, and is good in loosenesses. The dose is from half a scruple to a drachm.

SACCHARUM, *Sugar*, is of several sorts, which are so well known to every one that they need no description. Some are great enemies to Sugar, and affirm, it produces we know not what bad effects; but as those who have used it very freely, have never received any damage from it, we may conclude it to be entirely harmless. Compositions of Sugar are allowed on all hands to be good in disorders of the breast, and that, mixed with oil and sweet almonds; it is good in coughs, hoarseness, and the like. Externally, Sugar is a very great vulnerary, especially when mixed with a little brandy, for then it will heal wounds, cleanse ulcers, and prevent putrefaction.

TARTARUS, or **TARTARUM**, *Tartar*, is a saline hard substance, of an acrid and subaustere taste, which adheres to the bottoms and sides of wine vessels, from whence it is scraped off. It is of two sorts, the white and the red, both of which proceed from wines, of the same colours. The best Tartar is heavy, hard, with that part next to the

wine rising into chryftalline points, but when broken appears like sponge, or pumice stone, it being porous and mixed with earth, though it is a hard shining substance.

Tartar unprepared is seldom or never used internally; but is taken when purged, and then it is called cream or crystals of tartar; and is good to temperate the heat of the bile, and to quench thirst in burning fevers. It attenuates gross humours, opens obstructions of the viscera, and is good in cachectic and hypocondriac disorders. It is a laxative, and is often mixed with milder purges with success. When given from half a drachm to two drachms it is an aperient only, but from half an ounce to an ounce it is a purge. Cream of tartar will not dissolve in cold water, but it will in hot.

Salt of Tartar, which is procured by calcining tartar in an open fire, is a fixed alkali, and somewhat of a caustic quality. It serves for many chemical operations, and especially to extract the resinous and sulphureous parts of medicine in making of tinctures. When given alone, dissolved in a sufficient quantity of water, the dose is from twelve grains to half a drachm; it will attenuate gross humours, and cure the heart-burn proceeding from acids in the stomach. Among the medicines that are usually procured from tartar, are soluble tartar, vitriolated tartar, and emetic tartar.

NATURAL HISTORY of TUBERA, FUNGI, and Substances that adhere to certain VEGETABLES.

TUBERA CERVINA, or **BOLETUS CERVINUM**, *Deers Balls*, is a tuberose fungus, without a root, and is of a dusky yellow, with a hard, thick, and granulated rind; but the inside is of a purplish white. It is of the size of a walnut, though sometimes of that of a hazel nut, or less; and it is divided into cells that are soft and downy, in which are exceeding small seeds, lying together in a mass, and connected with filaments; when this substance has lost its seeds, it is then contracted into a small round ball. The smell and taste when fresh are rank, but when dry and laid up for some time, they become almost insipid. They are of little use;

C H A P. II.

Containing the NATURAL HISTORY of INDIGENOUS HERBS, PLANTS, SHRUBS, and TREES, and their various uses in Medicine.

INDIGENOUS plants are those which are produced in our climate, some of which have been, or are, used in medicine; while others are quite useless, at least as far as is hitherto known; and therefore they may be passed over in silence. In giving an account of them, we shall observe an alphabetical order, that each of them may be more readily found.

ABROTANUM MAS, *Southernwood*, of which there are two kinds of use in medicine, one of which is called the male, and the other the female; but the first of these is properly the Southernwood. In its characteristics it is much the same as wormwood, and its root is woody, with a few fibres proceeding from it. It has many branches, which sometimes rise to the height of four cubits; though they are generally much lower; they are hard, brittle, and full of a white pith, somewhat of a reddish colour, and are streaked and branched. It has many leaves, somewhat broader than those of fennel; and

for they are never eaten, nor have they any remarkable qualities to recommend them for physical purposes, whatever authors have said to the contrary.

AURICULA JUDÆ, or **FUNGUS SAMBUCINUS**, *Jews-ear*, is a membranaceous fungus, in the shape of an ear, from whence it has its name. It is a spongy substance, growing at the bottom of old alder trees, and is light, coriaceous, and membranaceous; it is ash coloured beneath, and blackish on the top, and the taste is earthy and flat, but it has no smell; it has little or no pedicle, but sticks close to the body of the tree. It is said to be astringent and drying, but is seldom or never taken inwardly.

AGARICUS, or **FUNGUS LARICIS**, *Agaric*, is a fungous substance, of a roundish, angular, unequal shape, and of different sizes, from the bigness of a man's fist to that of his head. It is very light, as white as snow, and may be readily rubbed into meal between the fingers; but it has a few fibres, and a callous ash coloured reddish rind, whose lower part is perforated by exceeding small seeds that lodge in the holes; the taste is at first sweetish, then bitter, acrid, and nauseous, with a slight astringency. It grows to the trunk of the larch tree, and is seldom or never found on the boughs. The best is white, light, and brittle. It goes under the denomination of a purge, though some deny it has any such quality, and is at best a useless medicine.

AGARICUS PEDIS EQUINI FACIE, *Touchwood*, or *Spunk*, grows to the ash and other trees; but that is supposed to be the best that grows to old oaks that have been lopped, and which has been gathered in August and September. This has of late been mightily cried up for stopping of blood upon the amputation of a limb, without making any ligature; but it has had the fate of many new discoveries, and is now almost entirely laid aside; though it might doubtless be of use in many cases. The inward part is best which feels to the touch like buff, which must be taken out, and beaten a little till it may be easily teased between the fingers. This being done, so much of it must be applied to the wound as will somewhat more than cover it, and over this a broader piece must be laid with proper bandages.

those below are divided into several parts, but those above have only one or two segments. They are of a hoary colour, with a strong agreeable smell, and a bitterish taste. The flowers on the sides of the branches are like those of wormwood; and consist of many small blossoms that are tubulated and divided at the top into five parts, in each of which there is a single seed, and they are all comprehended in a scaly cup. It is cultivated in gardens, by slips or cuttings, planted in the beginning of April on a bed of light fresh earth, observing to water them two or three times a week, till they have taken root. These leaves are often used in fomentations,

ARBOTANUM FOEMINA, by some called *Santolina*, and *Chamaecyparissus*, *Lavender Cotton*, has a thick, hard, woody root, from which there proceed branches above a cubit in height, which are woody, slender, covered with a hairy down, and divided into several branches, round which there are slender leaves about an inch in length, a little denticulated,

culated, or rather beset with small tubercles. They are all of a hoary colour, and of a physical smell, with somewhat of a sweetness; the taste is partly acrid, and partly of an aromatic bitter. On the top of each branch there is a yellow flower, consisting of several tubulous florets, divided at the top into five parts, with imbricated intermediate leaves, and contained in a common scaly cup. The cup of each floret, or embryo, turns into a streaked oblong brown seed, not at all furnished with down. These flowers are larger than those of southernwood, by which it may be distinguished from it, as well as by the whole appearance of the plant. This plant is cultivated in gardens, and may be propagated by planting slips or cuttings during the spring, which should be put into a border of light fresh earth, and watered and shaded in hot dry weather, until they have taken root. It is of little use in medicine, except in fomentations.

ABSINTHIUM VULGARE, *common Wormwood*, has a lignous and fibrous root, with stalks of an indeterminate height, branched out into many small shoots, with hoary leaves of a bitter taste, and furnished with spikes of naked flowers, hanging downwards, which are placed in long rows towards the top. They are composed of many tubulous florets, divided into five parts at the top, and are of a yellow colour; they are all contained in a common scaly cup, in each of which there is an embryo, which turns into a naked seed. It differs from other sorts of wormwood, in having larger leaves and more jagged. It is very common in all parts of England by the sides of high roads and in dung-hills. It is planted in gardens for common use, and may be propagated by slips in March and October; or it may be raised from seeds, which may be sown soon after they are ripe. Wormwood has always been looked upon as a valuable medicine, to promote the heat and circulation of the blood, and to recover the oscillation of the fibres while sluggish; by which means the gross humours are attenuated, and brought back into the common road of circulation. It restores the debilitated functions of the viscera, and is an excellent stomachic. It is good in the dropsy, green sickness, cachexies, and agues; which last it has often been known to cure. It also by its great bitterness is of some service against worms, by resolving the mucilaginous humours in which their eggs are contained; however, in all hot diseases and in inflammatory dispositions it is not safe.

ABSINTHIUM MARITIMUM, *Sea Wormwood*, has leaves much smaller than the common; they are hoary on the upper side as well as the lower, and the stalks are also hoary all over. It grows wild about salt marshes and near the sea coasts. The virtues are much the same as those of the former.

ABSINTHIUM ROMANUM, *Roman Wormwood*, differs much in appearance from the former. It has a great number of small and woody roots full of fibres, and the stalks are about a cubit in height, which are round, smooth, greenish, or of a reddish green or purplish colour. They are full of leaves from the top to the bottom, which have much the same appearance as those of southernwood, only they are shorter. The flowers are much like those of common wormwood, but less. It is cultivated in gardens, and may be easily raised by the planting and cutting of slips in the spring or autumn. The roots of this plant creep so much, that they will soon spread over a large piece of ground. It is not so bitter as the common wormwood, but is more aromatic; for which reason it is more agreeable to the taste. It has the same virtues as the common wormwood, but weaker.

ACANTHUS, BRANK-URSINE, has a thick fleshy root, black without, and white within, from

whence proceed great numbers of fibres. The leaves that lie on the ground are a cubit in length, and a span in breadth; but the stalks rise to two cubits high, are strong, and adorned with a long row of flowers elegantly disposed like a thyrsis. The leaves are somewhat like those of a thistle, and after them the Romans adorned the capitals of the Corinthian order of columns; that is, with the shape of these leaves; they were likewise imitated by embroiderers, in the time of Virgil. The flowers are labiated, and are of a sort of a flesh colour; the under lip of the flower is divided into three segments, which at the beginning is curled up in the form of a short tube. There is no upper lip, but in its place there are stamina that support the pointals, and the cup of the flower is composed of prickly leaves; the upper part of which is bent over like an arch, and supplies the defect of the upper lip of the flower. The pistil arises from the hinder part of the flower, and turns to a fruit in the shape of an acorn, which is divided into two cells, each containing a single smooth seed. The whole plant is full of a glutinous and mucilaginous juice. It grows spontaneously in Sicily and Italy; but is here cultivated in gardens, and is easily propagated by parting the roots in February or March, or by sowing the seeds at that time. It is seldom used in medicine.

ACETOSA, *common Sorrel*, has a long, fibrous, yellowish, bitter root, and leaves placed alternately on the stalk, in the shape of a spade. The stalk is streaked a foot in length, and is divided into several branches. The impalement of the flower is composed of three small leaves that are bended back, and the flower has three leaves, which are larger than those of the impalement. In the center of the flower is a three cornered pointal, or pistil, supporting three small styles, which are attended with six stamina. It afterwards becomes a triangular seed, inclosed by the petals of the flower; in short, it agrees with the dock in all its characters, except in having an acid taste. It is but a small plant in the fields, but in the gardens it produces large leaves. It must be sown early in the spring, in a shady moist border; and if it be afterwards planted out into another shady border, it will produce still larger leaves, and continue longer. The medicinal virtues are to cool and quench thirst, and their decoction makes a useful drink in fevers. It is also an excellent antiscorbutic.

ACETOSA ROTUNDIFOLIA, *round leaved or French Sorrel*, has the same characters as the former excepting the leaves, which are now and then almost round. This is the best sort for the kitchen use, for which reason it is often planted in gardens. The roots are very apt to spread, by which means it is easily propagated, and must be planted at larger distances, that is, a foot square at least. It is a cooler like the former; and quenches thirst as well as excites an appetite.

ADIANTHUM VERUM, *the true or French Maiden-hair*, is a capillary plant, and has a fleshy fibrous root, from whence arise slender, black, shining, branched pedicles, above a palm in height, which sustain leaves placed alternately, that are about a quarter of an inch broad, and somewhat shorter; they are green, crested, smooth, and streaked as it were with rays, and are like those of coriander. It seems to be without seeds; however, in September, certain notches appear in the leaves, which adhere to each other, and contain a fruit or round membranaceous capsula, which is very small and surrounded with an elastick ring, which by its contraction opens the capsula, which then emits a seed like dust, that is too small to be examined by the naked eye. It grows spontaneously in the northern parts of France, and continues green all the year. This herb was formerly celebrated for its pectoral virtues,

virtues, but is now greatly neglected. A syrup is made of this herb, which is sold in the coffee-houses, and called Capilaire; but it is generally supposed to be counterfeit.

AGNUS CASTUS, *the Chaste-tree*, is a shrub full of branches, so tough that they are not easily to be broken. The leaves are joined to a pedicle an inch or two long, and divided into five particular leaves, of an oblong shape, and sharp at both ends. The flowers grow in spikes, and are of a purple, or purple and white colour. They consist of one leaf, which looks as if it had two lips, and the fore part is tubulous. From each calyx arises a pointal, or pistil, which is fixed on the back part of the flower like a nail, and afterwards turns to an almost spherical fruit like pepper, divided into four cells, containing oblong seeds. It is cultivated in gardens, is very hardy, and may be propagated by planting the cuttings early in the spring, before they shoot. They require a fresh light soil, and must be frequently watered till they have taken root. They will grow to eight or ten feet high, and flower in autumn; the flowers grow in spikes at the extremity of every strong shoot. This shrub is acknowledged to be good in hysterical complaints, and in hypocondriacal spasms, especially if they proceed from gross viscid humours. The seed, in powder, is given from half a drachm to a drachm, or in an emulsion.

AGRIMONIA, *Agrimony*, has a blackish, thick, fibrous root, and a hairy branched stalk, two cubits high, with leaves above a palm in length, alternately placed, which are rough, hairy, pennated and grow alternately on the branches. The calyx, or flower-cup, consists of one leaf, which is divided into five segments, and the flowers, which have five or six leaves, form a long spike, which expand in the form of a rose, and are of a yellow colour. The fruit is oblong, dry, and prickly like a burdock, and in each there are two kernels. It is common in the hedges in many parts of England, and is noted for its astringent quality. It is said to be good in the cachexy, dropsy, jaundice, and in fevers arising from the obstructions of the viscera. It is also good in ulcers of the kidneys. The dose of the dried leaves is a drachm in a proper vehicle.

ALCEA, *Vervein Mallows*, have a woody whitish root, from whence proceed several stalks to the height of a cubit, which are round, full of pith, and thinly beset with longish hair. The leaves that proceed from the root and lower part of the stalks are roundish, with incisures on the edges; but those that grow near the top, and placed alternately, are remarkably jagged, and of a blackish green colour and hairy, particularly on the lower part. The flowers are like those of mallows, and of a purplish flesh colour, though they are sometimes white; they are succeeded by seeds, which are black when ripe, are shaped like those of mallows, and have the same faculties as that plant.

ALCHIMILLA, *Ladies Mantle*, has a root as thick as one's little finger, and is fibrous and black; from whence arise long pedicles, a palm and a half in length, which are hairy, and each sustain a single leaf, nearly like that of mallows, but more hard and crisp, and divided into eight or nine acute angles. The cup of the flower is divided into eight segments, which are expanded in the form of a star; the flowers are collected into bunches on the top of the stalk, which consist of several stamina with yellowish heads. The calyx becomes a capsula, containing generally two little round yellow seeds. It delights in mountainous places, such as the Alps and Pyrenees. It also grows wild in some parts of England. This plant is seldom made use of in medicine.

ALKEKENGI, *the Winter Cherry*, has a genicu-

lated root beset with small fibres, from whence arise reddish hairy branched stalks, a cubit in height, from the knots of which arise two leaves with long pedicles. The leaves are like those of garden nightshade, and the flowers consist of one leaf, expanded at the top, and of a whitish colour, but of a pentagonal figure. The fruit, which is about the size of a cherry, is inclosed in the flower cup, and swells over it in the form of a bladder. The fruit is only in use, and is good to promote urine, as well as to cleanse the kidneys and bladder. From three to eight of these cherries may be taken as a dose, and are said to have had a very good effect in preventing the gout, when eight of them were taken every change of the moon. It is very common in English gardens, and the fruit, which is ripe in October, often continues till the beginning of December. It is of the size of a common cherry, and of a fine red colour; the bladder that incloses it is of a deep red, which bursts when ripe, and exposes the fruit to sight. It may be propagated by sowing the seeds in the spring, or by the roots, which creep very much, so as to overspread a large tract of ground; and therefore they should be placed in pots, and set in a shady place in summer. If well watered in dry weather, it produces great numbers of cherries.

ALLIUM, *Garlick*, has a bulbous root, consisting of several membranes, and is of a whitish colour, with a purplish cast. The leaves are oblong, and not fistulous as in onions, but like grass, and the flowers consist of six whitish leaves, with a pistil in the middle, which turns into a roundish fruit of the size of a pea, and of a purplish colour without, but the pulp within is whitish. It is divided into three cells, full of roundish and blackish seeds. Garlick is proper to warm and stimulate the solids, and to dissolve the gross clammy fluids, whence it is good in cold constitutions, and in moist asthmas, as well as all defluxions on the breast. It has been found very serviceable in the dropsy, for it will sometimes cure it without any other medicine. It may be given alone, in a decoction, or made into a syrup; but it must be avoided in all inflammatory dispositions and hot diseases. It may be easily propagated in gardens, by planting the cloves, or small bulbs, in August or September, about four or five inches from each other. In the middle of June the leaves should be tied in knots, to prevent their running to seed, and then the bulb will be greatly enlarged. Towards the end of July, the leaves will begin to wither, and then the root should be taken out of the ground, and hanged up in a dry room.

ALNUS, *the Alder-tree*, is strait and upright, and of a moderate thickness, with a rough, brittle, blackish bark. The wood is reddish, soft, light, easily worked, and the boughs are very brittle. The leaves resemble those of the hazle, and the male flowers, or catkins, are produced at remote distances from the fruit, which is scaly, conical, and of the size of a hazle-nut. The bark, catkins, and fruit, are astringent, and the decoction has been prescribed in inflammations of the tonsils, as a gargle. Some recommend the bark in intermitting fevers.

ALTHÆA, *Marsh-mallows*, has a great number of white roots, about as thick as a finger, which all proceed from one head. The stalks are a cubit or two in height, and are slender, round, villous, and beset with leaves alternately, which are roundish, but sharp at the end, hoary, and beset with a soft down; they are about three inches long, and are sinuous and ferrated. The flowers come out between the pedicles of the leaves and the stalk, and are of a pale reddish colour. They are monopetalous, but divided into five segments, almost to the center, in which is a pyramidal tubulou style, loaded with stamina; and in the cavity there is a pistil, which turns

turns into a round flat fruit, consisting of several capsula, disposed like a ring about the cake in the middle. Marsh-mallows is very much in use to abate the acrimony of the urine; in disorders of the lungs, to thicken a sharp salt defluxion; and consequently is good in hoarsenesses, coughs, catarrhs, and the asthma. It is likewise good in erosions of the intestines, its decoction being drank, or given in clifters. It is also good for softening hard tumours, and easing pain. The leaves are much preferable to the roots. Syrup of marsh-mallows is a medicine commonly known, and is often prescribed to render the urinary passages slippery to those who are troubled with the gravel.

AMYGDALUS, *the Almond-tree*, has strong branched roots, with a rough trunk, and leaves like those of the peach tree, which are sharp at the ends, and crenated on the edges. The flowers are rosaceous, consisting of five petals, of a whitish, or light purplish colour; the calyx is single, but divided into five segments, with a pistil that turns to a fruit an inch in length, which is long and flat. The outer coat is thin and pretty dry when ripe, under which is a shell that is not so rugged as that of the peach. As for the almonds themselves, they are too well known to need a description. When they are bruised, they yield a large quantity of limpid oil, and when made into an emulsion with water, have a sweet pleasant taste, but if it be kept long it will turn sour like milk. Sweet almonds, when fresh, are nourishing, but they should be well chewed before they are swallowed. In all medicinal uses they should be blanched, that is, the outer skin should be taken off. The emulsion of sweet almonds is prescribed in burning fevers, too great watchfulness, heat of urine, and inflammations of the kidneys and bladder, as well as in all cases where the acrimony of the humours is to be corrected. It is given from one to four, and in some cases to eight ounces, and should be repeated every third or fourth hour. When children are griped, it should be given by spoonfuls, mixed with syrup of marsh-mallows.

AMYGDALUS AMARA, *the bitter Almond tree*, agrees with the former in all respects, except the bitterness of the fruit. They have been found to be poisonous when given to dogs and some other animals, but they may be eaten by men without any damage. The oil that is expressed from bitter almonds differs in little or nothing from the former, and may be used in the same cases; as also for softening the wax in the ears, when put therein with a bit of cotton wool. Almond trees are chiefly valued for the beauty of their flowers, which are produced early in the spring, and make a fine appearance. They are propagated by inoculating one of their buds into a plum, almond, or peach stock, the latter end of July. The best season for transplanting these trees into a dry ground, is when the leaves begin to decay; but for a wet soil, in February.

ANAGALLIS MAS, *male Pimpernel*, has a white single root, with a few fibres, and the stalks are so weak that they lie upon the ground; they are of the length of a palm, are square and smooth, and the leaves are placed by pairs, and sometimes three at a time opposite to each other; but they have no pedicles. The lower surface is spotted with blackish red spots; and the flower consists of one leaf, shaped like a wheel, and divided into five sharp segments, which are of a purplish red, with purple stamina, on which are yellow heads. The flower cup is also divided into five parts, from which a pistil arises, fixed in the middle of the flower like a nail, and turns to a fruit, or globous shell, which when ripe opens transversely into two parts, one of which lies upon the other, and incloses many angular wrinkled seeds. This is one of those called the sleeping

plants, whose flowers open about eight o'clock in the morning, and never close till past noon.

ANAGALLIS FEMINA, *female Pimpernel*, differs only from the former in the colour of the flower, which is blue, and being common in our corn fields; but this is more scarce. The male pimpernel is used as a salad and a pot-herb in many parts of England.

ANETHUM, *Dill*, has a slender white fibrous root, with a branched stalk, a cubit and a half in length; the leaves are like those of fennel, but less, and of a bluish colour, with a strong smell. The flowers are placed at the top of the stalks in umbels, and are rosaceous, consisting of five yellow petals, whose calyx or flower cup is changed into two palish yellow seeds, which are oval, flat, streaked, and have a foliaceous border. It is propagated from the seeds, which should be sown in autumn, soon after they are ripe, and thrive best in a light soil, where they are to remain, for they will not bear a removal. The seeds are only in use, and they have been commended in the flatulent cholic, and against wind. The essential oil is a carminative, and is given from two to four drops on a lump of sugar.

ANISUM VULGARE, *Anise*, has a slender annual fibrous white root, with pleasant green leaves, above an inch in length, which are divided into three parts, or particular leaves, which are smooth and crenated. On the upper part there are many divisions, and the stalk is ramous, streaked, hollow, and sustains flowers disposed in an umbel, which are small, rosaceous, and consist of five cloven white petals, with the flower cup, that turns into an oblong turbinated fruit, in which are two small gibbous streaked seeds, of a greenish ash colour. The taste and smell are sweet and very agreeable. The seed is only in use, which contains a great deal of essential oil. It is numbered among the four hot seeds, and is recommended for the helping of digestion, in the wind, cholic, and in shortness of breath. It is good for gripes in children, and to increase milk in the breasts of nurses. The dose, in powder, is from a scruple to a drachm, and that of the essential oil, from two drops to twenty.

ANONIS *five* ONONIS, *Rest Harrow*, has roots above a foot long, which creep every way, and are not easily broken. The stalks lie on the ground, and are slender, tough, reddish, hairy, and full of prickles; they are beset with leaves, placed three together alternately, and are roundish, slightly crenated, hairy, of a dark green colour, and glutinous to the touch. The flowers are papilionaceous, of a light purple, or flesh colour, and grow in spikes at the top of the branches. The pistil is near a quarter of an inch long, and consists of one bivalved flat capsula, containing a single seed in the shape of a kidney. It is said to open obstructions of the liver, and to cure the jaundice; but it is now out of use.

APARINE, *Goose-grass*, or *Clivers*, has a slender fibrous root, with slender, quadrangular, geniculated, rough, climbing stalks, three or four cubits long. At every genicula, or knee, there are from five to seven leaves placed like a star, which are narrow, rough and terminate in prickles. The flowers proceed from the knees towards the top, and are very small, white, monopetalous, in the shape of bells, and divided into four segments, as well as the flower cup, which turns into a dry, hard, cartilaginous fruit, covered with a thin blackish skin, and consist of two globes full of umbilicated seeds. It is met with almost every where in hedges. It is inciding and aperient, and not only promotes urine but sweat. Two ounces of the juice have been found to be very serviceable in the dropsy, carrying off the water by urine.

APIUM PALUSTRE, *Smallage*, has a thick, whitish stait root, descending deep into the ground, and is sometimes deeply divided into different heads; it has an acrid, bitter, disagreeable taste, with a strong aromatic smell; from the root proceed many leaves standing upon long pedicles; they are reddish, streaked, concave, and are divided into wings, or grow upon a branched rib; they are also cut into five segments, and are smooth, neat, juicy, and of a pleasant green; when rubbed with the fingers they have a strong smell, and the taste is not very disagreeable. The flowers proceed from the joining of the pedicles to the stalk, as well as the top, where they are collected into an umbel, and are small, rosaceous, and consist of five white petals; the calyx turns to a fruit, containing two very small seeds, which are streaked, ash coloured, depressed on one side, and gibbous on the other. It delights in moist marshy places, and is by some transplanted into gardens. The seeds are reckoned among the four lesser hot seeds.

AQUILEGIA, *Columbines*, has a white root an inch thick, which is branched and fibrous, and of a sweetish taste. It has leaves like meadow rue, they being cut on the edges, and are bluish underneath, but above of a dark green, with a bluish cast. The flowers are pendulous, and consist of many petals unlike each other; from the middle of the flower arises the pistil, beset with stamina, which turns to a membranous fruit, consisting of many husks, or pods, each of which is full of black shining seeds. The colours of the flowers are various, as blue, red, white, flesh coloured, and green, upon which account it is cultivated in gardens, and they flower in May and June. For raising them, the seeds should be sown in a nursery-bed in September, and in March following the young plants will appear above ground, which should be transplanted in the middle of May into good fresh earth, and set at nine inches distant every way. At Michaelmas they may be removed into the borders of a flower garden, and the May following they will produce flowers. It has been looked upon as an aperient and sudorifick; but it is now out of use.

ARGENTINA, *Silver Weed*, or *Wild Tansey*, has a blackish root, which is sometimes single and sometimes fibrous; the leaves are conjugated like agrimony, and they are deeply dentated on the edges; they have several small leaves set between them, and the upper part is of an herbaceous green; but the under like that of silver, they being covered with a soft down. The flowers are placed singly on long hairy pedicles, and consist of five petals of a gold colour, with a calyx divided into five sharp parts, between which are many small ones; and there are many stamina of the same colour, with heads thereon. The pistil changes into a spherical head, a quarter of an inch in diameter, full of seeds of a yellowish colour, and like those of poppies. Many physicians have a great opinion of this herb; for Boerhaave affirms it has the same virtues as the Peruvian bark. The dose of the juice is from four ounces to six, and of the seeds to half a drachm.

ARMENIACA MALUS, *the Apricot-tree*, has roundish acuminate leaves, serrated on the edges, and four or five of them are placed together. The flowers, that come out early in the spring, before the leaves, are rosaceous, consisting of five whitish petals, disposed in a ring, with a calyx divided into five segments, from which a pistil arises that turns to a fleshy succulent fruit, very well known. There are seven sorts cultivated in the English gardens, which are, I. *The Masculine Apricot*, which is the soonest ripe of all, and has a small roundish fruit, of a red colour towards the sun, which as it ripens fades to a greenish yellow on the other side. It is only valuable for being soonest ripe, for it has little flavour. II. *The*

Orange Apricot, which is the next that becomes ripe, and is of a deep yellow. The flesh is dry, and is better for tarts than for eating. III. *The Algier Apricot* ripens next, and is of an oval shape, only a little compressed on the sides. It turns to a pale yellow or straw colour when the flesh is dry, with a faintish taste. IV. *The Roman* is next, and is larger than the *Algier*, but not compressed on the sides; the colour is deeper, and the flesh is moister. V. *The Turkey Apricot* is the next in order, because it ripens later than the former, and is bigger than any of them, and has a globular shape. It is of a deeper colour, has a firmer flesh, and a better taste. VI. *The Breda Apricot* was brought originally from Africa, and is a large roundish fruit, turning to a deep yellow when ripe, and is of a deep orange colour on the inside. The flesh is soft, full of juice, and better tasted than any of the whole tribe. VII. *The Brussels Apricot* is the latest, it not being ripe till near the middle of August, unless exposed to a south sun; however too much heat spoils the taste. It is red on the side next the sun, with many dark spots, and of a greenish yellow on the other side; the flesh is firm and of a high flavour; but it often cracks before it is ripe. The best standard trees are those that are about two feet and a half, or three feet in the stem; but they may be planted as dwarfs against an espalier, where, with good management, they will produce a large quantity of fruit. These fruits are all propagated by budding them on plumb stalks; and they are all, except the two last, planted against the walls, which should be either east or west. The borders under these walls should be six feet wide at least, and if the earth be two feet deep, or two and a half at most, it is enough. The soil should be fresh earth from a pasture ground, taken about ten inches deep with the turf, and laid to mellow at least twelve months before it is used, often turning it. The trees that are budded should be but of one year's growth, and if the soil is dry, October is the best month for planting. At Michaelmas, or soon after, when the trees have grown, you must unnailed the branches and shorten them, in proportion to their strength; for a vigorous branch may be left eight or nine inches long; but a weak one only five or six. When they are shortened they should be nailed as horizontally as possible.

With regard to the medicinal uses of apricots, there is little to be said, only that they agree best with persons of hot constitutions; for in weak stomachs they readily corrupt, and then produce feverish disorders, which however are easily cured with emetics and purges.

ARTEMISIA, *Mug-wort*, has a creeping fibrous root, about as thick as one's finger, with a sweet aromatic taste. The stalks grow to two cubits in height or upwards, and are round, streaked, strong, stiff, generally of a purple colour, and covered with short hair; they have also pith in the middle, and are branched, with leaves thereon, placed alternately, that are not unlike those of wormwood; they are of a dark green above, and hoary underneath, by which they may be distinguished from wormwood. The flowers grow on the top of the branches like spikes, consist of many florets of a purplish colour, and divided into five parts, which are comprehended in a scaly cup. Among the florets there are naked embryoes, which turn into a double capillament, which afterwards, as well as the embryoes of the florets, turn into seeds like those of wormwood, but have not so strong a smell. It is generally accounted anti-hysterical, and is very often in use among the women for female disorders. In some parts of the kingdom it is used as a pot-herb. The dose of the dried herb is three drachms, drank in wine, and is said to be a good remedy against the hip-gout.

ARUM, *Cuckow Pint*, or *Wake Robin*, has a tube-

rose, fleshy root, as thick as one's thumb, but roundish, white, and full of a milky juice; the leaves are about eight inches long, a little triangular, and somewhat in the shape of the head of an arrow. The stalk rises to a cubit in height, and is round, streaked, sustaining a membranaceous flower like an ass's ear, contained in a sheath of a whitish green, in which is a pistil of a palish yellow, from which proceed berries, that are almost globous, and disposed into an oblong head; they are of a reddish purple, soft, full of juice, and contain a seed or two, that are hard, small, and roundish. The whole plant has a most acrid taste that burns the tongue. The root is only in use, and when tasted bites the tongue so much, that it may be felt a whole day. It has many virtues, but is good in ferous disorders, the cachexy, the green sickness, agues, the dropsy, the jaundice, and is excellent in all diseases that proceed from clammy humours, as well as for opening the obstructions of the viscera. It is also good in a moist viscid catarrhal cough, and to restore the tone of the stomach. It has this peculiarity, that it will cause those to sweat who can hardly be brought to it any other way, when taken to the quantity of a drachm in any good spirit; but if it be dried and taken in powder, then this medicine will fail. The best way of giving it is by beating the fresh root with gummy resins, and making the mass into pills. Outwardly it is very proper to cleanse ulcers, particularly those that are fistulous. The common dose is from half a drachm to four scruples.

ASARUM, *Asarabacca*, is an ever-green herb, which has a slender, angular, knotty, fibrous, ash coloured root, with a bitterish, nauseous, aromatic taste, somewhat like garden valerian; the leaves are round, stiff, shining, of a dark greenish colour, and are sustained by long pedicles; they are somewhat in the shape of an ear, for which reason they are called in French, *Orielle d'homme*, that is, man's ear. The flowers are hid in the leaves near the root, and are of a purple colour, which are scarcely perceivable, except the flower-cup, which is divided into three or four segments, and of a blackish purple colour. The fruit is divided into six cells, full of oblong seeds, that look like the stones of grapes. It delights in woody places, and is found wild in some parts of England, though but seldom. The flowers appear in April; but grow so close to the ground as not to be seen, unless you put away the leaves with your hand. It is best raised by slips. The leaves are a strong vomit, as well as the roots; working both upwards and downwards; but the leaves are chiefly in use, to make a sneezing powder, and are said to be the principal ingredient in Major's Patent Snuff.

ASCLEPIAS, *five* VINCETOXICUM, *Swallow-wort*, or *Tame Poison*, has a root full of fibres, which proceed from a single head, and has an acrid, bitterish, disagreeable taste, with a nauseous smell; the stalks are tough, hairy, and geniculated, and rise to a cubit in height; the leaves are placed by pairs over against each other, and are a little hairy on the hedges; they are in the shape of the leaves of ivy, but are longer, more wrinkled, and have very short pedicles. From the joints of these pedicles, with the stalk, proceed whitish monopetalous flowers, in the shape of a bell, and are divided into five parts, expanded in the form of a star, with five apices of the same colour, and a cup divided into the same number of parts, with a pistil fixed in the hinder part of the flower, like a nail, that turns to a fruit composed of two membranaceous husks that open from the bottom to the top, inclosing many seeds, that are covered with fine down, and are fixed to the membrane like scales on the skins of fishes. It has no milky juice like dog's-bane, by

which it may be distinguished from it. It is propagated by parting the roots, either in spring or autumn, which will grow almost in any soil. It has been cried up as an antidote against poison, but is now neglected for that purpose. It is much more proper for acute, than chronic diseases; because it is a gentle resolvent, and promotes both sweat and urine.

ASPARAGUS, *Asparagus*, corruptly called *Sparrow grass*, has a great number of roots, proceeding from a single head, that are round, fleshy, whitish, sweetish, and clammy. Early in the spring they emit tender, long, round, green shoots, without leaves, that are so well known they need no description. When they are grown up they arise to the height of two cubits, and are divided into slender strong branches, with green, capillaceous, soft leaves, an inch in length. The flowers are rosaceous; with six petals of a pale green colour, and a pistil that turns to a soft berry of the size of a pea, that is globous, purplish, soft, sweetish, and contains two or three umbilicated black seeds. It is cultivated in gardens for the use of the kitchen. Asparagus provokes the appetite, but yields little nourishment, and gives the urine a particular strong smell. It has little or no medicinal virtues.

ATRIPLEX FOETIDA, *Stinking Orach*, or *Ar-rach*, has a slender fibrous root, from whence generally proceed branched stalks, about nine inches in length, with roundish small leaves, terminating in a point, and are covered over with a mealy whitish powder. The flowers grow on the top of the stalks, and are without petals; for they consist of many stamina, arising from a calyx divided into five parts, with a pistil that turns into a single, small shining; blackish, and roundish flat seed in a capsula, in the form of a star. It grows in uncultivated places, and near the sides of roads. It is antihysterick; and the infusion of the leaves taken hot is an excellent medicine against the hysterick passion.

AURANTIA MALUS, the *Orange-tree*, is not very tall, but has a thick, woody, branched root, which spreads very much, and is of a yellow colour on the inside. The trunk is hard, whitish within, has an agreeable smell, and is covered with a greenish, smooth, white bark. The branches are numerous, flexible, and of a beautiful green, with a few thorns thereon. The leaves are somewhat like broad leaved laurel, and are always green, thick, smooth, broad, and ending at each end in a point, with a foliated pedicle in the shape of a heart. When held up to the light there appears to be a sort of holes in them like St. John's wort. The flowers grow in bunches, and are rosaceous, consisting of five white petals placed in a ring, with many stamina, which have yellow apices, or heads; at the bottom and center of the cup there is an orbicular placenta, which sustains a roundish pistil with a long tube, that runs into a globous fruit, covered with a rind, which is very well known. There are several kinds of Oranges, as the *common Seville Orange*, the *sweet Seville Orange*, the *China Orange*, the *curled leaved Orange*, the *striped curled leaved Orange*, the *horned Orange*, the *common striped Orange*, the *Hermaphrodite Orange*, the *willow leaved Orange*, commonly called the *Turkey Orange*, the *striped Turkey Orange*, the *Purple Nose*, or *Shaddock Orange*, the *double flowered Orange*, the *common Dwarf*, or *nutmeg Orange*, the *dwarf striped Orange*, the *dwarf China Orange*, the *childing Orange*, the *distorted Orange*, the *large warted Orange*, the *starry Orange*, and the *Orange with a sweet rind*. Many sorts of these oranges are cultivated in England, though more for curiosity than the fruit they produce; and of late years some of them have been planted against walls, with frames of glass to cover them in the winter. Some curious persons have likewise planted them in

the open ground, and have had covers for them, which have been taken away in the summer; by this means the fruit has ripened so well as to be extremely good for eating. However, in hard winters it is very difficult to preserve them.

Orange peel is an excellent bitter, especially that of Seville oranges, which strengthens the stomach, helps digestion, attenuates gross humours, discusses wind, and eases cholic pains proceeding therefrom. It is an ingredient in tinctures, called stomachic bitters, and is now common in taverns, where they mix it with a glass of wine, and drink it before dinner to create an appetite. The essential oil distilled from the rind is also proper for the same uses, when two or three drops are taken upon sugar, as well as the peel, when it is candied. The pulp of sweet oranges is cooling, quenches thirst, and excites the appetite; but the juice of four oranges not only serves to make a cooling drink in hot weather, but is of late found to be excellent against the scurvy.

BARDANA, *Burdock*, has a thick, single, straight root, a foot in length, blackish on the outside, white within, and of a sweetish subaustere taste. The leaves are large, being a foot long and upwards; they are sharpish at the points, hairy, and of a dark green colour, but hairy underneath. The flowers consist of many purple florets, deeply cut into five segments, resting on the embryo, which is contained in a cup made of many scales, that terminate in hooks, and bend inward. The embryo turns into an oblong, flat, streaked, flattish seed, with short down or rather tufts of hair. It is to be met with every where by the way sides. The root is diuretic, sudorific, pectoral, uterine, vulnerary, and febrifuge. It has been of late greatly recommended in the gout. It is given to a drachm in powder, and to an ounce in decoction. The seeds of burdock are of a bitter subacid taste, and are a powerful diuretic, when a drachm of them is taken in white wine, or any other proper vehicle.

BECCABUNGA, *Brook-lime*, has fibrous, white, creeping roots, with upright stalks, that are round, spongy, reddish, and branched. The leaves are roundish, smooth, thick, crenated, of a dark green colour, and above an inch in length. The flowers proceed from the places where they join to the leaves, and are placed on spikes, a palm, or a palm and a half, in length; they are monopetalous, but divided into four segments, and are of a bright blue colour. There are three blue apices, and a pistil that turns into a membranaceous flat fruit, of the shape of a heart, and a quarter of an inch long. It is divided into two cells, containing many small flat seeds. This herb has no remarkable taste, and yet some prefer it to other more acrid antiscorbutics. The dose of the juice is four ounces; but it is best mixed with the juice of oranges, and then it may have a very good effect in hot scurvies.

BELLA DONNA, *Deadly Night-Shade*, has a thick, long, juicy, whitish root, divided into several branches; the stalks are two cubits high, and are round, as thick as one's thumb, branched, hairy, and of a reddish black. The leaves are like those of garden night-shade, which are twice or thrice as large, and are soft and somewhat hairy. From the place where the leaves join to the stalks the flowers proceed, which are monopetalous, in the shape of a bell, divided into five segments, streaked, a little hairy, and of a dark purplish black, with five stamina, and as many whitish apices. From the calyx it is hairy; and divided into five parts; the pistil proceeds, which is fixed into the hinder part of the flower, like a nail, and turns into a soft round fruit, like a grape, of a shining black colour, and full of a vinous juice. It is divided by a partition in the middle into two cells, full of many minute oval seeds. It grows in woods, near walls and hedges, and in

other uncultivated places. The fruit, or berries, have often proved of dangerous consequence to children who have eat them. They produce a delirium, laughter, various gesticulations, and at last madness.

BELLIS MAJOR, *the greater, or Ox-eye Daisy*, has a fibrous creeping root, with stalks two cubits high, that are erect, of a pentagon shape, villous, and branched, with flat leaves placed alternately, two inches long, half an inch broad, and crenated. The flowers are large, radiated, and their disk consists of many gold coloured florets, divided into five segments, with a style in the middle of each; but the crown is composed of white semi-florets, resting upon embryos, and placed in a hemispherical scaly blackish cup. The embryos at length turn into slender, oblong, streaked, naked seeds. The heads, after the petals are fallen off, resemble obtuse combs.

BELLIS MINOR, *the common Daisy*, has many small roots, with a great number of leaves lying on the ground, that are flat, hairy, long, and narrow towards the root, sensibly increasing to the end, where they are roundish, and they are slightly serrated. It has no stalk, but there are many pedicles between the leaves, a palm or upwards in length, which are slender, round, hairy, and on the top of each there is a flower, whose disk is composed of many yellow florets, and the crown of semi-florets, of a white colour with a reddish cast. The embryos are placed in a single cup divided into many parts. The embryos afterwards turn to small naked seeds: it is every where common in meadow or pasture lands. Besides these there are the *small striped Daisy*, the *red garden Daisy*, with double flowers, the *white double garden Daisy*, the *double striped garden Daisy*, the *hen and chicken Daisy*, the *white cock's comb Daisy*, and the *red cock's-comb Daisy*. The garden Daisies are propagated by parting the roots in autumn, and should be planted in gardens of strong earth, and be exposed to the east, for the great heats of summer will sometimes kill them. The leaves of the ox-eye daisy gathered before the flowers appear, yield a decoction of an acrid taste, not much unlike pepper. It is commended in purulent spitting. The lesser daisy has been generally accounted good for internal wounds, and for dissolving and discussing grumous blood.

BERBERIS, *the Barberry-tree*, is a tall shrub, having fibrous, yellowish, creeping roots, and the branches are beset with sharp thorns. The leaves are small, oblong, narrow at the bottom, but broader towards the top, are crenated on the edges, and beset with short thorns. They are smooth, green, and have an acrid taste. The flowers consist of six leaves, that expand in the form of a rose, consisting of six petals of a yellow colour, with as many stamina, and a greenish pistil, turning into a cylindrick red soft fruit, one third of an inch in length, and full of an acrid juice, containing one or two oblong kernels. The fruit grows in clusters hanging down, and the bark of the tree is whitish. The best method of planting them is to place them eight or ten feet asunder, keeping their middles thin and free from dead wood. The branches should seldom be shortened, but when it is done it must be at Michaelmas, when the leaves begin to decay. The fruit is cooling and astringent, and proper to strengthen the stomach and intestines, as well as to excite the appetite. The dose of the expressed fruit is an ounce, though they are eaten commonly when ripe. The juice, or decoction, abates the inflammation of the fauces and tonsils, and heals loose rotten gums. Dyers make use of the bark for colouring yellow.

BERULA, *five SIUM, Water Parsnip*, has geniculated, creeping, white, fibrous roots, from whence proceed stalks above a cubit in height, which are hollow

hollow, round, strait, branched, and have many leaves that are set thereon by pairs, with a single leaf at the end; they are fat, smooth, and cut all round the edges like a saw. The flowers are disposed in umbels, and placed at the end of the stalk; they are rosaceous; and consist of five white petals, placed in a ring. The flower cup turns to a roundish fruit, containing two small streaked and gibbous seeds. It delights in being in and near rivulets and ditches. It is accounted an antiscorbutic and aperient, and is thought to open obstructions. Three ounces of the juice is a dose; however, it is seldom used in physic, but in some countries is eaten as a salad.

BETA, *white and red Beets*. The *white Beet* has a round, woody, long, white root, about as thick as one's little finger, with large, broad, smooth, thick, succulent leaves, sometimes of a pale, and sometimes of a deeper green, with a thick broad rib. The stalks are slender, streaked, branched, and two cubits high. The flowers proceed from the hollow between the stalk and the pedicle of the leaf, of which there is a long row; and they have no visible leaves, but consist of many stamina, or threads, which are collected into a globe; the cup of the flower is divided into five segments, which turns into a globous fruit, containing two or three small oblong seeds of a reddish colour.

Red Beet has a white root, and shorter leaves than the former, more or less red, and sometimes of a blackish red. This is distinguished from the former by the number of the leaves.

The *Turnip rooted red Beet* has a higher stalk than the common red beet, and the root is two or three inches thick, bellying out; on the outside it is of a deep blood colour. All these beets are cultivated in gardens for the use of the kitchen; but they were in greater esteem formerly than they are at present. However, the red beet is still used to garnish dishes.

BETONICA, *Betony*, has a thick, transverse, fibrous, hairy root, from whence proceed quadrangular knotty stalks, growing to the height of a cubit. Some of the leaves proceed from the knots by pairs, placed over against each other, and others lie on the ground; they are oblong, villous, wrinkled, and of a darkish green colour, and are crenated on the edges. The flowers grow in spikes, and are monopetalous, labiated, and of a purplish colour; the upper lip is fulcated, and as it were reclines backwards; but the lower consists of three lobes, with stamina of the same colour as the former. The flower cup is cut into five segments, from whence proceeds a pistil fixed in the hinder part of the flower, like a nail, with four embryoes, that change to as many roundish seeds, contained in a capsula, that was the cup of the flower. It is common in woods and shady places throughout England. *Betony* is discutient and aperient, and has been always accounted an excellent medicine for the head, and the leaves reduced to powder promote sneezing; for which reason, and for its being a cephalick, it is always an ingredient in the herb snuffs.

BISTORTA, *Bistort*, or *Snake-weed*, has a thick, oblong, geniculated root, in shape like a finger when it is close bent, and has many hairy fibres. It is of a blackish brown without, and of a reddish colour within. The leaves are oblong, broad, and acuminate like those of the dock; but less; they are full of veins, and of a blackish green colour above, but bluish below; the stalks are about a foot in height, and are slender, smooth, round, geniculated, and beset with a few smaller leaves; for the largest grow at the bottom. The flowers grow like a spike at the end of the stalk, and are without petals; for they consist of many stamina, with flesh coloured apices or heads. The cup is divided into five segments, and the pistil turns to a triangular reddish black shining seed, contained in a capsula, that was the

cup of the flower. The root is only in use. It is said to be balsamic, vulnerary, and astringent, and is used in all cases where astringency is proper, particularly in hæmorrhages, spitting of blood, and overflowing of the menses. The decoction of half an ounce to an ounce of the fresh root is a dose, or rather it may be taken at several times; and the powder may be given from half a drachm to a drachm, made into a bolus with conserve of roses.

BONUS HENRICUS, *the English herb Mercury*, has a thick yellowish root, furnished with a few fibres, from whence proceed concave stalks, to the height of a cubit, which are a little hairy; the leaves are triangular, smooth above, but below sprinkled with a sort of meal, and they have long pedicles placed on the stalks alternately. The flowers, that grow in several bunches on the top of the stalks, are small and without petals, but they have several yellow stamina proceeding from the flower cup, which is divided into many segments. The pistil turns into a small seed, in the shape of a kidney, which is black when ripe. It grows in uncultivated places by the way side, and among the ruins of old walls and buildings. It is often used for food in many parts of England, and is reckoned as good as spinach. It is emollient, and has been sometimes used as a cataplasm to appease the pains of the gout, and that without any danger.

BORRAGO, *Burrage*, has a white, thick, fibrous root, and broad, roundish, rough, wrinkled, blackish green leaves, that lie on the ground; but those that are higher are furnished with exceeding small prickles. The stalk is hairy, round, hollow, branched, and grows to the height of a cubit. The flowers, that grow on the top of the branches, are of a fine blue, placed on pedicles, an inch in length, that are crooked and bend downwards. The flowers have only a single petal, which is deeply divided into five segments, sharp at the ends, and placed like a star; the apices in the middle of the flower are sharp pointed, and adhere together in the shape of a pyramid. The flower cup is green, hairy, and divided into five acuminate segments, from which a pistil arises, fixed in the hinder part of the flower, like a nail; and there are four embryoes, that turn into as many seeds in the shape of a viper's head. It is common in all parts of England, and is often found in dunghills and on public roads. The seeds of this plant may be sown in the spring or autumn, soon after they are ripe; it will grow almost in any soil, but that which is dry is best. It is often used in the summer time with balm for making cool tankards, and the flowers are said to be cordial, and to have many other virtues, as well as the herb, that are now disallowed.

BRASSICÆ, *Cabbages*, are of several sorts, as the *common white Cabbage*, the *Russian Cabbage*, the *red Cabbage*, the *flat sided Cabbage*, the *sugar loafed Cabbage*, the *early Battersea Cabbage*, the *white Savoy Cabbage*, the *green Savoy Cabbage*, the *green Broccoli*, the *Italian Broccoli*, the *turnip Cabbage*, *curled Colewort*, the *must Cabbage*, the *branching tree Cabbage from the sea coast*, *brown Broccoli*, *common Colewort*, the *Cauliflower*, the *Boorcole*, *Alpine Colewort*, *perfoliated wild Cabbage*, *white Cabbage with a white flower*, and the *perfoliated wild Cabbage with a purple flower*.

BRASSICA CAPITATA ALBA, the *common white Cabbage*, is very well known, and bears, like all the rest, flowers that consist of four leaves or petals, in the form of a cross, which are of a yellow, or pale yellow colour, placed in a cup divided into four segments, from which arises a pistil that turns into a round, long, slender fruit, or pod, divided by a partition in the middle, and consisting of two cells, full of roundish blackish seeds.

BRASSICA CAPITATA RUBRA, the *red Cabbage*,

bage, has leaves like the common cabbage, but the colour is various, for sometimes they are of a blackish purple, sometimes of a greenish black, and at other times more greenish; but they have all red ribs and nerves.

BRASSICA RUBRA VULGARIS, the *common red Cabbage*, is taller than the former, and has a stalk that grows sometimes to the height of two yards, which is thick, of a blackish purple colour, and watry on the lower part. The leaves are irregularly placed, and are all of a greenish red, with some shades of blue, and wrinkled, with thick veins. The flowers that grow on the top of the stalks are yellow, and change into pods a palm in length, that contain red round seeds. The leaves are not collected into heads as the former, but continue expanded and open. It stands the winter very well, and continues several years. The ends of the branches in the spring are eaten as a sallad.

BRASSICA ALBA CRISPA, the *white Savoy Cabbage*, has round extremely wrinkled leaves, which seem to be divided into cells, and have short pedicles. They are collected into a small whitish head; but their extremities are of a dark green. The flowers and seeds are like the former.

BRASSICA CAULI FLORA, the *Cauliflower*, has large leaves, upwards of half a yard in length, which are sharper than those of the common cabbage, but not so broad; they are of a light green with a bluish cast, and the nerves on the outsides are whitish. The leaves are collected into a head, but not so close as a cabbage, between which there is a heap of thick whitish soft flowers, that are generally in great esteem. When they are not gathered for the kitchen, they arise to a considerable height in time, and turn from flowers to pods like the former. These are all the sorts mentioned by medicinal writers, for the rest are only for the kitchen.

The *common white, red, and long-sided Cabbages*, are chiefly cultivated for winter use, and the seeds must be sown at the end of March in beds of good fresh earth. Towards the end of April, when the young plants have about eight leaves, they should be pricked out into shady borders, about three inches square, to prevent their being long shanked. They should be transplanted in the latter end of May to the place where they are to grow, and should be set in rows, two feet and a half distant. If the season should prove dry when they are transplanted, they must be watered every other evening, till they have taken fresh root. As they advance in height, the earth must be drawn about the stems with a hoe, which will greatly strengthen the plants. Some of these cabbages will be fit for use soon after Michaelmas, and the rest will continue till the beginning of March, if not destroyed by bad weather: to prevent which the gardeners near London pull up their cabbages in November, and trench their ground up in ridges, laying their cabbages against the ridges as close as possible on one side, and bury their stems in the ground. They are suffered to remain in this manner till after Christmas, when they cut them for the market.

The *Battersea, and sugar loaf Cabbages*, are for summere use, and are usually named Michaelmas cabbages. The seeds are to be sown in the beginning of August, in an open spot of ground, and when they have eight leaves they must be pricked into beds at three inches distant every way. Towards the end of October they must be planted out for good, two feet and a half distant from each other, and the rows must be three feet asunder. In the spring the earth must be drawn up about the stem with a hoe, and in May their leaves will begin to cabbage, to promote which they may be tied together with a slender osier twig.

The *Savoy Cabbages* are propagated for winter use;

for a frost is thought to make them better. They must be sown about the middle of April, and cultivated in the same manner as common white cabbage, but somewhat nearer to each other.

The BRASSICA FIMBRIATA, that is, the *Boorcole*, may be treated in the same manner, but need not be planted above a foot square. These are never eaten till the frost has rendered them tender; for otherwise they are tough and bitter. The seeds of the several kinds of broccoli should be sown the latter end of May or beginning of June, and when the plants have eight leaves they should be transplanted into beds, like the common cabbage; and at the end of July they will be fit to plant out for good, which should be in a sheltered spot of ground, but not under trees, and about a foot and a half distant each way. Towards the middle of December they will begin to show their small heads, which are somewhat like a cauliflower, but of a purple colour; and they will continue to be fit to eat till the beginning of April. The brown sort should be sown in April, and be managed like the common cabbage.

The *Turnip cabbage* is not so much cultivated as formerly, though some yet esteem them for soups. The seeds must be sown on a bed of light fresh earth, and when the plants are about an inch high, they should be removed to a shady border, and set at about two inches distant every way, watering them till they have taken root. Near the middle of June they should be transplanted out where they are to remain, and set at two feet distance every way, watering them till they have taken root; the earth should be drawn about them with a hoe, to prevent them from drying, and in the winter they will be fit for use.

The seeds of the curled colewort may be sown in the middle of July, and when they are strong enough for transplanting, they should be set in rows, nine inches asunder, and at five inches distance in the rows, in a moist season. They will be fit for use after Christmas, and continue good till April.

BRYONIA ALBA, *white Bryony, or Wild Vine*, has a root sometimes as thick as a man's thigh, is fleshy, and divided into large branches; when it is dried it is spongy, and marked with circles and rays. The taste is acrid, bitterish, and disagreeable, and the smell while fresh is very strong. The stalks are long, slender, streaked, a little hairy, and climbing with tendrils like a vine. The leaves are angular, set alternately on the stalks, and are shaped pretty much like those of a vine, only they are less, and a little rough. The flowers proceed from the hollows where the leaves join to the stalk, and consist of a single petal, which is open in the shape of a bell, and divided into five parts, of a whitish green colour, marked with veins. Some of these flowers are large, and without embryoes; others are less, and contain one embryo, which turns into a spherical berry of the size of a pea; it is at first green, then red and full of a nauseous juice, as well as round seeds, covered with slime. It may be cultivated in gardens by sowing the berries in the spring of the year in a dry poor soil, where they will in two years time grow to be large roots. It grows wild under hedges, and climbs upon the bushes. The juice of the root is so sharp that it eats into the skin; however, when they are dry, they lose a great part of their acrimony; it is a strong cathartic, and we have some notable instances of its killing and bringing away worms; it has been used in madness, and some kinds of dropsies with success, as well as in a moist asthma. The dried root reduced to powder, is given from a scruple to a drachm; but the extract made by water is much the best and safest, because it works in a milder manner, and the dose is from half a drachm to a drachm. Externally, it is a powerful resolvent, and has been recommended against pains in the side,

side, the hip-gout, and scrophulous tumours. The fresh root being bruised, and laid to the small of the back, has promoted urine and cured the dropsy; likewise, when it has been grasped in the hand when fresh for some time, it has been known to purge. For the hip-gout it should be bruised, mixed with linseed oil, and laid warm to the part.

BRYONIA NIGRA VULGARIS *feu* **RACEMOSA**, *black Bryony*, has a large, thick, long, tuberoso root, black on the outside, but white within, and full of a thick sily juice, with no disagreeable taste. The stalks are like those of the vine, but without tendrils; however, they are slender, long, climbing, woody, and of a dark reddish colour, with soft, green, shining leaves, placed alternately thereon, like those of the great bind-weed. The flowers proceed from the hollows between the leaves and the stalks, and grow in bunches; they consist of a single petal in the shape of a bell, and are divided into six segments of a yellowish green colour, some of which are barren, and others fruitful. These last sort have an embryo, which turns to an oval red berry, or of a brownish red, full of roundish seeds. Its common use is as a resolvent; for it will take off the black and blue marks of the skin arising from bruises, when it is bruised and laid thereto in the form of a cataplasm.

BUGLOSSUM, *garden Bugloss*, has a long round root, about as thick as one's finger, which is reddish or blackish without, but white within, and abounding with a clammy juice. The stalks rise to above a cubit in height, which are round and beset with stiff hairs. The upper part is branched, and has leaves set thereon without pedicles; they are narrow, oblong, of a bluish green, and terminate in a sharp point, but are not wrinkled like burrage. They are hairy on both sides, and their edges are even. The flowers grow at the top of the stalks and branches, and are in the shape of a funnel, consisting only of a single petal. The flower cup is composed of five oblong, narrow, sharp, hairy segments, and the flower consists of the same number, and is of a bluish purple colour. The pistil is oblong, and fixed in the hinder part of the flower like a nail; there are four embryoes, which turn to as many seeds in the shape of vipers heads. The tops of the stalks and the cups of the flowers are purple. It is cultivated in gardens. The flowers are in the number of those that are said to be cordial, and are proper to restrain the heat of the blood, as well as to promote its circulation, according to some. The flowers may be used in the same manner as tea.

BUGULA, *Bugle*, or *middle Confound*, has a slender, fibrous, white root, with roundish, soft, sinuated leaves, of a dark greenish colour, and two inches in length. It grows in stony places; the lower part is generally purplish, and the taste at first is sweetish, but afterwards bitterish and astringent. Some of the stalks are slender, roundish, and creep on the ground, while others rise to the height of a palm, and are quadrangular, with hair on two of the opposite sides. The flowers are placed in whirls round the stalks, and consist of a single petal, one of whose lips is divided into three parts, the middlemost of which is split in two. The place of the under lip is supplied by small teeth, with a pistil and blue apices like the flower. The flower cup is short, hairy, and divided into five segments, from whence the pistil rises, and is fixed in the hinder part of the flower like a nail. It is attended with four embryoes, that turn to as many roundish seeds shut up in a husk, which before was the flower cup. It delights in meadows and shady places. It is a vulnerary herb, and is good in all cases where mild astringents are proper.

BURSA PASTORIS, *Shepherd's-Pouch*, has a

white, strait, fibrous, slender root, with a stalk that rises to a cubit in height. The lower leaves are sometimes whole, but more generally jagged like dandelion; but those that grow on the stalks are much less broad at the base, with even edges; and terminate in a point. The flowers are placed in rows on the tops of the branches, are small; and in the form of a cross; they consist of four roundish petals with small stamina, bearing yellow apices or heads. The flower cup consists of four leaves; and the pistil turns into a flat fruit in the shape of a heart; or as some fancy like a purse, and is a quarter of an inch long; it is divided into two cells, in which are contained exceeding small seeds. It is said to be a vulnerary, astringent, cooling herb, and is given in all hæmorrhages and fluxes; but some think it is so binding as not to be safe.

BUXUS, the *Box-tree*, is a shrub which seldom grows to any considerable size in England, though it has sometimes been seen as thick as a man's thigh. The largest were found in great plenty upon Box-hill, near Darking in Surry; but of late they have been pretty much destroyed; however, there are many still remaining, of a considerable bigness. Some have thought that the box wood, made use of by mathematical instrument makers and others, was the product of England; but this is a mistake, for it is brought from the Levant in large blocks. This shrub is an ever-green, and very bushy, having oblong, small, hard, thick, shining leaves, of a disagreeable bitterish smell and taste. The flowers are of two sorts, the barren and the fruitful: the first are without petals, and consist of many stamina, generally proceeding from the bottom of a foliated square flower cup, of a yellowish colour; the fruitful, or rather the fruit, is shaped like a pottage-pot turned upside down, and is divided into three cells of a green colour, containing two seeds, each of which when ripe is thrown out by the elasticity of the vessels; the seeds are brown, long, and shining. These shrubs are a very great ornament to cold and barren soils, where few other things will grow: They may be propagated by planting the cuttings in a shady border, observing to keep them watered till they have taken root. The best season for transplanting these into nurseries is in October; or the seeds may be sown soon after they are ripe in a shady border, which must be duly watered in dry weather; and from these you may expect the largest trees.

There are several sorts of Box-trees, as the *common Box-tree*, the *narrow leaved*, the *striped*, the *gold edged*, the *silver beaded*, the *dwarf*, and the *dwarf striped Box*. The dwarf kind is used for bordering flower-beds, for which purpose it is excellent, as it will bear all weathers, and is kept handsome with little trouble. This is easily propagated by parting the roots, which is much better than planting the slips. It is seldom used in medicine.

CALAMINTHA, *common Calamint*, has a fibrous root, with stalks growing to the height of a palm and upwards, which are quadrangular, branched, and have leaves growing by pairs opposite to each other. They are from half an inch to an inch in length, and are roundish, obtusely acuminate, a little serrated and hairy, with an acrid taste, and a disagreeable smell. From the middle to the top, the flowers grow where the pedicle of the leaves join to the stalk in bunches; they are long and tubulous, and open at the top with two lips; the uppermost of which, or crest, is roundish, and divided into two segments; but the lowermost, or beard, is divided into three. They are of a purplish colour, and placed in a hairy streaked calyx, from whence rises a pistil fixed in the hinder part of the flower like a nail, and as it were attended with four embryoes, which turn into as many light blackish

blackish seeds, whose calyx was the capsula of the flower.

Calamint (of which there are several sorts, but they differ so little from that already described, as to require no particular description) powerfully incises gross humours, excites the appetite, and discharges wind. It is taken in the manner of tea, and is generally accounted a good hysteric.

CALENDULA, *garden Marygold*, is otherwise called *Caltha Vulgaris*, and has a root divided into many thick fibres or branches; but the stalks are slender, a little angular, hairy, and clammy to the touch. It is divided into many branches, and the leaves are narrower at the base than at the top; they are hairy, and of a light green colour. The flowers grow on the top of the branches, and are of a gold colour and radiated; the disk consists of many tubulous florets, divided into five parts; and the crown is composed of crenated semi-florets, placed upon embryos in a hairy flower cup, divided into many parts. The embryos turn into crooked margined capsulæ full of oblong seeds. It is cultivated in gardens, and if the seeds are permitted to scatter, they will multiply greatly, and become as troublesome as weeds. The flowers are said to be aperient and dissolvent, and proper to open obstructions of the liver, spleen, and womb; but they are not very efficacious for these purposes; however, infused in wine, they will open a slight obstruction of the liver.

CAMPHORATA, *stinking ground Pink*, has a long woody root, about the thickness of a man's thumb, with many woody, thickish, branched, hairy, whitish stalks, with small knots placed alternately, from whence proceed a great many leaves, not a third of an inch in length, which are thin, hairy, pretty thick, have an aromatic smell, and when rubbed between the fingers smell pretty much like camphire. The flowers are without petals; for they consist of four stamina, with rose coloured apices, or heads, proceeding from a cup, which is only a single herbaceous leaf, divided into three, and sometimes into five, segments; from whence arises a pistil, that turns into a small, oblong, black, roundish seed, contained in a capsula, which was the calyx of the flower. It promotes urine and sweat, and is good in recent obstructions of the viscera, as well as in the moist dropsy. It may be drank as tea, but is very heating, and therefore must be used cautiously.

CANNABIS SATIVA, *manured Hemp*, has a single, white, woody, fibrous root, with a square hairy stalk, rough to the touch, and hollow within; it grows two yards high, and has a rind that may be divided into threads. The leaves consist of five segments or upwards, which are narrow and divided to the very pedicle; they are oblong, acuminate, serrated, veinous, rough, of a blackish green colour, and of a strong smell. The flowers and fruit do not grow upon the same plant; the former proceed from the places where the leaves join to the stalk, and have no visible petals; they consist of five stamina with yellow apices or heads, placed in a cup composed of five leaves, purplish without, and whitish within. The fruit on other stalks are without flowers; but they have pistils contained in a membranaceous capsula of a yellowish green colour, which turn into a roundish smooth seed, covered with a thin shining shell. The plants of both kinds proceed from the same seeds, which are sown in almost all parts of the world. The use of hemp is every where well known, it being made into ropes, thread, linen, and paper.

Hemp is always sown in a deep, moist, rich soil, such as is found in Holland, in Lincolnshire, and the fens of the Isle of Ely, where it is cultivated to great advantage. The land should be well ploughed and rendered fine by the harrow; the latter end of

April is the best time of sowing the seed, of which the heaviest and brightest coloured is best; when the plants come up, they should be hoed up like turnips, leaving them a foot or sixteen inches asunder; about a month after they should be hoed again, to destroy the leaves. The first season of pulling the hemp is about the latter end of August, and they first begin with the *finble hemp*, which is the male plant; but a fortnight or three weeks longer would be better, that none of the seeds may prove abortive. The second pulling is about the middle of October, when the seeds are ripe, and this is usually called *karl-hemp*, they being the female plants.

Hemp seed is recommended by Sir John Floyer, and others, against the jaundice, for which purpose two ounces may be boiled in a quart of milk till they break; and five or six ounces of this decoction may be taken several times in a day. It is also good in coughs, and heat of urine. The oil expressed from the seeds is recommended by some to ease the pain proceeding from burns.

CAPPARIS, *the Caper-bush*, has a large woody root, from whence proceed various shoots, armed with hard sharp prickles, and on which the leaves are alternately disposed, which are almost round, half an inch broad, and very bitter. The flowers proceed from the hollows where the leaves join to the stalks, and are rosaceous, white, and consist of four petals, from whose middle arises many stamina, with a long pistil; the flower cup consists of four green leaves, and the extreme part turns into a fruit almost in the shape of a pear; they are of the size of a large olive, and contain many small whitish seeds, almost in the shape of a kidney. In Italy it grows wild among the ruins of old walls and buildings, but in other places it is cultivated. There are several sorts of caper-bushes, as the *large fruited Caper without thorns*, the *prickly round leaved Caper with a small fruit*, the *sharp leaved Caper*, the *American tree Caper with a bay leaf*, and a *long fruit*, the *American tree Caper with a bay leaf and an oval fruit*, the *American tree Caper with laurel leaves and an oblong fruit*. In England it is very difficult to preserve these plants, and therefore nothing need to be said about their cultivation. What we call capers are the buds of the flowers before they are opened, which at first are laid in the shade for about four hours, and then put into vinegar for eight days; after which they are taken out, lightly pressed, and put into fresh vinegar for eight days more; this is repeated a third time, and then they are put up into casks for sale. They are every where known as a sauce; and are used to excite a languid appetite. Some put them into a brass vessel to give them a finer green colour, and then they are noxious. It is not used in medicine.

CAPRIFOLIUM, *Woodbind*, or *Honey-suckle*, has a woody creeping root with large fibres; the stalks are divided into branches, and are creeping or climbing, on which the leaves grow by pairs opposite to each other; they are oblong, sharp, soft, of a light green above, and hoary beneath. The flowers grow on the tops of the branches, and in some plants are white, and in others red or yellowish; they have a very sweet smell, and consist of a single tubulated petal, which grows open towards the top, and is divided into two lips, the uppermost of which is again divided into two, and the lowermost into many segments. The tube of the flower is bent, and sometimes resembles a huntsman's horn; they are produced in clusters, and placed in a cup consisting of a single leaf; this turns to a soft fruit, or berry, of which several grow together in bunches, almost in the manner of alder-berries. They are red when ripe, and are full of hardish, roundish, flattish seeds. It is found growing in the hedges in many parts of England, as well as in our gardens.

CARDIACA; *Mother-wort*, has a root consisting of fibres, proceeding from one head, from whence arise quadrangular hard stalks, two or three feet high, of a reddish black colour. The leaves are veinous and wrinkled, and, though smooth, are covered on both sides with down. The lowermost are round and of a pale green; but they are divided into three segments, dentated about the edges. The higher they are the narrower they grow, and end in a long point, having on each side a single tooth. The cups consist of a single leaf, are hard, and divided into five stiff sharp thorns, attended with many others. The flower is labiated, and consist also of one ear, whose upper lip is imbricated, with pieces laid over each other in the manner of tiles, and is much longer than the lower lip, which is cut into three parts. The pistil rises from the flower cup, attended with four embryos, and is fixed in the hinder part of the flower like a nail; the embryos turn into as many small, oblong, angular, smooth seeds, taking up the whole capsula, which was the cup of the flower. It is found wild in England near gardens, from whence it has been thrown out. It is said to cure convulsions, open obstructions of the viscera, and to kill worms; some account it excellent in diseases of the spleen, and the hysteric passion. The dose of the leaves in powder is a drachm, and must be taken in wine.

CARDUUS BENEDICTUS, *the blessed Thistle*, has a white fibrous root, and leaves lacinated like dandelion, but deeper, hairy, and terminating in short pedicles; they are alternately placed on the stalks, which are villous, streaked, and sustain large flowers, consisting of florets that are divided into segments, five with a pistil cut into three or five small stamina, on which are long apices or heads adhering to each other, and as it were forming a tube. The calyx is scaly, in the shape of a pear, and armed with branched spires, as well as with large leaves in the form of a head, covered with a great deal of down; the leaves are long, streaked, yellowish and downy. The whole plant is remarkably bitter, except the root, which is milder. It is resolvent and strengthening, promotes sweat, and restrains putrefaction. It is good in weaknesses of the stomach, the moist asthma, the hooping cough, the jaundice, and in all cold diseases; but in spotted fevers and the plague, it is not so good as some authors have pretended. It has often cured agues, when used some time before the fit. In chronical diseases, the infusion of the tops may be taken several times a day. The decoction is often used to provoke vomiting, when a former emetic has failed. A slight infusion is excellent in the loss of appetite after hard drinking; and one that is stronger will occasion a plentiful sweat, and promote all the secretions in general. Some give from an ounce to two ounces and upwards of the juice, and a drachm of the seeds in emulsions, which last, with distilled poppy water, has been given with great success against the pleurisy and rheumatism.

CARDUUS MARIÆ, *Ladies Thistle*, has a long, thick, fibrous root, and long, broad, sinuated leaves, crenated on the edges, with many hard, shining, smooth, stiff prickles, of a light green colour, and variegated with lines or stripes of white. The stalks are about as thick as one's finger, streaked, covered with a hairy down, are branched, and two or three cubits high. The flowers grow on the heads of the branches, and consist of many purple tubulous florets, divided into five parts at the top, each of which is placed on an embryo in a scaly prickly calyx. Each embryo turns into a smooth oval seed, a little flattish, and furnished with down. It grows in uncultivated places, and by the way sides. The tender leaves, after the prickles are taken off, are eaten by some as a sallad, and are said to have the same vir-

tues as *carduus benedictus*. The seed is excellent for the pleurisy, rheumatism, and pains of the breast; it is given in emulsions from one drachm to two.

CARYOPHILLUS, *Clove July flowers*, or *Carnations*, have a single fibrous root, with many smooth stalks rising to a cubit in height; they are geniculated, knotty, and branched, with leaves proceeding from every knee, which are narrow like grass, pointed at the end, and of a greenish blue colour. The flowers grow on the top of each branch, and are of different colours, as is well known to all; they have a spicy smell like cloves, and the stamina and apices are white, with a pistil terminating in two or three crooked filaments; the flower cup is scaly at the bottom, denticulated at the top, and membranaceous. The pistil turns to a cylindraceous fruit contained in the calyx, and is full of flat rough seeds, that are black when ripe. There is a great deal of difference, as well in the size and colours of the flowers, as in the number of the petals, which varieties proceed from the difference of their cultivation. They are propagated either from seeds or from layers. The seeds ought to be well chosen, and should be sown in pots or boxes about the middle of April, in fresh light earth, mixed with rotten cow-dung, well incorporated together, covering them about a quarter of an inch thick with the same earth. These should be placed so as to receive the morning sun only till eleven o'clock, and in a month's time they will come up, and be fit for transplantation in the middle of June, into beds of the same sort of earth lying in an open airy situation. They should be planted about three inches square, observing to water and shade them as the season shall require. They may remain thus till the middle of August, and then they should be removed to beds of the like earth, setting them at six inches distant every way, and not above four rows in a bed. When the flowers begin to blow, those that do not break their pods should be reserved to plant in borders, to preserve the seeds; those that burst their buds, and seem to have good properties, should be planted in pots; but you cannot be certain of the value of the flower till the next year. These flowers were formerly greatly esteemed by physicians for their excellent virtues; but they are now of no other use with us but to make syrup, for which purpose the red should be chosen, as they have a pleasant aromatic smell.

CARUUS, *Caraway*, has a single long root, about as thick as one's thumb, with a few fibres, and an acrid aromatic taste. The stalks rise to the height of a cubit, or a cubit and a half, and are smooth, streaked, and branched. The leaves are winged, narrow, conjugated, and cut into small segments, of a dark green colour. The flowers are placed in umbels; are small, rosaceous, and consist of five petals, in the shape of hearts, placed in a ring, and contained in a green cup, with very slender whitish stamina, and green apices or heads. The calyx turns to a fruit, consisting of two small longish seeds, streaked and gibbous on the one side, and on the other plain; they are blackish, acrid, and aromatic. It is sometimes found wild in England in rich moist pastures. There are several sorts, as the *common*, the *large seeded*, the *narrow leaved*, with *asphodel roots*, and the *alpine Caraway*. They are all to be seen in the gardens of the curious, and are cultivated by sowing their seeds in the spring of the year, in a moist rich soil. They should be hoed out to about six inches square, which will greatly strengthen them, and promote their seed plentifully. When the seeds are ripe, in autumn, the plants should be cut, and laid upon mats to dry, after which their seeds may be taken out and kept for use. They are stomachic and diuretic, and numbered among the four greater

hot seeds. They incide gross humours, disperse wind, appease the cholic, and help digestion; but they are bad in very hot constitutions and inflammations. The dose, in powder, is from a scruple to a drachm.

CASTANEA, the *Chestnut-tree*, is large, tall, and full of branches, and sometimes grows to a large size. The wood is solid, durable, and not obnoxious to putrefaction; it crackles in the fire, and has smooth, spotted, blackish bark, inclinable to an ash colour. The leaves are large, being about two inches broad, and four or five long; are thin, rough, wrinkled, and cut on the edges, with many transverse veins on the back, which run from the rib in the middle. The male flowers, or catkins, consist of many stamina, which proceed from a green cup, composed of five leaves, and have yellow heads. They are fixed to a small capillament or axis, and are barren. The outer coat of the fruit is very rough, and prickly, and grows distinct from the flowers. In each husk, or covering, there are two or three kernels or nuts, which are sometimes an inch in length, and of a roundish flat shape. This is the tree that is planted, but there is another sort which grows wild, and differs from the former only in being less in every sense. Chestnuts are of great use in many countries, where they eat them instead of bread, especially in the mountainous parts of France. Some boil them, and others roast them in pans over the fire; but whatever way they are prepared, they are windy and hard of digestion; and consequently seldom agree with any, except laborious working people.

CENTAURIUM MAJUS, the *greater Centaury*, has a thick, solid, heavy root, three feet in length, and blackish without, but reddish within, with a sweetish, astringent, biting taste. The stalks are round, and rise to the height of two or three cubits, with many branches; the leaves are large, and divided into several parts in the form of a wing. The particular leaves, of which they are made up, are near a span in length, and three or four inches broad, not unlike those of walnuts; they are smooth, serrated on the edges, full of nerves, and of a deep green colour. On the tops of the branches there are small heads or flowers, consisting of blue florets, divided into five parts, and placed upon an embryo in a scaly cup, but the scales are without points. The embryo turns to an oblong, smooth seed, furnished with down, like those of *carduus benedictus*. It grows wild among the Alps, from whence it is brought to us; but it is cultivated in gardens, and may be propagated either by sowing the seeds, or parting the roots, the latter of which is most commonly practised in England. The best seasons for this work, are October and February.

CENTAURIUM MINUS, *lesser Centaury*, has a small, white, woody, fibrous root, with a branched angular stalk, about a span in height. Some of the leaves lie on the ground, while others are placed on the stalk by pairs. The flowers grow in clusters on the top of the branches, and consist of single petals, in the shape of a funnel, and are of a beautiful reddish colour. The cup of the flower is composed of five sharp leaves, and a pistil, fixed in the lowest part of the flower, which turns to a membranaceous fruit, half an inch long, of a cylindrick shape, and full of exceeding small seeds. It grows wild upon dry arable land, and chiefly among corn. Both the flowers and leaves are extremely bitter, and the florid tops incide gross humours, strengthen the stomach, help digestion, open obstructions of the viscera, cure the jaundice, and the suppression of the piles. The dose in powder is to a drachm. Outwardly, it is vulnerary, and cures recent wounds, and old ulcers.

CEPA, the *Onion*, is of several kinds, but the

most usual are, the *common Onion*, the *red Spanish Onion*, the *Scallion*, and the *Ciboule*.

CEPA VULGARIS CANDIDA, the *common white Onion*, has a bulbous root, consisting of various coats, the outermost of which are membranaceous, and the innermost fleshy, with many fibres at the bottom. The leaves are long, fistulous, round, and sharp at the points; the stalk is naked, upright, and sometimes rises to the height of two or three cubits, especially in hot countries; this is likewise hollow, swells out in the middle, and the flowers are collected into a spherical head; they are composed of six petals or leaves, in the middle of which are six stamina, and a pistil, which turns into a roundish fruit, divided into three cells, full of roundish black seeds. They are propagated by seed, which should be sown in the beginning of March, on good rich sandy ground; and eight pounds is sufficient for a whole acre of land. About a month or six weeks after sowing, they will be ready to hoe, which should be done with one two inches and a half broad, cutting out, not only the weeds, but the onions, where they are too thick. This is best done in a dry season, and should be repeated twice more, cutting out the weeds as before. Towards the beginning of August, the onions will be at their full growth, which is known by the blades falling to the ground, and shrinking; but before they are quite withered, they should be drawn out, cropping off the extreme part of the blade, and then laying them upon a dry spot, turning them every other day for a fortnight, lest they should take root again. The Spanish onions are much in esteem, but will not long preserve their kind here, without fresh seeds from Spain or Portugal. They are chiefly preserved for the kitchen use, and are eaten raw by some, and roasted by others; but they are generally boiled. They are windy, heating, occasion troublesome dreams, and cause thirst; and therefore are bad for hot constitutions. However, when boiled, and mixed with honey, they are good in disorders of the lungs, arising from a thick clammy phlegm. When roasted, they are used by some to ripen boils.

CEPA ASCALONICA, *Scallions*, consist of several bulbous roots, somewhat larger than a hazel nut, have the taste of common onions; but not so strong nor so disagreeable. The leaves are slender, fistulous, round, smooth, and have the same taste. It is used in the spring, instead of green onions, in some countries, but it is now much neglected here. It is easily propagated, by parting the roots in the autumn, and then they will be ready for use in the spring. They must be planted three or four together, in a hole, at about six inches distant every way, for they multiply exceedingly. They have the same virtues as onions.

CEPULA, *five* CEPA FISSILIS, the *Ciboule*, is intirely like the *Scallion*, only it is larger in every sense, and differs in the acridity of its taste. They are planted for the same use as the former.

CERASUS, the *Cherry-tree*, is of different kinds, as the *red garden Cherry*, the *large Spanish*, the *red heart*, the *white heart*, the *bleeding heart*, the *black*, the *May*, the *black* or *Mozzard*, the *arch-duke*, the *yellow Spanish*, the *Flanders cluster*, the *carnation*, the *large black*, the *rose-flowered*, and the *double-flowered Cherry*; the *common white Cherry*, the *wild northern English*, with late ripe fruit, the *rock* or *perfumed*, the *Cherry-tree with striped leaves*, the *amber*, the *morella*, and the *Hertfordshire duke Cherry*.

CERASUS SATIVA FRUCTU ROTUNDO RUBRO ET ACIDO, the *common red* or *garden Cherry*, is a tree that is neither tall nor strait, which consists of a great many brittle boughs, with a moderately thick trunk, covered with a reddish bark, and the heart is of a blackish colour, but the

sap is whitish. The leaves are large, oblong, shining, and crenated on the edges. The flowers are rosaceous, consisting of several white petals, with stamina of the same colour; the flower cup is divided into five crooked segments, from whence arises a pistil, that turns to a well known fruit with long slender pedicles. It produces a yellowish shining gum, without taste or smell.

The *large Spanish CHERRY* grows on a tree not much unlike the former, but it is not so high, and therefore the sooner bears fruit. The stalk or pedicle is shorter and thicker than in the other kinds. Both these are cooling; and boiled in water, with a little sugar, make a pleasant drink for persons of hot constitutions; but those that have a weak stomach, abounding with acid humours, ought to abstain from them.

Heart CHERRIES are so called from being shaped somewhat like a heart, and the trees have larger leaves than the common sort; for they are somewhat like those of the chestnut tree, and hang downwards. The fruit has a harder and sweeter flesh, and are consequently more wholesome. All sorts of cherries are propagated by budding, or grafting the several kinds into the stocks of the black or wild red Cherries. The stones of these two kinds are sown in beds of light sandy earth in autumn, and when they rise, they must be carefully weeded. They should remain in these nursery-beds till the second autumn after sowing, at which time you should prepare an open spot of good fresh earth, into which you should plant out the young stocks, at three feet distance from row to row, and about a foot asunder in the rows. The second year after they are planted out, they will be fit to bud, if intended for dwarfs; but if for standards, they will not be tall enough till the fourth year; for they should be budded or grafted near six feet from the ground.

CERASUS NIGRA, the black Cherry-tree, is tall, with an upright trunk, and covered with a smooth, spotted, ash coloured bark, that is greenish on the inside. The leaves are oblong, shining, and deeply crenated. The flowers are joined together, as it were in a sheath, with slender, long pedicles or stalks, from which proceed round, small, sweet fruit, with somewhat of bitterness. It is not now kept in the shops; but it is common to steep them in brandy for a dram, which is known by the name of cherry brandy.

CHÆREFOLIUM, Chervil, has a single white fibrous root, with a stalk rising to a cubit and a half high, which is brown, streaked, hollow, geniculated, smooth, and branched. The leaves are like those of hemlock, but less, and they, as well as the pedicles or foot stalks, are of a faint reddish colour, and a little hairy. The flowers grow in umbels on the tops of the stalks, and are rosaceous, consisting of five white unequal petals, in the shape of a heart, with as many white stamina, and a flower cup, that changes into two oblong seeds, gibbous on one side, and flat on the other, which are black when ripe, and in shape like the bill of a bird. It is planted in gardens for sallads, by sowing the seeds in autumn, soon after they are ripe, or very early in the spring. If it be suffered to sow itself, it will thrive better than when cultivated by art. It is said to be inciding, attenuant, and aperient. It promotes urine so much, that Geoffroy takes it to be a specific against the dropsy, and he affirms, if chervil will not cure it, he does not know what will. The juice should be expressed from the fresh herb, or put in an earthen pan, and exposed to a violent heat, after which the juice is to be expressed out. The dose is three or four ounces, every third or fourth hour; or a decoction may be made of it with water, and then five or six ounces is a dose.

CHAMÆDRYS, *Germander*, or *ground Oak*, has fibrous creeping roots, with quadrangular stalks, that are branched and hairy, on which the leaves are set by pairs, and are of a beautiful green; they are half an inch long, and near a quarter broad, with a narrow base, and crenated from the middle to the end. The flowers arise from the places where the leaves join to the stalk, and consist of a purplish, labiated, single leaf; but the upper lip is wanting, and in its place there are crooked stamina, with a forked pistil. The beard, or lower lip, is divided into five parts, and the middle segment, which is largest, is hollow like a spoon, and sometimes divided into five segments, containing four roundish seeds, that proceed from the pistil. Both the leaves and flowers are in use, and grow wild in many parts of England. The leaves are bitter, and a little aromatic; they incide gross humours, restore the tone of the solids, and promote urine and sweat.

CHAMÆMELUM, *Camomile*, has a slender fibrous root, and slender branches, divided into many wings, which are eight inches high or higher. The leaves are slender, and cut into five segments; the flowers grow at the top of the stalks, and are for the most part radiated with white petals, and a yellow disk, which consists of many yellow florets; but the crown is composed of white semi-florets, and placed upon embryos, comprehended in a scaly cup. These turn into slender, oblong, naked seeds. The whole plant has a physical smell, which is not disagreeable. It grows wild in great plenty, on most of the large heaths near London, and is propagated for use, in physic gardens, by parting the roots, and planting them about eight or ten inches distant, every way, for they spread greatly. The proper time is in March, and they thrive best in a poor soil.

CHAMÆMELUM FOETIDUM, *five COTULA FOETIDA*, *stinking Camomile*, has a fibrous root, with round, greenish, brittle, succulent stalks, divided into many wings. It is thicker and higher than common camomile, with larger leaves, of a blackish green colour; but the flowers are much the same. It is easily known by its strong smell. The floret tops, and the leaves of both, are in use, but more particularly the flowers. Common camomile is an excellent carminative, and powerfully discusses wind, curing the cholic proceeding from thence, as well as in the convulsive cholic. They are also good in diseases of the breast, and more particularly in tumours of the stomach, proceeding from a violent heart-burn; as also in pains of the gravel. Externally, they are emollient and discutient, and are excellent in bruises, to disperse coagulated blood. Hence they are used in fomentations, cataplasms, paregoric clisters, uterine injections, and baths. The common method of taking them is as tea.

CHAMÆPITYS, *ground Pine*, has a slender, fibrous, white root, with stalks partly upright, and partly lying on the ground. They are villous, nine inches high, and two leaves proceed from every knot, an inch in length, and are somewhat in shape like those of the pine-tree, from whence it has its name; they are of a yellowish green. The flowers proceed from the places where the leaves join to the stalk, and have only a single petal, and a single lip; they are of a yellowish colour, and the lower lip is divided into three segments, the middlemost of which is parted in two. In the room of the upper lip, there are a few teeth, with stamina, of a light purplish colour. The flower cup is villous, divided into five segments, and contains four triangular brown seeds. The whole herb is in use, and has a pitchy or turpentine smell.

CHAMÆPITYS MOSCHATA, *Musk ground Pine*,

Pine, creeps on the ground like the former, but the stalks are harder. It has the same sort of flower, but of a purple colour, and the seeds are black, curled, and longish. The whole herb is very hairy, with a bitter taste, and a strong resinous smell, with somewhat of the scent of musk. These are numbered among the vulnerary, aperient, cephalic, hysterick, and nervine plants. The dose of the powder is a drachm, either alone, or with that of germander, in red wine; but it may be boiled in whey, when wine is not proper, and the decoction drank every morning.

CHEIRI, the *Wall-flower*, has a flower composed of four yellow petals, which are placed in the form of a cross, and out of the flower cup rises the pistil, which becomes a long flat pod, divided by a partition, into two cells, to which the valves adhere on both sides, and are furnished with smooth round seeds, with borders round their edges. The leaves are green, and acuminate at the end. It grows upon old walls, and flowers in June. They are said to be cordial, to ease pains, and to be good in the apoplexy and palsy.

CHELIDONIUM, *Celandine*, has a fibrous hairy root, and the lower leaves are large, a span long, lobated, of a fine green above, but of a bluish green below, and a little hairy. The lobes are roundish, have ears, and are placed one against another; they have also large veins and incisures. The stalks rise to a cubit in height, and upwards, are knotty, brittle, fistulous, and branched with leaves alternately placed. From the places where they join to the stalks at the top, flowers proceed, with a pedicle, a palm in length, and flowers collected in umbels. The flowers consist of four gold coloured petals, placed in the form of a cross, and the calyx consists of two leaves which soon fall off. The pistil of the flowers turns to a pod, an inch and a half long, which is round, slender, bivalved, and a little wrinkled; it is at first green, afterwards reddish, and pours out black, shining, roundish, flat seeds. The whole plant has a strong smell, and wherever it is wounded, pours out a liquor of a saffron colour, which is acrid and biting. It delights in watery shady places, and may be propagated, by sowing the ripe seeds in any corner of the garden. The colour of the root is red, and it is full of a bitter, acrid, burning juice. Some have given it inwardly to open obstructions, to promote urine and sweat, and to cure the dropsy; but others think it not safe for inward use, for in some cases, an infusion of two ounces of the root has been attended with dreadful symptoms. It is common to rub warts with the juice, to take them away.

CHELIDONIUM MINUS, *Pile-wort*, has a root consisting of tubercles, of the size of a grain of wheat, with many slender whitish fibres, which are pale without, but white within. The stalks rise to a palm in height, are slender, and most of them lie on the ground; the leaves are roundish, smooth, and shining, like those of ivy; and on the top of the stalks there is a rosaceous flower, like a ranunculus, consisting of eight or nine petals of a gold colour, placed in a circle. There are many saffron coloured stamina in the middle, placed in a cup, consisting of three leaves. The pistil is placed in the middle of the flower, and turns to a roundish prickly fruit, of a greenish yellow colour. It grows in meadows, and by the sides of high-ways. The leaves are without acrimony; but the roots are said to cool and moisten. It is looked upon as an antiscorbutic plant, and the fresh leaves are eaten in some places as a sallad.

CICLORIUM, *wild Succory*, has a root a foot in length, and about as thick as a man's thumb, with a few fibres, and full of a milky juice. The stalk is strong, hairy, branched, and grows to a cubit and a

half high, with leaves like those of dandelion, but larger, and they are hairy, and of a dark green colour. The flowers consist of many bluish semi-florets, placed upon an embryo, contained in a calyx, which being contracted, turns to a capsula, full of angular, naked, short seeds. The leaves and roots are bitter, and it not only grows wild, but is planted in gardens, and flowers in June. The fruit, leaves, and flowers, are in use, but the wild is better than the garden succory. Some use it as a sallad, when young. It is accounted good to resolve thick clammy humours, and to strengthen the solid parts, as well as to temperate the hot intemperaries of the viscera; for which reason, it has been given in recent obstructions of the liver, and against the jaundice. The juice taken in large quantities, so as to keep up a gentle diarrhoea, and continued for some weeks, has been found to be excellent against the scurvy, and other chronical disorders. The dose of the juice is four ounces.

CICUTA, *Hemlock*, has a root a foot in length, and as thick as one's finger, and before the stalks are produced, solid, and before they are grown, fungous. The stalk is streaked, fistulous, smooth, and grows to the height of three cubits and upwards; some are greenish, others reddish, and others again spotted like serpents. The winged leaves are cut into many minute segments, and nearly resemble those of parsley, for which it has been often taken white young. The flowers are collected in umbels, on the top of the stalks, and are rosaceous, consisting of five white petals, in the shape of hearts. The calyx turns to a globous fruit, containing two small seeds, gibbous on one side, and streaked on the other; and of a palish green colour. The whole plant has a disagreeable strong smell. We have several histories both of its good and bad effects, which render it probable, it was not the same plant that was eaten. We shall take no notice of the properties ascribed to this plant by Dr. Stork; for, though we greatly admire that gentleman, and believe what he says respecting *Hemlock*, and its effects in Germany, yet we have the mortification to find it does not produce the same effects in England. Outwardly it is sometimes applied to hard and scrophulous tumours, and to reduce the size of women's breasts, when they are grown too large; as also to keep back the milk in those that do not give suck.

CINARA HORTENSIS, the *Artichook*, has a thick strong root, with leaves a foot, or a foot and a half in length, divided into several broad segments, beset with a hairy down. At the top of each branch there is a turbinated head, surrounded with large acuminate scales, which are fleshy, and of a bluish green colour, and are very thick at the bottom. The scaly head or calyx being taken off, there are seen underneath flowers, consisting of many florets, of an elegant greenish purple; which are divided into five parts, and placed upon embryos; each of which turns to an oblong swelling seed, covered with a smooth ash coloured rind, and furnished with long down. The lower part of the cup or placenta, is fleshy, and is the part which is eaten.

CARDONES, the *spiny Artichook*, differs in nothing from the former, but in having prickles at all the corners of the leaves and flower cup.

The manner of propagating the first sort, is from slips or suckers, taken from the old roots in March, which, if planted in a good soil, will produce large fair fruit in the autumn following. The prickly artichook, or chardon, is propagated by seed in the middle of March, which should be sown in an open bed of light rich earth. When the plants appear above ground, they should be carefully weeded, and in dry weather often watered. In the middle of May, they will be fit to transplant into beds of light rich

rich earth, placing them in rows a foot asunder, eight inches distant from each other, observing to water them constantly, till they have taken root. In the beginning of July, they will be strong enough to plant out for good, in a spot of light rich ground, placing them in rows of four feet distant each way, observing to water them constantly as before, till they have taken root. In August they will be fit to tie up with hay bands, in a dry day, bringing the leaves as close together as possible, without bruising them. Then with a spade the earth must be banked up round the plants, leaving about ten inches, or a foot of the tops uncovered, taking care that the earth does not get into the middle. As the plants advance in height, they must be earthed up from time to time; for, if they thrive kindly, they will grow to the height of four feet, and will, when taken up for use, be near three feet, when trimmed of their outer leaves; for the tender branched part is only valuable. This by some is accounted a great delicacy.

Some eat the flesh of the smooth Artichoaks with salt and pepper, they being thought proper to help digestion. As for their physical uses, they are not said to have any, only the roots are commended to promote urine.

CITREUM CITRUM, *five* MALUS MEDICA.

The *Citron tree* is called MALUS MEDICA, because it was first brought into Europe from Media; it is of a moderate height, with a branched spreading root, yellowish without, and whitish within. The trunk is slender, the wood white and hard, and the bark of a pale green. The boughs are numerous, long, slender and tough, and the oldest of them are of a light yellowish green, and armed with pale prickles; but those that are more recent, are of a beautiful green. The tops of the branches are tender, and of a brownish red green, as well as the leaves, which are of the size of those of the walnut-tree, generally blunt, but now and then acuminated, and they are three times as long as they are broad; the lower part is not so green as the upper; and the edges are a little serrated. The tree is always clothed with them, both winter and summer, and when they are held up against the sun, they appear to have holes in them, like St. John's wort, or rather full of transparent specks. The flowers grow on the tops of the branches, and are rosaceous, with fleshy petals, which are generally five in number, and stand almost upright; without they have a reddish blush, but are white within, and placed in a ring. The calyx is small, and divided into five segments, and under the yellow apex there are a great many stamina, and part of the flowers are fruitful, and part barren. Among the stamina there is a longish pistil, the rudiment of the fruit, and those flowers that are without never produce any. The shape of the fruit is oblong, but sometimes globous, and some terminate in a point, while others are blunt; the surface is wrinkled and tuberose, and is often nine inches in length, and upwards. The size is different, as well as the weight; for some weigh six, nine, and even thirty pounds. The outer rind is tough, thin, bitter, and hot, and the colour is at first green, which turns to that of gold, when ripe; the inner or white rind is thick, firm, sweetish, with a little acidity. Within it is divided into several cells, full of an acid juice; the seeds are numerous, for sometimes an hundred and fifty have been found therein; they are oblong, half an inch in length, and sharp at both ends; they are bitter, yellow without, covered with a streaked skin, and contain a double white kernel. In hot countries both flowers and fruit may be seen on the tree at the same time, as well in the spring as the autumn; but they are more plentiful in the last.

CITRONS are not used as an aliment, but as a

No. 36.

saucy, and are cut into small slices, as we do lemons, to garnish the dishes, and to squeeze upon the meat. The acid is very agreeable, excites a weak appetite, and helps digestion, when used moderately. The outward rind, on account of its hardness, is not easy of digestion. It is an excellent remedy against the scurvy, and is a kind of specific to cure that disease, as well as the juice of oranges and lemons; when the gums of patients, afflicted with that disease, are ulcerated, this juice will cure them. The juice is also good in burning and malignant fevers, to quench thirst, and to restrain the heat and effervescence of the blood. Besides, the juice of citrons is diuretic, cleanses the kidneys of small gravel, and restrains vomiting, proceeding from bilious humours. The flowers, as well as the leaves, have an exceeding fine refreshing smell, though they will not prevent contagion on this account, as some pretend. The outer yellow bark has also a very fine aromatic smell, because it has a prodigious number of vesicles full of essential oil. Being chewed, it mends the breath, and by its bitterness strengthens the stomach; it powerfully discusses wind, and concocts crude humours in the stomach and intestines. However, the juice is not good in the pleurisy, inflammation of the lungs, spitting of blood, a consumption, and the like.

MALUS LIMONIA, the *Lemon tree*, is placed here on account of its affinity with the former, and is pretty tall, though not very full of branches; the leaves are like those of the citron tree, but shorter, and the prickles are more numerous, but less, and venomous. The flowers have much the same smell, and the shape of the fruit is likewise oval, but shorter, and not of so deep a yellow. Likewise, the rind is thinner, and they are much more full of juice, which is more acid than that of citrons. Upon which account it is thought to be more cooling, and more efficacious in hot diseases; in short, what has been said of the juice of citrons, may in most respects be applied to this.

COCHLEARIA HORTENSIS, *garden Scurvy-grass*, has a white, thickish, strait, fibrous and hairy root, with many roundish leaves, of a deep green colour, about an inch in length, which are hollow, almost like a spoon; they are thick, full of juice, and placed upon pedicles, a palm in length. The stalks are branched, upright, smooth, a cubit in height, and have leaves that are more jagged than those next the root; they are also longer, and without pedicles. The flowers have four petals, which are white, and in the form of a cross, with a calyx, consisting of four leaves, and a pistil that turns to a membranaceous round fruit, the sixth part of an inch in length, and composed of two cells, full of small, round, reddish seeds. But a distinction ought to be made between the garden and sea scurvy-grass; for the leaves of the former are always roundish, and of the latter sinuous. It is propagated by sowing the seeds at the latter end of July, soon after they are ripe, in a moist shady spot of ground. When the plants are come up, they should be thinned so, as to be left at four inches distance each way, and in the spring they will be fit for use; for those that are suffered to remain will run up to seed in May. They must be sown every year.

This plant has its English name from its virtue in curing the scurvy, against which it is accounted a specific. In some parts of England they brew an ale therewith, which is recommended by many to cure the same distemper. However, it is more effectual when mixed with sorrel, or some such acid herb, because of itself it is too hot, and if used too freely, will produce bad symptoms. The people that inhabit cold countries, are not ignorant of this mixture, for they have learnt by long experience, that scurvy-grass, and sorrel together, make an excellent remedy

remedy against this disease. Scurvy-grafs is not ufeless in other difeases; for it is excellent in recent obstructions of the viscera, in the green sickness, and some sort of asthma; but the dried leaves are not near so valuable as the fresh. The dose of the leaves, in decoction, is from a pugil to a handful, and of the juice from one ounce to three. Externally it is good in scorbutic disorders of the mouth, in the bloody swelling of the gums, and to fasten loose teeth, the gums being rubbed with the juice, or held in the mouth as a gargle.

COLCHICUM, *meadow Saffron*, whose flowers appear, near the beginning of autumn, before there are any leaves. These flowers consist of a single petal, which proceed from the root itself, and are in the form of a very small white tube, divided into six segments. They are somewhat like the florets of saffron; but of a lighter colour, with internal stamina, of a pale yellow, and a pistil arising from the bottom of the flower, and terminating in slender hairs. In a day or two's time they begin to wither; but in the following spring, three or four oblong, broad, smooth, flat leaves, shoot out, like those of the white lily. Between these are seen three or four thick, oblong, triangular bladders, like pods, divided into three cells, which open when they are ripe, and are full of a reddish, black, roundish seed. The root is bulbous, turbinated, but flat on one side, on which is a furrow, when in flower, that does not appear at any other time. It is covered with a blackish coat, and has a few fibres at the bottom. The bulb itself is fleshy, white, and when fresh, it pours out a milky juice as soon as taken out of the ground; but when it is dried, it is blackish without, reddish within, and of a sweetish taste, with a little bitterness. The smell of the whole plant is strong and nauseous. Both antients and moderns agree, that the root is poisonous, and those that eat it feel an itching all over the body, with a biting pain of the internal parts, and of the stomach, with great heat, which afterwards turns to a bloody flux.

CONSOLIDA MAJOR, the *greater Comfrey*, has thick fleshy roots, divided into several parts, black without, but white and clammy within. The stalks grow to the height of a cubit and a half, and are light, hairy, rough, and winged. The leaves are two spans in length, and a palm in breadth; they are of a dark green, rough, hairy, and sharp at the point. The flowers grow at the top of the branches, and are placed in elegant rows, and before they open are rolled up like the tail of a scorpion; they are pendulous, consist of one flower, in the shape of an oblong funnel, and are of a whitish or purplish colour; they are a quarter of an inch in length, and slightly divided into five segments; the cup is also divided into five parts, and has a long pistil of the same colour with the flower, which turns into four seeds, that are black and shining, and resemble vipers heads. It grows wild on the sides of banks and rivers, in several parts of England, and may be propagated by sowing the seed, or parting the roots in autumn, which is best. They should be planted about eighteen inches asunder, that they may have room to spread. The root is only in use, and has the same qualities as that of marsh-mallows. The dose of it in powder, is to a drachm, and in decoction or infusion to an ounce. It is commended in ulcers of the lungs, and other disorders that proceed from the acrimony of the humours.

CORIANDRUM, *Coriander*, has a slender, white, single root, with a few fibres; as also a single, slender, round, smooth stalk, full of pith, that is branched, and rises to the height of a cubit and a half. The lower leaves are broad, and conjugated, but the upper are deeply cut into five segments; the flowers grow in umbles, at the top of the branches, and are rosaceous, and of a whitish pur-

ple colour; they consist of five petals, in the shape of a heart, with a calyx that turns to two seeds, that, when together, make up a whole sphere; they are green at first, but afterwards of a palish yellow. The smell of the whole plant is strong and aromatic; but that of the seeds becomes more mild, and they have a sweet agreeable taste. This plant is propagated by sowing the seeds early in the spring, in an open situation, and in a bed of good fresh earth; when the plants are come up, they should be hoed out to about four inches every way. The seeds have a carminative virtue, and are good against catarrhs, flatulencies, worms, the cachexy, and slight obstructions of the glands. The dose of the seed, in powder, is from a scruple to a drachm.

COTONEA MALUS, the *Quince tree*, is of several kinds; as the *Pear Quince*, the *Apple Quince*, the *Portugal Quince*, the *Quince tree, with oblong, smooth, sweet fruit*, the *Quince tree with lesser oblong, downy fruit, which are not eatable*, and the *common Quince tree, with narrow leaves*.

It is a dwarf tree, with a branched root, and is covered with a brown bark; it is sometimes strait, and has many slender branches on the top. The leaves are roundish pointed, and of the size of those of the apple tree; they are not cut on the edges, and on the lower part they are covered with a soft down, but on the upper they are greenish and smooth. The flowers grow single, and are rosaceous like the wild rose, consisting of five roundish petals, half an inch broad, and of a flesh colour; in the middle there are many purple stamina, with yellow apices, and the flower cup is composed of five greenish, hoary, villous leaves, which, when the fruit is grown, appears at the top thereof. The fruit is of different shapes, which have been above taken notice of; the seeds are in the middle of the quince, and are like those of pears; but they are rendered slippery by a sort of slime that covers them. When quinces are unripe, they are seldom or never eaten, especially raw; but when they are boiled, they are very well liked by some. They are greatly astringent, strengthen the stomach, and may be of some use in all sorts of fluxes. The use of quinces is very well known for the making of marmalade; the seeds are so mucilaginous, that an ounce of them will render three pints of water thick and ropy, like the white of an egg. A spoonful of the marmalade is good in coughs, for it incises clammy phlegm, and causes expectoration; and it is the more valuable, because those that refuse other medicines will take this.

CUCUMIS SATIVUS VULGARIS, the *common Cucumber*, has strait roots, with many white fibres, and thick, long, branched, hairy stalks, creeping on the ground, on which are leaves alternately disposed, a palm or two in breadth, serrated on the edges, and rough to the touch. They are furnished with clasps, and the flowers proceed from the places where the leaves join to the stalks, which are in the form of a bell, divided into five segments, and half an inch in length. They are of a pale yellow, and some are fruitful, others barren; the fruitful have an embryo, which turns to a fruit that is sometimes six inches long, and is extremely well known. The seeds only are in use, and are reckoned among the four greater cold seeds. As for the flesh or pulp, it is unfit for nourishment, and is generally offensive to the stomach, especially if not corrected with a good deal of pepper, as well as vinegar. However, they agree extremely well with some who eat them frequently, without any bad consequence. The seeds are cooling, and sometimes emulsions of them have been prescribed in burning fevers, a fit of the gravel, and heat of urine.

CUCUMIS AGRESTIS, *wild Cucumber*, has a root two or three inches thick, and divided at the bottom into various fibres; it is white, fleshy, and

has a bitterish and nauseous taste. The stalks lie on the ground, and are rough, thick, and furnished with leaves above a palm in length, that are roundish, acuminate, and have ears at the base. The flowers proceed from the hollows where they join to the stalk, and consist of a single petal in the shape of a bell, which is deeply divided into five parts, and is of a yellowish colour with greenish veins. The fruit grows to two inches in length, is in the shape of a cylinder, and covered over with rough studs. It is divided into three cells full of a bitter juice, and when ripe, they pour it out upon the slightest touch in a violent manner with the slippery seeds, which are broad, smooth, and blackish. It grows in the southern parts of France, near the highways and among rubbish, and is also planted in gardens, not only for variety, but for diversion upon the above mentioned account. It may be propagated by sowing the seeds in the spring in an open warm border; and, when the plants are come up, they should be transplanted into an open bed, about six or eight feet distant, because they creep very far. The fruit is ripe in autumn, and the seeds will sow themselves without any farther trouble. Elaterium is made of the juice of the ripe fruit, and is a most violent purge, and particularly evacuates serous humours both upwards and downwards; for which reason some prescribe it in a dropsy, and give half a grain at first, and afterwards from two or three to five; however, it should be exhibited very cautiously.

CUCURBITA, *the Gourd*, has stalks as thick as one's finger, that run along the ground, or climb by the help of clasps; the leaves are round, and are from a foot to a foot and a half broad, and covered with a down, as well as a little crenated at the edges. The flowers proceed from the hollows where the leaves join to the stalk, are white, and in the shape of bells; they are cut into five segments, but so deep that they seem to be so many petals. Some of the flowers are barren, others fruitful, which last have an embryo that turns into a fruit, which is sometimes two yards long; but this is very rare. It has a thick neck and a moderate belly; and, when ripe, has a hard rind, of a yellowish colour, with a white tasteless pulp, or flesh, that is pretty spongy. It is divided into five cells, containing oblong flat seeds, almost an inch in length; but have sometimes a border round them. There are four sorts, namely, the *Long Gourd*, with a soft leaf and a white flower; the *Sickle shaped Gourd*, with a soft leaf and a white flower; the *flat Gourd*, with a soft leaf and a white flower, commonly called *Squashes*; the *bottle shaped Gourd*, with a soft leaf and white flower. There are several other varieties every year brought from America; but the seeds will not produce fruit of the same shape for two years together. They may be all propagated by sowing the seeds on a hot bed; when the plants are come up, they should be removed to a moderate bed; and when they have got four or five leaves, they should be transplanted into holes made upon an old dunghill; but they should be allowed a great deal of room to creep, because some have run forty feet from the holes; and if the side branches were permitted to remain, they would overspread twenty rods of ground. The seeds are numbered among the four greater cold seeds, and emulsions made therewith temperate the acrimony of the urine, and often procure rest.

CUPRESSUS, *the Cypress tree*, is of five kinds, namely, the *common Cypress tree*, the *male spreading Cypress*, the *Virginian Cypress*, with leaves like *Acacia*, that fall off in winter, the *spreading Portugal Cypress* with smaller fruit, and the *American Cypress* with the least fruit, commonly called *white Cedar* in America. The first sort has a strait thick trunk, palish, and sometimes reddish, and a very sweet smell. The male

has a spreading top, but in the female it is collected as it were into a point. It is an ever-green, and the leaves are like those of savine, the shoots being very small, and seemingly covered with scales. The catkins consist of very small leaves, or scales, and under them are apices that pour out an extremely fine powder; the fruit grows on other parts of the tree; this is roundish, and composed of many woody tubercles; and in the clefts between them there are reddish, hard, angular seeds, round at one end and sharp at the other. It is very common in many of the old gardens in England; but at present is not much in request, though for what reason is hard to say. These trees are all propagated from seeds, which should be sown early in the spring, on a bed of warm, dry, sandy earth, fitting the same earth over them to half an inch thick; in a month's time the young plants will appear above ground, and should be often watered in dry weather. In two years time they will be strong enough for transplantation into a nursery, and the best season is the middle of April, in a cloudy day, at the distance of eighteen inches in rows, observing to close the earth well to their roots. They may remain here three or four years; and when they are planted out for good, it should be at the distance of twenty feet every way, taking care not to shake the earth from the roots.

CYANUS, *Blue-bottle*, has a woody fibrous root, and stalks that sometimes rise to the height of a cubit and a half, which are angular, hollow, covered with down, and branched. The lower leaves are sinuated, not much unlike those of dandelion; but the rest are narrow and long, with a single nerve running through the whole length. The flower has a scaly hairy cup, and the disk is almost flat, but the outer florets round the border are large, tubulous, and deeply cut; the inner florets are less, and the colour of them all is generally blue, though sometimes they are of other colours. The first are always barren, but the others are succeeded by a single naked seed. It increases greatly by its creeping root, and is only fit for large borders under trees, or in wildernesses, because it will overspread the plants that grow near it. They are propagated by taking off sets from the old roots, either in spring or autumn, and will grow in any soil or situation.

CYCLAMEN, *Sow-bread*, has a thick, globular, fleshy root, but somewhat flattish, white within, and blackish without. It has a pungent, burning, disagreeable taste, and from it proceed leaves that are almost round, growing on pedicles a palm in length; they are pretty much like those of cuckow-pint, but not so thick, and are of a blackish green above, with white spots; but below they are purplish, and a little sinuated on the edges. The flowers have long tender pedicles, and consist of a single globous petal divided into five or six segments, that turn down almost to the bottom; they are sometimes of a light, and sometimes of a dark purplish colour, with a sweet smell; the pistil is fixed in the hinder part of the flower, like a nail, and when the flower falls off it curls and bends down to the ground, where it turns to a globous membranaceous fruit, full of oblong angular seeds, adhering to a placenta. These being sown always turn to a root, from whence the leaves afterwards proceed; but it does not flower till autumn, and then it is before they have any leaves. There are several sorts, and particularly one with a white flower; they are both propagated by sowing the seeds soon after they are ripe, in tubs of fresh earth, and in four or five years time they will begin to flower. At first the roots are small, and will produce but few flowers; but they will grow to upwards of fourteen inches in diameter, and then they will produce above an hundred flowers. When the root is dried it will lose its acrid taste, and yet it will

will continue to be a violent purge. Country people will take a drachm of it in powder, and half an ounce in decoction; but the internal use of it is not very safe. However, outwardly, it is recommended against hard scirrhus and scrophulous tumours, when applied in the form of a cataplasim.

DAUCUS CRETICUS, *the candy Carrot*, has a long root, about as thick as a man's finger, and has a taste somewhat like a parsnip; the stalk, which is round, streaked, and hairy, grows to the height of about nine inches, on which there are downy ash coloured leaves, divided into narrow segments; however, they are sometimes smooth, and of a blackish green colour. The flowers grow in umbels at the top of the stalks, and are small, rosaceous, and consist of five white petals, whose calyx turns to a fruit composed of two oblong streaked seeds, that are gibbous on one side and flat on the other; they are hairy, and in shape resemble lice.

DENS LEONIS, *Dandelion*, has a root as thick as one's little finger, and the leaves are oblong, acuminate, and lactescent, with deep incisions on the edges like wild fuccory, but are smoother, and lie on the ground. It has no stalk, and the pedicles are naked, fistulous, round, and above a palm in length; though there is sometimes a little hair, which comes readily off; on these the flowers are placed, which consist of many petals that open in the form of a marygold, and are of a yellow colour. The cup of the flower is smooth and divided into many parts, without which there are four or five green leaves that turn backwards; the semi-florets in the middle have each their proper embryo, and turn to a reddish or citron coloured seed, furnished with long hairy down. It is accounted an aperient, and to open the obstructions of the viscera. Boerhaave is of opinion, that, when it is used for a considerable time, it will dissolve almost all kinds of coagulations, and open the most obstinate obstructions of the viscera.

DIGITALIS, *Foxglove*, has many slender fibrous roots, with a stalk that sometimes grows to two cubits in height; it is thick, angular, hairy, reddish, and hollow, with oblong, acuminate, hairy leaves, serrated on the edges, of a blackish green above, and hoary below. Those at the root have long pedicles, and those at the stalks are placed without any regular order. The flowers are disposed in a long spike, and always pendulous, growing on one side of the stalk, with short hairy pedicles; they consist of a single petal, and somewhat resemble the finger of a glove, from whence it has its name; but it is open at the top, and has, as it were, a lip on each side; it is of a purple colour, excepting the lower part, where it is whitish or flesh coloured. In the lower part of the flower there are purple or white crooked stamina, with apices of a saffron colour. The pistil is slender, purplish, fixed in the back part of the flower, like a nail, and turns to a fruit, or pod, which ends in a point and opens in the middle, it being divided into two cells full of small, angular, reddish seeds; the cup of the flower is generally composed of five leaves. This plant is by many thought to be poisonous, and yet there are country people who give it as a purge in agues; but it works very violently. Some recommend it externally against scrophulous swellings, and for that purpose set the flowers in the sun in May butter, in order to extract their virtues, and this is used as an ointment; but it must be continued a long while.

DRACUNCULUS, *five* DRACONTIUM, *Dragons*, or *the many leaved Arum*, has a root that lies deep in the earth, which is almost of an orbicular form, and fills the palm of the hand, with many white capillaments and a yellow rind. The stalk is single, strait, and thicker than one's thumb; it grows to a

cubit and a half high, and is round, smooth, and of several colours, like the skin of a serpent. The leaves have pedicles nine inches in length, and are divided into digitated segments, which are six or seven in number or upwards; they are oblong, narrow, smooth, shining, and there are shafts not so thick as a man's little finger, and at the top there is a vagina, or sheath, a foot long, of an herbaceous colour without, but within of a reddish purple; when it is unfolded, it turns to a flower with a single petal, in shape like an ass's ear, within which there is a blackish, long, thick pistil, bigger than that of arum, and ends in a sharp point; at the base there are a collection of several apices and embryos, each of which turns into a globous juicy berry, disposed like a bunch of grapes, and are all at first green, and afterwards red; they contain a hard seed or two that are somewhat wrinkled. The berries have a hot biting taste. It is cultivated in gardens, and is propagated by the knobby roots, which in two or three years time will afford many off-sets. The best season for transplanting them is in autumn, after the decay of the leaves; they should be set in an open place and in a light soil. The root and leaves have the same virtues as arum, and are said to dissolve gross humours in the lungs and viscera, to open obstructions, and promote urine. The dose of the dried root, in powder, is from one drachm to two. Externally, the root is an excellent remedy against inveterate ulcers; but the fruit is more powerful than the leaves or root.

DRACUNCULUS PRATENSIS, *meadow Dragon*, sometimes grows to three cubits in height, and has a crooked geniculated root, furnished with large long fibres; the stalk is round, smooth, fistulous, slender, and yet pretty stiff. The leaves are placed in no regular order; they are serrated with sharp rough teeth on the edges, and are of a blackish green shining colour, of a hot taste, but milder than pellitory of Spain. The highest part of the shaft is angular, hairy and divided into sprigs, on which are umbellated white radiated flowers, twice or thrice bigger than those of yarrow; their disk consists of several florets set close together, and divided into five segments; but the crown of semi-florets is placed upon embryos in a slender short cup, that afterwards turns to slender seeds; it flowers in July, and the root and leaves have been sometimes in use. The root being eaten is said to purge the head and cure the tooth-ach. Some eat them in fallads.

DRACUNCULUS ESCULENTUS, *Tarragon*, grows to the height of two cubits and upwards. At first the leaves are divided; but when they are full grown, they become like those of flax or hyssop, of a shining blackish green colour. The flowers grow on the top of the branches in bunches, and consist of florets so small that they are hardly visible; however, upon examination, they appear to be tubulous, and divided into five parts at the top, under which are embryos placed in a scaly cup; each embryo turns to a small naked seed. The whole plant is very acrimonious, is aperient, diuretic, and proper to open obstructions; being chewed it provokes spittle like pillitory of Spain. It is mixed with fallads by some to correct the coldness and crudity of other herbs, and because it is good for a cold stomach.

EBULUS, *dwarf Elder*, is somewhat like common elder, but seldom grows so tall as a man; the root is long, fleshy, white, spreading, and of a bitterish, subacid, and nauseous taste; the stalks are herbaceous, angular, streaked, and geniculated, with frequent joints, and are pithy like common alder; the leaves consist of three or four conjugations, with a single leaf at the end; they are longer than the leaves of common alder, as well as sharper, and are serrated on the edges. The flowers are small, grow

in umbels, are white, and consist of a single petal divided into five segments; they have five white stamina, and as many rusty coloured apices; when the flowers are fallen off, the flower cups turn into berries, which are black when ripe, and the juice will colour the fingers purple. It is found wild in some counties of England, but near London is cultivated for use. It multiplies exceeding fast, and, if permitted, will soon over-run a large spot of ground. The off-sets of these roots may be transplanted any time from September to March, and will grow in any soil or situation. The leaves of this plant are bitterish, and the berries very bitter, with somewhat of an astringency. It is a strong purge; but the roots are most powerful as well as its bark. They have been frequently given in the dropsy, but with different success; however, it should not be exhibited at all, except to those that have strong constitutions. The powder of the seeds is given to a drachm; but a rob made of the berries is the most proper to purge off water in dropical patients, and may be exhibited from half an ounce to an ounce.

ENDIVIA, *five* **INDYBUS**, *Endive*, is of three sorts, the *broad leaved* or *common Endive*, the *narrow leaved* or *lesser Endive*, and the *curled* or *Roman Endive*. The first has fibrous roots full of milk, and the leaves spread on the ground before the growing of the stalk. The leaves are like those of lettuce, and now and then crenated on the edges, and a little bitterish: those that grow on the stalk are like those of ivy, but less. The stalk rises sometimes to a cubit and a half in height, and is smooth, streaked, light, and divided into many crooked branches, which pour out a milk when wounded. The flowers and seeds are like those of fuccory. *Narrow leaved Endive* differs only from the former in having more narrow leaves, and a more bitter taste. The *Roman* or *curled Endive*, has leaves that are bigger than those of the common, which are sinuated on the edges; the stalk also is larger, thicker, and more tender, and the seeds are black. The first and second sorts are now disused in kitchen gardens, as being vastly inferior to the curled kinds. The seasons for sowing the seeds are in May, June, and July, at four or five different times; but that which is first sown is very apt to run to seed, especially if the autumn prove warm and dry; however, it is necessary to have a little sown in May for the first crop. They should be sown in an open situation, and in a good rich soil, but not too thick. When they are come up, and grown to about two inches high, they must be transplanted into another good open spot of ground, at about ten inches distant every way, observing to cut off the largest leaves before you plant them, as also to water them constantly every other evening until they have taken fresh root. Some of the largest must be tied up with osier twigs to blanch, which should be done in a dry afternoon. You must first gather up all the inner leaves of the plant regularly into one hand, and then those on the outside that are sound, pulling off all that are rotten and decayed, placing them as near as possible in the natural order of their growth; then tie it up with a twig very close, about two inches below the top, and about a week after go over the plants again, and give them another tie about the middle. This must be done for the two first sowings; but those of the latter sowings should be taken up in a very dry day, and, with a sharp pointed dibble, plant them into the sides of trenches of earth, which are laid very upright, sideways towards the sun, with the tops of the plants only out of the ground, so that the heavy rains may run off, and the plants be kept dry and secured from frost. They will be fit for use in about a month's time, after which they will not keep good long, and therefore fresh ones should be put into the

No. 36.

trenches every fortnight at least, that you may have a constant supply. The blanched leaves are more tender and more agreeable to the palate than the green. They are cooling and aperient, and serve to temperate the heat of the blood and bilious humours. They are good in the jaundice and bilious fevers, and four ounces of the juice is a dose.

ENULA CAMPANA, *Elecampane*, has a thick fleshy root, of a dusky colour without, but white within, with an acrid, bitterish, aromatic taste. The leaves are a cubit in length, and almost a span broad; they are of a pale green above, hoary underneath, crenated on the edges, sharp at both ends, and soft to the touch. The stalks rise to three or four cubits in height, and are strait, villous, streaked, branched, and support radiated gold coloured large flowers, whose florets are hermaphrodites, but the semi-florets are female; the embryoes which are placed on a naked placenta are crowned with down, and are all included in a scaly cup. Elecampane grows wild in moist fields and meadows in several parts of England, and is cultivated in the gardens near London. It may be propagated by seeds, or with the small off-sets furnished with buds at the top. The seeds should be sown in a moist bed of light earth soon after they are ripe, and they generally remain in the ground till the following spring; when the plants appear, they should be weeded and watered in a dry spring; should remain in the bed till the Michaelmas following, and then be transplanted in rows about a foot asunder, and nine inches distant in the rows, making the holes deep enough, and putting the crown of the root just under the surface of the ground; then tread the earth gently about them with your feet. The roots will be fit for use the Michaelmas following. The root is of great use as well recent as dry: it opens obstructions of the glands, helps catarrhs, and has often been found good in atrophies. It is sudorific and diuretic, and has been found of service in feverish disorders. It is likewise good in difficulty of breathing, and the moist asthma. The dose of the fresh root is from half an ounce to an ounce in decoction, and of the dry, in powder, from a drachm to two drachms. It also helps digestion, by restoring the lost tone of the stomach, and by inciding and expelling the impurities contained in the stomach and intestines. For the same reason, it is good in cholic pains proceeding from wind, and cleanses the kidneys. Spirituous liquors extract its virtues much better than the watery.

ERUCA, *Rocket*, has a white, woody, slender root, with hairy stalks that rise to a cubit, or a cubit and a half in height. The leaves are like those of mustard, they being long and narrow, with deep incisions on each side. The flowers at the top of the stalks consist of four petals, in the form of a cross, of a whitish yellow colour, with blackish streaks. The cup is hairy, from whence rises a pistil, that turns into a pod like that of mustard, but longer, with a partition in the middle. It is divided into two cells full of yellow seeds, larger than those of mustard, and not so round. The smell of this plant is strong and disagreeable, as well as the taste. There are several sorts of rocket that are planted in physic gardens, but are of no great use. They may be propagated by sowing their seeds in the spring, on a bed of light earth, where they will soon come up, and will be large enough for use in a short time; when young, they are eaten by some as a salad. This plant is said to excite the appetite and help digestion, to strengthen the stomach, and to promote urine.

ERYSIMUM, *Hedge Mustard*, has a single, white, woody root, about as thick as one's little finger, and the stalks rise to two cubits in height, which are round, firm, rough, and branched. The first leaves

are a palm in length, and are hairy, being divided into several triangular segments, of which the uppermost is the biggest. The flowers are small, and placed in rows on the branches; they consist of four yellow petals, in the form of a cross, with a hairy calyx consisting of four leaves. The pistil is changed into a pod half an inch or longer, which is horned and divided into two cells, containing many small bay hot seeds. It is accounted good in old coughs, the asthma, and other disorders of the lungs; for it not only dissolves viscid matter in the lungs and fauces, but also in the stomach and intestines, whence it is good in cholics proceeding therefrom. The dose of the leaves in decoction is a handful, and of the seeds, which are best, to a drachm. These last are good in a suppression and difficulty of urine; and some esteem them very much for their good effects against the gravel.

ESULA MINOR, *the lesser Spurge*, has a woody fibrous root, about the thickness of the little finger, which has a nauseous, acrid, pungent taste; the stalks grow to a cubit in height, and the leaves are placed very thick thereon; they are at first like those of toad flax, but afterwards grow much more slender and capillaceous. The flowers grow on the top of the branches as it were umbellated, and consist of a single petal, which is in the shape of a flower, and of a greenish colour, but divided into four segments. The pistil changes to a triangular fruit, in which are three cells containing three roundish seeds. The whole plant is full of milk, and grows by the way sides and in woods.

EUPATORIUM CANNABINUM, *Hemp Agrimony*, has a thick crooked root, with many large fibres; the stalks rise to two or three cubits high, and is strait, round, downy, of a purplish green colour; and also full of white pith. The leaves grow thick upon the stalks, and are like those of hemp, they being oblong, acuminate, and serrated on the edges. The flowers are collected into umbels on the top of the branches, and consist of many tubulous florets of a purplish colour, divided into five parts at the top, with long capillaments or double pistils, placed upon an embryo in a long, round, scaly cup. The seeds are pappous, or furnished with a long hairy down. It grows in waters, and in watery places. It is said to be hepatic, aperient, and vulnerary; and the leaves have a very bitter taste, with a great degree of pungency. It is said to be greatly prevalent against the cachexy, and Boerhaave informs us, that it is the constant medicine of the turf-diggers in Holland against scurvies, foul ulcers, and swellings of the feet, to which they are subject. Many drink it like tea several times a day; and others give three ounces of the juice. Externally, the leaves and floret tops boiled in wine are good against watery swellings.

EUPHRASIA, *Eye-bright*, has a single slender root, with a few large fibres; the stalks rise to the height of a palm and a half, and are round, a little hairy, and blackish, with leaves about a quarter of an inch long, that are roundish, smooth, though a little wrinkled, and of a dusky green. They are placed by pairs opposite to each other, without any pedicles. The flowers grow on the top of the branches, and consist of a single whitish petal, streaked with purple and yellow lines, and divided into two lips. The upper lip is upright, cloven, obtuse, crenated, and hides a few stamina; but the lower is divided into three segments, in the shape of hearts. The calyx is divided into four parts, and contains a pistil fixed in the back part of the flower, like a nail, which turns to a fruit or flat capsula a quarter of an inch long, divided into two cells full of exceeding small, oblong, ash coloured seeds. It is common in mountainous and woody places. This plant has been greatly celebrated for curing disorders of the

eyes; but it is not acknowledged at present to have any such virtues. It is said to dissolve the thick gross humours, especially of the brain. The dose of the leaves, in powder, is from one drachm to three, thrice a day.

FABA MAJOR HORTENSIS, *Windsor Beans*, has a root that is partly strait and partly creeping, with a quadrangular stalk, that is light and has several ribs. The conjugation of the leaves are not exact; for there has been sometimes three, four, five, or more, of an oblong roundish shape, that are flat, of a bluish green, veinous and smooth. The flowers proceed from the hollows where the ribs join to the stalk, and, though several of them are together, they have but one pedicle; they are papilionaceous, and are succeeded by a long pod, so well known that it needs no description. There are several sorts of beans, as the *Mazen Bean*, which is the first and best sort of early beans at present known, and are brought from a settlement of the Portuguese on the coast of Africa, near Gibrona. The seeds of this sort are much less than those of a horse-bean, and if they are sown in October, under a warm hedge or wall, and are carefully earthed up as they grow, they will be ready for the table in May. The *early Portugal Bean* differs little from the former, though it is not so well tasted; but is commonly used by gardeners for their first crop. The *small Spanish Bean* will come up soon after the former, and is much sweeter. The *Sandwich Bean* comes up soon after the *Spanish*, and is almost as large as the *Windsor bean*; but, being more hardy, is commonly sown a month sooner. The *Toker Bean* comes up about the same time with the *Sandwich*, and, as it is a great bearer as well as that, it is now much planted. The *white and black blossomed Beans* are in great esteem by some; but all these sorts are very apt to degenerate, if their seeds are not preserved with great care. The *Windsor Bean* is allowed to be the best of all, and is the largest. It is seldom planted before Christmas, because it will not bear the frost so well as any of the former. Those that are planted in October will come up about a month after, and, as soon as they are two inches above ground, the earth should be carefully drawn up with a hoe to the stems; and this must be repeated two or three times, which will protect them against the frost; but, if the winter proves very severe, it will be proper to cover them with pease haulm, fern, or some other light covering, which must be taken off in mild weather. The *Horse Bean* delights in a strong moist soil, that lies quite open; for they never thrive well on dry warm land, or in small inclosures. The season for sowing these beans is from the latter end of February to the beginning of April, according to the nature of the soil.

With regard to the nature and faculty of beans, authors are not agreed; but the common opinion is, that they are windy and hard of digestion. Some have doubted the nourishing quality of beans; but innumerable experiments have established their credit beyond all contradiction. The meal of dried beans is reckoned among one of the four resolvent meals, and is used by some as a cataplasm, boiled in milk, to resolve and suppurate tumours. The water distilled from the flowers is looked upon as a cosmetic, and is still in use, to take away spots on the face.

FILIPENDULA, *Drop-wort*, has a fleshy blackish root, which terminates in several branches or fibres, and near the ends there are knobs, or bulbs, somewhat longer than an olive. There are several leaves that proceed from the root, which are finely cut into narrow segments, and are of a blackish green colour; the stalk is generally single, erect, and about a foot in height. It is streaked, branched, and has but few leaves, and the flowers grow on the top of the

the stalks in umbels; they are rosaceous; consist of six white petals, which are a little reddish on the outside; there are many stamina and red apices, placed in a cup consisting of a single leaf that has a great number of points. The pistil turns into a globous fruit, composed of eleven or twelve rough flat seeds, and are so placed together in a head, resembling a tub. It grows wild in many parts of England, upon heaths and commons. The leaves of drop-wort have an astringent, saltish, glutinous taste; the whole plant is said to incise and attenuate gross humours, and to carry them off by urine. The dose of the root, in powder, is a drachm, and some have looked upon it as a secret to cure the bloody flux, when given in wine or the yolk of an egg.

FOENICULUM VULGARE, *common Fennel*, has a perennial root, and is about as thick as one's finger; it is strait, white, and has a sweetish aromatic taste; the stalk rises to the height of three cubits, which is strait, round, streaked, geniculated, smooth, slender, and covered with a greenish rind; it is full of a spongy white pith, and divided into many twigs towards the top. The pedicles surround the stalk and branches like a sheath, from whence proceed the leaves, that are divided into slender segments, or capillaceous jaggs, of a dark greenish colour, with a sweet taste and smell. It is an umbelliferous plant; for the flowers grow in umbels at the ends of the branches, and are rosaceous, and consist of five yellow petals; the calyx turns to a fruit composed of two oblong thickish seeds, gibbous and streaked on one side, and plain on the other.

FOENICULUM DULCE, *sweet Fennel*, differs little from the former, only the stalk is not so high nor so thick, and the leaves are less; but the seeds are larger, streaked, whitish, more sweet, and less acrid. They are propagated by sowing the seeds soon after they are ripe, and when the plants are come up, they should either be transplanted, or hoed out, to the distance of sixteen or eighteen inches each way. The seeds must not be suffered to shroud on the ground; for then they will overrun every thing that grows near them. The Sweet Fennel is annual, and must be sown in March, in a warm soil and open situation. They should be hoed out at the distance of ten inches from each other, and in August the seeds will be ripe; soon after which the roots will decay. The best seeds are those that are brought from abroad, which are so cheap, that it is not worth cultivating here. These plants are diuretic, aperient, sudorific, stomachic, pectoral, and febrifuge. The root is numbered among the five aperient roots. The powder of the seeds is given from half a drachm to a drachm, with sugar in wine. The whole plant, as well as its seeds, is greatly cried up against dimness of the eye sight, especially for those that have hurt their eyes by reading in the night time; for which purpose the powder of the seeds should be taken every morning fasting with sugar. The essential oil is a great carminative, and from six to twelve drops, on a lump of sugar, are a dose. It is good against the flatulent cholic, and helps digestion. The use of green fennel with fish is very well known.

FOENUM GRÆCUM, *Fenugreek*, has a slender, white, single, woody root, from whence proceeds a stalk, that rises to the height of half a cubit, which is slender, green, hollow, and divided into wings or branches; and there are three leaves growing upon one pedicle, like those of meadow trefoil; they are slightly serrated on the edges, and are sometimes more broad than long; they are green on the upper side, and of an ash colour below. The flowers proceed from the places where the pedicles join to the stalk, and are papilionaceous and whitish, changing to pods a palm, or a palm

and a half in length; they are flattish, a little crooked, narrow and slender, with a long, light, slender, sword-like point; they contain many seeds that are yellowish, and have no very agreeable smell. They have a mucilaginous taste, and the meal made therewith softens, digests, ripens, discusses tumours, and eases pains.

FRAGARIA, the *Strawberry plant*, has a perennial reddish root, consisting of many capillaceous fibres, of an astringent taste. The pedicles are a palm in length, and are slender, hairy, and branched at the top, some of which sustain leaves, and others flowers; there are three leaves on every pedicle that resemble those of cinquefoil, which are veinous, hairy, serrated on the edges, of a greenish colour above, but whiter below. There are four or five flowers upon one pedicle, that are rosaceous, and consist of five whitish petals, with as many short stamina sustaining yellow apices. The pistil is globous, and placed in a cup composed of ten parts or segments. The pistil turns to a globous fruit, which when ripe is red, though sometimes whitish, and is very well known. It grows wild in shady places, and is cultivated in gardens. They are of several sorts, as the *common*, or *wood Strawberry*; the *common Strawberry with white fruit*; the *Hautboy*; the *Virginian Strawberry with scarlet fruit*; the *large Chili Strawberry*; the *globe Hautboy*; and the *Strawberry with a small greenish white fruit*. The first and second sorts are found wild in the woods, from whence they are transplanted into gardens, where the fruit is improved, the best season for which is early in the spring, if the weather proves moderate. The best soil for these plants is fresh loam, not over rich, and the ground should be well dug. It should be made quite level, and marked out into beds about three feet and a half wide, leaving a path between each bed two feet broad. In these beds may be planted four rows, and the plants should be at least eight inches asunder in the rows, when they are designed for the wood strawberry, for the others will require more room. If it is a dry spring, they should be well watered, otherwise there will be no fruit; and the beds must be well weeded from time to time. They will not continue to bear well above three years. Strawberries are cooling, quench thirst, loosen the belly, promote urine, and expel small gravel. They should be eaten with cream, because with milk they curdle upon the stomach. The roots and leaves are diuretic and aperient, for which reason they are recommended by some in obstructions of the viscera, and the jaundice.

FUNGUS CAMPESTRIS ESCULENTUS VULGATISSIMUS, the *common esculent Mushroom*, when it first appears is globous, after which it expands by little and little, and underneath there are reddish plates placed near together all round; on the upper part it is smooth and white; the flesh is extremely white, and it has a short thick pedicle. The smell and taste are good when it first appears out of the earth, and it should be gathered before it is expanded; for when it is older, it has a stronger smell, and is of a brownish colour. It grows almost every where in woods and pasture grounds after rain. They have now a method of cultivating it in gardens; in order for which some are to be sought for in August and September, and having found them you must open the ground about the roots, where you will often find the earth full of small white knobs, which are off-sets, or young mushrooms. These should be carefully gathered, preserving them in lumps with the earth about them. The beds to receive this spawn should be made with dung, in which there is plenty of salts. These beds should be made on dry ground, and the dung should be laid upon the surface; the breadth should be two feet and a half from the bottom, and

the length in proportion to the quantity of mushroom desired. The dung should be a foot thick, and covered with about four inches of strong earth; then lay more dung ten inches thick; and then another layer of earth, still contracting the sides of the bed so as to form it like the ridge of a house. This done, it should be covered with litter, or old thatch, to keep out the wet, and to prevent its drying. It must remain thus eight or ten days, and the spawn, which should be always kept dry till it is used, should be thrust into the bed after the covering is taken off, and another of earth put on, about an inch thick. It should be laid in lumps two or three inches asunder, and then covered with the same light earth half an inch thick, over which the litter must be laid again to keep out the wet. The spring and autumn are the best seasons for this purpose; for then the mushrooms will appear in about a month. The bed will continue good for several months, and produce great quantities of mushrooms; and they will likewise supply you with fresh spawn, which must be laid up in a dry place till the proper season.

GALEGA, *Goats Rue*, has slender, woody, white, fibrous, perennial roots, and stalks that rise to the height of two cubits and upwards, which are light, streaked, and divided into several branches. The leaves are winged like those of vetches, and there is always a single one at the end; but they are longer and terminate in a soft thorn. The flowers are of the papilionaceous kind, and are white, or of a whitish purple colour. It consists of the standard, the wings, and the keel; and the pistil becomes a long taper pod, containing oblong seeds, in the shape of a kidney. It grows wild in Italy, but with us is cultivated in gardens. This may be propagated either from the seeds, or by parting of their roots. The best season for sowing the seeds is in the beginning of March, in a light soil, and in an open situation; when the plants are come up, they should be well weeded, and, if they are too close, some of them should be pulled up, leaving the rest at eight or nine inches distant from each other. The next year these plants will flower, and produce ripe seeds. The roots may be parted into small heads, in order for their increase in autumn. It is accounted a great alexipharmic, and has been commended in pestilential fevers, and for the epilepsy in children. The herb may be eaten either crude or boiled, or a spoonful of the juice may be given for a dose. Some look upon this herb as a great preservative against the plague, and likewise affirm it to be good to kill worms.

GALEOPSIS, *dead Nettle*, or *stinking dead Nettle*, has a creeping root, with slender fibres proceeding from the joints; the stalks rise to the height of a cubit, or a cubit and a half, and are square, hairy, light, and branched. The leaves are placed by pairs opposite to each other, and are somewhat broader than the common nettle, but sharp at the points, and serrated on the edges; they are covered with a sort of down, and on the tops of the stalks and branches there are spikes of flowers, which consist of a single petal, which is labiated, and the upper lip is hollow like a spoon; but the under one is divided into three segments, of which the middlemost is the largest; the stamina, as well as the flower, are of a purple colour, with a strong disagreeable smell. The cup of the flower is in the shape of a funnel, divided into five parts, the pistil is fixed to the back part of the flower like a nail, and is attended with four embryoes, that turn to as many oblong seeds, which when ripe are black. It is said to be vulnerary, and that when the fresh leaves are bruised and laid upon old ulcers it will heal them in a short time.

GALEOPSIS ANGUSTIFOLIA FŒTIDA;

narrow leaved stinking dead Nettle, differs very little from the former in either form or virtues.

GALLIUM LUTEUM, *Ladies Bed-straw*, or *Cheese Rennet*, has a small, creeping, slender, woody, brown root, from which square stalks proceed to a cubit in height. The leaves are placed at the joints of the stalk, in a radiated form, and are five or six in number; they are long, narrow, slender, soft, and of a darkish green colour. From every joint proceed two branches, on which are flowers consisting of a single petal, in the form of a bell, which is expanded towards the upper part, and divided into four segments. The calyx turns to fruit composed of two dry roundish seeds. Some of the modern physicians commend it against the epilepsy, and give a drachm of the powder for a dose. of the juice four ounces, and a handful in decoction.

GENISTA, *Broom*, is a shrub that sometimes grows to be as tall as a man; the root is hard, woody, tough, yellow, and furnished with crooked fibres. The stalks are slender, woody, and many twigs proceed from them, that are angular, green, tough, and about them there are small, hairy, dark green leaves, sometimes growing three together, and sometimes single. The flowers that grow thereon are of a beautiful yellow, and papilionaceous, with crooked stamina, and saffron coloured apices; to which succeed flat broad pods, which are blackish when ripe, and full of flat, hard, reddish seeds in the shape of a kidney. It grows in barren grounds all over England. There are several sorts of these plants cultivated in gardens, and they may be propagated by seeds, which should be sown on a moderate hot bed in the spring; as soon as the plants are strong enough to remove, they should each be set in a pot filled with light earth, and it will be safest to plunge the tender kinds of them into a very temperate hot bed, where they should be shaded till they have taken root; then they should be inured to the open air by degrees; but in winter they should be placed in a good green-house, and in mild weather they should have as much free air as possible. Several of them are useful in dying, and therefore they have the name of dyers weeds. Common broom is intensely bitter, and the leaves; tops, and branches, decocted in wine or water, are useful in dropsies, and in all obstructions of the kidneys and bladder; for they partly purge off the serous humours by stool, and partly by urine. A drachm and a half of the seeds will purge very briskly, and sometimes vomit. In some places they mix the flowers with sallads, without any bad effects.

GERANIUM SANGUINEUM, *bloody Cranes bill*, has a red thick root, and many long thickish appendages, with a few fibres, and every year new shoots proceed from the roots. It has several stalks that arise to a cubit in height, that are reddish, hairy, geniculated, and divided into many wings. A pair of leaves proceed from every knot, which are divided into several parts, and are hairy and green above, but hoary below; there are oblong pedicles that proceed from their upper wings, which sustain a single flower, and is the largest of any that belong to this kind of plants; it is of a beautiful red colour, composed of five petals of the same colour, and ten small stamina, that are supported by five hairy, greenish, small leaves. The bill is in the shape of a pentagon, and contains swelling tailed seeds, which are thrown out by the twisting of the bill. There is another Geranium, called *Geranium Batrachoides*, *Crow-foot Cranes-bill with a blue flower*, which has all the characters of the former, except the colour. Bloody cranes-bill is styptic, and has been used in vulnerary decoctions, or broths. Doves foot cranes-bill

bill has the same virtues as the former, and a syrup made of the juice is commended against the bloody flux.

GROSSULARIA, *the common Gooseberry*, is a shrub; and has a woody root; it is sometimes two cubits high or higher, and is full of branches; with a bark, when full grown, of a purplish colour, and there are long sharp thorns at the rise of the leaves, two or three of which are placed together. These have short pedicles, and are of the breadth of a man's nail, or somewhat broader, and are lacinated or jagged. The flowers are small, and several of them proceed together from the same tubercle as the leaves, and have a very short, hairy, reddish pedicle; they are rosaceous, consisting of five petals of an herbaceous whitish colour, with a calyx consisting of a single leaf in the shape of a basin, and divided into five reddish segments bending downwards, with five stamina and a greenish pistil. The hinder part of the calyx turns into a globous berry universally known. There are several sorts of gooseberries, besides this, cultivated in gardens, as the *large manured Gooseberry*, the *red hairy*, the *large white Dutch*, the *large amber*, the *large green*, the *large red*, the *yellow leaved*, and the *striped leaved Gooseberry*. These are propagated by suckers taken from the old plants, or by cuttings, which is best. The best season for planting them is in autumn, just before their leaves begin to fall, always taking the handsomest shoots, that proceed from branches that bear the greatest quantity of fruit. They should be six or eight inches long, and planted in a border of light earth, about three inches deep, and exposed to the morning sun, observing to water them a little when the weather proves dry; when they begin to grow, the under shoots should be rubbed off, leaving only the uppermost and strongest. In October following, these plants will be fit to remove to an open spot of fresh earth, in which place they may remain for a year, and all the lateral shoots should be taken off, so as to leave the stem clear about a foot above the surface of the earth. In a year's time they may be removed to the place where they are to remain. The best season for transplanting them is in October. As to their physical virtues, nothing need to be said about them, they being only eaten for pleasure, or used to make gooseberry wine.

HEDERA TERRESTIS, *Ground Ivy*, has a creeping fibrous root, with slender, quadrangular, reddish, hairy stalks, on which the leaves are placed by pairs on long pedicles; they are roundish, an inch broad, hairy, and crenated; the flowers grow on the top of the stalks, and consist of a labiated single petal. The upper lip is divided into two segments, that turn back to the sides, and the lower into four segments, and the tube is variegated within with deep purple spots and lines, and the opening of the mouth is covered with a sort of white down. The pistil is slender and forked, and the calyx is oblong, narrow, streaked, and divided on the edges into five short segments, which, when the flower decays, has a swelling belly, containing four oblong, roundish, smooth seeds. The whole plant is opening, cleansing, discutient and vulnerary. It is excellent for wounds and ulcers of the viscera, and is good in the beginning of a consumption. The dose of the tops, reduced to powder, is from half a drachm to a drachm twice a day. It is also good against the gravel as well as the cholic. Ray affirms, that the powder, snuffed up the nose, will cure a violent headache. It is common about London to infuse the dried leaves in malt liquor, and then it goes by the name of gill-ale.

HEDERA ARBOREA, *common Ivy*, is well known in most parts of England, and sometimes grows very large, forming a sort of a tree; at other times fastening itself to trees, walls, houses, and churches. It

No. 36.

sends forth roots or fibres from its branches, by which it fastens itself to whatever is near it, from which it receives a great part of its nourishment; the leaves are angular, and the flowers consist of six leaves, that are succeeded by black berries, which grow in round bunches, each of which contains four seeds. The leaves are said to be heating, drying, and subastringent; but are seldom given inwardly, because they are offensive to the nerves. The berries purge upwards and downwards, and the leaves applied to corns will take them away in a short time. The gum has been treated of in the former part.

HELIANTHEMUM TUBEROSUM, *five HE-*
LIANTHEMUM INDICUM TUBEROSUM,
the Potatoe plant. One stalk or more rises from each root, which is green, streaked, rough, hairy, and attains the length of twelve feet or upwards, full of a white spongy pith. The leaves are many, placed in no order, and from the bottom to the top; are greenish, rough, broad, and acuminate like those of the common sun-flower, but not so much wrinkled nor so broad. The stalks soon after their rise are branched, and the leaves decrease in size from the bottom to the top. The flowers grow on the top of the stalks, and are of the size of marygolds, and radiated. The disk consists of many yellow florets, with a crown composed of twelve or thirteen streaked pointed gold coloured semi-florets, placed on embryos in a scaly villous cup. The embryos turn into small seeds, and the stalk emits several slender creeping roots, that spread themselves on all sides, between which there are many tuberose roots, sometimes adhering to the chief root, and sometimes connected to long fibres a foot distant from them. One root will produce thirty, forty, fifty, or more potatoes. These are reddish or whitish without, and consist of a whitish substance, or flesh, with a sweetish taste, and are often bigger than a man's fist. They continue in the ground all the winter, and the next year they spring again. This plant has been greatly propagated in England for more than fifty years past; for, though it was brought from America in 1623, it was not much cultivated before, because they were then thought only fit for poor people; but now they are in general esteem. It is propagated here by the roots, which if large are cut into pieces, preserving a bud or eye in each; but the best method is to plant the finest roots entire, allowing them a pretty large space of ground between the rows, as also each root, and then those that are produced will be large the following autumn. A light sandy loam is best, if not too dry or moist; it should be well ploughed two or three times, and the deeper the better. They are very nourishing, abate the acrimony of the blood and juices, and are consequently good in disorders of the breast. Some people in France eat them raw with salt and pepper.

HERNIARIA GLABRA, *smooth Rupture-wort*, and HERNIARIA HIRSHUTA, *hairy Rupture-wort*, are both small herbs that lie on the ground, and are divided into several branches that proceed from a small root, which descends directly downwards; the stalks are round, reddish, and full of joints, at each of which there are very small leaves, placed in pairs opposite to each other, less than those of dodder, and of a yellowish green colour. From the same joints there proceed many flowers that are small, yellowish or white, without petals; but there are many stamina. The pistil turns into a very shining small black seed, contained in an oblong streaked capsula, that was the calyx of the flower. It is a very mild astringent, and is likely to be of some service in a flaccid state of the viscera. The dose of this herb, in powder, is a drachm; and, when a handful of the herb is steeped in a pint of

wine

wine or water, five or six ounces may be given at a time.

HORMINUM, *Clary*, has a single, woody, brown root, with many fibres, from whence arises a stalk to the height of two cubits, about as thick as one's finger, quadrangular, hairy, geniculated, and divided into branches; it is full of a white pith, and the leaves are set by pairs opposite to each other, which are hoary, wrinkled, of a roundish oblong shape, a span in length, and half a span broad, terminating in a point, and a little dentated or crenated on the edges; they are a little hairy, and gradually decrease in size from the bottom to the top. The flowers proceed from the places where they join the stalk, and consist of a labiated single petal, whose upper lip is long and falcated, with a slender crooked pistil, cloven at the top, and attended with four embryos; there are two stamina with oblong apices, that are hid thereby; but the lower lip is divided into three segments, the middlemost of which is hollow like a spoon. The calyx is tubulated, streaked, glutinous to the touch, and divided into five small spines, whereof three arise above the flower, and the other two are below. The embryos at the bottom of the calyx, when they are ripe, turn to four large roundish seeds, gibbous on one side, angular on the other, slippery, and bright, and of a reddish colour. It is found dry on many banks in various parts of England; but there are many other sorts that are cultivated in gardens. The leaves and flowers are given in decoction in water and wine, in some cases peculiar to women. It is usually drank as tea.

HYOSCYAMUS NIGER VULGARIS, *black Henbane*, has a thick, wrinkled, long root, divided into many parts, brown without, and white within, with broad, soft, hairy leaves, of a light green colour, and deeply cut on the edges; they are placed in an irregular order, or branched, thick, roundish, hairy stalks, that arise to a cubit in height. There are long rows of flowers on the stalk, that consist of a single petal in the shape of a funnel, with a short cylindraceous tube, and is divided into five obtuse segments, of a yellowish colour on the edges with purplish veins; but the middle is of a blackish purple, with five short purple stamina, and thick oblong apices; the pistil is long and white, with a round apex, and the calyx is hairy, oblong, and consists of a single leaf, having stiff acuminate teeth on the edges, of which there are five in number; this turns to a fruit in the shape of a pot with a cover to it, and is divided into two cells, containing several ash coloured, small, roundish, wrinkled, flat seeds. The whole plant has a disagreeable smell, that renders the head heavy and produces sleepiness. It is very common in England, growing on the sides of banks and old dunghills every where.

HYOSCYAMUS ALBUS, *white Henbane*, differs from the former in having softer and lesser leaves, covered with a greater plenty of white down, as also whiter seeds. They have been only used externally to ease pains, and to abate the acrimony of the humours; however, it is not safe used any way, for it produces extreme sleepiness, and strange fantastical dreams.

HYPERICUM, *St. John's-wort*, has a woody, fibrous, yellowish root, with many stiff, woody, round, reddish, branched stalks, that rise to the height of a cubit or higher; the leaves are placed thereon by pairs opposite to each other, but without pedicles; they are above half an inch long, a quarter of an inch broad, smooth, and with nerves that run throughout the whole length; when they are held up to the sun, they seem to be perforated with a great number of holes, which are nothing else but vesicles full of an oily juice. The flowers grow on the extremities of the branches, and are rosaceous, consisting of five gold coloured petals, in the mid-

dle of which there are a great number of capillary stamina, with golden apices. The cup is composed of five leaves, contains a thick pistil divided into three parts, and placed in the center of the flower; turns to a capsula divided into three cells, containing very small, oblong, brownish black seeds. Both the flowers, and the head full of seeds, when rubbed, yield a red juice. The leaves have a saltish, bitterish, styptic taste, and the whole plant is accounted the principal of the vulnerary kind; for which reason it is recommended to cure wounds both inwardly and outwardly, as well as for spitting and pissing of blood. The dose of the floret tops, in decoction or infusion, is a handful, and sometimes the leaves and seeds are prescribed to a drachm. *St. John's-wort*, applied outwardly, is an excellent vulnerary, and cures wounds, bruises, and ulcers.

HYSSOPUS, *Hyssop*, has a woody, hard, fibrous root, about as thick as one's finger, with stalks that grow to the height of a cubit, which are branched and brittle. The leaves are placed by pairs opposite to each other, and are from an inch to an inch and a half in length, and only a sixth part of an inch broad. They are sharp, smooth, of a dusky green, with an acrid taste, and a sweet smell. The flowers grow at the tops of the stalks, and are large, blue, labiated, and consist of a single petal, whose upper lip is upright, roundish, and divided into two segments, and the lower into three; the middlemost of which is hollowed like a spoon, having a double part, and is somewhat winged. There are four oblong blue stamina, with small dark blue apices. The flower cup is long, streaked, and divided into six segments, from which the pistil arises, fixed in the back part of the flower like a nail, attended with four embryos, which turn into as many small, roundish, brown seeds, contained in a capsula that was the cup of the flower. Hyssop is propagated either by seeds or cuttings, and must be sown in March, on a bed of light sandy soil, and when they are come up they should be transplanted out to the places where they are to remain, placing them at least a foot asunder every way. The cuttings should be planted in April, or May, on a border where they may be defended from the violent heat of the sun, and being frequently watered they will take root in two months, after which they may be transplanted where they are to continue. Hyssop has an acrid taste, and a strong aromatic smell. It strengthens the stomach, helps digestion, incides viscid mucus of the lungs, and promotes expectoration: whence some account it a specific in the moist asthma. It is given in infusion, or decoction, in water, wine, or ale, from half a handful to a handful and a half.

JASMIMUM, *the Jessamine tree*, has a pinnated leaf, and the cup of the flower consists of a single leaf divided into five segments; the flower also consists of a single leaf, in the shape of a funnel, and divided into five segments, with small apices; the embryo is roundish, with a pistil like a thread, of the length of the stamina, with a double apex. The embryo turns to an oval smooth berry, divided into two cells, in each of which there is a large oblong oval seed, wrapped up in a membrane, convex on one side, and flat on the other. It is very common in most English gardens, where it is cultivated for the sweetness of the flowers, and is propagated by laying down the tender branches in the spring. In the succeeding spring, they will be rooted strong enough to be transplanted; and it must be placed against a wall, or pales, where the flexible branches may be supported. It was formerly in some esteem for its medicinal virtues, but is now out of use.

IBERIS, *Sciatica Cresses*, whose flower consists of four unequal parts, that are vertically oval, blunt, and open, with oblong erect heels, of which the outer ones are by far the greatest, and the innermost least

and

and bent back. The flower cup has four leaves, vertically oval, concave, open, small, equal, and soon fall off; the stamina are six subulated erect filaments, of which the two lateral are the shortest, and the apices are roundish. The germen, or embryo, is roundish and flat, and the stile, or pistil, single and short, with a blunt apex, and turns to a small roundish flat pod, consisting of two cells, in each of which there is an oval seed. It has the same virtues as water cresses, and, when bruised together with salt and hog's-lard, makes an excellent cataplasm against the hyp-gout. It is only to be met with in botanic gardens.

JUGLANS, *the Walnut-tree*, is very large, and stands upon many very long roots. The trunk, or stem, is very thick, infomuch that in some countries it is three cubits in circumference, with many branches at the top. The bark is thick, of a greenish ash colour, and smooth; but, when it grows old, is full of chinks. The wood is well known for making or covering curious cabinets, chests of drawers, and the like, and is greatly esteemed for its beautiful variegations. The leaves are disposed in wings, and there are five, six, or seven adhering to one rib, consisting of conjugations, with a single leaf at the end. At first they are tender, reddish, and have a sweet smell; but, when they are full grown, they are a palm and a half in length, and almost a palm broad, and pointed at both ends, with veins that run from the middle nerve, and are smooth, of a beautiful green, with the smell of laurel, but much stronger, and of an astringent taste. The smell of the walnut is at first pulpy and white, and of a bitter acrid taste; but, as it ripens, it becomes woody, and divides into two parts, in which is a kernel with four lobes, and covered with a thin skin. The taste is sweet and agreeable when fresh; but, when dry, it becomes oily and rancid. The skin is bitter, acrid, and when the kernels are fresh may be easily taken off. Walnuts are of different species, as the *largest Walnut*, the *thin shelled*, the *hard shelled*, the *late ripe*, the *black Virginia*, the *black Virginia with long fruit*, the *Hickary*, the *shag bark*, the *small Hickary* or *white Virginia*, and the *least Virginia Walnut*. The four first sorts are propagated every where in England, and the first and second are preferred for their large nuts. The Virginian sorts are only rarities, but are worth cultivating for their timber. All sorts of walnuts, that are propagated for timber, should be sown in places where they are to remain, but such as are designed to produce good fruit, are greatly mended by transplantation. The nuts should be preserved in their outer covers till February, when they should be planted in lines at the distance they are intended to remain. When these trees are transplanted, neither the roots nor branches should be pruned. The best season for this is as soon as the leaves begin to decay, and this may be done till they are eight or ten years old. They delight in a firm, rich, loamy soil, or such as is inclinable to chalk or marl. They should be placed forty feet asunder, when any regard is had to the fruit; but, when for timber, they must stand near each other, because it promotes their upright growth.

The inner bark of the Walnut tree is a strong vomit, but the catkins are more gentle, and have been given in powder from half a drachm to a drachm. Some account the leaves an excellent cataplasm against the gout, when they are placed while green in a glazed earthen vessel one layer upon another. The juice of the root is a violent purge, unless it proceeds from the wounded root in February, and then it is recommended in chronic diseases, especially in the gout, gravel, and head-ach; for it greatly promotes urine. The green outer rind is astringent, and is said by some, when recent, to have an emetic faculty. The kernels are best while

fresh, because when old they grow rancid, as was before observed. The membrane, or pith, powdered and given to a drachm, is good in the cholic, and by some esteemed as a secret against fluxes of the belly.

JUNIPERIS, *the Juniper tree*, is a shrub well known in all parts of Europe, and grows in woods and mountainous places. The stem rises sometimes to the height of a man, but is slender, and has many branches, with a rough reddish bark. The wood is pretty firm and reddish, especially when it is dry, with an agreeable resinous smell. The leaves are very sharp, exceeding narrow, and seldom above an inch in length, but often shorter; they are stiff, pungent, always green, and several of them grow together, with some distance between. The catkins appear in April and May, in the places where the leaves join to the stalk, and are a quarter of an inch long, variegated with purple and saffron colours; they consist of several scales, whose lower part is furnished with three or four vesicles, less than poppy seeds, which are full of a fine golden coloured powder. This is the male flower, but the cup of the female flower is very small, adhering to the embryo, and divided into three parts, and there are three stiff sharp petals. The pistil is divided into three single styles, with each a single apex; and they turn to a fleshy roundish berry, containing three seeds each, convex on one side and angular on the other. Some trees produce only the male or female flowers and others both. The berries do not grow ripe till the second year, and there are some that are three years old. The berries are resolving, discutient, attenuating, heating, abstergent, and strengthening. They are good in a cold stomach, discuss wind, help digestion, promote urine, and ease the pains of the cholic. They are likewise good against coughs, and in the moist asthma; they restore the fluidity of the blood, and promote sweat. The dose is a drachm, which may be either eaten, or their infusion may be drank in the manner of tea, before meals, to help digestion. Many will eat a pugil at a time, without any manner of harm, and found they have not only brought away gravel but small stones.

LACTUCA SATIVA NON CAPITATA, *common garden Lettuce*, has a long thick root with many fibres, and oblong, broad, wrinkled, smooth, palish green leaves, which are very agreeable while young, but bitterish when old. When it shoots up to a stalk, it is strong, thick, round, and grows to the height of a cubit and a half and upwards. The flowers are collected in a sort of umbel, and the flower cup is imbricated, consists of many acuminate scales, and is of an oblong oval shape. The flowers consist of many yellow semi-florets, with five very short capillary filaments, on which are cylindrical tubulated apices. The pistil is like a thread of the length of the stamina, on which are two apices bent backwards, to which succeed small seeds, sharp at both ends, furnished with down, and of an ash colour.

LACTUCA SATIVA CAPITATA, *Cabbage Lettuce*, has shorter and broader leaves than the former, which are soon collected into a round head; the seeds are like the former but black. Besides these, there are the *Silicia Lettuce*, the *Dutch brown*, the *Aleppo*, the *imperial*, the *green capuchin*, the *upright white Cos*, the *black Cos*, the *white Cos*, the *red Capuchin*, the *Roman*, the *prince*, the *royal*, and the *Egyptian Cos Lettuce*. The first of these is commonly sown for cutting very young, with other small salad herbs. They may be sown any time in the year, but in winter it should be under glasses. The *Cabbage Lettuce* may be also sown at different times of the year, particularly in February for the first crop, in an open warm spot of ground, and when they

they are come up they should be thinned to the distance of ten inches every way. The seeds, that are sown for the succeeding crop, should be in a shady moist situation, but not under trees. Those for the last crop should be sown in August, on a good light soil, and in a warm situation. In the beginning of October, they should be transplanted into warm borders, where, if the winter is not very severe, they will stand very well. Most of the other sorts may be sown in March, upon a warm light soil, and in an open situation, and afterwards in April, May, and June; and in August, those that are intended for the winter, which should be transplanted either under glasses, or in beds arched over with hoops, in order to be covered over in the winter.

The *Roman Lettuce* has longer and narrower leaves than the two first, and not so wrinkled, and underneath, on the sides of the rib, there are small prickles. Some, as these lettuces grow, tie the leaves together, by which means they become exceeding white and tender; and then they are thought by many to excel all other kinds. In general lettuces are easy of digestion, abate the acrimony of the humours, and quench thirst; for which reason they are frequently used in the summer season. Many take them to be anodyne, and to procure sleep, which is done not by any narcotic quality, but by relaxing the fibres, and temperating the heat of the viscera. They are good in dry constitutions, and help those that are costive.

LAPATHUM MAJUS, *five* RHABBARBARUM MONACHORUM, *Monks Rhubarb*, has a long thick root, from which proceed many fibres, and is brown without, but within of a deep saffron colour. The stalk, which sometimes rises to the height of a man, is reddish, streaked, and divided into many branches at the top; the leaves are from a foot to a foot and a half long, and are broad, acuminate, firm, smooth, of a darkish green, but not hard and stiff; the edges are sometimes a little turned up, but they are even, and have long pedicles. The flowers grow in long rows on the stalks, and are like those of sorrel, to which succeed angular seeds contained in membranaceous cells, and are like those of the dock; they are said to purge bile gently, to be a powerful astringent, and to open obstructions of the liver; whence the powder or decoction is given in some fluxes of the belly. The dose, in powder, is from a drachm to half an ounce, when it is designed to purge.

LAPATHUM SANGUINEUM, *Blood-wort*, is not unlike the garden dock, but may be easily distinguished from all other docks by its blood-red juice, and by its numerous nerves; the juice first tinges the hands with a purple colour, which afterwards changes to blue. The leaves are eaten by some after they are boiled, and have likewise been prescribed in emollient and cooling broths. The seed is strengthening, astringent, and anodyne, and the powder of them is given from half a drachm to a drachm to stop uterine fluxes, and those of the belly attended with gripes.

LAPATHUM ROTUNDIFOLIUM, *five* LAPATHUM MONTANUM, *bastard Monks Rhubarb*, has a long branched root, and each of the branches are as thick as a man's thumb; they are wrinkled and fibrous, and of a deep yellow, with a bitter taste. The stalk sometimes rises to three cubits high, and is hollow, furrowed, reddish, and has many wings. The leaves are like those of burdock, and are remarkably round, smooth, and of a yellowish green, with a reddish streaked pedicle. There are several flowers placed upon the stalks, consisting of many yellow stamina and apices, with a calyx composed of six leaves, to which succeed triangular reddish seeds. The root is variegated with yellow and red, like true rhubarb, and some pretend it has the same virtues, but weaker. Its dose, in powder, is to two

drachms. When the roots are taken fresh out of the ground, and dried in the shade, they are used in fomentations, liniments, and ointments against diseases of the skin.

LAPATHUM AQUATICUM, *five* HYDROLAPATHUM, *great water Dock*, has a more fibrous root than the former, which is black without, and of the colour of box within. The stalks rise to the height of two or three cubits, and the flowers and seeds are like the former, but larger; the leaves are broad, long, and somewhat like those of monks rhubarb; but are almost a cubit and a half in length, terminating in a sharp point, with the edges slightly curled. It grows in marshy places, and by the sides of ditches. The leaves of this plant are styptic and bitterish, and the taste of the root is very bitter. The root is a laxative, opens obstructions of the viscera, and is good in diseases of the skin. The fresh root is given from an ounce to two ounces in decoction, and in substance, when dry, from a drachm to two drachms.

LAPATHUM SPINACIA DICTUM, *Spinage*, of which there are three kinds, the *common Spinage*, the *common barren Spinage*, and the *common Spinage with a capsula of the seed not prickly*.

The *common Spinage*, or the *common prickly narrow leaved Spinage*, has a slender, white, single root, with a few fibres, and the stalks, which rise to the height of a foot, are fistulous, round, streaked, divided into wings, and have long pedicles. The leaves at the bottom are sometimes jagged on both sides, with sharp points; but those on the top have only two processes, like ears at the base, with a fine sort of meal thereon. The flowers are placed on the stalks from the middle to the top, and are without petals; but they have many stamina and small herbaceous, or purplish small apices, placed in a cup, consisting of four leaves. Those that arise from the wings of the leaves, or the female plants, have no petals, but only greenish embryoes, with four whitish filaments; that turn to a pretty large fruit, or capsula, with prickles adhering thereto. It is planted in gardens.

Common smooth seeded Spinage, with broader leaves, has much larger leaves than the male and barren or female kinds, and are also rounder, and the capsula of the seeds is quite smooth and of an ash colour. These are common kitchen herbs throughout Europe. In general, they are said to temperate acrid bilious humours in the first passages; but, as they are watery, some correct them with salt, pepper, and other spices. They do not yield much nourishment, but are not unwholesome, and generally keep the body open. The seeds of the male and barren kinds should be sown in an open spot of ground in the beginning of August, when it is likely to rain; when the plants are come up, they should be thinned, leaving them three or four inches asunder; and this should always be done in dry weather. In October they will be fit for use, and then you should only crop off the largest leaves, leaving those in the center of the plants to grow bigger. Thus you may continue cropping it all the winter and spring, till the young spinage, sown in the spring, is large enough for use, which is commonly in April. The other sort is likewise to be sown in an open spot of ground. The plants should be left about three inches asunder, and, when they are grown large enough to meet, part may be taken up for use, that so the plants, being thinned, may have room to spread; this may be repeated twice, and at the last, they should be eight or ten inches asunder.

LAVANDULA, LATIFOLIA; *greater, or broad leaved Lavender*, has a woody root divided into fibres, and the plant consists of many thick, slender, quadrangular, geniculated branches, that rise to the height of a cubit and a half, or two cubits. The

lower leaves are thickly placed, and irregular; but the upper are set by pairs alternately, and are fleshy, hoary, and oblong, with a nerve running along the middle; as also a strong agreeable smell, and a bitterish taste. It is a verticillated plant, and the flowers grow on the tops of the branches in spikes, which are blue, labiated, and consist of a single petal; the upper lip is upright, roundish, and cloven into two parts, and the lower into three, that are almost equal. The calyx is oblong and narrow, and from it rises a pistil fixed in the back part of the flower like a nail, and attended with four embryoes, that turn to as many seeds, contained in a capsula, that was the cup of the flower.

LAVANDULA ANGUSTIFOLIA, *narrow leaved Lavender*, is in all respects like the former, only it is less, shorter, and the leaves are lesser, narrower, and not so long or white, nor is the smell so strong; but the flowers are larger. Sometimes they both vary in having white flowers. They are propagated by cuttings or slips, and the best season is in the latter end of March, when they should be planted in a shady situation; or at least be shaded with mats till they have taken root; after which they may be exposed to the sun, and, when they are strong enough, may be removed to the places where they are designed to remain. They delight in a dry gravelly soil, where they will endure our severest winters. Lavender is cephalic, nervous, and uterine; for by its aromatic, subtile, acrid particles, it stimulates the nervous fibres to an oscillation, and restores their tone; it dissolves thick humours, and renders them fit for motion. It is good in catarrhs, the apoplexy, palsy, spasms, the vertigo, lethargy, and trembling of the limbs. The dose of the flowers, or seeds, is from a scruple to a drachm; or the infusion may be drank in the same manner as tea. The dose of the conserve of the flowers is half an ounce, and of the essential oil, from two drops to six, on sugar.

LAUREOLA MAS, *Spurge Laurel*, has a tough, thick, long, woody root, divided into several branches, with several ash coloured or whitish stems, rising to the height of two cubits, with leaves like those of laurel, but less, or somewhat like those of myrtle, they are blackish, thick, smooth, shining, and pointed at both ends, and are thickish near the ends of the branches. It is an ever-green, and the flowers that grow on the top, are of a greenish yellow, consisting of a single petal, that is fibrous on the back part, but before divided into four acuminate segments; there is no cup, but there is a pistil that turns to a berry, in the shape of an olive, though much less. It is at first green, but black when ripe, and contains a hard oblong seed, full of a white pulp. The leaves, fruit, and bark, are very acrimonious, biting the tongue, as it were setting them on fire.

LAURUS VULGARIS, the *Bay-tree*, in hot countries, grows to a considerable height, and has a smooth trunk without knobs, and long branches; the leaves are long, sharp, hard, nervous, smooth, but have little juice, though they have a fine smell, and an acrid, bitter, astringent taste. The flower consists of a single petal, shaped like a funnel, and divided into four or five segments. The male flowers, which are produced on separate trees from the female, have eight stamina, which are branched into arms; and the embryo of the female flowers becomes a berry, inclosing a single seed within a horny shell, which is covered with a skin. Besides this, there are several sorts of Bay-trees, that are cultivated in gardens, most of which have been lately brought from distant countries. They are propagated either from the seeds, or by laying down the tender branches, which will take root in a year's time, and may then be taken

No. 37.

off, and transplanted into a nursery, or the places where they design to remain. The leaves are aromatic, bitterish, with somewhat of an astringency, and they are heating, resolvent, strengthen the stomach, help digestion, and discuss wind; for these purposes, the infusion may be drank as tea, or the powder may be given to a drachm. The berries are more heating than the leaves, and two scruples in infusion is a dose; but their principal use in the present practice is in clysters, and the leaves as a fomentation.

LEPIDIUM LATIFOLIUM, *common broad Dittander, or pepper wort*, has a white root, as thick as one's finger, that creeps in the ground, and has an acrid hot taste, that immediately vanishes. It has several stalks, two cubits in height, that are round, smooth, branched, and full of pith; it is covered with a blueish meal, which may be easily wiped off. The leaves are long, broad pointed, and like those of the citron-tree, but larger and softer, of a darkish green, and serrated on the edges. The flowers grow on the tops of the branches, and are small in proportion to the size of the plant; they consist of four petals, placed in the form of a cross; and the pistil, that rises out of the calyx, turns into a very small flat fruit, with a sharp point, and a partition in the middle, that divides into two cells, full of small, oblong, red seeds. The whole plant has an acrid taste, and grows wild in some parts of England; but it is generally cultivated in gardens for use. It is easily propagated, by planting small bits of the root, either in spring or autumn; but it should be placed in some corner of the garden, because the root will spread and over-run the ground. This plant incides gross humours, opens obstructions of the liver and spleen, and is accounted by some a great antiscorbutic. When the leaves are eaten fasting in the morning, they excite the appetite, and help digestion.

LEVISTICUM, *Lovage*, has a large fleshy root, blackish without, and white within, and the stalks often rise to the height of a man; these are thick, light, streaked, and divided into many branches. The leaves are like those of parsley, but larger every way, and they are smooth, shining, of a dark green colour, with a strong smell. The flowers grow in umbels on the tops of the branches, and are roseaceous, consisting of five yellow petals, or upwards. The calyx turns to a fruit, composed of two oblong, thick seeds, gibbous and streaked on one side, and on the other flat, and of a dirty colour. Lovage is said to be alexipharmic, carminative, diuretic, urine, and vulnerary. It strengthens the stomach, helps digestion, discusses wind, attenuates gross humours, eases pains of the cholic, and is good in the asthma. It is looked upon as a specific against the jaundice, especially when it proceeds from a clammy bile. The dose of the root, in powder, is from half a drachm to a drachm, and of the seed from a scruple to half a drachm.

LIGUSTRUM, *Privet*, is a shrub divided into a great number of branches, covered with an ash coloured bark, and the wood is whitish and hard. The leaves grow by pairs opposite to each other, and are oblong, and narrow like those of willow; but they are shorter, thicker, smooth, shining, and of a blackish-green colour. The flowers grow on the top in bunches, and consist of a single petal in the shape of a funnel, divided on the top into five segments. They are white, have a sweet smell, and in the middle there are placed yellowish green apices, with a green pistil that turns to a soft and almost globous berry, of the size of juniper berries, and are blackish when ripe, and full of juice. They contain generally four globous seeds, with a bay coloured skin, and a whitish pulp. It is com-

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mon in hedges in most parts of England, and generally grows to about eight or ten feet high. The leaves are bitter and styptic, and therefore they, as well as the flowers, are recommended by some against hæmorrhages.

LILIUM ALBUM, the *white Lily*, has a bulbous root, consisting of several fleshy scales, united together, and fixed to an axis, under which there are many fibres; the stalk is upright, and sometimes rises to the height of a cubit and a half; it is single, brown, and at the bottom there are oblong, broadish, fleshy, smooth leaves, without a pedicle, of a shining light green colour, but towards the top they become gradually less and narrow, and, if they are rubbed between the fingers, they have a smell like boiled mutton. There are several flowers placed on the top, that do not grow at the same time; they are composed of six leaves, in shape somewhat like a bell, and in the middle there is a longish pistil terminating in three points, of a greenish white colour; the stamina are also six in number, and of the same colour with the petals, with apices of a saffron colour. The pistil turns to an oblong triangular fruit, divided into three cells full of reddish seeds with borders, and lie upon each other in a double row. They are cultivated in gardens for the sake of their beauty and sweet smell. There are many other kinds of lilies, all which may be propagated by sowing their seeds in square boxes about six inches deep, with holes at the bottom, and filled with light, fresh, sandy earth. They are to be sown soon after they are ripe, pretty thick, and must be covered with light sifted earth about half an inch; then the boxes are to be placed where they have the morning sun only, and must be watered in dry weather. They must continue thus till October, when they must be removed to places where they may have as much sun as possible, and yet screened from the north and east winds during the winter; but in the spring, about the middle of April, they must be removed to their former position; for then the young plants will appear above ground. Here they must remain till August, when they must be taken out of the boxes with the earth, and planted in beds of fresh light earth; that is, the small bulbs, together with the earth, must be strewed over the beds, covering them about half an inch thick with fine sifted earth, observing to water them in hot and dry seasons. They must be shaded in the middle of the day, and refreshed now and then with water. In the spring, when the hard frosts are over, the surface of the beds must be cleared, and a little fresh earth sifted thereon; but this should not be deferred too long, lest the shoots should be coming up and broken by this means. When the leaves are decayed, you should stir the surface of the beds again, to prevent the weeds from growing, and in September you must sift some more fresh earth, to the thickness of half an inch. In September following, they will require to be transplanted to a greater distance in moist weather.

The flowers are used in emollient cataplasms, and the oil made by insolation is of common use in pains and tumours of all kinds. The roots are also in great request for softening and ripening tumours, and are particularly recommended for burns and bruises, when roasted under the ashes.

LILIUM CONVALIUM, *Lily of the Valley*, has a slender, white, fibrous root, creeping near the top of the ground, and produces two or three leaves, a palm and a half in length, two inches broad, shining, of a light green, nervous, and terminating in a point; among these the stalk arises to a span in height, which is slender, angular, naked, and from the middle of which, and at the top, there proceeds a long series of flowers, growing

at some distance from each other, but almost all looking the same way; they have very short pendulous pedicles, and consist of a single white petal, in the shape of a bell, divided into six segments, with as many stamina, of a greenish yellow, and adhering to the bottom; the pistil is triangular, and turns to a spherical, soft, red fruit, full of pulp, and three hard, horny, bitterish seeds. The flowers only are in use, which have a very pleasant agreeable smell. It increases very fast by its creeping roots, for which reason it may be propagated in great plenty, by parting the roots in October; they must be planted in a shady situation, and in a moist soil, placing them near a foot asunder. The flowers have a bitterish taste, and when dried, powdered, and snuffed up the nose, they occasion sneezing. It is accounted a cephalic nervous remedy, and to be good in all diseases of the head and nerves. The dose of the powder is a drachm, and of the conserve half an ounce.

LINUM VULGARE, *common Flax*, has a slender root, with a few fibres, and a round stalk, that is generally single, light, smooth, and grows to the height of a cubit, or a cubit and a half. The leaves are acuminate, of the breadth of a straw, and about two inches long; they are alternately placed on the stalk, and are soft and smooth. The flowers grow on the tops of the branches, on slender longish pedicles, and are of a blue colour; they consist of five petals, and when expanded, are in the shape of a clove gilly-flower. The flower cup is tubulous, consisting of a single leaf, and is divided into five parts at the top. The pistil, which rises from the center of the flower cup, turns into a globous fruit, that is slightly acuminate, and is composed of several cells, opening inward, full of flattish oval seeds, blunt at one end, and sharp at the other; they are smooth, shining, and of a yellowish purple colour. It is cultivated for use in many parts of Europe, and is accounted, with good management, a very advantageous plant. The seeds are mucilaginous, abate the acrimony of the fluids, and are greatly recommended against heat of urine. The expressed oil loosens the belly, appeases coughs, and promotes expectoration; it is accounted a specific against the pleurisy, when given from two to four ounces every fourth or sixth hour; but it must be fresh, and have a sweet taste. Externally it is emollient, and relaxes the contractions of the tendons. It is called linseed oil, and its use in painting is very well known.

LITHOSPERMUM, *Cromwell*, has a woody fibrous root, about as thick as one's thumb, with upright, stiff, round, rough, branched stalks, that rise to a cubit and a half in length; there are many leaves, placed alternately, that are two or three inches long, sharp, rough, without pedicles, and of a blackish green colour. The flowers proceed from the places where the leaves join to the stalk, and consist of a single white petal, in the form of a funnel, divided into five blunt segments, with a hairy calyx, consisting of a single leaf, cut almost to the bottom in five narrow hairy segments; the pistil is green, and attended with four embryoes, that turn to as many roundish, hard, smooth, shining seeds, of the colour and shape of small pearls. It grows in shady lanes, and uncultivated places, in various parts of England. The seed is accounted a great diuretic, and a gentle anodyne; for which reason it is recommended to promote urine, and expel gravel. The dose is to two drachms.

LUJULA, *wood Sorrel*, is a low plant, with a thickish, scaly, reddish, white root, from whence proceed weak, slender, brown pedicles, a palm in length, on which are three leaves, that are thin, broader than long, smooth, in the shape of a heart, and of a pale green colour. Among these there

there are other pedicles, each sustaining a single flower, that consists of one petal, in the shape of a bell, and divided into five segments; it is white, open, transparent, and the calyx is divided into five parts, with a pistil fixed in the lowest part of the flower like a nail, that turns to a cylindraceous five cornered fruit, divided into five cells, containing shining reddish seeds, which, when ripe, burst out with violence. It grows in most parts of England, and has much the same virtues as common sorrel. It quenches thirst, mitigates heat, and resolves viscid blood; whence it is said to cool the liver, and is accounted a good antiscorbutic. The dose of the juice is an ounce.

LUPINUS, FLORE ALBO, *the white Lupine*, has a single, woody, fibrous root, and a stalk that rises to a cubit and a half in height, which is pretty thick, upright, round, a little downy, and full of pith. The flowers, which grow on the top, are papilionaceous, and appear in spikes at the top of the branches, on short pedicles. The pistil, which rises from the calyx, turns to a thick, broad, flat pod, three inches long, with a yellowish colour, and a little hairy on the outside, but smooth within, and contains pretty large, roundish, flat seeds, white without, but yellowish within, and very bitter. The leaves are irregularly placed on pedicles, two or three inches long, and consist generally of seven oblong, narrow segments, proceeding from the same point of the pedicle, like those of cinque-foil. Lupines are used externally, in decoctions, against diseases of the skin; and their meal is mixed in cataplasms, being reckoned among the four resolvent meals.

LUPULUS, *the Hop-plant*, has a creeping root, with such weak stalks, that they could not support themselves without twisting about whatever is near them; they are exceeding long, rough, angular, hairy, and hollow; the leaves proceed from the stalks by pairs, and are placed over against each other; they are like those of the mulberry-tree, and terminate in points; they are generally divided into three, and sometimes into five segments, and are serrated on the edges. That sort, which bears flowers, has no seeds, and that, which has seeds, has no stamina. The male flowers consists of a calyx divided into five parts, and surrounds the stamina, but there are no petals; the flowers of the female plants are collected into scaly heads, which grow in bunches, and have some resemblance to pine-apples; they are composed of several membranaceous loose scales, of a yellowish green colour, and adhere to a common axis; the seeds are small, flat, and red, and have the smell of garlick. The people that cultivate hops reckon three varieties, as the *long square garlick Hop*, *the long white Hop*, and *the oval Hop*, all which are cultivated in England, and particularly in Kent, where they account new land best for their growth. The first shoots of hops, or rather their heads, are commonly called hop-tops, and are by some accounted not inferior to asparagus. They gently loosen the belly, and are good in obstructions of the viscera; as for the use of hops, it is very well known throughout the world, it being brewed in malt liquors, to prevent their growing sour.

MAJORANA, *sweet Marjoram*, has slender roots, and the stalks rise to a palm in height, and upwards; they are slender, woody, often square, a little hairy, and reddish, about which the leaves are placed opposite to each other. It is a very verticillated plant, and the flowers grow on the tops of the branches, and consist of a single, labiated, whitish petal, whose upper lip is upright, roundish, and divided into two parts, and the lower into three. The flowers are collected into thick, short, round heads, and proceed from a four-fold order of leaves, placed like scales. It is cultivated in gardens, and is an

annual plant; for which reason the seeds must be sown every year, which are brought from the southern parts of France, where it grows wild. They must be sown in the beginning of April, in a dry warm spot of ground, and in June the plants will be strong enough to be removed into beds of rich light earth, where they are to be placed four inches distant from each other; they will flower in the beginning of August, and then is the time to pull them up for medicinal use.

MAJORANA TENUIFOLIA, *gentle Marjoram*, differs only from the former, in having more slender, and fragrant leaves. They both consist of fine oleous, aromatic, active particles, and are used as pot herbs, and sometimes in salads, to promote digestion, and to discuss wind. They attenuate gross viscid humours, excite the sluggish, languid oscillations of the fibres, and open the pores of the brain and nerves, upon which account it is good in cold diseases of the head, and trembling of the joints. A scruple, or half a drachm of the powder, mixed with a proper conserve, and taken every morning, has been greatly commended in the epilepsy; it is also an ingredient of the cephalic snuffs, because it is said to purge the head.

MALVA VULGARIS, *common Mallows*, has a single white root, with a few fibres, and a stalk that rises to a cubit and a half in height, and upwards; many of these proceed from the same root, and are round, hairy, branched, and full of pith. The leaves grow single about the stalk on long pedicles, and are roundish and jagged on the edges, with a little down, are of a blackish green colour, and crenated on the edges. The flowers proceed from the places where the pedicles of the leaves join to the stalk; they are large, in the shape of a bell, and consist of a single petal, divided into five segments, in the shape of hearts; they are purplish, and streaked with deep purple lines, but are sometimes variegated with white. From the bottom of the flower proceeds a tube, in the shape of a pyramid, on which are purplish stamina. It has a double calyx, the innermost of which is divided into five parts, and the outermost into three. The pistil arises from the bottom of the calyx; it is placed in the tube, and turns to a flat round cake, somewhat in the form of a cheese; for which reason they are commonly called cheese-cakes by children. They contain a great number of seeds, in the shape of kidneys, which are disposed round an axis, in such a manner, that they appear to be very artificially jointed. *Mallows* were formerly used for food; but is now only in request on account of its medicinal virtues, for it is an emollient, and abates the sharpness of urine. It is also used in emollient cataplasms.

MALUS SATIVA, *the Apple-tree*, grows to a considerable size, and the branches are spreading, but more depressed than those of the pear-tree. The flowers consist of five leaves, which expand in the form of a rose, with yellow apices in the middle, and a green calyx, divided into five parts, which turns to a fleshy roundish fruit, generally umbilicated at each end; however, they are of different sizes and shapes, according to their different kinds, which are generally so well known, that they need no description. The first apple which is brought to market is the codlin, and the next is the margaret-apple, which is not so long as the codlin, and the side next the sun changes to a faint red when ripe; but the other side is of a pale green. This fruit is firm, and has a pleasant taste, but does not keep long. The summer pearmain is an oblong fruit, striped with red next the sun, and the flesh is soft, and grows mealy in a short time. The Kentish fill-basket is of a large size, is of a somewhat longer shape than a codlin, and ripens a little later. Loan's pearmain is a beautiful fruit, and of a fine red next the sun; the flesh is vinous, but soon grows mealy.

The QUINCE APPLE is of the size of a golden pippin, but shaped like a quince, especially towards the stalk; the side next the sun is of a russet colour, but the other side is inclining to yellow. It is an excellent apple, but will not keep above three weeks in September. The golden rennet ripens about Michaelmas, and continues to be a good fruit about a month. The aromatic pippin is of the size of a nonpareil, but a little longer, and the side next the sun is of a bright russet colour. It ripens in October. The winter pearmain is rather long than round, of a fine red next the sun, and striped with the same colour on the other side; the flesh is juicy, but it is not a good eating apple. The Kentish pippin is large and handsome, and of a pale green colour. It is a very good kitchen fruit, and will keep till February. The Holland pippin is larger than the former and of a darker green. It will keep longer than the former. The monstrous rennet is very large, of an oblong shape, reddish towards the sun, and of a dark green elsewhere; it is of no great value. The embroidered apple is pretty large, with red broad stripes, from whence it has its name; it is a tolerable kitchen apple. The royal russet is of a deep russet colour, and is large, and of an oblong shape, but broad towards the base, and the flesh is a little yellowish. It will continue good from October to April, and is the best of all kitchen apples. Wheeler's russet is of a light russet colour next the sun, and of a pale yellow on the other side. The size is middling, the flesh firm, and has a quick, tartish taste; it will keep a long while. Pile's russet is oval, and of a russet colour next the sun, but of a dark green on the other side; it is a good baking apple, and will keep sound till April. The nonpareil is very well known, but there is another apple generally sold for it, that is a larger fruit, and more inclining to yellow. It is ripe earlier, sooner gone, and is not so flat as the true nonpareil; which last is not ripe before Christmas, and will keep good till May. The golden pippin is peculiar to England, for it will not succeed well in other countries. It is an excellent apple, and would be still better, if proper care was taken in its cultivation. There are a great many other sorts of apples, which have no particular names, except such as serve for making cyder; the redstreak, the whitfour, the Hertfordshire under leaf, the John apple, the everlasting hanger, and the gennet moil. They are all propagated by grafting or budding upon stocks of the same kind. Apples in general are used for eating and baking; but, as for their medicinal virtues, they are scarcely worth mentioning, though they are said to temperate the bile, and to be good in fevers to allay thirst. Some pretend they are excellent pectorals, and will appease coughs; but this may be doubted.

MALUS GRANATA, *five* PUNICA, *the Pomegranate*, is a low tree, or rather a shrub, with slender angular branches, beset with long thorns or prickles. The leaves are like those of the myrtle tree, or olive, only not so sharp, and are of a shining green, with reddish pedicles and veins. The flowers are rosaceous, consisting of five petals of a red or scarlet colour, in the middle of which there are many stamina, with their apices, and the calyx is also red, above an inch long, in the form of a bell, and divided into five pointed jaggs, which, after it is turned to a fruit, are placed round the navel at the top. Pomegranates are of various sizes, some being as big as large apples. The rind is pretty thick, hard, and brittle; before it is ripe it is green, and smooth, but afterwards reddish and wrinkled, and last of all it becomes of a bay colour, and yellowish within, with an astringent taste; it is full of seeds disposed in various cells, and the pulp has a sweetish vinous flavour; though it is sometimes acid. There are several kinds, as the common pomegranate, the

sweet, the wild, the double flowered, and the American double pomegranate. The first and second of these are hardy enough to resist the severest cold of our climate, in the open air; and, if planted against warm walls, the first sort will often produce fruit, which in warm seasons will ripen tolerably well; but they are seldom well tasted in England. These plants may be easily propagated, by laying down their branches in the spring, which in one year's time will take good root, and may then be transplanted where they design to remain; and the best season for this is the spring, just before they begin to shoot. The flowers always proceed from the extremity of the branches which are produced the same year, for which reason all the weak branches of the former year should be cut out, and the stronger should be lengthened according to their strength. The best time for this is the beginning of October.

MALICORIUM, *or the rind of the Pomegranate*, has a bitterish austere taste, is very astringent, and will supply the place of oak bark, for tanning of leather, as well as of galls for the making of ink. It is good in a diarrhoea, and all fluxes of the belly whatever, as well as in hemorrhages. It strengthens the tone of the parts, and sometimes proves an aperient as well as an astringent. The dose, in powder, is from half a drachm to a drachm, and in decoction to half an ounce.

BALAUSTIA, *Balaustines*, are the flowers of all sorts of pomegranates, with their flower-cups; but those of the double sort are generally chosen, because they are large, and have a great number of petals. The cup is not so long as in the first sort; it is however more flat and broad, and the colour is of a yellow purple. They are astringent, but not so much as the rind, and therefore they have been in frequent use in all sorts of fluxes whatever; but they are seldom met with in extemporaneous prescriptions, though often in shop medicines. The dose, in powder, is to a drachm, and to half an ounce in decoction.

MALUS PERSICA VULGARIS, *the common Peach tree*, rises to a moderate height, and has a pretty thick stem, with many brittle branches, and a reddish and brownish bark. The leaves are thin, oblong, acuminate, crenated, and like those of the almond tree; but larger, and have a bitter taste, like those of peach kernels, though not so pleasant. The flowers appear in the beginning of the spring, before the leaves, and without pedicles; for they adhere to the tubercles of the branches, and are rosaceous, consisting of five broad petals, of a light reddish colour, and in the middle there are many longish stamina, that are either purple or white, with a pistil of the same length, that proceeds from a reddish calyx, divided into five acute segments, and turns to a fruit that is almost globous, though a little flattish on one side, and is furrowed according to the length, and covered with a thick, soft, whitish down, in many of the species; but some are smooth, of a yellowish herbaceous colour, and these are commonly called Nectarines, which contain a woody, oblong, oval stone, consisting of two valves, deeply furrowed, and the pulp in some adhere very obstinately thereto, but in others it readily parts from it. When the bark is wounded, a gum will proceed from it like the plumb tree gum.

Some Peach trees are cultivated for the beauty of their flowers, as the peach tree with double flowers, the dwarf peach tree with single flowers, and the double flowering dwarf peach tree, though some place these two last among the almonds. The peach trees, that are cultivated for their fruit, are the white nutmeg peach, which has serrated leaves, and large open flowers, but the fruit is small and white, as is also the pulp at the stone, from which

it easily parts. It is esteemed for being the soonest ripe.

The *early purple* PEACH TREE has leaves even at the edges, and the flowers are large and open; the fruit is large, round, and of a fine red colour, and the flesh is white except at the stone, where it is very red. It is full of juice of a rich vinous flavour, and is an excellent peach; it is ripe towards the latter end of August.

The *large French Mignon* PEACH TREE has leaves that are even at the edges, and the flowers are large and open; the fruit is a little oblong, and has generally a swelling on one side. It has a fine colour, and the juice is very sweet, with a high flavour; the flesh is white, but very red at the stone, which is small; it is ripe towards the end of August. It is separated easily from the stone, and is one of the best sorts.

The *Belle Chevreuse* PEACH TREE has smooth leaves, and the flowers are small and contracted; the fruit is of a middling size, a little oblong, and of a fine red; the flesh is white, but very red at the stone, from which it easily parts; its juice is sweetish and rich, and it ripens in the beginning of September.

The *red Magdalen* PEACH TREE has deeply serrated leaves, with large open flowers, and the fruit is large and round, and of a fine red; the flesh is white, but very red at the stone, from which it readily parts. The juice is sweetish, and has a very fine flavour; it is ripe at the beginning of September, and is one of the best peaches.

The *Chancellor* PEACH TREE has leaves that are even at the edges, and has small contracted flowers; the fruit is shaped somewhat like the belle chevreuse, but is rounder, with flesh that is white, and melts in the mouth; it parts freely from the stone, where it is of a fine red. The skin is very thin, and the juice rich; it ripens in the beginning of September, and is one of the best sort.

The BELLEGARD has leaves that are even at the edges, with small contracted flowers; but the fruit is very large and round, and is of a deep purple colour, next the sun; the flesh is white, melts in the mouth, and parts readily from the stone, where it is of a deep red; the juice is very rich. It ripens in the middle of September, and is an excellent peach.

The *Bourdine* PEACH TREE has leaves that are even at the edges, with small contracted flowers, and large round fruit, of a fine red colour next the sun; the flesh is white, melts in the mouth, and parts readily from the stone, where it is of a fine red; the juice is vinous and rich, and ripens in the middle of September.

The *Rosanna* PEACH TREE has leaves that are even at the edges, with small contracted flowers, and large fruit; the flesh is yellow, and parts readily from the stone, where it is red. The juice is rich and vinous, and it ripens in the middle of September.

The *Rambouillet* PEACH TREE has leaves that are smooth at the edges, with large open flowers, and fruit of a middling size, rather round than long, and divided by a deep furrow in the middle; it is of a fine red colour next the sun, and of a light yellow next the wall. The flesh is of a bright yellow, melts in the mouth, and parts readily from the stone, where it is of a deep red, and the juice is rich, with a vinous flavour; it ripens at the latter end of September.

The *Nivette* PEACH TREE has serrated leaves, with small contracted flowers, and large fruit, somewhat longer than round, of a bright red colour next the sun, and of a pale yellow on the other side; the flesh melts in the mouth, is full of a rich juice, and is

very red at the stone, from which it parts. It ripens towards the latter end of September.

The *bloody* PEACH TREE bears fruit of a middling size, of a deep red next the sun, and flesh that is of a deep red to the stone; but it seldom becomes quite ripe in England. Besides these, there are a very great variety of other species of peaches; but as these we have here described are the most usual sorts planted, we shall not tire the reader with a long catalogue of names, which he may never have occasion to peruse. A good peach ought to have a firm flesh, a thin skin, of a fine red colour next the sun, and of a yellowish cast next the wall; the flesh should be of a yellowish colour, full of juice, and high flavoured, with a small stone, and the pulp or flesh very thick.

All Peach trees have been originally obtained from the stones, which should be planted in autumn, on a bed of light dry earth, about three inches deep, and four inches asunder; in the winter the beds should be covered to protect them from the frost, and in the spring, when the plants come up, they should be carefully cleared from the weeds, as well as all the summer observing to water them when the weather is dry. They should remain here till the following spring; when they should be carefully taken up, without breaking the tender roots, and transplanted into a nursery in rows, three feet asunder, and eighteen inches distant plant from plant in the rows, observing to lay a little mud about the roots; they must also be watered in dry weather once a week, till they have taken root. Here they may continue two or three years, till they are transplanted, where they are to remain. When this is done, the downright roots must be pruned pretty short, and the bruised parts cut off, as well as the small fibres; but the heads should not be meddled with. These are generally designed for standards. As for the planting, budding, and management of peach trees that are to be placed against walls, we must refer the reader to books entirely devoted to the use of the common gardener, as it would take up more room than this treatise will allow.

The NECTARINES are properly peaches, though generally distinguished from them, of which the following are the most remarkable sorts; and indeed it may be doubted whether there are really any more or not.

Fairchild's early NECTARINE TREE produces fruit the soonest ripe of any we have; it is small and round, about the size of a nutmeg peach, and of a beautiful red; it has a very good flavour, and ripens towards the end of July.

The *Etruge* NECTARINE TREE has serrated leaves, with small flowers of a dark red or purple next the sun; but of a pale yellow or greenish colour towards the wall; it parts from the stone, melts in the mouth, and is ripe in the beginning of August.

The *Newington* NECTARINE TREE has serrated leaves, with large open flowers, and a fair large fruit, of a beautiful red next the sun, but of a bright yellow towards the wall; it has a very rich juice, and the pulp or flesh adheres closely to the stone, where it is of a deep red. It ripens in the middle of August, and has a better flavour than any of the rest.

The *scarlet* NECTARINE TREE bears fruit a little less than the former, of a fine red or scarlet next the sun, but of a paler red towards the wall; it ripens in the beginning of August.

The *Brugnon* or *Italian* NECTARINE TREE has leaves that are even on the edges, and small flowers, with a fair large fruit, of a deep red next the sun, but yellowish towards the wall; the pulp is firm, of a rich flavour, and closely adheres to the stone, where

it is very red; it ripens towards the latter end of August.

The *Roman red* NECTARINE TREE has leaves that are even at the edge, and flowers with large fair fruit, of a deep red or purple colour next the sun, but has a yellowish cast towards the wall; the pulp is firm, of a rich flavour, and adheres closely to the stone, where it is very red. It ripens towards the latter end of August.

The *Murrey* NECTARINE TREE bears a middle sized fruit, of a deep red next the sun, but of a yellowish green towards the wall; it has a pretty good flavour, and ripens towards the end of August.

The *golden* NECTARINE TREE bears a handsome fruit, of a light red next the sun, and of a bright yellow towards the wall; the pulp is very yellow, has a rich flavour and closely adheres to the stone, where it is of a faint red; it ripens towards the middle of September.

The *Temple's* NECTARINE TREE bears a middle sized fruit, of a light red next the sun, and of a yellowish green towards the wall. The pulp melts in the mouth, and is of a white colour at the stone, from which it readily parts, and has a fine flavour; it ripens towards the end of September.

The *Peterborough, or late green* NECTARINE TREE, bears a middle sized fruit, of a pale green next the sun, but of a whitish green towards the wall. It has a firm well flavoured flesh in a good season, and ripens in the beginning of October.

The flowers have an aromatic bitter taste, and, when fresh, an infusion of half an ounce in water, or a drachm when dry and sweetened with sugar, is a useful laxative for children. Peaches themselves agree very well with persons of hot constitutions, and costive, especially if they are eaten in a morning fasting. Peach kernels are bitterish, diuretic, and good against worms. The leaves have the same virtues, and the gum resembles gum arabic.

MANDRAGORA MAS, seu CANDIDA, *Mandrake* has a thick long root, generally divided into two parts, and sometimes more; it is whitish without, or of a rusty ash colour, and pale within. It has no stalk, though it has leaves a cubit in length, and a palm and a half broad, and sharp at both ends; among these pedicles arise stalks, a palm in length, on each of which there is a single flower, in the shape of a bell, consisting of a single leaf, divided into five segments; it is a little hairy, of a dirty white, or purplish colour, with a hairy green calyx, divided into five parts; from whence arises a pistil, fixed in the bottom part of the flower, that turns to a fruit, like a small apple, at first green, and then yellowish, fleshy, soft, of a strong nauseous smell, and in the pulp there are roundish flat seeds, somewhat in the shape of a kidney.

MANDRAGORA FEMINA seu NIGRA, *female Mandrake*, has leaves like that of the former, but narrower, less, and blacker; the flowers are of a bluish purple, and the fruit are paler, less, and in the shape of a pear. They both grow wild in Italy and Spain, as well as other hot countries, and delight in woody and shady places. With us they are cultivated in gardens, and the seeds are sown in a bed of light earth, soon after they are ripe; they come up in the spring, and in very dry weather they must be refreshed with water. They should remain here till the end of August, and then they should be transplanted to the places where they are to remain. The roots will continue sound for above fifty years; but as to the resemblance to a human form, as many assert, it is nothing but an imposture, owing to persons that would deceive the publick, who form the fresh roots of Bryony into such shapes, and show them for Mandrakes. Many wonderful things have been said of its virtues, by different authors; however, they all agree it is a narcotick, and, when taken

in too large a dose, will produce dangerous symptoms. Some have given it from half a scruple, to procure sleep. Some affirm, that the leaves applied outwardly, as a cataplasm, will resolve hard swellings of the spleen.

MARRUBIUM, *Hoar-bound*, has a single woody root, which sends forth many fibres, and several stalks, to the height of a foot and upwards; these are hairy, square, branched, and the leaves proceed from the joints in pairs, which are placed opposite to each other; they are roundish, hoary, wrinkled, and crenated on the edges. The flowers likewise proceed from the joints, and surround the stalks; the calyx, or flower cup, is hairy, streaked, and terminates in prickles; the flower consists of a single labiated leaf, of a whitish colour, whose upper lip is upright and forked, and the lower divided into three segments. The pistil is fixed in the back part of the flower, like a nail, and attended with four embryos, that turn to as many oblong seeds, contained in a capsula, that was the calyx of the flower. The whole plant has a strong disagreeable smell, and grows near highways, and on the sides of fields, in neglected places. It is aperient, powerfully resolves viscid humours, and by some is accounted a specific in a moist asthma.

MARRUBIUM NIGRUM, *black Hoar-bound*, has a perennial fibrous root, and hairy, square, light, branched, reddish stalks, with leaves that proceed from the joints in pairs, and are placed opposite to each other; they are like those of the Balm, or rather red Archangel, only they are rounder and blacker; they are hairy, soft to the touch, and wrinkled. The flowers likewise proceed from the joints, and consist of a labiated single petal, whose upper lip is hollow like a spoon, and the lower divided into three segments, of which that in the middle is biggest, and in the shape of a heart; the colour is purple, streaked with deeper lines of the same; the flower cups are streaked, oblong, and divided into four or five sharp segments. The pistil is fixed in the back part of the flower, and is attended with four embryos, that turn into as many small oblong seeds, that are blackish when ripe, and contained in a tubulated capsula, with five sides, that was the calyx of the flower. It grows wild by the sides of hedges. The leaves are bitter, have a strong smell, and by some are accounted an excellent remedy in hypochondriac and hysteric disorders.

MARUM VERUM, seu MARUM CORTUSI, *Syrian herb Mastich*, has a fibrous root, and a stalk that rises to the height of a foot, or rather several hoary downy stalks; with leaves like the end of a lance, a quarter of an inch long, two broad, and of a light green above. The flowers are like those of Germander, and consist of a single, labiated, purple petal, whose stamina are in the room of an upper lip; but the lower is divided into five segments, the middlemost of which is hollow like a spoon. The calyx is likewise like that of Germander, and the pistil is fixed on the back part of the flower, with four embryos, that turn into as many roundish seeds. This plant has the appearance of a shrub, and has a hot volatile smell. It is propagated by cuttings, in any of the summer months, on a bed of fresh light earth, observing to water and shade them, till they have taken root; after which they may be transplanted either in pots or borders of the same earth; but the greatest difficulty is to preserve it from cats, which will come from a great distance, to tear this plant in pieces; for which reason, it is hard to preserve it near towns and cities. The best way is to plant large quantities thereof, and then they will not come near them. When they are placed in pots, they may be cut into any figure, for they will grow to near three feet high. It is said to be good in cold and moist diseases, and to be an excellent diuretick; though

though it is of little use with us, except in making herb-snuff. However, it is certainly better than Marjoram, and the dose of the powdered leaves is a drachm.

MARUM, *herb Mastich*, is a small woody shrub, with many branches, and slender woody roots, with leaves like Thyme, but hoary, and which smell like Mastich. The flowers are white, and consist of a single labiated petal, whose upper lip is upright, and divided into three segments, but the lower into three in such a manner, that it looks like a flower with five leaves, and have a white down growing upon their oblong heads. This plant is propagated by cuttings, in any of the summer months, in a bed of light rich earth, observing to water and shade them till they have taken root, after which they may be transplanted into a light dry soil, in a warm situation. It produces great numbers of flowers in July, has an agreeable smell, and deserves a place in the borders of every good garden. The virtues are the same as those of the former, and it is undoubtedly an excellent cephalic.

MATRICARIA, *Feverfew*, has a white fibrous root, with several stalks, that rise to the height of a cubit and a half; these are strong, streaked, smooth, thick, and full of a spongy pith, with many leaves of a light green colour; they are conjugated, and divided into many segments, which are by some called wings. The flowers grow in umbels, on the top of the stalks; they are radiated, but not large, and the disk consists of many yellow florets, and the crown of white semi-florets, placed over the embryos of the seeds in a semi-spherical scaly cup. The seeds are oblong, small, streaked, and fixed in a bed at the bottom of the cup. The whole plant has a very strong smell, and is found wild upon dunghills and uncultivated places, in many parts of England; it is likewise planted in gardens for medicinal purposes. They are propagated by seeds, which should be sown in the latter end of March, upon a bed of light earth, and when they are come up, they should be removed to nursery beds, and placed about eight inches asunder, where they may remain till the latter end of May; then they may be taken up, with a ball of earth at their roots, and planted in the middle of large borders, where they will flower in July and August. It is an hysterical plant, and is excellent in uterine disorders. The dose, in powder, is from half a scruple to two scruples, and of the juice to an ounce or two. It is certainly a very good carminative, as it discusses wind, strengthens the stomach, and helps digestion. Outwardly, it is prescribed in fomentations, with camomile flowers.

MELILOTUS, *Melilot*, has a white, slender, tough root, with many short fibres, and generally several stalks, which sometimes rise to a cubit and a half in length; these are smooth, round, streaked, and weak, and the leaves are placed alternately thereon, by threes, on the same slender pedicle; they are smooth, oblong, denticulated, and of a dusky green. The flowers grow on long spikes, and are papilionaceous, small, yellow, and consist of four petals; these are succeeded by short, single, pendulous, wrinkled, naked pods, not hid in a calyx, as in trefoil, and they are black when ripe, containing one or two roundish seeds of a yellowish colour. It is found near hedges, and among corn. It is seldom given inwardly, but is often used outwardly, and in clysters. It is said to be emollient, anodyne, and resolvent, and is used by some in all kinds of external inflammations.

MELISSA, *Balm*, has a round, long, fibrous, woody root, with stalks that rise to a cubit high, and upwards; these are square, almost smooth, branched, hard, stiff and brittle. The leaves are oblong, of a brownish green, and pretty much like those of cala-

mint; but they are shining, covered with a little down, and dentated on the edges. The flowers grow at the places where the leaves proceed from the stalks, and are somewhat verticillated, though they do not grow quite round the stalks; they consist of a single labiated petal, whose upper lip is roundish, upright, and divided into two parts; but the under lip is cut into three. The hairy calyx is divided into two parts; and the pistil is attended with four embryos, that turn to as many seeds, joined together, of a roundish shape, and contained in a capsula that was the cup of the flower. It is cultivated in gardens, and flowers in June, July, and August. It is propagated by parting the roots, either in spring or autumn, or by planting slips at the distance of eight or ten inches. Balm is said to be cordial, cephalic, and to fortify the stomach. It is taken in the manner of tea, is a little aromatic; and has done service in a lax state of the viscera.

MELISSA SYLVESTRIS, *wild Balm*, is nothing less than the former in its primitive state, before it is cultivated in gardens. This plant has a bad smell, and grows in woods, flowering in May and June. It is reckoned a vulnerary, and is said to be an excellent remedy against suppression of urine.

MELO VULGARIS, *common musk Melon*, is a plant, with stalks that creep along the earth, and are rough to the touch, as well as the leaves, which are smaller and rounder than those of Cucumbers. The flower consists of a single petal, in the shape of a bell, cut into several segments, exactly like those of a Cucumber, and some of them are barren, while others are fruitful, and turn into a fruit of an oval shape, and different sizes; the rind is harder than that of a Cucumber, pretty thick, variegated with green and ash colour. The pulp is tender, moist, clammy, yellow, or red, and when ripe, has a very agreeable flavour. It is divided into three cells, containing oblong, flat, whitish yellow seeds, covered with a hard skin, containing an oily kernel, but is very white; and has a sweetish taste. There are several sorts of Melons, besides that already mentioned; as the *Portugul*, or *pocket Melon*, the *netted or wrought Melon*, the *great musk Melon*, with a smooth green skin, and a green seed, the *white Spanish Melon*, the *green fleshed Melon*, the *Cantaleupe Melon*, the *Zatta Melon*, the *Melon with a hairy skin*, and the *winter Melon*. The seeds should not be sown till they are three years old, and it should be at two or three different seasons, the first of which is the latter end of February, when the weather is mild, on the upper side of a Cucumber bed, and the plants must be raised and managed in the same manner as Cucumbers. The second season is about the latter end of March, and they both should be planted under frames. Those that are designed to be raised under bell-glasses, must be sown about the latter end of April, if the season proves forward; but if it be cold, it had better be deferred somewhat later. There are particular rules required for their management, that are too long to be inserted here, and therefore we shall only observe, that when the fruit is fully grown, they must be carefully watched, to cut them at a proper time; and therefore they should be looked over at least twice a day; for if they are left growing a few hours too long, they will lose much of their delicacy. If they are cut early in a morning, before the sun has warmed them, they will be much better flavoured.

The seeds of Melons are one of the greater cold seeds, and serve to make emulsions; but at present they are not so much taken notice of as formerly.

MENIANTHES, *five TRIFOLIUM PALUSTRE*, the *Buck-bean*, has a long, knotted, creeping root, which has fibres by intervals, and there are three

three leaves that grow on the same pedicle, that are of the same size and shape as those of beans, and smooth to the touch. Among these there arises a stalk to the height of a foot and a half, which is slender, smooth, green, and bears a tuft of flowers at the top, in the shape of a funnel, and of a whitish purple colour. Before they open they are red, and after they are open they divide into five pointed segments; their internal surface is covered with very slender, white, curled filaments, that appear like down. The cup of the flowers is in the shape of a mug, and dentated, and each flower contains five white stamina, with yellow apices; the pistil is placed in the middle, and is shorter and greener than the stamina. These are succeeded with roundish or oblong fruit, that contains oval seeds like those of the Sun flower. This plant grows wild in marshes, and flowers in May or June. Buck-bean has gained great reputation for its virtues, and is found very efficacious in the gout, king's-evil, the cachexy, and dropsy. In a fit of the gout, the patient must drink a glass of the decoction every four hours; but Boerhaave was relieved in this distemper, by drinking the juice mixed with whey. It will be likewise proper to apply the leaves that have been boiled, to the painful part, after the decoction is strained off. The seed is good against the moist asthma, for it incises the gross phlegm that stuffs the lungs. This plant is in such reputation in Germany, that they give it in almost all diseases.

MENTHA VULGARIS, *garden, or spear Mint*, has a creeping root, furnished with fibres, that extend far and near; the stalks rise to a foot and a half in height, and are square, a little hairy, strong, and reddish. The leaves are placed by pairs opposite to each other, and appear at first sight like Balm; but those at the top of the stalk are longer, and more pointed, and of a deep green colour; they are also more deeply dentated. The flowers grow in spikes, and consist of a single labiated petal, whose upper lip is arched, and the lower divided into three parts; but both of them are so cut, that the flowers seem to be divided into four parts, the two lips scarcely appearing. Each flower is succeeded by four seeds contained in the flower cup. Mint has a peculiar well known strong smell. It is cultivated in gardens, and flowers in July and August. Besides this, there is the *pepper Mint*, the *long leaved horse Mint*, *water Mint*, commonly called *water Calamint*; *orange Mint*, *Spear-Mint with a variegated leaf*, the *great round leaved water-Mint with a variegated leaf*, *Spear-mint with a rugged leaf and a strong scent*, and *narrow leaved Aleppo Mint*. They are all propagated by parting the roots in the spring, or by planting the cuttings in any of the summer months.

SPEAR-MINT is stomachic, cephalic, and carminative, and is excellent in the loss of appetite, retchings to vomit, and weakness of the stomach. It resolves coagulated blood, eases pains of the cholic, and does a great deal of service in fluxes of the belly. It may be drank as tea, especially when the leaves are dry, and the infusion must be strong. Water Mint has a bitter, acrid, aromatic taste, is stomachic and diuretic, and, like the former, may be drank as tea. The juice is good against the gravel, stops vomiting, and hiccoughing, cures the gripes, and swelling of the stomach.

MENTHA ALBA, *five MENTASTRUM, Horse-Mint*, has a fibrous creeping root, and sends out stalks to the height of a cubit, and upwards, which are square and hairy. The leaves are almost round, wrinkled, and covered with a white wool. The flowers are like those of garden Balm, and are of a whitish red colour, with dentated flower-cups. Each flower is succeeded by a small black seed.

The leaves have a bitter, acrid, astringent taste, with a strong smell, and it grows by the sides of brooks, and in moist places in most parts of England. It is said to kill worms; to help the moist asthma; and many apply a cataplasm made with this plant, to the affected part, against the hypogout; they affirm it raises blisters, which when broken ease the pain.

MENTHA PIPERITES, *Pepper-mint*, has shorter and fuller spikes than the common Mint, but the leaves are like them, only they are covered with a short hairy down. This plant has been lately brought into esteem, and is of great use in flatulent cholics, and in many cold diseases; its effects are almost immediately felt; for it causes a glowing warmth to be felt throughout all parts of the body. It readily communicates its pungency to water, as well as to that which is distilled from it.

MERCURIALIS, *male and female French Mercury*. The male has a tender, fibrous, annual root, and sends forth stalks to the height of a foot, that are angular, geniculated, smooth and branched. The leaves resemble those of pellitory, and are oblong, pretty broad, sharp, smooth, and green; they are placed by pairs opposite to each other on the stalk, and are crenated on the edges; the flower cup consists of one leaf cut into three segments, as well in the male as in the female. The flower of the male has no petals, but has from eight to twelve stamina collected into a spike. There are two embryoes contained in a sort of purses, and, when they are ripe, there is in each a small oval seed.

The *female Mercury* resembles the male in all respects, except the flowers; for these produce neither fruit nor seed. The virtues are both alike, and they flower all the summer. The leaves are said to be aperient and laxative, and they are placed among the five emollient plants. It is sometimes made use of in clysters, and a syrup made of the leaves is a mild and useful laxative; the dose is two spoonfuls, which is to be given three hours before meals. Warts rubbed with this plant will frequently soon wither away.

MESPILUS APII FOLIIS SYLVESTRIS SPINOSA, *five SPINA ALBA*, the *White Thorn* or *Hawthorn*, is a shrub that has a pretty thick firm trunk, full of branches, and armed with strong thorns, that are much harder than the wood. The branches are strong and flexible, and the leaves are like those of parsley, and have a clammy taste. The flowers grow in tufts, and have pedicles about an inch and a half in length; they are white, have five petals, placed in the form of a rose, and reddish stamina, like those of the pear-tree. The fruits, or haws, are a little larger than Myrtle-berries, are red when ripe, and hang in bunches. They have a black navel, and are full of a clammy, soft, sweetish pulp, wherein are two hard white stones. It grows every where in hedges, and flowers in May; the berries grow ripe in September, and continue a great part of the winter, when the leaves are falling off.

MESPILUS PYRIFOLIA, *five PYRICANTHA*, the *ever-green Thorn*, is a thorny shrub, covered with a blackish bark, whose branches are armed with thorns, whereof some are an inch in length, and others shorter. The leaves resemble those of the wild pear-tree, or rather the almond tree; some are oblong, and a little pointed, while others are almost round, smooth, and dentated on the edges, especially the lowermost. The flowers consist of several petals, of a reddish colour, and disposed in the form of a rose. The berries are like those of the hawthorn, and of a golden scarlet colour, growing together in bunches, and furnished with a sort of a crown. The pulp is a little tartish,

and contains four or five whitish yellow seeds, of a triangular shape, and a little shining. It grows in the hedges in Italy, and the southern parts of France; but elsewhere it is cultivated in gardens. It flowers in May, and the berries grow ripe in autumn. Children are very fond of them, and they have the same taste and properties as haws.

MILIUM, *Millet*, has many fibrous, and strong, whitish roots, that send forth stalks to the height of two or three feet, which have several knobs. The leaves are large, long, and about an inch broad, in the shape of those of reeds; they are covered with a sort of thick down, at the places where they surround the stalk, after which they become smooth; the flowers grow in loose panicles at the top of the stalks, and are generally yellow, though sometimes blackish; they are composed of three stamina, that proceed from the middle of the flower-cup, which generally consists of two leaves. When the flowers are fallen off, they are succeeded by oval grains, that are yellowish or white, hard, shining, contained in three sorts of thin tender shells. These plants were originally brought from the eastern countries, where they are still greatly cultivated, and from whence we have the grain, which is highly esteemed by many for making puddings. It is a common aliment in the eastern countries, where they boil it in milk, and it has the same virtues as rice. It is good in disorders of the breast and obstinate coughs; but it is a little binding and windy.

MILLE FOLIUM VULGARE, *Yarrow, or Nose-bleed*, has a woody, fibrous, blackish, creeping root, from whence proceed a great number of stalks, to the height of a foot, or a foot and a half, that are stiff, angular, hairy, reddish, and branched at the top. The leaves are divided and subdivided into a vast number of segments, adhering to a long rib, and have some resemblance to those of camomile; but they are more stiff, and somewhat like the feathers of a bird. The flowers are collected into round umbels, each of which is radiated, whitish, and placed in a scaly cylindric calyx, and are succeeded by very small seeds. It grows in uncultivated sandy places, where the leaves generally lie close to the ground till the stalks begin to rise. It is called Noose-bleed by the country people, because a sprig of it put up the nose will bring away a little blood. It flowers in May and June, and has an acrid, bitter, aromatic taste. It is a vulnerary plant, and is said to cure wounds, tumours, and inflammations without repulsion.

MYAGRUM, *Gold of Pleasure*, has a fibrous root, a little woody, which sends forth a stalk to the height of a cubit and upwards, from whence proceed several cylindric, strait, slender branches, a little downy, and full of a spongy pith. The leaves are longish, pointed, soft, of a palish green, slightly dentated on the edges, and their bottoms surround their stalk in such a manner, that the sides represent two wings or ears. The flowers consist of four petals, placed in the form of a cross, and of a yellowish colour; the pistil arises out of the calyx, and afterwards becomes a fruit in the shape of a pear, with one cell, including an oblong seed, and two empty cells at the point. It is an annual plant, that decays as soon as the seeds are ripe, and grows wild in several parts of Europe. The oil of these seeds is emollient, and moderately heating, and it is given inwardly in a painful costiveness.

MYRRHIS, *sweet Cicely*, has a long, thick, white, soft, and somewhat spongy root, with stalks that rise to the height of four or five feet, which are branched, downy, and hollow. The leaves are large, and winged like those of hemlock, but whiter, and often marked with white spots; they are soft to the touch, a little downy, and have the smell of chervil. The flowers grow in umbels on the tops of the branches,

and are composed of five unequal petals, disposed like those of the flower-de-luce. The calyx turns to a fruit, composed of two seeds, resembling the bill of a bird, and are gibbous on one side; but plain on the other. It may be propagated at the beginning of March, by sowing the seeds on a bed of light earth in a shady situation; and when the plants come up they should be transplanted into the like earth in a moist shady situation, about two feet asunder. Some use the leaves as a salad, and think it is as good as common chervil; it flowers in June, and the seed is ripe in July. It is looked upon as a pectoral, and the leaves when dried in the shade, and smoked like tobacco, help those that are troubled with an asthma.

MYRTUS MINOR VULGARIS, *Box-leaved Myrtle*, is a shrub that has a hard woody root, that sends forth a great number of small flexible branches, furnished with leaves like those of box, but much less, and more pointed; they are soft to the touch, shining, smooth, of a beautiful green, and have a sweet smell. The flowers grow among the leaves, and consist of five white petals, disposed in the manner of a rose, and have a calyx cut into five segments. There is a great number of stamina, which have a fine smell, and when the flower is fallen off, the calyx becomes an oval oblong berry, adorned with a sort of crown, made up of the segments of the calyx. The berry is green at first, but grows black when ripe, and is smooth, juicy, and divided into three cells, containing hard seeds in the shape of kidneys. This sort of myrtle is the most common in the gardens of the northern countries, and is propagated from cuttings, the best season for which is in July. The shoots should be six or eight inches long, and the leaves on the lower part should be stripped off above two inches high, and the part twisted which is to be placed in the ground. They should be planted in pots, two inches distant from each other; the earth should be pressed close about them, and there should likewise be some water to settle it. The pots should be plunged in old dung, or tanner's bark, and shaded with mats in the heat of the day, watering them occasionally. In about a month's time they will take root; and, towards the beginning of September, they should be removed to a place sheltered from cold wind, where they may remain a month, and then be removed to the green house. At the beginning of the next April, they should be taken out carefully, and placed in separate pots, with a ball of earth at the root.

MYRTUS BRABANTICA, *Dutch Myrtle*, is a small shrub, with a hard flexible root, and rises to the height of a cubit or upwards; it has the look of a small willow, for which reason it is called by some Sweet Willow. There are male and female flowers on different plants, and those of the male are oblong; loose, scaly catkins, and in each of the scales there is a flower in the shape of a half moon, but without petals, though there are from five to six stamina. The female flowers have no stamina, but an oval pistil, supported by two styles, which afterwards changes to a berry, containing one roundish seed. It grows plentifully upon bogs in many parts of England, and flowers in May and June; and the seeds grow ripe in July and August. Where this shrub grows in plenty, it is so fragrant, especially after a shower of rain, as to perfume the air at a great distance, during the spring and summer. The leaves have been said to have many virtues, and they are still used in some places to kill worms.

NARCISSO-LUCOIIUM, *Snow-drop*, has a bulbous root, composed of several white coats, except the outermost, which is brown, and underneath there are whitish fibres. It sends forth three, four, or five leaves, like those of leeks, which are green, smooth, and shining; among these arise an angular,

furrowed, hollow stalk, six inches high, cloathed with leaves as far as the middle, which form a kind of white sheath. It generally bears but one flower at the top, though sometimes two, but seldom three. The sheath of the flower is oblong, blunt, compressed, and opening sideways becomes a dry skin; the flower itself has three oval oblong petals, which are spread open, and are equal; the nectarium is seated in the middle, and is cylindrical, blunt, and bordered. The pistil is placed in the center of the flower, attended by six stamina, and afterwards becomes an oval capsula, with three cells full of roundish seeds. They are of two sorts, the single and the double; and they are valued for their early appearance, which is commonly in February. The roots should never be planted single, because the flowers make the best appearance when they grow in bunches. When there are twenty or more roots together, they have a very good effect. The root is of no use in medicine.

NASTURTIUM HORTENSE, *garden Cresses*, have a single, woody, white root, that is not so acrid as the leaves. This root sends forth several stalks, to the height of a foot, or a foot and a half, that are round, smooth, solid, branched, and covered with a sort of bluish dust, that will readily come off. The leaves are oblong, deeply cut, and have no disagreeable taste. The flowers grow on the tops of the branches, and consist of four petals, placed in the form of a cross, and of a whitish purple colour. The pistil, which rises from the center of the flower-cup, becomes a roundish smooth fruit, divided into two cells, containing small, oblong, yellowish seeds. It is cultivated in gardens as a salad herb, and is in most esteem in the winter, and in the spring. During the winter they must be sown on a gentle hot-bed, covered with mats or glasses; in the spring upon warm borders, and in the summer upon those that are shady. They attenuate and cut gross thick humours, and are good in obstructions of the viscera. It may be eaten plentifully as a salad, and therefore nothing need to be said of the dose.

NASTURTIUM AQUATICUM, *Watercress, or Cresses*, have a small white root, full of knots, from each of which several capillary fibres proceed, that enter into the water. The stalk arises to the height of a foot, and is crooked, thick, hollowed, furrowed, smooth branched, and of a green colour, with a reddish cast. The leaves are almost round, juicy, of a greenish brown colour, and have a biting agreeable taste. The flowers grow on the top of the stalks, and are small, white, composed of four petals in the form of a cross, with several yellow stamina and apices; these are succeeded by pods, that are a little crooked, and divided into two cells full of roundish, small, reddish seeds, of an acrid taste. It grows on the sides of brooks and ditches, and flowers in July and August. It is used as a salad herb, especially in the winter. When the leaves first appear, they are almost round, but afterwards they are cut like those of rocket. It has much the same virtues as garden cresses, but stronger, and is accounted one of the best antiscorbuticks in these parts of the world.

NEPETA, *Nep, or Cat-mint*, has a woody root, divided into several branches, and sends forth a stalk three feet high and upwards, which is square, hairy, branched, reddish near the ground, and the upper part whitish; the branches are always produced opposite to each other by pairs; the leaves are like those of the nettle or betony, and are serrated on the edges; they are pointed, downy, whitish, and have long pedicles, and have a strong smell of mint, with a biting acrid taste. The flowers grow on the tops of the branches, where they are collected into six spikes; they are purple or whitish, and they each consist of a tube, whose upper lip is cut into two segments, and

the lower into three; the middle segment is broad and hollowed like a spoon, and elegantly crenated on the edges; it is sustained by a calyx, in the shape of a horn, and succeeded by four naked oval seeds. It is called cat-mint, because the cats will not suffer it to grow, and is propagated by sowing the seeds in March, in beds or borders of common earth; but it is found wild in many parts of England. It is aperient, has all the virtues of common mint, and may be drank in the manner of tea. When the cats eat too much of it, it will make them drunk; but, what is very remarkable, if it be raised from seeds the cats will not touch it.

NICOTIANA MAJOR LATIFOLIA, *the greater broad-leaved Tobacco*, has a white fibrous root, which sends forth a stalk to the height of five or six feet; as thick as one's thumb, and round. It is hairy, and full of a white pith. The leaves are large; without pedicles, and placed alternately on the stalks by their large appendages; they are hairy, full of nerves; a little pointed, clammy to the touch, and of a pale green, inclining to yellow. They are divided into several branches at the top, that support flowers in the shape of a bell, divided into five deep segments, as well as the calyx, which expand like a star. They are of a purple colour, and the apices of the stamina are sprinkled with a fine powder of an ash colour. The embryo becomes an oblong, roundish, membranaceous fruit, divided into two cells full of reddish seeds, that are exceeding small, in proportion to the bigness of the plant. It is a summer plant with us, though it will sometimes, in moderate winter, continue all the year. It is known by the American planters, under the title of Oroonoko Tobacco; but it is not in such esteem with the English, as the other sorts. In Brasil it flowers continually, and will live ten or twelve years.

NICOTIANA MAJOR ANGUSTIFOLIA, *the greater narrow-leaved Tobacco*, differs only from the former in their leaves, which are narrower, and more pointed, and are fixed to the stalk by pretty long pedicles.

NICOTIANA MINOR, *the lesser, or common English Tobacco*, has a single thick root, sometimes divided into several tender white fibres, and sends forth a stalk to the height of two feet, which is hairy, solid, sometimes as thick as one's finger, branched, and clammy to the touch. The leaves are rounder than those of the former sorts, and are placed alternately on the stalks; they are flat, blunt at the end, of a greenish brown, and have short pedicles. The flowers are numerous on the top of the branches, and are divided into five segments like the former; they have five stamina, whose apices are of an ash colour, as well as the pistil; they are less than those of the former kind, and the colour is of a greenish yellow. The calyx is hairy, clammy and divided into five parts. The flowers are succeeded by roundish capsula, in the form of a navel, and, when ripe, open into two parts, and are full of a vast number of yellow tawny seeds. Besides these, there are other sorts, as *the greater narrow-leaved perennial tobacco; the lesser tobacco with larger and rougher leaves; the great broad-leaved tobacco with white flowers, and a short seed vessel; the dwarf tobacco with a primrose leaf; and the small tobacco with a leaf in the shape of a heart, and a flower with a longer tube.* The first of these sorts is most common in England, and is generally raised by the gardeners near London. They were all brought originally from America, and at first were in high esteem for their medicinal qualities. It is called tobacco from the island of Tobago, from whence it was brought in the year 1560.

The taste and smell of tobacco is well known, as well as its common use. Some use it as a vomit, which should be never done, except in cases of necessity. The watery extract made by long boiling, and

and preserved dry, has a cleansing anodyne quality, and is excellent for appeasing an asthmatic cough. It may be taken in broth, or with a stomachic remedy to four or five grains. In some delicate constitutions, it will occasion a retching to vomit, which may be easily remedied with a draught of burnt wine. Outwardly, the plant is cleansing and healing, and will soon cure malignant ulcers, when other things fail. Some make an ointment of tobacco for the killing of lice, but it should be used very cautiously. When it is beaten into a cataplasm with vinegar or brandy, it will remove hard swellings of the liver and spleen, as we learn from the Edinburgh essays. Some recommend the smoking tobacco in the time of the plague, and other infectious diseases. We know an instance of the efficacy of smoking tobacco in a person, who was thereby cured of a dry asthma, when all other remedies had failed. Having smoked part of a pipe, merely for good company sake, he found such an abatement of his cough, as induced him to pursue it, which at last effectually cured him, by gradually bringing off his lungs the coagulated matter, with which they were clogged. However, this may not succeed in every constitution; and it will be prudent not to continue it, if after once or twice smoking, the patient has not some substantial encouragement to proceed, which may compensate for the sickness tobacco always occasions those, who are not used to smoking it.

NIGELLA ROMANA, *Roman Fennel-flower*, has a root with many furrowed slender stalks, a foot in height; the leaves are pretty large, green, and cut into slender segments. The flowers are placed at the tops of the branches, distinct from each other, and are composed of five petals, of a pale colour, and disposed in the form of a rose. There are several stamina in the middle, surrounded with a crown, and are succeeded by a membranous fruit, and divided into several cells, that terminate in horns. This plant is cultivated in gardens, and flowers in July, August, and September. The seeds brought from Italy are the best, and should be fresh, large, and of a fine yellow colour or black. It is resolvent, discutient, and strengthening, and is proper for correcting the impurities of the stomach, breast, and kidneys. It is good against catarrhs of the head, the head-ach, arising from thence, the vertigo, and obstructions of the nose, either in fumigations, or snuffed up when powdered. The dose inwardly is from one scruple to a drachm. It is of great use among the Germans, but neglected by us.

NOLI ME TANGERE, *five* **BALSAMINE**, *Balsamine*, has a root that runs level with the ground, and sends forth a stalk to the height of a foot and a half, which is tender, of a bright green, smooth, shining, light, branched, geniculated by intervals, with tuberosities. The leaves are placed alternately, and are deeply dentated on the edges. From the places, where the leaves join to the stalk, there proceed long pedicles, that bend down to the ground, which are divided into three or four branches, on which hang small flowers, with four unequal petals, supported by two small green leaves; but the flower is yellow, representing a kind of a sea-monster, with a small body, and a slender, short, crooked, pointed tail, like an ox's horn, sprinkled with deep red spots; the mouth is wide, and in the middle there are several stamina, of a whitish colour. They are succeeded by long, slender, knotted fruit, of a whitish green, streaked with green lines, bending to the ground. They open as they grow ripe, and when the wind blows a little stronger than ordinary, or by the least touch, they shoot out their seeds, at the same time writhing themselves like worms; the seeds are either ash coloured, brown, or red. Those that are not used to this plant, are always startled

when the seeds burst out in the above manner; and from its not bearing to be touched without this effect, it is called *Noli me tangere*, that is, *touch me not*. It grows wild in some places, and flowers in June, and it is also cultivated in gardens, for the diversion it affords. It is propagated by the seeds, and if suffered to cast them, it will come up every spring without any care; but it delights most in moist shady places. It is very aperient and diuretic, and frees the kidneys from gravel.

NUMMULARIA, *Moneywort*, has a very creeping slender root, and sends forth several long, slender, angular, branched stalks, that creep on the ground, and whose leaves are placed in pairs opposite to each other; they are about as broad as one's finger, and are almost round, though a little curled; and of a yellowish green; where the leaves join to the stalk, the flowers proceed, which are large, and consist of a single petal, cut into the shape of a rose. On some branches there are three leaves, and as many flowers at each knot. They are succeeded by small round fruit, containing seeds hardly visible. It is called moneywort from its roundness of the leaves, and is common in moist places, and by the sides of ditches. It begins to flower in May, and continues to do so most of the summer. The leaves are astringent and vulnerary, and proper to stop hæmorrhages, both inwardly and outwardly. The dose of the juice is from one ounce to three, and, in decoction, from one handful to three. Boerhaave recommends it greatly against the hot scurvy.

NYMPHÆA ALBA, *white Water-lily*, has a long root, as thick as one's arm, and sometimes as the leg; full of knots of a brown colour without, and white within; it is fleshy, spongy, full of clammy juice, and adheres at the bottom of the water to the earth; by several fibres. It sends forth large roundish leaves, in the shape of a heart, that are thick, fleshy, veinous, and of a whitish green colour on the top, and of a brownish green beneath, and swims on the surface of the water; these are supported by long pedicles, as thick as a child's finger, which are cylindrical, reddish, tender, juicy, and spongy. The flowers are large and broad when blown, consisting of several leaves, disposed in the form of a rose, of a fine white colour, but of little or no smell. The flower cup consists of five whitish leaves, and there are other leaves on the edges, of a whitish green colour. There are a great number of stamina, with a pistil that turns to a globular fruit, like the head of a poppy, divided into several cells, full of oblong; blackish, shining seeds. It grows wild in marshes and standing waters, and flowers in May and June.

NYMPHÆA LUTEA MAJOR, *the great yellow Water-lily*, differs from the former, in having leaves not quite so round, and in the flower, which is yellow; besides which the fruit is of a conical shape, and contains larger seeds. It is found in the same places, and flowers at the same time as the former. The roots have both the same virtues, and have a clammy bitterish taste. They are proper in heat of urine, want of rest, and all internal inflammations, but are now seldom used. The powder of the dried root is given from a scruple to a drachm.

OLEA MAJOR, *five* **HISPANICA**, *the manured Olive tree*, has a trunk that is knotted, and more or less high, with a smooth ash coloured bark, and yellowish wood, that has somewhat of a bitter taste. The leaves are oblong and narrow, almost like those of willow; they are pointed, thick, fleshy, hard, of a greenish yellow above, and whitish below, but without down; they have very short pedicles, and are generally placed by pairs opposite to each other. The flowers proceed from the places where the leaves are joined to the stalks, and grow in whitish branches, like those of the alder; they consist of a single petal, the

the lower part of which is hollowed, and the upper is divided into four parts; the embryo of which is fixed in the center of the flower cup, and becomes an oval, green, fleshy, succulent fruit, of different sizes; for in Spain it is as big as a middling plumb; whereas in Italy and Languedoc, it scarce arrives at the size of a common acorn. This is the olive, which is at first green, then yellowish, and at length blackish, when it is full ripe; though there are some in Spain that turn white. They are oily, have an acerb disagreeable taste, and contain an oblong stone, which is very hard, and within it is a kernel of the same shape. It is cultivated in the southern parts of Europe, and delights in dry, marly places, that are exposed to the south or east; and it flowers in June and July. This tree continues a long time, and the wood which has a fine smell, will burn as well green as dry. They produce a large quantity of fruit, of which they make oil-olive, or salad-oil, well known all over Europe. They are planted out of curiosity in England, in pots or cases, but must be removed into the green-house all the winter. There are several sorts of olives that differ in shape, colour, size, and juice. They are pickled, and then become agreeable to the taste; and are well known in England by the name of pickled olives; they are then said to create an appetite, and strengthen the stomach.

ONOBRYCHIS, *Cock's-head, or Sain-foin*, has a long, hard, woody root, black without, and white within, which sends forth several straight strong stalks, about a foot in height, and of a reddish green colour. The leaves which are like those of vetches, but smaller, are green above, white and downy below, pointed, and placed by pairs on one side. The flower is papilionaceous, and the pistil rises out of the downy flower cup, which afterwards turns to a crested pod, in the shape of a cock's-comb, and is rough, with prickles; each of these contain a seed, in the shape of a kidney, which has a pretty good taste when it is green. *Sain-foin* is a French word, which signifies wholesome hay, and is so called, because it is thought to fat all sorts of cattle the soonest of any other. The hay made of it is accounted among us the best sort of food for most cattle, especially in the spring, there being no danger attending it, as there is in clover; it breeds abundance of milk, and the butter that is made of it is very good. There is a sort with a deep red flower, which, when disposed in the large borders of pleasure gardens, afford an agreeable variety; for they are of a beautiful colour, grow in long spikes, and continue a great while. Some observe, that if *Sain-foin* be carefully gathered, well dried, and kept in boxes, it has the smell of tea, inasmuch that it has been mistaken by good judges for green tea; but then it must be gathered before it flowers.

OPULUS, *five* SAMBUCUS AQUATICA, *Marsh elder, or Gelder-rose*, has a thick, firm, white root, that sends forth a stalk to the height of five or six cubits, divided into several branches, like those of the elder tree, and is knotted by intervals; it is covered with a smooth ash coloured bark or rind, is full of white spongy pith; and is very tender and brittle. The leaves proceed from the knots, and are large, angular, and like those of the maple tree. The flowers consist of a single petal or leaf, divided into five parts at the top, and expanded in the form of a rose. Those about the circumference of the umbel are larger than the rest, and of a fine white, with a calyx that proceeds from the middle of the cup, but they are barren. Those in the middle or centre are smaller, open later, and in their bottom there is a hole that receives the point of the calyx, and they are of a yellow colour. This turns to a berry a little larger than that of the common elder, which is soft and red when ripe; in each of these

there is a flat red seed in the shape of a heart. This shrub delights in moist woods, and on the banks of rivers, and it flowers in May; but the berries are not ripe till autumn, and they continue all the winter. There is another *Gelder-rose*, that differs from the former, only in having the flowers collected into a globe, and is common in old gardens in most parts of England. At a distance the flowers resemble snow-balls, for which reason it is called in some countries the *Snow-ball tree*. It is of no use in medicine.

ORCHIS, *feu.* SATYRIUM, *Fool-stones*, has a root composed of two tubercles almost round, which are fleshy, and of the size of nutmegs; whereof one is full and hard, and the other wrinkled and spongy. At first it sends forth six or seven leaves, that are long, pretty broad, smooth, and like those of the flower-de-luce, but smaller, and generally marked at the top with brownish red spots. The stalk rises to the height of a foot, and is round, streaked and encompassed with one or two leaves; on the top there is a long spike of beautiful purple flowers, that are whitish towards the center, and sprinkled with specks of a deeper purple. Each flower is composed of six unequal petals, of which the five uppermost compose a sort of helmet; and the lower petal, which is larger than the rest, has a sort of a head or helmet at the top, and terminates in a tail, or sharp point like a spur. The calyx becomes a fruit, with three sides, and is divided into three cells, containing many small seeds. It flowers towards the end of April, and the beginning of May, and is found in many parts of England.

ORCHIS LATIFOLIA, *feu* MAJOR, *Dog's-stones*. This plant has a root composed of two bulbs, or fleshy tubercles, but larger, and in the shape of large olives. The stalk rises near the height of a cubit, and has long pyramidal flowers at the top, which are large and beautiful, whitish within, and sprinkled with purple spots; but they are reddish on the outside, and represent a man in armour, without hands or feet. The leaves are big, long, and broad, and are roundish at first when they rise out of the earth in November. The seed is like that of the former, and flowers in May. There are several other sorts of these plants, the under part of whose flower represents several shapes, as a naked man, a butterfly, a fly, a drone, a pigeon, an ape, a lizard, and a parrot; and these all grow wild in several parts of England; but deserve a place in every good garden. The Turks have a preparation of a certain root that is called *lalep*, which they make use of to recover their strength. It is supposed to be a kind of orchis, and the following preparation of this root will answer the same purposes. Take the roots or bulbs of orchis, that are well nourished, and after they are skinned, throw them into cold water; after they have been there some hours, boil them in a sufficient quantity of water, and then strain them; this done, put them on a string, and dry them in the air; this is best done in a dry hot season. They will become transparent, very hard, and will resemble pieces of gum tragacanth. If they are kept in a dry place they will always remain good, and may at any time be reduced to a very fine powder. A scruple of this, put by little and little into boiling water, will entirely melt, and will be sufficient for a pint of water; it may be rendered more agreeable; by putting in a little sugar, and is exceeding useful when mixed with milk, in all diseases of the breast; for it is very emollient, and will abate the sharpness of the humours; it is excellent in consumptions, and bloody fluxes of the bilious kind.

OREOCELINUM, *five* APIUM MONTANUM, *Mountain Parsley*, has a root consisting of many fibres, adhering to one head, which creep greatly in the earth; they are blackish on the outside.

side, white within, and are full of mucilaginous juice. It has a single ferulaceous stalk, that rises to the height of four or five feet, which is furrowed, and divided into wings. The leaves proceed as well from the root as the stalk, and are large, but like those of the common parsley, only they are more firm and smooth. The flowers grow in umbels at the top of the stalks and branches, and are small, whitish, and consist of five purplish petals, disposed in the form of a rose. These are succeeded by a fruit, which was the calyx of the flower, composed of two seeds, that are oval, flattish, radiated on the back, and bordered with a membranous leaf, of a reddish colour. It grows in mountainous places, where there are pastures.

OREOCELINUM, *five APIUM MONTANUM MINUS*, *smaller mountain Parsley*, has a pretty thick, soft root, that is fibrous on the upper part, and white both within and without; the stalks rise to the height of a cubit and upwards, and is pretty thick, firm, furrowed, knotted by intervals, reddish and branched. The leaves lie on the ground, and are like those of garden parsley. The flowers grow in umbels on the top of the stalk and branches, and are of a white colour. The seeds that succeed them have a more acrid taste than the leaves. It delights in mountainous and sandy places, and flowers in July and August. The seeds are accounted an aperient, and proper to open the obstructions of the liver and spleen; they are also diuretic, and free the kidneys from gravel; but they are seldom used among us.

ORIGANUM VULGARE, *wild Marjoram*, has a slender, woody, fibrous root, creeping obliquely into the ground, which sends forth several stalks, that rise to the height of two or three feet, and are hard, square, and downy. The largest leaves resemble those of common calamint, and the lesser those of marjoram; they are downy, have an agreeable smell, and an acrid, aromatic taste. The flowers are collected into scaly spikes, and are labiated, consisting of a single petal, whose upper lip is erect, roundish, and divided into two segments, but the lower into three. The pistil arises from the calyx, and is fixed in the back part of the flower like a nail; it is attended with four embryoes, and turns into as many small seeds, contained in a capsula, that was the calyx of the flower. It grows wild on dry chalky hills, and on gravelly soil, in several parts of England, and it flowers in the summer. Wild marjoram is diuretic, and diaphoretic, and may be used in the manner of tea in the asthma, and a violent cough. The powder of the leaves and the flowers dried in the shade are cephalic, and being taken as snuff, will make the nose run considerably. It helps digestion, discusses wind, and is employed externally in baths for the feet.

ORNITHOPODIUM MAJUS, *the greater Bird's-foot*, has a small, white, single, fibrous root, accompanied with several grains or tubercles, with several flexible, weak, branched, round, hairy stalks, that seem to creep on the ground. The leaves are less than those of the Bastard Sena, and the flowers are small, papilionaceous, and disposed in spikes on the top of the branches; the pistil arises out of the calyx, which afterwards becomes a hooked jointed pod, that is generally undulated, and at every joint there is a round seed; and several of these pods grow together in such a manner, as to resemble the foot of a bird. It flowers in summer, and generally in June, and delights in dry cultivated places. The whole plant is accounted aperient and diuretic, and when powdered, the dose is a drachm in a glass of white wine; but it is not now in use.

ORYZA, *Rice*, has a root like that of wheat, and furrowed stalks, that rise to the height of three or four feet, which are thicker and stronger than those

of wheat or barley, and knotted by intervals. The leaves are like those of reeds in shape, but they are fleshy like leeks. The flowers which grow on the tops are of a purple colour, and are disposed into panicles. The seeds are almost oval, white, transparent, hard, and are contained in a yellowish, rough, furrowed, angular, downy capsula, somewhat like barley; they are placed alternately on each side of the branches. This plant is cultivated in hot countries, in moist marshy land, and the use of the seeds is principally for food. However, they destroy the acrimony of the humours, and are good in fluxes of the belly. Rice serves instead of bread in most of the eastern countries, and is their principal nourishment. It is now planted in South Carolina, where great quantities have been produced, and as good as in any other part of the world. It is chiefly used here for puddings, and to make rice-milk.

PÆONIA MAS, *Male Peony*, has an oblong, thick, tuberose root, brown without, and pale within, and is often divided into several branches; it sends forth stalks to the height of two or three feet, that are a little reddish, and divided into branches. The leaves are large, and composed of several other leaves, almost like those of the hazel tree; but they are broader and thicker, and of a shining, brownish green colour; they are also covered underneath with a down, and have long reddish pedicles. The flowers grow on the tops of the stalks, and are large, consisting of several petals, that expand in the form of a rose, sometimes of a purple colour, and sometimes of a palish red. The calyx is composed of five leaves, and in the middle there are purple stamina with saffron coloured apices. They are succeeded by fruit, composed of several small, white, downy, shining, crooked horns, that are open when they are ripe, and contain many globulous seeds, that are red at first, and afterwards of a dark blue or black. It flowers at the beginning of May, and they fall off soon afterwards. It is cultivated in gardens for the sake of the roots, which are used in medicine. They are propagated by parting the roots, and are extremely hardy, for they will grow in any soil or situation: the best season for this is in the beginning of September.

PÆONIA FÆMINA, *female Peony*, has a root composed of several tubercles, connected together with fibres, and sends forth a tall stalk, that has scarce any redness at all; the leaves are of a greenish pale colour above, and whitish, and a little downy underneath. The flowers are like those of the former, but neither they nor the fruit are so large. This is a very common sort, and is to be met with almost every where in gardens. The *Male Peony* is principally used in medicine, and the roots and seeds have been thought by many to be a specific against the falling-sickness, convulsions, and the palsy. They are reduced to powder, after they have been dried in the shade, and then the dose is a drachm or two; or an ounce of the roots is given in decoction, while they are fresh.

PALIURUS, *Christ's-iborn*, has a hard woody root, with a stem that grows so high, that it sometimes deserves the name of a tree. The branches are long and thorny, but those that are near the leaves are smaller, and not so prickly as in other places. The leaves are almost round, pointed, and of a dark green, with a reddish cast. The flowers are small, yellow, grow on the tops of the branches, and are generally composed of five petals, in the form of a rose. The pistil arises from the flower cup, which turns to a fruit almost in the shape of a bonnet, having a shell that is nearly globular, divided into three cells, on each of which there is a single roundish seed. This shrub grows wild in the hedges of Italy, Spain, Portugal, and the south of France, from whence its seeds are procured. It flowers in May and June, and

and the fruit is ripe in the autumn. It is called *Christ's-thorn*, because they suppose his crown of thorns was made of the branches of this tree. It may be propagated by laying down the tender branches in the spring, which will take root in a year's time; the best season for transplanting them is in autumn, soon after the leaves begin to decay. The fruit is said to be diuretic, and to help the moist asthma, by promoting expectoration; but it is not in use among us.

PAPAVER CORNUTUM, seu CORNICULATUM, Yellow horned Poppy, has a root as thick as one's finger, which is long, blackish, and full of a yellow juice, as well as all the plant, which has a particular taste and smell. It sends forth long, fleshy, thick, downy leaves, cut deeply on the sides, and dentated on the edges; the colour is of a sea-green, and they lie upon the ground, where they continue all winter. The stalk, which does not rise till the second year, is strong, solid, knotty, smooth, and divided into several branches, sending forth leaves from the knots that are smaller, and not so jagged as those below. The flowers grow on the top of the stalks and branches, and are as large as those of garden poppies, being each composed of four yellow petals, placed in the form of a rose, in the middle of which there are a great number of stamina of the same colour. They are succeeded by fruit, or a sort of pods; a span in length, or longer, and are very slender and crooked like horns; they are rough to the touch, blunt at the ends, and contain a double row of seeds, separated by a partition, and as round as those of the common poppy, and very black. It grows wild on the sea-shore, and in sandy maritime places. If it be sown in gardens in autumn, it will come up in the spring, and will flower in June and July, and the pod will be ripe in August. This plant is accounted diuretic, and very good for those who make thick urine: in Portugal they give an infusion of half a handful of the leaves in a glass of white wine for the gravel and stone; but it has not been brought into use in England.

PAPAVER RHÆAS, the greater wild Poppy, or Comrose, has a single white root, as thick as one's little finger, furnished with a few fibres, and has a bitter taste. It sends forth several stalks, to the height of a cubit, or upwards, which are round, solid, hairy, and branched; the leaves are jagged like those of succory, hairy, of a brownish green, and dentated on the edges. The flowers grow on the top of the stalks and branches, are composed of four large, thin, deep, red leaves, which are ready to fall off with each blast of wind; these are succeeded by small heads of the size of hazel nuts, that are oblong, smooth, and much of the same shape with those of the garden poppy. They are divided into several cells, containing blackish, or dark-red seeds. This plant grows almost every where in the fields, especially among corn. It flowers in May, June, and July. The flowers are made use of in medicine, and are in some measure anodyne and narcotic. They are good in acrimonious catarrhs, roughness of the face, and in commotions of the fluids. They may be drank as tea, and are of very great service in all cases where a gentle opiate is useful; there is a syrup made with these flowers, kept in the shops, which will serve for the above purposes.

PAPAVER HORTENSE NIGRO SEMINE, the lesser Garden Poppy, has a root about the thickness of one's little finger, full of a bitterish milk, as well as the whole plant. It sends forth an upright stalk, to the height of two cubits, which is generally smooth, though sometimes a little hairy, and the leaves are oblong, broad, dentated, curled, and of a sea green colour. The flowers grow on

the top of the stalks and branches, and are large, in the shape of a rose, of a reddish colour, sometimes single, and sometimes double; as also, sometimes fringed on the edge, and sometimes not. The calyx consists of two leaves, that generally fall off as soon as the flower is blown. It is succeeded by roundish heads of different sizes, crowned with a sort of cover, in the form of a star, and contains in their cavities or membranous cells, seeds of a blackish colour. There is a great variety of these plants, as well in colour as shape, that are sown in gardens for the sake of their flowers; but they are not so much used in medicine as the white poppy. They may be all propagated by the seeds sown in autumn, and will flower in May and June, and sometimes during all the summer.

The heads of the stalks of these plants contain a milky juice, which may be collected in a considerable quantity, by slightly wounding them when almost ripe; this, exposed for a few days to the air, thickens into a clammy mass of the same quality as opium, but weaker. Poppy heads boiled in water communicate their virtues to it very freely; and when the liquor is strongly pressed out, clarified with the whites of eggs, and evaporated to a due consistence, yields an extract that weighs about one sixth of the weight of the heads. Some count it more safe than opium, but it must be given in a double dose.

PARIETARIA, Pellitory of the wall, has a fibrous reddish root, with several stalks that rise to the height of two feet, which are round, reddish, brittle, and branched. The leaves are oblong, and are pointed, downy, of a brownish green colour, shining, rough, and apt to hang to the cloaths of passengers; they have long pedicles, and are placed alternately on the stalks. The flower has no petals, but has generally four stamina, that rise out of a flower-cup, divided into four parts, which is sometimes in the shape of a bell, and sometimes like that of a funnel; they surround a pistil that generally turns to an oblong seed, contained in a capsula that was in the cup of the flower. It grows upon old walls and buildings in great plenty, and flowers in May. It is looked upon as aperient, temperating and resolvent, whether taken inwardly or applied outwardly. The dose, in infusion, is from one handful to three; and of the juice from one ounce to three. It is accounted one of the five emollient herbs, and is made use of occasionally for that intention, particularly in decoctions, fomentations and clysters.

PASTINACA, Parsnep, or the Garden Parsnep, has a long, thick, fleshy root, of a yellowish colour, in the middle of which there is a nerve, that runs throughout its whole length. The stalk rises to the height of three or four feet, and is upright, firm, furrowed, hollow, and branched. The leaves are large, and composed of other leaves, that are villous, dentated on the edges, winged, and are placed on a pretty large rib; they are of a brownish green, and placed by pairs along the rib, which is terminated by a single leaf. The flowers grow on the tops of the stalks and branches in large umbels, and each flower has four yellow petals, placed in the form of a rose; these are succeeded by large, oval, flattish, slightly furrowed seeds, bordered by a small membranous leaf, resembling those of angelica. The root of this plant is of great use as food, for which it is chiefly employed. It flowers in July and August, the second year, after it has been sown. The taste of parsneps is well known, and they are more nourishing than carrots, though some have a natural aversion to their use.

PASTINACA SYLVESTRIS, wild Parsnep, has a white single root, that has sometimes large fibres, and has the same taste and smell as the garden parsnep. The stalk is two or three cubits high, and is upright,

upright, stiff, furrowed, hairy, hollow within, branched, and has leaves alternately placed like the former; but they are smaller, of a deeper green, and are sometimes hairy, especially towards the root. The flowers grow in umbels, and are small, yellow, and composed of five petals each; these are succeeded by double seeds, as in the former. It grows in uncultivated places, in dry fields, and upon hills, and flowers in the summer. Some make use of it as an aliment, and pretend, when the seeds are sown in the garden, they will produce as good parsneps as the garden sort. Both the seeds and root have been commended as a remedy against agues; but they often fail.

PERIPOLCA, *Virginian silk*, or *climbing dog's bane*, of Montpellier, has a root almost as thick as one's finger, that is long, white, fibrous, and creeping; as also full of milky juice, as well as the rest of the plant. The stalks rise to the height of two cubits, and are slender, round, branched, pliant, and creep upon any tree that stands near it. The leaves stand opposite to each other, are large, thick, whitish, pointed, and cut in the form of a cross, near the pedicle, and are full of a milky juice. The flowers proceed from the places where the leaves join to the stalk, consisting of a single petal that is white, and cut into five segments in the form of a star. The pistil is succeeded by a fruit, so like that of dog's bane, as not to be distinguished from it; and when it is opened, it discovers a downy substance, under which the seeds lie. It grows wild about Montpellier, but with us it is propagated in gardens, by laying down the branches at the spring of the year; it flowers in June, July and August; and the milky juice being inspissated over the fire, becomes blackish, and greatly resembles scamony, but is not so purging; and therefore requires a large dose to procure that effect.

PERSICARIA MITIS, *dead or spotted Arse Smart*, has a slender, oblique, woody, fibrous root, difficult to break, and sends forth stalks to the height of a foot, that are round, hollow, reddish, branched and knotted. The leaves are like those of the peach-tree, and sometimes marked with blackish spots. The flowers grow in spikes, and consist of single petals, cut into five segments, and are without a calyx; but there are five stamina that are purple and shining, though sometimes whitish; they are succeeded by oval, flattish, pointed, smooth, blackish seeds. It has not so acrid a taste as the following, and is a little tart. It grows in watery, marshy places, as well as in moist ditches, almost every where, and flowers in July and August. It is looked upon as astringent, detersive, and vulnerary, and its decoction is said to be good in fluxes of the belly, and for ulcers of the intestines.

PERSICARIA URENS, *biting Arse Smart*, has a small, single, woody, white, fibrous root, that sends forth several stalks to the height of a foot and a half, which are firm, round, smooth, knotty, branched, sometimes reddish, and sometimes of a greenish yellow. The leaves proceed from the knots of the stalk, which they embrace by their membranous appendages, and are of a pale green, and like those of the peach-tree. The flowers grow in long spikes on the top of the stalk and branches, and consist of a single petal, cut into five segments; there is no calyx, but there are five stamina generally of a purple colour, which are succeeded by pretty large seeds, somewhat triangular, shining and blackish. It has an acrid biting taste, like pepper, and grows in watery marshy places on the sides of brooks and ditches; it flowers in July and August. It is said to be cleansing and vulnerary, and to be good in the dropsy, jaundice, and obstructions in the viscera. Its distilled water, given

to two or three ounces, is by some accounted a specific against the gravel. All authors agree, that this herb, applied to old ulcers, eats away proud flesh, and cleanses and dries them; being applied as a cataplasm to the bruises of horses, it resolves the coagulated blood; if the wounds and ulcers are washed with the juice, the flies will never come near them.

PERVINCA, *five CLEMATIS DAPHNOIDES*, *Periwinkle*, has a fibrous root, with slender, long, round, green, knotty, creeping, climbing stalks; the leaves are oblong, green, smooth, and placed by pairs, opposite to each other, and are of a bitter styptic taste. The flower cup consists of a single leaf, divided into five long, narrow segments; and the flower of a single petal is cut into five segments, that expand into the form of a salver. The pistil is fixed in the lowest part of the flower, like a nail, and turns to a fruit composed of two husks or pods, which contain oblong, cylindrical, furrowed seeds. Some call it Ground Laurel, because its leaves resemble those of that tree. This plant is an evergreen, and is propagated by the branches that take root in the earth. It flowers in the spring, and continues to do the same for a long while. It is accounted vulnerary, and is found almost every where, in hedges, and among shrubs.

PERVINCA LATIFOLIA, *five FLORE CÆRULEO*, *greater Periwinkle*, with a blue flower, has a fibrous creeping root, with several thick, round, knotty, green, creeping branches. The leaves are placed by pairs, facing each other, along the stalks, and are of a shining green, with a bitter acrimonious disagreeable taste. The flowers, like the former, are generally blue, though sometimes white and without smell; it differs from the former only in being larger in all its parts. It is said to be vulnerary, astringent, and febrifuge, and is given to abate all kinds of bleedings.

PETASITES, *Butter Bur*, has a thick, long root, brown without, and white within; the stalks are thick, hollow, and hairy, and rise to the height of half a foot; the leaves are small, narrow, and pointed; and the flowers grow at the end of the stalks in tufts, and consist of many florets, divided into several parts; they are contained in a cylindrical calyx, cloven almost down to the bottom, into many segments. There is a single embryo that becomes a seed, furnished with down. The flowers appear before the leaves, which are very broad, and have a hollow in the middle, and round that a hollow expansion in such a manner, that they resemble bonnets. It grows in moist places on the sides of rivers, brooks, lakes, and ponds, and flowers early in the spring. In some places, the leaves grow to the height of a man, and continue all the winter. Some authors have confounded this plant with the great burdock, because the leaves have some resemblance to each other. The root, which is the part made use of is aperient, resolvent, hysteric, and vulnerary, and brings up phlegm in asthmas and obstinate coughs.

PETROSELINUM, *Parsley*, has a single root as thick as one's finger, and often much thicker, that is furnished with a few fibres; it is whitish, long, and good to eat. The stalks sometimes grow to the height of three or four feet, and are round, furrowed, knotted, and branched. The leaves are composed of others that are cut into jags, are green, and have long pedicles. The flowers grow on the top in umbels, and are composed of five pale petals, disposed in the form of a rose; these are succeeded by seeds that are joined by pairs, and are slender, furrowed, grey, and roundish at the back. It is cultivated in gardens, and will endure all sorts of weather. It delights in a moist ground, for which reason it should be often watered. It sends forth

a stalk the second year after it is sown, flowers in June and July, and the seed is ripe in August. It is aperient, and is said to open obstructions; but its chief use is only as a kitchen herb. The seed is one of the four hot seeds, is attenuating and diuretic, and is said to be good in the gravel and dropsy.

PETROSELINUM MACEDONICUM, *Macedonian Parsley*, has a long, thick, white, wrinkled, woody root, which sends forth a stalk to the height of a foot and a half, that is thick, hairy, and branched. The leaves resemble those of garden parsley; but are more large, a little more cut, and dentated. The flowers grow on the top of the branches in umbels, are whitish, and composed of five petals in the form of a rose. They are succeeded by slender, hairy, oblong, aromatic seeds, of an acrid taste. It grows wild in Macedonia, and was greatly valued by the ancients; but is here cultivated in gardens. The seed only is in use, and has the same virtues as that of common parsley, but stronger, and is an ingredient of Venice treacle.

PHASEOLUS, the *Kidney bean plant*, has a slender, fibrous root, and sends forth a long, round, branched, climbing stalk. The leaves come out by threes, in the manner of trefoil, and are large, pointed at the end, fleshy, smooth, and almost like those of ivy, with long, green pedicles. The flowers are papilionaceous, and a pistil rises out of the flower cup, which turns to a long pod full of seeds, generally shaped like a kidney. The use of kidney beans is well known, and therefore need not be mentioned here. They are opening, emollient, resolvent, and promote urine, and generally agree with most constitutions. The meal of the seed is sometimes mixed in emollient cataplasms.

PHILLYREA, *Mock Privet*, has a thick strong root that runs deep into the ground, and the stems rise to eight or ten feet high, and are covered with a white or ash coloured bark, a little wrinkled. It is an ever-green shrub, with leaves like those of the privet, and a flower that consists of a single petal in the shape of a bell, cut into four parts at the top; the colour is a whitish green or herbaceous. The pistil that rises from the center of the calyx afterwards turns to a spherical fruit or berry, that is black when ripe, and contains one seed. They have been formerly in great request, for hedges and to cover walls; but they are most proper for wildernesses. It flowers in May and June, and the fruit is ripe in September. It is of little or no use in medicine.

PHYTOLLACA, *American night shade*, has a root a foot long, that sometimes grows to the thickness of a man's thigh, which is white, and perennial. The stalk rises to the height of five or six feet, and is thick, round, strong, reddish, and divided into several branches. The leaves are placed irregularly, and are large, veinous, soft, and of a pale green, though sometimes reddish; the shape is like those of common night shade. The flowers grow in bunches, each of which consists of several petals, placed in a circular order, which are of a pale red colour. The pistil rises from the center, and the flower is succeeded by a soft fruit or berry, that is roundish, full of juice, and like a button flattened above and below; when it is ripe, it is of a brownish red colour; and contains several round black seeds, placed orbicularly. It is very common in our northern American plantations, and is cultivated in England, for the beauty of its flowers. It may be propagated by sowing the seeds in the spring, upon a bed of light rich earth; and when the plants are come up, they should be moved into the borders of large gardens, allowing them room enough to grow, for they will become very large. The berries are full of a purple juice, which gives a fine tincture to paper; but it will not last long.

PILOSELLA, *common Mouse Ear*, has a short, slender root, furnished with fibres, that send out slender, hairy stalks, which creep upon the ground, where they take root again. The leaves are oblong and roundish at the end, like the ears of a mouse, from whence it has its name, and they are covered with hair; they are green above, but downy below, and have an astringent taste. The flowers are only a single floret, of a yellow colour, with a scaly single calyx, which is succeeded by slender, black, downy seeds, in the shape of a wedge. It grows in dry barren land, and on the sides of highways. It flowers in May, June, and July. It is very bitter and accounted astringent, vulnerary, and detergent. The extract, given to two drachms, is said to be very useful in internal ulcers; likewise eight ounces of the infusion of this plant, in white wine, is boasted of as an infallible remedy against the ague, given an hour before the fit.

PIMPINELLA, *Burnet, or Pimpernel Parsley*, has a round, slender root, divided into several reddish branches, among which are sometimes found certain red grains, which they call wild cochineal, and which are useful in dying. The stalks are red, angular and branched; the leaves are oblong or roundish, dentated on the edges, and placed by pairs on the ribs. The flowers grow on the ends of the stalks, in round heads, and consist of a single petal, divided into four parts, in the form of a rose, and of a purple colour; in the middle there is a tuft of long stamina, the flowers are of two sorts, the one barren, and furnished with stamina, the other fruitful, that have a pistil. This is succeeded by a quadrangular fruit generally pointed at both ends, and of an ash colour when ripe, containing oblong, slender, reddish brown seeds, with an astringent and somewhat bitter taste. It grows wild in many parts of England, particularly on dry chalky land, and on hills and mountains. It is said to be detergent, vulnerary, and diuretic, and some pretend it stops hæmorrhages, as well internal as external, either given in decoction or powder. The dose, in infusion or decoction, is from half a handful to two handfuls, and of the juice, from an ounce to three ounces, or by spoonfuls.

PINGUICULA, *Butter wort*, has a fibrous root, that sends forth six or seven leaves, and sometimes more; they lie upon the ground, are of a yellowish green, and somewhat thick and shining, as if butter had been rubbed over them; they are two inches long, about one broad, somewhat blunt at the extremities, and even on the edges. In the middle a pedicle arises as high as one's hand, at the top of which is a purple violet, or white flower, like that of a violet; but it consists of a single petal, divided into two lips, and sub-divided into several parts; but, at the bottom, it terminates in a spur. It is succeeded by a fruit or shell, whose lower part is inclosed in the calyx, which when open discovers a button, containing several small almost round seeds. It grows in meadows, and other moist and marshy places, and flowers in the spring. It is vulnerary, and heals green wounds very soon; and the juice makes an excellent liniment for chaps of the nipples.

PIPER INDICUM, *five CAPSICUM*, *Guiney Pepper*, has a short, slender root, furnished on each side with a great number of fibres, which send forth a stalk to the height of a foot and a half, and upwards, especially in hot countries; this is angular, hard, hairy, and branched; the leaves are long, pointed, and broader than those of arse-sinart; they are somewhat thick and fleshy, of a greenish brown, and without hair. The flowers, which grow under the joints of the leaves, where they adhere to the branches, are rosaceous, and of a whitish colour, very much resembling those of

common nightshade, but larger, and supported by a pretty long, fleshy, red pedicle. They are succeeded by a long capsula, as thick as one's thumb, strait, and formed of a fleshy, shining, polished skin, which is green at first, afterwards yellow, and then red; it is divided into two or three cells, that contain many flattish seeds of a whitish colour, inclining to yellow, and generally of the shape of kidneys. It grows naturally in the Indies, and particularly in Guiney and Brasil. It is easily propagated by seeds in hot countries, and there are several sorts of it; as the capsicum with long hanging pods; that with long pods which turn up at the end; the broad leaved capsicum, with long streaked pods, commonly called bonnet pepper; African capsicum, with rough hanging pods; African capsicum, with pyramidal rough pods, generally growing erect; capsicum with long hanging pods that are not hot; capsicum with red pods, in the shape of hearts, generally hanging downwards; capsicum with pyramidal, thick, red pods, generally growing upright; upright olive shaped capsicum; capsicum with small, red pods, growing upright, called Barbary pepper; capsicum with small, round, very hot pods, named bird pepper; American capsicum, with round shaped fruit, broad leaves; American capsicum, with oblong white pods, growing erect, and capsicum with large, rough, red pods, generally hanging downwards. There are two or three other sorts, but these are the principal, and they are sown in many curious gardens, in hot beds. They are pretty hardy, and may be planted abroad about the middle of June. The inhabitants of the West Indies make a great use of the bird pepper, which they dry, reduce to a powder, and mix with other ingredients. They send some of the pots to England, under the name of Cayan pepper, and this is in great esteem by some. They likewise eat the fruits of some of these kind raw, but they will burn the throats of those that are not used to them. The last makes one of the finest and wholesomest pickles in the world, if they are gathered before the skins grow tough. It is at present of no use in physic.

PISUM, *the Pea Plant*, has a slender, fibrous root, that sends forth long, hollow, brittle stalks, of a sea green colour, that would lie upon the ground if they were not supported by props. The leaves are oblong, of the same colour as the stalks, and some are so placed that the stalks seem to run through them, while others grow by pairs on the ribs, that are terminated by tendrils or claspers, which lay hold of every thing they meet with; two or three flowers proceed together from the places where the leaves join to the stalks, and are papilionaceous and white. The pistil is succeeded by a long pod, full of roundish seeds, which are very well known. There are several sorts of peas, as the great garden pea, with white flowers and fruit; the hotspur pea; the dwarf pea, the French dwarf pea; the pea with an esculent husk, the fickle pea, the common white pea, the green rouncival pea, the grey pea, the marble rouncival pea, the rose pea, or brown pea, the Spanish morotto pea, the marrowfat pea, the union pea, the English sea pea, and the pig pea. The English sea pea is found wild on the shores of Suffex, and several other counties in England; and in times of scarcity they have been a very great help to poor people. The propagating of peas is so well known, that the manner of it needs not to be taken notice of here. The use of peas is also very well known, they being common food in all parts of England; but they are windy, and do not very well agree with weak stomachs. Green peas are very good eaten raw, for those that have the sea scurvy.

PLANTAGO MAJOR, *great Plantain*, has a short root, as thick as one's finger, and is furnished with whitish fibres on the sides; it sends forth large

shining leaves, seldom dentated on the edges, and have each eight nerves, that run throughout their whole length. The stalk, which rises from the middle of the leaves to about a foot in height, is round; hard to break, and sometimes reddish, as well as a little hairy. There grows on the top an oblong point, with small whitish flowers; each of these is a pipe, close shut at the bottom, open at the top, and cut into four parts, in which are several stamina. It is succeeded by a fruit, with a thick, oval, pointed shell, that opens crossways, and contains several small, oval, reddish seeds. This plant is very common, and grows almost every where. It flowers in May and June, and the fruit is ripe in August.

There is another sort of plantain, that has a thick root, which seems to be bit off at the end; the leaves are narrower than those of the former, and contain only five nerves; there are likewise a third that contains but three, and this is called the Lesser Plantain. They all have the same medicinal uses, and the leaves are bitter and astringent. It is accounted resolvent and febrifuge; for the juice being given from two to four ounces, in the beginning of intermitting fevers, often cures them. A ptisan, made with the leaves of plantain, is good in the bloody-flux, spitting of blood, and all other hæmorrhages whatever. The decoction is an excellent gargle in ulcers of the mouth; and with lime-water it cures ulcers of the legs. Made into an ointment, with fresh butter, it is said to cure the piles.

POLYGONATUM, *Solomon's seal*, has a long root, as thick as one's finger, and full of large knots or tubercles, of a whitish colour, and furnished with many fibres. The stalks rise to the height of a foot and a half, and are round, smooth, and without branches. The leaves are placed alternately, and are large, oblong, full of nerves, and of a brownish, shining green above, but of a sea-green or bluish colour below. The flowers grow in the places where the leaves join to the stalks, sometimes single, and sometimes double and treble; they are in the shape of a bell, cut at the top into six segments, but they have no calyx; the colour is white, except the edges, which are greenish. The embryo, which is seated on the center of the flower, becomes a berry, like those of ivy; it is a little soft, green, purple, or blackish, and generally contains three large seeds, like those of vetches. It is very common in all parts of England, and grows in shady places by the sides of hedges, and in woods and forests. There are several sorts of this plant, which may easily be propagated, by parting the roots in the spring, before they begin to shoot; they should be planted in fresh, light earth, that is not very rich, where they will thrive exceeding well. It flowers in May and June, and the berries are ripe in August; but the root is chiefly used in medicine. All authors look upon this plant as astringent and vulnerary, and it has been often used for the cure of ruptures; but it is now intirely neglected among us.

POLYPODIUM, *Polypody, or Oak Fern*, has a root six inches in length, and almost as thick as a man's little finger, that creeps along the surface of the ground; it is full of tubercles or warts, and is easily broken. It sends forth leaves, which are like those of male fern, but much less; they are deeply cut almost to the rib, into long narrow segments, which are covered on the back with a sort of reddish powder. This, examined through a microscope, appears to be spherical, membranous shells, which open, and let fall small yellow seeds, in the form of a kidney. It is a capillary plant, and consequently bears no flowers; it grows in forests, valleys, and among stones covered with moss, as well as on the trunks of old trees. The root only is used in medicine,

dicine, and that is accounted best that is found upon oaks. It is green all the year, and in April it sends forth fresh leaves. The ancients accounted this root to be purgative; but it does not so much loosen the belly, or at least very weakly. Some affirm, that it opens obstructions of the viscera; but the best authors are not agreed in its virtues, though it has been much used in medicine.

POPULUS NIGRA, *the black Poplar tree*, has a root that spreads very deep in the earth, and grows to a tall tree, with leaves that are almost round, and cut on the edges. They are of a blackish colour, and always tremble, though there is no wind. Some bear no flowers or fruit, except catkins, which consist of many pointed small leaves; for the fruit grows on those trees that bear no catkins, and they consist of several small leaves, under which lies a bell, containing the embryo; this turns to a membranaceous spiked pod, that opens two ways, and is full of downy seeds. In the beginning of the spring it produces many buds, about the size of capers, which are oblong, pointed, of a greenish yellow, and full of a clammy juice, which sticks to the fingers of those that touch them. It grows in moist watery places, on the sides of brooks and rivers; the buds appear in April, and the catkins in May or June. The buds are only made use of in medicine, and a tincture may be extracted from them with spirits of wine, which, according to Tournefort, is excellent to stop inveterate fluxes of the belly, and to heal internal ulcers. The dose is a drachm morning and evening, in a spoonful of hot broth. They are also employed in making the unguentum populeum.

POPULUS ALBA, *the white Poplar tree*, has a root that spreads on the surface of the earth, and the trunk is high, and full of branches, with a smooth, whitish bark. The wood is white, but not so hard as that of the black poplar, and is more easily cloven. The leaves are broad, and deeply cut on the edges, they being not very unlike those of the vine, or the large maple, but they are more small, green, smooth, and without hair above, but underneath they are white, and downy, and have long pedicles. The catkins and fruit grow on different trees, and are like those of the former. It delights in moist places, and grows to a considerable height in a little time. It may be easily propagated by the shoots that grow on the foot of the tree, and may be planted in meadows, but not in the places where the spreading roots will damage the grass. It grows almost every where, and the wood is of greater use than that of the black. In France they make wooden shoes with it, and it serves every where for the heels of women's shoes. No part of it is now used in medicine.

PORRUM COMMUNE CAPITATUM, *the common Leek*, has an oblong, almost cylindrical, smooth, shining, white, bulbous root, consisting of several white coats, joined one to another, and furnished below with several fibres. The leaves proceed from the coats of the root, to the height of a foot, and are pretty broad, and placed alternately; they are flat or folded in the form of a gutter, and are of a pale greenish colour. Between these leaves there rises a stalk to a considerable height, and in some countries it is five feet high, and as thick as a man's finger. It is firm, solid, full of juice, and has at the top a bunch of flowers, each of which consists of six petals, composed in the shape of a bell, with as many large cylindrical stamina, terminating in three capillaments, of which the middlemost is furnished with a chive. The pistil is seated in the center of the flower, which becomes a roundish fruit, divided into three cells, containing roundish seeds. It has somewhat of the smell of an onion, and is a common kitchen plant, used almost every where. It flowers in July, and its seed is ripe in August. It is

somewhat hard of digestion; and is a little windy; but these inconveniences may be avoided by boiling them well. They are diuretic, and a drachm of the seeds in particular may be given in a glass of white wine for that purpose. It is cultivated by sowing the seeds in the spring, along with those of onions; and when these last are drawn up in July; the leeks will have time to grow large afterwards.

PORTULACA, *Purslane*, has generally a single root with a few fibres, which becomes woody in length of time; the stalks grow to the height of a foot, and are thick, roundish, reddish, tender, full of juice, smooth, and divided into several branches; the leaves, which are ranged alternately, are almost round, thick, fleshy, shining, of a yellowish colour, and a clammy taste. The flowers grow at the places where the leaves join to the stalks, and are of a yellow or pale colour. They are each composed of five leaves, which expand in the form of a rose. The calyx consists of a single leaf, somewhat like a mitre, from which rises a pistil, which, together with the flower-cup, turns to a fruit, or oblong capsula, that is like a small urn, and of an herbaceous colour. These capsula open transversely into two parts, and contain many small black seeds. It is propagated almost every where in gardens, by seeds, which must be sown in beds of light rich earth, during any of the summer months, and it will be fit for use six months after sowing. It is cooling, abates the acrimony of the humours, and is excellent in the scurvy. It is only proper for young persons, and those of a hot, bilious constitution. The leaves of purslane being chewed, abate the pains of the teeth, that arise from having been set on edge by eating green fruit.

PRIMULA VERIS, *Primrose*, has a thick, scaly, reddish, fibrous root, that sends forth large, rough, wrinkled leaves in the spring of the year, which lie on the ground, and are covered with so short a down, that it can hardly be perceived. From among these leaves there arise several stalks, to the height of a palm, that are round, a little hairy, naked, firm, and sustain the bunches of flowers at the top; they consist of a single petal, the lower part of which is tubulous, but the upper part expands in the form of a salver, and is cut into several segments. The pistil arises from the flower-cup, which is fistulous, and, when the flower is decayed, turns to an oblong fruit or husk, lying almost concealed in the flower-cup; it opens on the top, and discovers many roundish seeds, fastened to the placenta. It grows almost every where in the fields, in shady places, from whence they may be transplanted into the garden, and placed under hedges. The best time for this is about Michaelmas, and then the roots will produce flowers early in the spring. It has always been observed, that this plant has somewhat of a soporiferous quality. The medicinal uses of this flower are not yet properly ascertained.

PRUNUS, *the Plumb tree*, has a flower that consists of five petals, placed in a circular order, and expanded in the form of a rose. The pistil arises from the flower-cup, which afterwards becomes an oval, globular fruit, with a soft fleshy pulp, surrounding an hard oblong stone, generally pointed. The pedicles, or foot stalks, are long and slender, and there is only a single plumb on each. There are several sorts of plumb trees, as the *Jean hantive*, or white Primordian, which bears a small, longish, white plumb, of a clear yellow colour, covered over with a white flue, that easily wipes off. The juice is sweet, and it ripens in the middle of July.

The *early black Damask*, commonly called the *Morocco PLUMB*, is pretty large, of a round shape, and furrowed in the middle like a peach; the outside is of a dark black, covered with a light violet bloom; the flesh is yellow, and it parts readily from the stone.

It ripens towards the end of July, and is in good esteem.

The *little black damask* PLUMB is small and black, with a violet bloom, and the juice has a rich sweetish taste; the flesh parts readily from the stone; it is a good bearer, and is ripe towards the latter end of July.

The *great damask violet* PLUMB of *Tours* is pretty large, inclining to an oval shape, and the outside is of a dark blue, covered with a violet bloom; the juice is rich and sweet, the flesh yellow, and parts readily from the stone; it ripens towards the latter end of July.

The *Orleans* PLUMB is of a reddish black colour, and is a fruit so well known to almost every person, that it needs not be described; it is a very plentiful bearer, and is planted by those who supply the markets with fruit, though it is but an indifferent plumb.

The *Fotheringham* PLUMB is of a blackish red, is somewhat long, and deeply furrowed in the middle; it has a firm flesh, that readily parts from the stone; the juice is very rich, and it ripens towards the latter end of July.

The *Perdrigon* PLUMB is of a middle size, and an oval shape, with a very dark outside, covered over with a violet bloom. The flesh is firm, and full of an excellent rich juice; it is in great esteem, and is ripe in the beginning of August.

The *violet Perdrigon* PLUMB is a large fruit, and rather round than long; it is of a bluish colour on the outside, but the flesh is yellowish, pretty firm, and adheres closely to the stone; the juice is extremely rich, and it ripens in the beginning of August.

The *white Perdrigon* PLUMB is of a middle size, and an oblong shape, with a yellowish outside, covered with a white bloom. The flesh is firm and well tasted, and it is a very good fruit, either to eat raw, or make into a sweet-meat; for it has a pleasant sweetness, mixed with an acidity.

The *red imperial* PLUMB has a large fruit of an oval shape, and of a deep red colour, covered with a fine bloom. The flesh is very dry, but it makes excellent sweet-meats, and is ripe in the beginning of August.

The *white imperial Bonum magnum, or white Holland, or Mogul* PLUMB, is a large fruit, of an oval shape, and a yellowish colour, powdered over with a white bloom. The flesh is firm, and adheres close to the stone; the taste is acid or sour, which renders it unfit to be eaten raw; but it does very well baked, or to make sweet-meats thereof. It is ripe in the beginning of September.

The *Cheston* PLUMB is of a middle size, and of an oval shape, with a dark blue outside, and a violet bloom. The juice is rich, and it is ripe in the beginning of August.

The *Apricot* PLUMB is a large round fruit, of a yellow colour, powdered over with a white bloom; the flesh is dry, the taste sweet, and it parts readily from the stone. It ripens in the beginning of August.

The *Maitre Claud*, though it has a French name, is not so called in France; it is of a middle size, rather long than round, and the colour is finely variegated with red and yellow; the flesh is firm, has a delicate flavour, and parts readily from the stone; it is ripe in the beginning of August.

The *red diaper* PLUMB is a large round fruit, of a reddish colour, powdered over with a violet blue; the flesh has a very high flavour, and adheres closely to the stone; it is ripe about the middle of August.

St. Catherine's PLUMB is large and oval, but somewhat flat, and the outside is of an amber colour, powdered over with a whitish bloom; but the flesh is of a bright yellow, and is dry, firm, and adheres

closely to the stone. It has a very agreeable sweet taste, and makes an excellent sweet-meat; it is ripe in the beginning of September.

The *royal* PLUMB is a large fruit, of an oval shape, inclining to a point next the stalk; the colour is of a light red, powdered over with a whitish bloom, and the flesh, which has a fine sweet taste, adheres to the stone; it is ripe about the beginning of September.

The *Brignole* PLUMB is of a large oval shape, and of a yellowish colour, mixed with red; the flesh is of a bright yellow, and, though it is dry, has an excellent rich flavour. It ripens towards the latter end of August, and is thought to be the best plumb for sweet-meats yet known.

The *black Bullace* grows wild in the hedges all over England, and is seldom or never cultivated in gardens.

The *white Bullace* grows wild as the former, and is very rarely planted in gardens.

The *Black-thorn, or Sloe-tree*, is very common almost every where, and is chiefly used for planting hedges, like the white thorn, and its being of a quick growth renders it very proper for that purpose. All sorts of plumbs are propagated by budding or grafting on the stocks of any sort that shoot freely; however, budding is much preferable to grafting.

PLUMBS are in great esteem every where, and may be planted to grow in various manners, as in standards, espaliers, or against walls. They require a soil neither too dry nor too wet, and those that are planted against walls should be placed to an east or south-east aspect, which are better than a direct south. Plumbs in general are moistening, laxative, and emollient, except the bullaces and sloes, which are astringent. They are cooling, quench thirst, and create an appetite, and therefore they agree best with hot constitutions; but they do not at all sit easy with those that have weak stomachs. In those years that plumbs are very plenty, and consequently much eaten by all sorts of people, fluxes of the belly generally abound, which often turn to bloody fluxes; hence it appears, that they ought always to be eaten very moderately, and then they should be quite ripe and sound.

PULEGIUM, *Penny-royal*, has a creeping, fibrous root, with square hairy stalks, some of which are upright, and others creep upon the ground. The leaves are like those of marjoram, but softer to the touch, and blacker; the smell is agreeable, but strong, and the taste is hot. The flowers proceed from the places where the leaves join to the stalks, and are disposed in rings round them; they are of a bluish or purple colour, though sometimes of a pale red; they are labiated, and the upper lip is cut into two segments; these are succeeded by small seeds. It flowers in July and August, at which time it ought to be gathered for use. This plant is aperient, hysteric, and good for disorders of the stomach and breast. It is proper for inveterate coughs, and rheums, and some recommend it to cure hooping-coughs. It may be taken in the manner of tea.

PULMONARIA, *Lungwort, or Sage of Jerusalem*, has a white fibrous root, and angular, hairy stalks, which rise to a foot in height, and are of a purplish colour, resembling those of bugloss. Some of the leaves proceed from the root, and lie upon the ground, while others embrace the stalks without pedicles; they are all oblong, broad, terminate in a point, have a nerve that runs through the whole length, are covered with a soft down, and generally marbled with whitish spots. The flowers grow in bunches, and each consist of tubes, that terminate in the shape of basons on the upper part; they are cut into five segments, and are of a purple or violet colour, with a calyx that is a dentated tube. They are

are succeeded by four roundish seeds; contained in the flower-cup like those of bugloss. It grows in woods, groves, and in mountainous and shady places. It is also cultivated in gardens, and flowers in March and April.

PULMONARIA ANGUSTIFOLIA, *Lungwort*, or *narrow leaved Sage of Bethlehem*, has a root like the former, which sends forth angular hairy stalks, to the height of a foot, and the leaves are oblong, narrow, and hairy, like those of wild bugloss, but softer, and not so rough; they have no pedicles, and they embrace their stalk by the middle. The flowers grow on the top of the stalks, and are like the former, only they are of a fine purple colour, mixed with blue. It grows almost every where, in woods and shady mountainous places.

PULMONARIA GALLORUM, *French Lungwort*, has a long, thick, jointed, reddish, fibrous root, full of a bitter milky juice, and the stalks rise to the height of a foot and a half; these are slender, hairy, and divided into several branches. The leaves proceed from the root, lie on the ground, and are sinuated towards the pedicle, they are greenish and hairy above, downy and whitish below; but generally marbled with long blackish spots. The flowers grow on the tops of the branches, and consist of yellow semi-florets, placed in a scaly cup; they are succeeded by oblong, small, tufted seeds, of a blackish colour. It generally grows on old walls, and in uncultivated places; it flowers in June and July, and sometimes later. They have all three the same virtues, and are accounted good in diseases of the lungs.

PULSATILLA, *Pasque-flower*, has a long, thickish, single root, which is divided into several heads, that are hairy on the upper part and black. The leaves proceed from the root, and are jagged and hairy; they are placed on long, reddish, very hairy ribs, that lie near the ground. From between the leaves there proceeds a round hollow stalk, to the height of a foot, covered with a thick soft down, and is without leaves, except one a little below the top. The flower consists of six oblong, pointed petals, disposed in the form of a rose, of a purple colour, hairy without, and smooth within. The pistil is placed in the middle, surrounded with yellow stamina or chives; this turns to a fruit, with a round head, that consists of several seeds, that terminate in a tuft like a feather. It grows in stony, dry, mountainous places, flowers near Easter, and is called Pasque by the French, from whence it has its name. It is cultivated in gardens, for the sake of the flowers. It is said to be a vulnerary plant, and the powder of the dried leaves and flowers, snuffed up the nose, provoke sneezing; but it leaves a burning heat behind it, that reaches as far as the brain; for this reason it is accounted good in sleepy diseases.

PYROLA, *Winter-green*, has a flexible, slender, fibrous, creeping, whitish root, which sends forth five or six fibrous leaves, like those of the pear tree; they are fleshy, thick, of a deep brownish green, and are smooth, have long pedicles lying on the ground, and continue green all the winter. The stalk rises to the height of a foot among the leaves, and is angular, single, and sometimes furnished with small pointed leaves; the flowers grow on the top, and are beautiful, scented, and are composed of five petals, placed in the form of a rose; they are white, and have ten shortish stamina, with a crooked pistil in the middle, like the trunk of an elephant; this turns to an angular fruit or button, consisting of five furrowed cells, containing reddish seeds, that are exceeding small. It grows wild in the north of England, on mossy moors, hills, and heaths; for which reason it is difficult to cultivate them in the southern parts; it flowers in June and July, and is looked upon to be an astringent vulnerary plant, and proper

to stop internal bleedings; it may be taken in the manner of tea.

PYRUS, *the Pear tree*, has flowers that consist of several leaves, placed in a circle, which expand in the form of a rose; the flower-cup becomes a fleshy fruit, universally known, that has a hollow like a navel on the upper part; the cells, in which the seeds are lodged, are separated by soft membranes. The tree is so well known, that it needs no description, and therefore it will be sufficient to describe the several sorts of fruit.

The *little musk PEAR*, commonly called *the supreme*, is generally produced in large clusters, and is rather round than long, with short stalks; the skin is yellow when ripe, and the juice is somewhat musty; it is an excellent pear, if gathered before it is too ripe. It ripens towards the middle of July, and will continue good but a few days.

The *Ohio PEAR*, commonly called *the little Bastard musk pear*, is smaller than the former, but much of the same shape. The skin, when ripe, has a few streaks of red on the side next the sun, but it seldom hangs in clusters.

The *hasting PEAR*, commonly called *the green Chiffel*, is larger than either of the former, and is longer next the stalk. The skin is thin, and of a whitish green when ripe; the flesh melts in the mouth, and, if not too ripe, has a sweetish taste; it is fit to gather towards the end of July.

The *red MUSCADELLE* is a large early pear, of great beauty, and the skin is of a fine yellow, beautifully striped; the flesh has a rich taste, if gathered before it be too ripe; but it is apt to be mealy. The tree generally produces two crops in a year, the first of which is commonly ripe towards the end of July, and the second in September, but is seldom well tasted.

The *little MUSCAT* is a small pear, rather round than long, and the skin is very thin, and of a yellowish colour when ripe. The flesh melts in the mouth, and has a rich musky flavour; but will not keep long when ripe, which is towards the latter end of July.

The *JARGONELLE* is a very long pear, in the shape of a pyramid, with a long pedicle or stalk; the skin is pretty thick, and of a rusty colour towards the sun; but the other side is of a russet green; the flesh has a rich musky flavour, and it ripens towards the end of July. This is one of the best early summer pears.

The *Windsor PEAR* is of an oblong shape, and terminates almost in a point next the stalk; the skin is smooth, and when ripe, of a yellowish green, with a very soft flesh; but if it hangs two or three days after it is ripe, it grows mealy.

The *JARGONELLE*, now commonly called *Cuisse madame*, is somewhat like the *Windsor Pear*, but is longer towards the crown, and smaller next the stalk; the skin is smooth, and of a pale green, with a flesh that is apt to be mealy.

The *orange musk PEAR* is of a middle size, of a short roundish form, and a yellowish skin, spotted with black. The flesh is musky, but is apt to be a little dry and choaky; it is ripe in the beginning of August.

The *little blanket PEAR* is much less than the former, and more pinched in near the stalk, which is shorter, but slenderer than that of the former. The skin is soft, and of a pale green, with a tender flesh, full of a rich musky juice; it ripens in the beginning of August.

The *long stalked blanket PEAR* is shaped somewhat like the former, but the eye is larger, and more hollow at the crown; it is somewhat plumper towards the stalk, and a little crooked, with a very smooth white skin; the flesh is full of a rich sweetish juice, and it is ripe about the middle of August.

The *skinless* PEAR, or *early Ruffelet*, is middle-sized, long, and of a reddish colour, with an extremely thin skin; the flesh melts in the mouth, and is full of a rich, sweet juice; it ripens in the beginning of August.

The *musky rovine* PEAR, *the queen's* PEAR, or *the amber* PEAR, is small and round, and of a yellowish colour when ripe; the flesh has a rich musky flavour, and it ripens in the beginning of August.

The *musky drone* PEAR is middle sized and round, and the skin is of a yellowish colour when ripe. The flesh melts in the mouth, and is full of a musky juice; but, if it hangs too long on the tree, it grows mealy: it ripens in the beginning of August.

The *red orange* PEAR is middle sized and round, and of a greenish colour, except on the side next the sun; which is purple when ripe. The flesh melts in the mouth, and the juice is sweet, with a very hollow eye, and a short stalk; it ripens about the middle of August.

The *great onion*, PEAR, or *the Summer Arch-duke*, is of a middle size and round; and of a brownish purple next the sun; the flesh melts in the mouth, and is tolerable good; it ripens in the beginning of August.

The *August MUSCAT*, or *the royal* PEAR, is in shape much like a Bergamot, and the stalk is long, strait, and a little spotted. The skin is smooth, and of a whitish yellow colour, with a rich, sweet, perfumed juice; it is one of the best summer pears yet known, and grows ripe in August.

The *rose* PEAR is short and round, and of a yellowish green colour, but a little inclining to red next the sun. The stalk is very long and slender, and the juice is musky; it grows ripe in August.

The *prince's* PEAR is small, roundish, and of a bright red colour next the sun, but on the other side it is yellowish; the flesh has a very high flavour, and grows ripe in the middle of September.

The *great mouth-water* PEAR is large and round, with a smooth green skin, and a short thick stalk; the flesh melts in the mouth, and is full of juice, if gathered before it is too ripe, which is about the middle of August.

The *summer Bergamot* is a pretty large, round, flat pear, of a greenish yellow colour, and hollowed a little at both ends, like an apple; the flesh melts in the mouth, and it is ripe towards the latter end of August.

The *autumnal Bergamot* is smaller than the former, but of the same shape, with a yellowish green skin, reddish on the side next the sun; the flesh melts in the mouth, and it grows ripe towards the latter end of September.

The *Swiss Bergamot* is somewhat rounder than the former, with a tough greenish skin striped with red; the flesh is full of juice, melts in the mouth, and it is ripe in the beginning of October.

The *red butter* PEAR is sometimes of other colours, as green or grey, whence some have supposed them to be different fruits. It is large and long, and generally brown, with a melting flesh, full of rich sweet juice; it ripens in the beginning of October.

The *long green* PEAR is long, and very green when ripe, with a melting juicy flesh. It grows ripe in the middle of October, and in some years will keep till December.

The *white and grey Messieure Jean* is one of the best autumnal pears, when grafted on a free stock. It is a large roundish fruit, with a tough skin, that is generally brown; it is full of a rich sweet juice, and ripens about the beginning of October.

The *flowered Muscat* is an excellent pear, of a middle size, and round, with a dark red skin; the flesh is very tender, and of a delicate flavour; it ripens towards the end of October.

No. 38.

The *wine* PEAR is round, and of a middle size, with a dark red skin; the flesh is full of a clammy juice, and it grows ripe towards the end of October; but should be gathered before, otherwise it will soon rot.

The *Roussiline* PEAR has a smooth skin, of a deep red colour next the sun, with grey spots, but the other side is of a greenish-yellow; the flesh is tender and delicate, and the juice sweet; it is ripe towards the end of October, but must not be kept long.

The *Marquise* PEAR is like the Blanket, when planted in a dry soil; but, when it is rich and moist, it grows larger. It is flat at the top, with a small hollow eye, and a skin of a greenish yellow, inclining to red on the side next the sun. If it is yellow when ripe, the flesh is tender and delicate, and full of a sweet juice. It grows ripe at the beginning of November.

The *crassane*, or *flat butter* PEAR, is of a middle size, and hollowed at the crown like an apple. The stalk is very long and crooked, and the skin is rough, and of a greenish colour when ripe, or rather ruffet. The flesh is tender and buttery, with a rich sweet juice. It is the very best pear of the season, and is fit to eat about the middle of November.

The *Lansac*, or *Dauphine* PEAR, is about the size of a Bergamot, of a roundish shape, and flat towards the head; but it is a little longish towards the stalk; the skin is smooth, of a yellowish-green, with a yellow, tender, sweet flesh; the eye is very large, and the stalk long and strait; it grows ripe about the middle of November.

The *Martin sec* is like the ruffelet in shape and colour. The shape is oblong, and the skin is of a deep ruffet on one side, but on the other inclining to red. The flesh is fine and sweet, and it is fit to eat about the latter end of November.

The *little lard* PEAR, or *the ruffet of Anjou*, is of a bright green, with a few spots, and a large hollow eye. The flesh is extremely fine, with a sweet juice; it is fit to eat in December, and is one of the best fruits in that season.

The *Louise bonne* has a short fleshy stalk, a small eye and flower, and a very smooth skin; the colour is green, inclining to white, and the flesh is extremely tender, and full of a sweet juice. It is fit to eat in December.

The *Eschafforie*, or *the winter long green* PEAR, is shaped like a citron, with a smooth green skin, that becomes yellowish when ripe. The eye is small, and the flesh melting and buttery, with a sweet juice. It is fit to eat in the beginning of December.

Parkinson's Warden, or *the black Pear of Worcester*, commonly weighs a pound or upwards, and has a rough, dark, red skin next the sun. It is only fit for baking or stewing, and is in season from November to Christmas.

The *small winter butter* PEAR has a small oblong shape, and a yellow colour, spotted with red. The flesh has a very rich juice, and it is fit to eat in December and January.

The *Ronville* PEAR is about the size and shape of a large ruffelet, and the middle is swelled more on one side than the other; the skin is soft and smooth, and of a lively red colour next the sun, but yellow on the other; the flesh is full of a very sweet juice, that is a little perfumed.

The *winter citron* PEAR, or *the Musk-orange*, is a pretty large pear, and is in shape and colour very like an orange; the flesh is hard and dry, and apt to be stony, but it bakes very well, and is in season from December to March.

The *winter ruffelet* PEAR is of a greenish-yellow, inclining to brown, with a buttery melting flesh, which is generally very full of a very sweet juice; but

but it must always be pared, because the skin has a bad taste. It is fit to eat in January and February.

The *Bergamot Bugi* is a large pear, and almost round, but it is a little longish towards the stalk; the eye is flat, and the skin green, and there are many rough protuberances thereon; but as it ripens it becomes yellowish, and in a good season the flesh is sweet; it is good to eat from February to April.

The *Dutch Bergamont* is large and round, and of the shape of the common bergamot; the colour is greenish, the flesh pretty tender, and the juice of a high flavour. It continues good till April.

The *Naples PEAR* is pretty large, long, and greenish, with a sweet, and somewhat veinous juice; it is called in England the *Easter St. Germain*, and will keep till April.

There are many other sorts of pears that are still to be seen in some old gardens, but are of no great esteem; those that plant pears for use, ought always to choose them of the best sorts, because the trouble and expence is the same. They are propagated by budding or grafting them upon stocks of their own kind, which are commonly called free stocks; but quince stocks are greatly used in the nurseries, for all sorts of pears that are designed for dwarfs or walls.

As to wild pears, they are always so astringent and rough, that they are not fit to be eaten, though they may serve well enough to make perry. In general, pears are windy, and improper for weak stomachs; some think they are enemies to the nervous parts; however, those are best that are quite ripe, and have a sweet juice, and then they are seldom noxious, unless eaten to excess.

QUERCUS VULGARIS, *the common oak tree*, is well known in all parts of Europe, as also its wood, for its long duration, and various uses. The flowers are long catkins, which consist of a great number of small slender threads; but the embryoes are produced at some distance from these, and afterwards become acorns, with hard scaly cups. It grows in woods, forests, and high mountainous places; the leaves appear before the flower, and the catkins may be seen in April and May, but the acorns are not ripe till August. It is commonly said, that an oak tree is an hundred years coming to its full growth, an hundred years in perfection, and an hundred years in decaying. Some affirm the wood will continue good six hundred years in the open air, and five hundred under ground. Oak bark is of very great use for tanning of leather, and upon these accounts the oak is called by some the king of trees. The English oak is best for building of ships; but now there are great numbers constructed in New-England, of the oak wood that grows in those parts, though they are not so lasting.

The leaves of the oak are styptick, and a little bitterish, and all parts of it are astringent. They have often been prescribed for all sorts of hæmorrhages and fluxes of the belly, and some pretend that a decoction of the bark has cured a most terrible bloody-flux. In times of scarcity, a great many poor people have made bread of the acorns, and the poets tell us they were the food of the golden age; however, they are heavy, windy, and hard of digestion, and therefore mankind in those early ages must doubtless have a better digestion than us. They are now given to hogs, for which they are excellent nourishment, and render the flesh fat, firm, and sweet; for which reason that bacon is in most esteem, that comes from places where there are plenty of acorns.

There are a great number of trees that go under the name of oaks, in divers parts of the world, but there are no where so many different kinds, as in America; the wood however is not nigh so valuable as the English oak, which has been hinted at above.

QUINQUE FOLIUM, *Cinquefoil*, has a long fibrous root, blackish without, and reddish within, which sends forth several stalks to the height of a foot and a half, which are round, flexible, hairy, reddish, and knotted; from these knots the leaves and roots proceed, and by their means this plant multiplies greatly. The leaves are oblong, roundish at the ends, nervous, hairy, dentated on the edges, of a dark green, and placed like an open hand, to the number of five upon the same pedicel, which is three inches and upwards in length. The flowers grow single on the top of the stalks, and consist of five yellow petals, in the form of a rose, and are somewhat in the shape of a heart; there are five stamina, with their apices in the form of a half-moon, and the pistil becomes a round fruit, composed of many pointed seeds, placed in the form of a head, and contained in the cup of the flower. It grows in fields, and in sandy stony places, as well as in meadows on the sides of waters; it flowers in May and June, and the root is chiefly in use. It is accounted balsamic, vulnerary, and astringent, and has been given in all sorts of hæmorrhages, as well as in all kinds of fluxes of the belly; some affirm it succeeds better than ipecacuanha; for which purpose an ounce of the root has been boiled in three pints of water to two; this decoction is also recommended in spitting of blood. It is confidently said, that a drachm of this root, given in a glass of water, before a fit of an ague, will certainly cure it.

RANUNCULUS BULBOSUS, *Bulbous Crow-foot*, has a round bulbous root, with several upright stalks, that sometimes rise to the height of a foot, which are hairy, and have leaves that are cut into several slender jags, and on the top there are flowers of a fine yellow shining colour; they are generally single, and consist of five roundish petals, disposed in the form of a rose, the leaves of the calyx being bent back towards the pedicel. The fruit that succeeds the flower contains many roundish seeds, placed together in the form of a head. It flowers in May, and is to be met with almost every where in pasture grounds and meadows. When it is transplanted into gardens, the flower becomes double. The root of crow-foot is extremely acrid and caustic, and some authors recommend it to raise blisters; but this practice is dangerous, because it may cause a gangrene. There are quacks that apply it to the part afflicted with the gout, and on corns, to take them away; but we have much safer remedies. In some places it is common for beggars to make sores with this root, to raise compassion. The bruised leaves were once applied to the head of a patient, who had kept his bed for three years, on account of a violent head-ach, and they raised a blister, which ran freely, and he was soon cured.

RANUNCULUS NEMOROSUS, *Wood Anemone*, has a long creeping root, purplish or brown without, and yellowish within, when young. The stalk is small, slender, reddish, and rises to the height of a palm and a half, on the top of which there are three leaves, or reddish pedicles, each of which are cut down to the pedicel into three jags, and on the top there is a single flower without a calyx, sometimes white, and sometimes purplish or flesh coloured; it consists of six oblong leaves, in the middle of which there are several yellowish stamina. These are succeeded by naked, oblong, hairy seeds, collected into a head. It flowers towards the beginning of March, to the end of April. Some recommend a cataplasm of the leaves and flowers for scald heads, and affirm it will cure them in a few days, if it be renewed twice a day; but others think it unsafe, from the bad effects they have seen from such applications.

RANUNCULUS PRATENSIS REPENS, *Crow-foot*, has a small creeping root, composed of whitish fibres, and many slender, round, hairy, hollow, creeping

creeping stalks, that lie upon the ground. The leaves are cut into three segments, somewhat like parsley, and are dentated on the edges, and hairy on both sides; they are of a blackish green, and generally marked with fine spots on the upper part. The flowers are of a shining yellow, and composed of five petals, disposed in the form of a rose, with a great number of stamina in the middle, and a flower-cup, consisting of five leaves, that falls off with the flower, which are succeeded by black seeds, placed together in the form of a head, and full of small points or prickles. It flowers in May, and grows almost every where in meadows and shady places. This may be taken inwardly without danger, and the cattle that feed on it yield a great deal of milk. Some use it in a fomentation against the piles. There are other species of the crow-foot, which had best be avoided.

RAPA, *the Turnep plant*, has a tuberose, fleshy, bellied, round, thick root, that grows sometimes to the size of a child's head, and is universally known. The leaves are oblong, large, lie upon the ground, and are cut deeply into jags. They are rough to the touch, are of a greenish brown colour, and of the taste of a pot herb. The stalk rises from among the leaves, to the height of two feet, and sometimes to that of a man. The leaves embrace the stalk with their broad base, and terminate in a point. The flowers grow on the top of the stalk, are yellow, and consist of four leaves, disposed in the form of a cross, with a calyx fixed on a long slender pedicle. The pistil is succeeded by a pod, divided into two cells, by a partition, which contain two rows of roundish, reddish seeds. It flowers in the spring and summer.

RAPA OBLONGA, *five* FOEMINA, *oblong*, or *female Turnep*, differs from the former in having an oblong root that is not so thick. Besides these, there are the garden turnep, with a green root above ground; the ground garden turnep with a purple root; the round garden turnep with a rusty black root, and the round garden turnep with a yellow root both within and without; they all delight in a light sandy soil, for in a rich soil they will grow rank and sticky. The common season for sowing them is from the middle of June to the latter end of August, and in some places they sow them much later.

The use of turneps, as an aliment, is well known, and they are accounted an emollient, and proper to abate the acrimony of the humours; but they are windy, cause obstructions, and do not digest very easily. They are accounted a great pectoral, and many have been said to be cured of an asthma by their juice, that is, by taking a large spoonful in a morning fasting, for forty days together.

RAPHANUS MINOR, *the garden Radish*, has a long fleshy root, red or purple without, and white within. The leaves are large, rough, green, deeply cut, and much like those of turneps. A stalk arises from among these, to the height of a foot and a half, or two feet, that is round, branched, and is adorned with flowers, consisting of four petals, in the form of a cross; the pistil arises from the flower-cup, which turns into a pod of the shape of a horn, that is spongy within, and contains two rows of roundish seeds that are separated by a thin membrane. It is cultivated in gardens, and the root is chiefly in use in the spring, which is tender, full of juice, and eaten as food. It agrees very well with most constitutions, provided they have good stomachs, for it is apt to rise therein. The juice is good in the gravel, if four ounces be taken of it for four days, in a morning fasting.

RAPHANUS RUSTICANUS, *Horfe Radish*, has a long, thick, creeping, white root, that sends forth large long pointed leaves, of a fine green colour,

somewhat like monk's rhubarb. From among these there arises a stalk, to the height of a foot and a half, which is upright, hollow, furrowed, and furnished with leaves, a palm in length, and an inch in breadth, and cut deeply on both sides. On the top there are small flowers, composed of four white petals, in the form of a cross, which are succeeded by small roundish pods, divided into two cells, that contain smooth, roundish, reddish seeds. It flowers in the spring, and grows wild on the sides of brooks and rivers, but is cultivated in gardens. It is used as mustard, to promote the digestion of aliments, and to create an appetite. The distilled water is given to four ounces against the scurvy and gravel, and to cleanse the blood. The expressed juice of the roots and seeds mixed with honey, and taken in a morning fasting, for some time, in whey, cleanses the stomach, kidneys, and lungs; it cures coughs, and inveterate hoarsenesses, provided they are not dry, or attended with spitting of blood. It is said to be excellent against the scurvy, dropsy, and rheumatism, if continued for some time. The dose of the root in powder, is from one scruple to two; of the fresh root in decoction, from half an ounce to an ounce; and of the juice a spoonful. It is hard to say what a scruple of the root will do, since it is often eaten at meals in much larger quantities, therefore this seems to be a trifling dose.

RESEDA VULGARIS, *common bastard Rocket*, has a long, slender, woody, white root, which sends forth several stalks, to the height of a foot and a half, that are furrowed, hollow, hairy, branched, weak, crooked, and furnished with leaves, placed alternately; these are deeply cut, are curled, and of a dark green colour, with the taste of a pot-herb. The flowers are in loose spikes, and are each composed of yellow irregular petals, in the middle of which there are several small stamina, with yellow apices, and a pistil that turns to a four-cornered fruit, an inch in length, and like cylindric urns, full of small, roundish, black seeds. It flowers in June, July, and August, and is common in the fields. There are several kinds of this plant, that are propagated in the gardens of curious botanists. It is said to be emollient and resolvent, and is applied externally by some, to discuss inflammatory swellings, as well as to ease the pain.

RHAMNUS CATHARTICUS, *purging Buckthorn*, is a shrub with a long, hard, woody root, and it sometimes grows to the height of a tree, with a bark, like that of the cherry tree, and a yellowish wood; the branches are armed with thorns, like those of the wild pear tree. The leaves are roundish, of a blackish green, slightly dentated on the edges, and pretty much like those of the plumb tree. The flowers are small, of a greenish or yellowish colour, grow in bunches along the branches, and consist of single petals, in the shape of a funnel, divided at the top into four parts, and have as many stamina. These are succeeded by soft berries, green at first, and black when they are ripe; they are as large as juniper berries, are shining, and full of a greenish black juice, with four seeds, roundish on the back. This shrub is common in hedges, and flowers in May, and the berries are ripe towards October. When these berries are gathered in harvest time, and steeped in alum-water, they will yield a yellow or saffron coloured juice; if they are gathered in autumn, when they are ripe, and kept in a glass vessel, they will yield a good green; but if they are left on the tree till towards St. Martin's day, they will yield a scarlet, that is very useful to dye leather, and to colour cards with red. It is well known that the berries are a purge, which are said to be good in the dropsy, palsy, rheumatism, and gout. A drachm, or a drachm and a half, of the ripe berries, dried and powdered, is a dose. They generally occasion gripes,

gripes, sickness, a dryness of the mouth and throat, and thirst. About twenty of the fresh berries is a dose in substance, and twice or thrice this number in decoction, or an ounce of the expressed juice. A syrup made of the juice is kept in the shops.

RHUS FOLIO ULMI, *common Sumach*, has a long, creeping, woody root, and is a shrub that grows sometimes to the height of a tree; the leaves are oblong, pointed, hairy, winged, reddish, dentated on the edges. The flowers grow in bunches among the leaves of the branches, at the top, and are of a whitish yellow colour; they are composed of five leaves disposed in the form of a rose, sustained by a calyx, and divided into five parts. The pistil turns to a flat, oval, membranous, greenish capsula, that contains a single seed, almost of the shape of a kidney. It grows plentifully in the southern parts of Europe, as also in Turkey, where the branches are used for tanning of leather. This is not so common in England, as those brought from America, which are the *Virginian Sumach*, improperly called *the Stag's horn tree*; *New England Sumach*, with loose herbaceous panicles, and smooth branches, the *Canada Sumach*, with a longer leaf, smooth on each side, and the *dwarf Virginian Sumach* with narrow leaves. The first of these is very common in gardens, and produces bunches of small flowers in June, at the extremities of the branches, which are succeeded by seed included in red covers. They may be all propagated by seeds, which should be sown soon after they are ripe, and the plants will come up the following spring. The leaves and fruit have been sometimes used in decoctions, for fluxes of the belly, and against internal hæmorrhages.

RIBES VULGARIS, *the red Currant bush*, rises to the height of two or three cubits, and has a bay or ash coloured bark. The leaves are like those of the vine, but much less, and are smooth, of a dark green above, but covered with a soft down beneath. The flowers grow in bunches, and are composed of five purple petals, placed in the form of a rose, and are somewhat in the shape of a heart. The calyx is in the form of a basin, divided into five segments, and the hinder part turns to a berry, green at first, and afterwards red, which is universally known. Besides this, there are other sorts, as *the Dutch red Currant*, *the common white*, *the large Dutch white*, *the Champaign*, *the Gooseberry leaved*, *the small wild*, *the black*, and *the yellow striped leaved*; *the common Currant*, with leaves, beautifully variegated with green and white; *the white Currant* with striped leaves; *the striped gooseberry leaved Currant*; *the black Currant* with striped leaves; and *the American black Currant*. The manner of the flowering of this last is very different from the other sorts; but the fruit is not much valued. They may be all propagated by cuttings, from September to March, but autumn is best, and they will thrive almost in any soil or situation. Red currants, and their preparations, are generally accounted good to abate internal heats, and to restrain the effervescence of the blood; as they are somewhat astringent, they strengthen the stomach, excite an appetite, and are good against vomiting. Currants eaten too freely will cause loosenesses, attended with gripes, and are hurtful to the lungs.

The leaves of black CURRANTS have been accounted by some a sort of a panacea, and in some parts of France, after they have been bruised in wine, and the juice pressed out, it has been given to half a pint, twice a day, for eight days together, to those that have been bitten by a mad dog, that is, in the morning fasting, and three or four hours after dinner. Others say, that four ounces of the juice of the leaves, or rather the infusion in wine, for twenty-four hours, given to four ounces in a morning fasting, will cure the dropsy. In the Philosophical Transactions it is said, that the gelly of black cur-

rants, swallowed down leisurely in small quantities, is a specific against the quinsy; and in winter, when the gelly cannot be had, a decoction of the leaves and bark in milk, used as a gargle, is said to cure all inflammatory distempers of the throat.

ROSA PALLIDA, *five INCARNATA*, *the pale Rose*, has a long, hard, woody root, that sends forth several stalks, which form a shrub, that divides into firm long branches, covered with a dark greenish bark, and often furnished with strong prickles; the leaves grow by pairs, and are generally seven in number, on one rib, which is terminated by a single leaf; these are roundish, dentated on the edges, and rough to the touch. The flower is sometimes single, and composed of five large petals or leaves, with several yellow apices in the middle. It is sometimes double, and then the external petals are a little larger than the internal, and of an agreeable red or carnation colour, with a very sweet, though weak smell. When the flower is falling off, the calyx turns to an oval fruit, in the shape of a small olive, with a rind that is a little fleshy, and consists only of a single cell, full of angular, hairy, whitish seeds. It flowers in May and June, and is cultivated in gardens. The distilled water from these roses is accounted good against inflammations of the eyes; and some say when it is given inwardly, from one ounce to six, it will stop loosenesses and spitting of blood; but the syrup of pale roses is solutive, and is given from an ounce and a half to two ounces.

ROSA DAMASCENA PALLIDA, *the damask Rose*, has a root like the former, from whence arise stalks or stems, to the height of ten or twelve feet, which are thick, strait, and armed with reddish strong thorns, that are not so flat as those of the former; the leaves are also set at greater distances, are less wrinkled, more pointed, and are green above, and whitish below; they are dentated on the edges, and are sometimes seven, and sometimes nine on the same rib, placed by pairs opposite to each other, and terminating in a single leaf; it has crooked thorns on the base. Some of these rose bushes have flowers, consisting only of five petals, that have a very sweet smell. It is cultivated in gardens, and flowers in autumn. That with double flowers is not of a distinct kind, but only a variation of the former. The flowers are solutive, or rather purging; for two pugils infused in veal broth, and taken in a morning, will purge very well.

ROSA ALBA, *the white Rose*, has a root like the former, which sends forth stalks to the height of eight or ten feet, which are thick, woody, and armed with crooked pedicles. There are sometimes five, and sometimes seven, oblong, smooth, crenated leaves on one rib, that are sometimes prickly at the base. The flowers which grow at the extremity of the branches are large, beautiful, and have a sweet smell. It is cultivated in gardens, and generally flowers in May and June. All authors agree, that they are astringent, and the distilled water is made use of, in some parts, against inflammations of the eyes.

ROSA RUBRA, *the red Rose*, has a creeping, strong, woody root, with several stems, that are lower than those of the former, covered with a green bark, armed with prickles. The flowers are of a beautiful red, with a sweet agreeable smell; it is cultivated in gardens, where it flowers in June and July. These are reckoned astringent, cleansing, and proper to strengthen the stomach, to stop vomiting, fluxes, and hæmorrhages. The dose of the conserve is from two drachms to half an ounce, and is given against coughs, and in consumptions.

ROSA SYLVESTRIS VULGARIS, *the Dog-Rose*, has a long, creeping, hard, woody root, that sends forth long thick branches, armed with strong thorns or prickles; the leaves are large, oblong, smooth,

smooth, and like those of the common rose. The flowers consist of five white petals, with a mixture of red or carnation, and they fall off with the least blast of wind; they are succeeded by oval oblong fruit, which are green at the beginning, and as red as coral when they are ripe. The rind is fleshy, and has a sweetish tart taste; the seeds are angular, white, hard, and wrapped up in strong hair, that readily separates from them. It grows every where near or in hedges without cultivation. The fruit is called hips, and there is a conserve made of them kept in the shops. These flowers are purgative, like those of other roses; but the conserve is recommended in fluxes of the belly, to moderate the heat of the bile, and to abate the sharpness of urine; the dose is from two drachms to half an ounce.

ROSMARINUS HORTENSIS ANGUSTIORE FO. IO. *narrow leaved garden Rosemary*, has a slender, small, fibrous root, that sends forth a stalk that becomes a shrub, which in some countries rises to the height of three or four feet; the leaves are whole, narrow, hard, stiff, of a brownish green above, and white below. The flower consists of a single petal, of a pale blue colour, that is labiated, and whose upper lip, or crest, is cut into two parts, and is turned backwards, with crooked stamina or chives; but the upper lip or beard is divided into three parts, the middlemost of which is hollow like a spoon; the flower cup is dentated, being divided into three cells, from whence arises the pistil, attended with four embryos, that turn to as many roundish seeds, inclosed in the flower cup. It is cultivated in gardens, and flowers in April, May, and June; but it grows wild in many hot countries, such as Spain, Italy, and the southern parts of France. However, they are hardy enough to bear a moderate winter in these parts in the open air, provided they are planted on a poor, dry, gravelly soil. Besides this, there is the *broad leaved garden Rosemary*; the *gold striped Rosemary*; the *narrow leaved silver striped Rosemary*; the *Rosemary of Almeria, with a large spiked purplish flower*, and the *broad leaved Rosemary with an elegant striped leaf*. They may be all propagated by planting slips or cuttings at the beginning of the year, upon a bed of light fresh earth, and they should be transplanted in the beginning of September, to the places where they are designed to grow.

The flowers and leaves are made use of in medicine, and are used both internally and externally. They strengthen the brain, are good against the palsy and epilepsy, as well as obstructions of the viscera, they restore the tone of the solids, and incide and attenuate gross humours. The water wherein the flowers and leaves are steeped for a night, is good for the jaundice, and it strengthens the memory and sight. Hungary-water is made from the flowers, cups, and young leaves of this plant, after they have been digested in spirits of wine, and the spirit distilled off; the dose of this is a small spoonful, in a glass of water. The conserve of the flowers is cordial, stomachic, and cephalic, and the dose is from a drachm to half an ounce. Boerhaave looks upon the essential oil, to be the best remedy against the epilepsy; and a few drops of it are to be given in wine; the usual dose of this is five or six drops.

ROS SOLIS, *Sun dew*, has a fibrous, slender, hairy root, that sends forth several long, small, hairy branches, on which there are small roundish leaves that are hollow like an ear-picker, and of a pale green; the stalks are adorned with a reddish, hairy fringe, and are hollow, from whence transudes drops of a fluid into the hollow of the leaves, inso-much that their hair is always moist, as it were with dew, in the driest seasons. From among the leaves there arise two or three stalks, to the height of six inches, that are slender, round, reddish,

tender, without leaves, and on whose top are small whitish flowers, with several petals placed in the form of a rose. The flower cup is in the shape of a dentated horn, and the flowers themselves hang on one side. They are succeeded by small fruit, of the size of a grain of wheat, which contains several seeds. It grows in deserts, wild, sandy, moist, marshy places, and most commonly among water moss, of a whitish red colour, and flowers in June and July. This plant is said to be pectoral, and good against all disorders of the lungs; the dose is a drachm in powder, and two drachms in infusion. Boerhaave recommends this last in the vertigo, the epilepsy, and disorders of the eyes.

RUBIA TINCTORUM SATIVA, *cultivated dyer's Madder*, has a long, creeping, succulent root, divided into several branches, and of the thickness of a goose-quill. It is woody, and red both without and within. It sends forth long branches, that are square, geniculated, or knotty, and rough; and from each knot there proceed five or six oblong leaves, that surround the stalk in the form of a star; they are hairy, and crenated all round, with small furrows. The flowers grow on the tops of the branches, and consist of a single leaf, which is cut into four or five segments, expanded at the top; the flower cup becomes a fruit, composed of two juicy berries closely joined together, which are black when ripe, and full of juice; each contains a seed, which is generally hollowed like a navel, and is almost round. It flowers in July and August, is cultivated in many parts of Europe, and is made use of for dying. Though the propagation of it in England has been long neglected, it is now cultivated with greater spirit than ever, by which we are supposed to save near thirty thousand pounds annually. The root is taken out of the earth in May and June, and they dry it for transportation. The root is one of the five lesser opening roots, and is said to resolve gross humours, and to be useful in obstructions of the viscera. Boerhaave affirms, it is good against the gravel, and cleanses the kidneys and bladder from mucous matter. The dose of the root in powder is a drachm or two, and in decoction from half an ounce to an ounce. It has one very uncommon property, that is, it will turn the bones of those animals red, that have fed upon it for some time.

RUBUS VULGARIS FRUCTU NIGRO, *the common Bramble or Blackberry bush*, has a slender, creeping, knotty root, that sends forth several long, weak, bending, greenish, red, angular, pithy branches, that are armed with strong crooked prickles, which lay hold of the garments of those that pass by. The leaves are oblong, pointed, dentated on the edges, rough, and brown above, but whitish below; they are placed by three's, or five's, on the same pedicles, and never fall off in winter, till others come in their places. The flowers on the end of the branches consist of five petals or reddish leaves, disposed in the form of a rose, and the flower cup is cut into five parts, in the middle of which there is a pistil, surrounded with a great number of stamina, or chives. These are succeeded by round or oval fruit, nearly like mulberries, that are composed of several berries, full of juice, closely joined together, that are red at first, and black when ripe; each of these contain an oblong seed. It grows almost every where in the fields and woods, and flowers in June, July, and August: the fruit is ripe in autumn. The root is cleansing, astringent, and absorbent; and a syrup made of the fruit is recommended in heat of urine. Boerhaave affirms, that the roots taken out of the earth in February or March, and boiled with honey, are an excellent remedy against the dropsy. The leaves pounded and applied to ring-worms and ulcers of the legs, heal them in a short time.

time. The fruit when ripe is cooling, and quenches thirst.

RUBUS IDÆUS SPINOSUS FRUCTU RUBRO ET ALBO, the *Raspberry bush*, has a long creeping root, divided into several branches, and sends forth several stalks, to the height of a man, armed with thorns, that are not very prickly; the leaves are like those of the bramble, but more tender and soft, and of a brownish green above, but whitish below. The flowers are white, and consist of five petals, disposed in the form of a rose, and the calyx is divided into five parts; from the center of which the pistil arises, with many stamina, that afterwards turn to the fruit, which is larger than a strawberry. It is round, a little hairy, and composed of five berries, joined closely together; the colour is generally red, and they are full of a rich vinous juice, and each contain a seed. It grows wild in moist shady woods, and is cultivated in gardens and orchards; it flowers in May and June, and the root is ripe in July, but it will not keep. There are other sorts of raspberries, and particularly one, that has white fruit; but they have all the same qualities, and are said to be cooling, cordial, and to strengthen the stomach. They agree with people of hot constitutions, and there is a syrup made with them, that is kept in the shops.

RUSCUS LATIFOLIUS FRUCTU FOLIO IN NASCENTE, *narrow leaved butcher's broom*, or *Alexandrian laurel*, with the fruit growing on the leaves, has a long, white, hard, knotty, fibrous root, that sends forth stalks to the height of two feet, which are small, flexible, green, round, and furnished with pretty thick, broad, nervous, bending leaves, of a beautiful green, and resembling those of the common bay tree. The flowers proceed from the large nerve of the leaves, and are in the shape of little bells, but without pedicles; they are small, and of a greenish or pale yellow, with a pistil in the middle, that becomes a soft roundish fruit or berry, that is red when ripe, and contains two seeds as hard as horn. This shrub grows wild in mountainous places, and is cultivated in gardens. It flowers in summer, and the fruit is ripe in autumn. The roots are said to be aperient, and to be good in a suppression of urine; the leaves are vulnerary, and proper to cleanse and dry moist ulcers.

RUSCUS MYRTIFOLIUS ACULCATUS, the *common Knee-bolley*, or *butcher's broom*, has a thick, crooked, warty, hard, creeping, white root, furnished with thick long fibres, and sends forth stalks to the height of two feet, that are tough and hard to break; and are furrowed, and divided into several branches. The leaves are like those of the myrtle, but more stiff and rough, pointed, prickly, nervous, and without pedicles; they are always green, and have a bitter astringent taste. The flowers grow in the middle of the leaf, and consist of a single petal, cut into six parts, whose stamina, being united, are in the shape of a bell, but there is no calyx. These are succeeded by round berries, as large as peas, somewhat soft and red when ripe. It grows in rough, stony places, and in woods, forests, and hedges; it flowers in April and May. There proceed tender shoots from the roots in spring, that are green, and may be eaten as asparagus. If they are suffered to grow, they become leafy, woody, and tough; and in some places they make brooms with them. This plant is said to incise gross humours, and to carry them off by urine; and the root is one of the five greater opening roots. The dose is from half an ounce to an ounce in decoction, and has been recommended in the jaundice, dropsy, and gravel. Boerhaave affirms, that the decoction of the leaves, in white wine, is an excellent remedy in the gravel and dropsy, and the dose is a glass in a morning fasting; but it must be continued for some time.

RUTA HORTENSIS LATIFOLIA, the *common broad leaved garden Rue*, has a woody root, furnished with a great number of fibres; and sends forth stalks in the form of a shrub, that sometimes rise to the height of five or six feet; they are as thick as one's finger, woody, divided into several branches, and covered with a whitish bark. The leaves are divided into several segments, and are small, oblong, smooth, of a sea-green colour, and placed by pairs in a rib, terminating in a single leaf. The flowers grow on the tops of the branches, and generally consist of four somewhat oval leaves, of a pale yellow; the pistil arises out of the flower cup, which turns to a fruit, consisting of four capsulæ, fixed to an axis, that are full of angular seeds, in the form of a kidney. It is cultivated every where in gardens, flowers in June, and continues green all the winter.

RUTA SYLVESTRIS MAJOR, the *greater wild Rue*, is somewhat like the garden rue, but smaller, and the leaves are divided into longer segments, which are also more narrow, and of a darker green. It grows in the southern parts of Europe, in rough, stoney, mountainous places. They both have the same virtues, and have a disagreeable smell, with an acrid bitter taste. The leaves, when in perfection, will blister the skin, if much handled, and are said to be incising, attenuant, and discutive; therefore they are proper, as they have also a stimulating quality, to quicken the circulation of the fluids, to dissolve gross humours, and to open obstructions of the glands. Boerhaave had a high opinion of it, and affirms nothing can be more proper to promote sweat and perspiration, and to cure the hysteric passion, and the epilepsy. An extract, made with the rectified spirit, contains the whole virtue of the rue. The dose of the juice is to two ounces; but the leaves are best for those that can eat them; or they may be taken in powder, from a scruple to a drachm, or the infusion may be drank as tea.

SABINA MAS, the *common Savine*, has a strong, woody root, that sends forth a stem or shrub, that extends more in breadth than in height, and is always green. The leaves are like those of German tamarisk, but are more hard and thorny, and have a strong disagreeable smell, with an acrid burning taste. On the top of the branches there are catkins or flowers, that have three stamina without petals, and which are not succeeded by any fruit; however, if the shrub be very old, it sends forth small greenish flowers, that are succeeded by small flattish berries, less than juniper berries, that are of a blueish black when ripe. It is cultivated in gardens, but in our climate seldom or never yields any fruit.

SABINA FOLIO CUPRESSI, the *berry-bearing upright Sabine*, has a root like the former, but produces a higher stem, for it rises to a sort of a tree, whose wood is reddish within, and is covered with a reddish pretty thick bark. The leaves are like those of the cypress tree, but more compact, with a strong penetrating smell, and a bitter, aromatic, resinous taste. The flowers consist of three pointed petals, as well as the calyx, which is divided into three parts, and is of a yellowish colour. The berries are roundish, fleshy, and on the lower part there are three tubercles, with a navel, armed with three small teeth, and they contain three oblong stones, that are convex on one side, and angular on the other. It grows among mountains, woods and other uncultivated places, and is also planted in gardens. The first is only used in medicine, and is incising, penetrating and aperient. The dose of the leaves in infusion, is half an ounce, and, in powder, to a drachm, in a glass of white wine. The distilled oil taken upon a lump of sugar, has the same virtues, and is employed by some to kill worms. This plant is a good remedy for opening obstructions

obstructions of the viscera, proceeding from a weakness of the vessels, and the clamminess of the fluids.

SALICARIA, *five* **LYSIMACHIA PURPURA**, *purple spiked Willow herb, or Loose Strife, with long leaves*, has a thick, woody; white, perennial root, with branches that sometimes rise to the height of a man, that are stiff, angular, branched, and reddish. The leaves are oblong, pointed, narrow, and of a deep green; they proceed from the knots of the stalks by pairs, and sometimes by threes, but very seldom by fours; they surround the stalks by intervals, and have a dry astringent taste. The flowers are verticillated in the middle of the branches, and are collected in spikes, of a fine purple colour, and each consists of six leaves or petals, in the form of a rose, with twelve stamina of the same colour, placed in the middle. The pistil rises from the middle of the flower-cup, and turns to a husk, or oblong pointed capsula, divided into two cells, full of small seeds. It grows in moist marshy places, and by the sides of waters and rivers; it generally flowers in June and July. This plant is detersive, astringent, vulnerary, and cooling, but is seldom used in medicine, though some pretend it is an excellent remedy against the bloody-flux.

SALIX VULGARIS ALBA ARBORESCENS, *the common white Willow tree*, has a long, woody, white root, that produces a pretty large tree, with many firm green branches, covered with a smooth soft bark; the wood is white, pliant, and difficult to break. The leaves are long, narrow, downy, whitish, soft, and more or less dentated on the edges. The flowers and fruit grow distinctly from each other, and the male has only catkins, or long scaly spikes without petals, but there are two stamina in the center. The female willow has catkins like the former; but they have an oval, pointed pistil, somewhat longer than the fruit, which afterwards becomes a bivalved capsula of the same shape, full of oval tufted seeds. It grows every where in moist marshy places, and on the sides of brooks and rivers.

SALIX CAPREA seu MINOR, seu SALIX LATIFOLIA ROTUNDA, *the round leaved Willow*, has a root like the former, which produces a pretty large shrub, covered with a whitish bark. The leaves are roundish, broad, nervous, of a deep green above, and whitish and downy below, and the pedicle is often furnished with two small leaves, cut like ears; the catkins and flowers grow in distinct places, and it delights in moist woods, and along the sides of rivers and ditches, and is common in hedges. It flowers in March and April, and the wood, though more brittle than the white willow, serves to make hoops for barrels. The bark, leaves, and catkins, are said to be cooling and astringent, and they have been used in decoctions, and in all kinds of hæmorrhages, but they are now out of use.

SALVIA MAJOR, *the greater or common Sage*, has a perennial, hard, woody, fibrous root, with woody, branched, hairy, white, green stalks, generally square, with leaves placed opposite to each other; these are oblong, broad, obtuse, wrinkled, rough, and whitish, inclining to purple, and sometimes other colours; they are downy, thick, have a little juice, and are crenated on the edges. The flowers grow in spikes on the tops of the branches, and consist of a single labiated petal, with two stamina; they are of a bluish colour, inclining to purple, and are contained in a large calyx, in the shape of a horn, that is cut into five segments, and has the smell of turpentine. These are succeeded by four roundish blackish seeds, contained in a husk, that before was the flower-cup. It is cultivated in gardens, and flowers in June and July.

SALVIA MINOR, five PINNATA, *Sage of Vir-*

tue, has a root like the former, with several woody, whitish, downy stalks, as long as those of the common sage; but the leaves are less; whiter, wrinkled, rough, and generally attended at the base with two small leaves, in the shape of ears or wings. The smell and taste are stronger, more penetrating and aromatic. The flowers and seeds are like the former, and it is cultivated in gardens:

SALVIA HISPANICA, *Spanish Sage, with a lavender leaf*, somewhat resembles the former, but is less, and the leaves are narrower, and more white, as well as the flowers. It flowers in summer, but is very tender, and will not bear the cold very well. They may be all planted by slips, during any of the summer months, observing to shade and water them till they have taken root; after which they may be taken up and planted in a dry soil, where they may have the benefit of the sun. Sage of virtue is by most accounted the best, though the properties of all are much the same; they are cephalic, and very good against the apoplexy, epilepsy, palsy, and trembling of the limbs. They are all used in the manner of tea, against any of the disorders abovementioned, as well as for a preservative, and are very good for disorders of the brain, to promote the circulation of the fluids, to strengthen the stomach, and to help digestion. It is commonly said, that the Chinese wonder we should buy their tea, when we have so much sage of our own, which they take to be much more excellent. As to outward use, the leaves and flowers are often employed in fomentations, to strengthen the nerves, and to discuss the swellings of wounds.

SAMBUCUS FRUCTU IN UMBELLÀ NIGRO, *the common Elder tree with black berries*; has a woody, long, whitish root, and sometimes grows to a middle sized tree. The branches are large, round, and full of a white pith, that is green at first, and afterwards grey. The trunk is covered with a rough, ash coloured bark, full of cracks, under which there is another, which is green, and is used in medicine. There are five or six leaves that grow on one rib, which are dentated on the edges, and each rib is terminated with a single leaf, that is larger than the rest. The flowers grow at the tops of the branches in umbels, and consist of a single petal divided into five segments, that expand in the form of a rose; they are white, small, and have five stamina, with roundish apices; these are succeeded by soft, round, juicy berries, that are green at first, but black when ripe, and there are generally three seeds in each. It grows almost every where, in all parts of Europe, but delights in valleys and moist shady places. It flowers in May and June, and the berries are ripe in autumn. All parts of this tree are in use, and are generally known to have a purging and aperient quality. The dose of the rob of elder berries is from a drachm to half an ounce, in the bloody-flux, and to promote urine and sweat. The use of elder-berries in made wines is universally known.

SANICULA, *Sanicle*, has a thick root above, that is fibrous below, blackish without, and white within. It sends forth several broad roundish leaves, that are a little hard, smooth, dentated on the edges, and of a fine green shining colour; from among these there arises a stalk to the height of a foot, that is smooth, without knots, and reddish towards the root, and on the top there are several small flowers collected into an umbel, consisting of five white or red petals, placed in the form of a rose, with five stamina, and roundish apices. The petals are generally bent back to the calyx, on which they rest, and which turns to a fruit composed of two seeds, convex on one side, flat on the other, and prickly at the points, by which means they stick to the garments of those that pass by. Some of the flowers are always barren. It delights in shady woods, and in a flat moist soil, and

flowers

flowers in June. It has been long noted for its vulnerary virtues, and may be used in the manner of tea; but it is not now depended upon for any such purpose.

SATUREIA HORTENSIS, *garden Savory*, has a small, single, woody root, with stalks that rise to the height of a foot, or a foot and a half, which are round, reddish, and a little hairy and knotty. The leaves are small and oblong, like those of hyssop; they are a little hairy, and seem to have several holes, with a smell like that of thyme, but weaker. The flowers are small and labiated, consisting of a single petal; whose upper lip or crest is divided into two parts, but the lower lip or beard is divided into three, and has the middle part crenated; they proceed from the places where the leaves join to the stalk, somewhat loosely, but not in whorls or spikes, like most of this kind. They are white or purplish, with four silky stamina, that are succeeded by as many brownish round seeds, contained in a capsula, that was the cup of the flower. It is cultivated in gardens, by sowing the seeds on a bed of fresh light earth, in March; and when the plants are come up, they must be moved into other beds, placing them about four or five inches asunder each way. It flowers in the summer. It is aperient, inciding, and strengthening, but it is chiefly cultivated for the use of the kitchen, and is very proper for cold stomachs.

SAXIFRAGA ALBA RADICE GRANULOSA, *white round leaved Saxifrage*, has a root that sends forth several fibres, at the top of which there are several tubercles, somewhat larger than coriander seeds, which are partly purple, and partly white, and of a bitterish taste. The leaves are almost round, crenated on the edges, and pretty much like those of ground-ivy, only they are thicker and whiter. Among these the small stalks rise to the height of a foot, and are tender, hairy, purplish, and branched. The flowers grow on the top, and have five white leaves or petals, placed in the form of a rose, that have six stamina, with roundish apices. The flower-cup is divided into several segments, out of which the pistil arises, that, together with the flower-cup, turns into a roundish fruit, with two horns, and two cells full of small, longish, reddish seeds. This plant is common in moist meadows, in divers parts of England, and flowers in May. It is said to be good in disorders of the breast, and particularly in the moist asthma; but it is now almost neglected.

SAXIFRAGA VULGARIS, *Meadow Saxifrage*, has a perennial, long, thick, wrinkled root, white within, and hairy at the top, with stalks that rise from one foot to two in height, which are thick, round, furrowed, smooth, pithy, reddish towards the bottom, and branched. The leaves are smooth, of a deep green, and divided into longish, narrow-pointed, stiff segments, with an acrid taste. The flowers, which grow on the tops of the branches in umbels, have five leaves or petals in the form of a rose, of a whitish yellow. These are succeeded by fruit, composed of two short furrowed seeds, convex on one side, and flat on the other; they have a strong pleasant smell, and a vinous aromatic taste. It grows almost every where in moist places, and has been looked upon as exceeding good for the gravel, the root being a powerful diuretic; but it is not now much used for that purpose.

SCILLA VULGARIS RADICE RUBRA, *common red Squill*, has a root like an onion, or a bulb, sometimes as large as a child's head, composed of thick, red, juicy, clammy coats, placed one upon another, and underneath there are large fibres. It sends forth leaves a foot in length, and as broad as the hand, that are fleshy, green, and full of a clammy bitter juice. In the middle of these there arises a

stalk to the height of a foot and a half, on the top of which there are flowers, with six white petals, but without a calyx, disposed in a ring, and as many oblong stamina. These are succeeded by roundish fruit, on which are three corners, and they are divided into three cells, full of roundish black seeds. The root only is in use.

SCILLA RADICE ALBA, *the white Squill*, has a large root, but less than the former, and composed of several white coats, full of a clammy juice, and furnished underneath with many pretty thick fibres. It sends forth an upright naked stalk, to the height of a cubit, adorned at the top with several white flowers in the form of a star. The flowers appear before the leaves, and after them six thick, fleshy, large, deep, green leaves, proceed from the root, and lie upon the ground. This, as well as the former, grows in sandy places near the sea, and flowers in August and September. The seeds are ripe in November and December. These roots are brought from the Levant and Spain every year, and deserve to be cultivated in every good garden, for the beauty of their flowers. Those roots should be chosen that are fresh, of a middle size, sound, heavy, firm, and full of a clammy, bitter, acrid juice. They are excellent in disorders of the lungs, caused by a clammy, viscous phlegm; for which reason they perform wonders in the fits of the moist asthma, and in a disposition to a dropsy. However, in swellings arising from the dropsy, and in the inflammation of the kidneys, they are best given with nitre; that is, there should be double the quantity of this to that of the root; and the dose of the latter, in powder, is from four to ten grains. When given in this manner, it almost always operates as a diuretic. There are several preparations of this root kept in the shops.

SCORDIUM ALTERUM, *five SALVIA AGRESTIS*, *wood Sage*, has a woody, flexible, creeping, fibrous, perennial root, that sends forth several square, hairy, purplish, branched, pithy stalks, to the height of two or three feet. The leaves resemble those of sage of virtue, only they are broader and softer, like balm; they are also wrinkled, downy, of a dirty green, dentated on the edges, and have a bitter taste. The flowers grow in spikes, and consist of a single labiated petal, like those of German-der, and have the same shape, but are of a pale white colour, with four purple stamina, that are succeeded by four roundish, blackish seeds, contained in a capsula, that was the cup of the flower. It grows in uncultivated sandy places, and among hedges. It flowers in the summer, and continues a long while in flower. It has somewhat of a garlick smell, and is said to strengthen the stomach, kill worms, and promote urine; but it is now neglected.

SCORSONERA, *five SCORZONERA*, *Viper's Grass*, has a root a foot long, as thick as one's thumb, blackish without, white within, and easy to be broken; it is full of a sweetish milky juice, and some account it good eating. It sends forth a round, furrowed, hollow stalk, to the height of two feet, covered with a little down, and divided into several branches. The leaves are long, pretty broad, smooth, and embrace the stalk by their base; they are sometimes a little sinuated or curled at the edges, terminating in a long narrow point, and are of a dark green colour. The flowers grow on the tops of the branches, and are large, yellow, and composed of semi-florets, with a long, slender, scaly flower-cup; these are succeeded by long white seeds, tufted at the top. It is cultivated in many kitchen gardens about London, and flowers in May and June. The root is accounted good both for food and physic; for it is said to strengthen the stomach, and to promote urine and sweat. Some take the boiled root to be very good food, and affirm it agrees with all ages and sexes.

sexes. The juice of the root, taken to three ounces in a morning fasting, Boerhaave affirms to be good in hypochondriac diseases, and to open obstructions of the viscera.

SCROPHULARIA AQUATICA, *water Betony*, has a thick perennial root, furnished with long fibres, and several stalks, that rise to the height of two or three feet; these are square, thickish, reddish in some places, and green in others, hollow within, pretty tender, full of juice, smooth and branched. The leaves are like those of the former, but more blunt at the end, and twice or thrice as large; they have a disagreeable smell and taste. The flowers are like those of the former, but a little larger, and of a reddish, rusty colour. These are succeeded by round pointed fruit, divided into two cells, that contain very small brown seeds. It is common in all watery places, and flowers in July and August. It is said to be an excellent vulnerary, and to have the same virtues as the former in other respects; but it is not now in much esteem.

SEDUM MAJUS VULGARE, *common great House Leek*, has a small fibrous root, with many oblong, thick, flat, pointed, fleshy, juicy leaves, that grow close to the ground; they are always green, and ranged in a circular order, in the form of a rose, they being convex without, and flattish within, and have a very little down on their edges. A thick, reddish, pithy stalk arises from the middle of these, clothed with the same sort of leaves as the former, only they are more narrow and pointed. It is divided at the top into several branches, on which are flowers, with five petals, placed in the form of a rose, and of a purple colour, with ten stamina, that have roundish apices or summits. The pistil rises from the flower-cup, which afterwards turns to a fruit, composed of many seed vessels, resembling husks, that are collected into a sort of a head, and are full of small seeds. It grows on the top of old walls, and on the roofs of houses; it flowers in July, and the stalk withers away in the autumn, when the seed is ripe. This plant is said to be cooling, cleansing, and astringent, and some give four ounces of the juice, to cure intermitting fevers, when there is no cold fit.

SEDUM PARVUM ACRE FLORE LUTEO, *Wall Pepper, or Stone Crop*, has a small fibrous root, with several low, short, slender stalks. The leaves are very small, somewhat thick, fat, pointed, triangular, and full of juice; the flowers are yellow, and consist of six petals in the form of a star, with many stamina and apices, or summits, of the same colour in the middle, that are succeeded by several sheaths or seed vessels, collected in the form of a head, and full of small seeds. It grows almost every where suspended by its roots, or lying on old walls, and on the tops of cow houses; it flowers in June, and has a pungent, hot, burning taste. It is looked upon by some as an excellent remedy for the scurvy, and is particularly good for ulcerated gums, occasioned by that distemper.

SENECIO MINOR VULGARIS, *common Groundsel*, has a small, whitish, fibrous root, with several round, furrowed, hollow stalks, that rise to the height of a foot; these are sometimes reddish, branched, and hairy in certain places, exposed to the sun. The leaves are oblong, jagged, dentated, placed alternately, fixed to the stalks by a broad base, and terminate in a blunt point; the colour is of a dark green, and the flowers are placed in bunches at the top of the stalks; they consist of many yellow florets, disposed in the form of stars, and contained in a flower-cup, consisting of a single leaf, with five small stamina, that have cylindric apices or summits in the middle; these are succeeded by downy seeds, that altogether form a white head. It grows every where in fields, and by the way sides, in sandy

No. 39.

places exposed to the sun; as soon as the leaves wither, others arise; insomuch that it continues green all the year, and flowers in all seasons. It is accounted emollient and resolvent, and the juice, given to two ounces, kills worms. Some account it good in the jaundice, and even in spitting of blood. Boerhaave recommends the juice, mixed with oxycrate, as a gargle, in inflammations of the throat.

SERPILLUM VULGARE MINUS, *Mother of Thyme*, has a small, woody, perennial, brown root, furnished with capillary fibres, as also several small, square, woody, reddish, and low stalks, that are somewhat hairy. The leaves are small, green, roundish, nervous, a little broader than those of common thyme, and have an acrid, aromatic taste. The flowers grow on the tops of the stalks, disposed like a head, and generally of a purple colour; they consist of a single labiated petal, that has two lips, and is placed in a calyx, made like a horn. These are succeeded by small roundish seeds, contained in a capsula, that was the cup of the flower. It grows in uncultivated, mountainous, dry, sandy, stony places, and flowers in the summer. There are several sorts, but they have all the same virtues, and are accounted cephalic and stomachic, and may be used in the same manner as common thyme, though they are not quite so efficacious.

SILICUASTRUM, *five ARBOR JUDÆ, Judas's tree*, has a thick, hard, woody, perennial root, that sends forth a trunk, which in time becomes a middle sized tree, and is divided into branches at considerable distances from each other; the bark is of a blackish purple colour, on which papilionaceous flowers appear in the spring of a beautiful purple colour, and several of them are placed together; they are composed of five petals or leaves, the two lowermost of which are larger than the upper, which is contrary to other flowers of the leguminous kind. The pistil rises from the center of the flower-cup, is surrounded with stamina, and afterwards becomes a long flat pod, containing several seeds in the shape of kidneys. After these the leaves appear, which are round, and placed alternately on the branches; they are nervous, green above, and whitish below; the pods that contain the seeds are six inches in length, and very flat, purple, membranous, semi-transparent, and made in some sort like the sheath of a knife. This tree grows in hot countries, near rivers and brooks, on mountains and in valleys; it is cultivated in gardens for its beauty, and flowers in April and May. It was formerly preserved in green-houses as a curiosity; but of late years has been transplanted into the open air, where it thrives very well. It may be propagated by sowing the seeds on a bed of light earth, towards the middle of April, and earth should be sifted over them to the thickness of half an inch; if the season proves wet, the bed should be covered with mats. Some few of the plants rise the first year, but the greatest number in the second. About the middle of April following, just before they begin to shoot, they should be taken up carefully without breaking their roots, and planted in fresh ground as soon as possible. After they have continued here two or three years, they may be removed to the places where they design to remain. It is of little or no use in medicine, though the pods are said to be astringent. In the southern parts of France, the flowers are eaten as a salad; but they are best when pickled like capers before they open.

SINAPI SILIQUA LATIUSCULA GLABRA SEMINE RUFO, *five VULGARE, common or red Mustard*, has a white, woody, brittle root, furnished with fibres, that sends forth a stalk to the height of four or five feet, which is pithy, hairy below, and divided into several branches. The leaves are large, and

and much like those of radishes, but smaller and more rough. The small yellow flowers grow at the top of the branches, and consist of four leaves in the form of a cross; the pistil arises out of the flower-cup, which turns to a fruit or pod, divided into two cells by a partition, to which the valves adhere on both sides, and are full of roundish, reddish, or blackish seeds, of an acrid biting taste. This grows wild on the sides of ditches, among stones, and on land newly broken up, particularly in the Isle of Ely, where the land has been flooded for many years, and has afterwards been drained. It is also cultivated in gardens, and flowers in June.

SINAPI ALBUM, *five* **HORTENSE SEMINE ALBO**, *garden, or white Mustard*, has a single, woody, white root, furnished with long fibres, and sends forth a stalk to the height of a foot and a half, or two feet, which is branched, hairy, and hollow. The leaves are like those of radishes, and armed above and below with stiff prickly hair. The flowers are small, yellow, in the form of a cross like those of the former, and are succeeded by hairy pods, that terminate in an empty point, and contain four or five round, whitish or reddish seeds, that seem to be articulated or knotted. It grows wild in fields among the corn, and is cultivated in gardens; it flowers in May and June, and the seeds are ripe in July and August. Both kinds have the same properties, though the former is generally preferred. The seeds are stomachic, diaphoretic, antiscorbutic, and are good in hypochondriac diseases, as well as in sleepy disorders. The common use of mustard is known to every one, and is very proper for people of a cold constitution; because it creates an appetite, helps digestion, and attenuates the food. The powder of mustard seed, taken in white wine, is excellent against the scurvy, and some affirm it will cure a quartan ague, if taken in hot wine two hours before the fit. Some apply mustard outwardly to cure the hypogout, and also lay it to the feet, mixed with other things, in dangerous fevers. The white mustard is used as a salad herb, especially in winter, and in the spring. There are two other sorts of this plant, but these are the most useful.

SISARUM GERMANORUM, *the Skerrit*, has a root composed of several parts, as long as a man's hand, and as thick as the little finger, which are tender, brittle, wrinkled, and fixed to a sort of a neck; they are covered with a thin pale rind, and have a white pulp. The branches rise to the height of two or three feet, and are thick, knotted, and furrowed; the leaves are winged, and placed by pairs opposite to each other, on a rib that terminates in a single leaf, which is longer and broader than the rest; they are greener and softer than those of parsnips, and are slightly crenated on the edges. The flowers grow in umbels on the top of the stalks, and consist of four white leaves, placed in the form of a rose, with as many stamina in the middle. The flower-cup afterwards turns to a fruit, composed of two oblong seeds, which are furrowed on the back, and of a dark colour. It is cultivated in the kitchen garden, and flowers in June. It is thought by some to be the most wholesome and nourishing of all kinds of roots, though it is not very common in the gardens near London, but for what reason it is hard to say. It may be propagated by sowing the seeds about the middle of April, upon a moist, rich, loose soil; the plants will come up in May, and, when the leaves are decayed, the roots may be taken up for use as they are wanted; they will continue good in the ground from October till March, after which they are good for nothing. They are accounted good for all ages and constitutions; Boerhaave looks upon them as one of the best remedies for pissing and spitting of blood, and would have them dressed

several ways, that the patient may feed frequently upon them, especially if inclined to a consumption.

SISYMBRIUM AQUATICUM, *Water-radish*, with *dentated leaves*, has a long flexible root, furnished with fibres, and has a taste like that of radishes. It sends forth several branched, hollow, furrowed stalks, to the height of three feet; the leaves are large, long, sinuated, dentated on the edges, and especially towards the lower part. The flowers grow on the top of the branches, and consist of four yellow petals or leaves, disposed in the form of a cross; the pistil proceeds from the flower-cup, that afterwards turns to a fruit or pod, which is divided into two cells by a partition, to which the valves adhere on both sides, and contain small roundish seeds. It grows in marshes, brooks, rivers, ditches full of water, and flowers in spring. It is observable, that the leaves differ greatly from each other, according to the places in which they grow.

SISYMBRIUM SILVESTRE, *five* **RHAPHANUS AQUATICUS**, *Water-radish*, has an oblong white root, as thick as a man's little finger, that has an acrid pungent taste; the stalks, which rise to the height of three feet, are furrowed, hollow, and sometimes reddish. The leaves are oblong, pointed, cut deeply into jags, dentated on the edges, and are placed alternately on the stalks. The flowers grow on the tops of the stalks and branches, and are small, considering the size of the plant; they consist of four yellow petals or leaves, disposed in the form of a cross, with six stamina; they are succeeded by small short pods, divided into two cells, that contain small roundish seeds. It grows in ditches full of water, and in marshy places; it flowers in June and July. Some account the roots of both kinds good to eat, and use them in the same manner as radishes. They are aperient, cleansing, good against the gravel, scurvy, and dropsy; but they are seldom used either for food or physic.

SISYMBRIUM PALUSTRE REPENS NASTURTI FOLIO, *Water Rocket*, has a creeping, slender, whitish root, with an acrid taste, but not so strong as that of radish; the stalks are short, furrowed, slightly perforated, and are sometime reddish, and like those of the garden cresses. The flowers grow at the top of the branches, and are small, consisting of four yellow leaves or petals, that are succeeded by small cylindric pods, which are longer than those of the former kinds, and are divided into two cells by a partition, containing several small seeds. It grows on the sides of rivers in moist ditches, and in stony brooks; it flowers in July and August. It has the same virtues as the two former, but is now made little or no use of.

SISYMBRIUM ERUCÆ FOLIO GLABRO FLORE LUTEO, *Common winter cresses*, has a long, pretty thick, white, perennial root, with an acrid taste; the stalks are furrowed, firm, branched, pithy, hollow, and rise to the height of a foot and a half. The leaves are smaller than those of radishes, and are somewhat like cresses; they are of a deep, shining green; but have not so acrid a taste as the root. The tops of the stalks and branches are adorned with long spikes of yellow flowers, composed of four petals in the form of a cross; these are succeeded by slender, long, tender, cylindric pods, full of many small reddish seeds. It grows on the sides of ditches and brooks, and sometimes in fields; it is also cultivated in gardens for salads, in some parts of Europe; it flowers in May and June, and continues green all the winter. It is cleansing and vulnerary, and is good in the beginning of a dropsy, made use of in the manner of tea.

SMILAX LÆVIS MAJOR, *greater Bind Weed*, has a long, slender, whitish, perennial root, furnished with

with fibres; and the stalks are long, slender, furrowed, and climb upon trees and bushes, by means of their clasps. The leaves are in the shape of a heart, and are bigger and softer than those of ivy; they are also smooth and green, and the flowers are in the form of a bell, and as white as snow. The calyx is oval, and divided into five parts, with as many stamina, and flattish summits. These are succeeded by round fruits as big as cherries, wrapt up in the calyx, and contain two angular or pointed seeds, of a blackish colour, with a reddish cast. It is milky like other plants of the same kind, and grows almost every where amongst hedges and bushes; it flowers in summer, and the fruit is ripe in autumn. This plant is purgative and vulnerary, and the milky juice is of the same nature as scammony; but it must be given in a larger dose, that is, from twenty grains to thirty.

SMILAX LENIS MINOR, *small Bind Weed*, has a very long, slender, creeping, perennial root, with many small, weak, slender branches, that wind round the neighbouring plants. The leaves are in the shape of a heart, but more rough, nervous and small, than the former. The flowers proceed from the places, where the leaves join to the stalks, like small, whitish bells; but they are sometimes reddish or purplish. These are succeeded by roundish, small fruit, containing pretty large angular seeds. It is an anodyne, cleansing, vulnerary plant, and country people often use it to heal wounds, by applying it after it has been bruised between two stones; many are lavish of their praise of this plant on that account. There is another species of this plant, called the rough Bind Weed, with a red fruit; but it is of no use in medicine.

SOLANUM HORTENSE, *Common Night-shade, of the shops, with black fruit*, has a long, slender, hairy, dirty, whitish root, with a firm, angular stalk, that rises to the height of a foot and a half, is of a blackish green colour, and divided into several branches. The leaves are oblong, pretty large, soft pointed, and blackish; whereof some are angular, others crenated, others whole, smooth, and full of a greenish juice. The flowers grow on the branches, a little under the leaves, and consist of a single petal, divided into five parts, and expanded in the form of a star; there are as many yellow stamina, with oblong summits, and a pistil, which afterwards becomes a berry, like those of the juniper-tree; it is green at first, but when it is ripe it is soft, smooth, black, and full of juice. It grows on the sides of highways, near hedges and houses, and flowers in August and September. Some sorts of this plant have red fruit, and others yellow, which seems to be the principal difference: Some have given the leaves and fruit inwardly, but very rashly; for they are often attended with dangerous consequences, and therefore it is better to abstain from it entirely.

SOLDANELLA MARINA, *Scottish Scuroy-grass, or Soldanella*, has a small fibrous root, with several slender, pliant, reddish stalks, that creep on the ground; the leaves are roundish, smooth, shining, like those of the lesser celandine, but thicker, and full of a milky juice. The flowers consist of a single petal, in the shape of a bell, and are of a purple colour. The pistil, which rises from the lower part of the calyx, turns to a roundish membranous fruit, that contains angular black seeds. It grows frequently on the sandy shores of the sea, and flowers in summer; the whole plant is dried with the root, in which manner it is sent to us. It has a bitter, acrid taste, that is somewhat saltish, and is looked upon by some as very proper to purge off watery humours, particularly in a dropsy, palsy, and the rheumatism. The dose of the powder, when dried, is from half a drachm to a drachm.

SONCHUS LÆVIS, *Smooth Sow Thistle*, has a

small, white, fibrous root, and a hollow, tender, furrowed, purplish stalk, that rises to the height of a foot and a half. The leaves are long, smooth, larger and more tender than those of dandelion, and are dentated on the edges. They are ranged alternately; are full of a milky juice, and some of them embrace the stalks with their broad bases. The flowers grow on the tops of the stalks and branches in bunches, and consist of yellow semi-florets, like those of dandelion, but smaller; these are succeeded by fruit, of a conical shape, that contain oblong, reddish, brown seeds, with a downy tuft. It grows almost every where, and flowers in May and June; rabbits and hares are fond of this plant.

SONCHUS ASPER, *prickly Sow Thistle*, has a root like the former, but the leaves are more entire, resembling those of endive, and they embrace their stalk with their base; they are of a deep shining green, and furnished with long hard prickles. It grows in the same places as the former, and flowers at the same time; it is full of a milky bitter juice. They are both of little or no use in physic.

STACHYS MAJOR GERMANICA, *base Hoarhound*, has a hard, woody, fibrous, yellowish, perennial root, with several stalks that rise to the height of two feet, which are thick, square, knotted, white, downy, and pithy. The leaves are placed opposite to each other at each knot, and are like those of white hoarhound, but longer, and whiter, and as well downy as dentated on the edges. The flowers are verticillated, and disposed like spikes on the top of the stalks, between the leaves; they are downy without, smooth within, and generally of a purple colour, though sometimes white; they consist of a single petal in the form of a tube, cut on the upper part into two lips, the uppermost of which is hollow like a spoon, and erect; but the upper lip is divided into six segments, of which the middlemost is much the largest; the pistil rises from the flower-cup attended by four embryoes, that turn to as many roundish blackish seeds, contained in a capsula that was the cup of the flower. It grows in mountainous uncultivated places, and is cultivated in gardens, where it is propagated by seeds; it flowers in June and July. It is of little use in medicine, though Boerhaave recommends it against the apoplexy and the palsy.

STATICE, *Thrift, or Sea Pink*, has a long, thick, round, reddish, woody, perennial root, with several heads; from whence proceed a great number of long narrow leaves, like those of grass, and of a sea-green colour. From among these several stalks arise, to the height of a foot, that are upright, knotty, hollow, and almost all naked; the bunch of flowers grow at the top, and consist of five small whitish petals, in the form of a pink, and the calyx in the shape of a funnel, besides which there is a general scaly calyx. They are succeeded by seeds, pointed at each end, and contained in a capsula, that was the cup of the flower. It grows wild in Germany, and other inland countries, from whence it has been brought into England, and planted in gardens, to make edgings, and the sides of borders of flower-gardens; but it is now almost neglected, because they require transplanting every year. It continues a long while in flower, even to the very end of autumn. Boerhaave recommends this plant as an astringent vulnerary, and proper to stop internal hæmorrhages; for which purpose the juice is to be drank.

SUBER LATIFOLIUM, **PERPETUO VITENS**, *the Cork tree*, has a long, thick, hard root, that produces a middle sized tree, with a thick trunk, and a few branches. It has a thick, light, spongy bark, of a yellowish grey colour, that cleaves of itself, and parts from the tree; because it is pushed forward by another bark that grows under it. The leaves are like those of the scarlet oak, but they are larger,

larger, longer, green above, and sometimes a little prickly; the catkins and acorns are also like those of the same tree; but they are longer, blunter, and have a more disagreeable taste. The flower-cup is also bigger, and more hairy; it grows in the southern parts of Europe. The inhabitants of the places where they grow cleave the trunk of this tree lengthways, to take off the bark more readily, and then they put it over burning coals, laying stones thereon to render it flat; after which they clean it, and send it to other countries; this is what we call cork, that serves for so many different uses. When cork is burnt, and reduced to a fine powder, it is a very good remedy to ease the pains of the piles, mixed with the white of an egg, and the oil of sweet almonds.

TAMARISCUS GERMANICA, *the German Tamarisk tree*, has a root as thick as a man's thigh, covered with a thick bitter bark, from whence proceed several brittle stems, covered with a reddish bark, divided into several branches, and adorned with leaves, like those of common heath, of a sea-green colour, and an astringent taste. The flowers grow in spikes at the extremities of the branches, and consist of five white, purplish, oval petals, or leaves, with as many stamens and roundish yellow summits; these are succeeded by small oblong pods, which before were the pistils, and are full of small downy seeds. This shrub grows in Hungary, about Strasburg, Landaw, and Geneva, by the sides of running waters, and moist stony places. It flowers in May and June, and does not cease to bear flowers and fruit all the summer. They may be easily propagated in England, by laying down the tender shoots in the spring; but they are not of much value here because they have stragling branches.

TAMARISCUS NARBONENSIS, *the French narrow leaved Tamarisk tree*, has a thick woody root, divided into several branches, that send forth several stems, which together form a bush or shrub, and sometimes a pretty large tree, with a trunk covered with rough grey bark. The leaves are small, long, and round, like those of the cypress tree and common heath; the flowers grow on the tops of the branches in bunches; these are of a whitish purple colour, and consist of five petals or leaves, that are succeeded by pointed fruit, which contain small downy seeds. It grows chiefly in hot countries, but may be propagated here like the former, though it is of no great value. It flowers generally three times a year, namely, spring, summer, and autumn; but the leaves drop off in the winter. The virtues of both these shrubs are much the same, and the root, bark, and leaves, are said to open obstructions of the viscera, and to attenuate gross humours, but they have been long out of use with us.

TANACETUM VULGARE LUTEUM, *common Tansey*, has a long, woody, fibrous, perennial root, which sends forth stalks to the height of two or three feet, which are round, streaked, a little hairy, and pithy. The leaves are large, long, winged, dentated on the edges, and disposed in pairs along a rib, terminating in a single leaf; however, botanists generally reckon all these but one leaf. The flowers grow on the top of the leaves in bunches or umbels, and consist of many florets, divided into several segments, and are of a beautiful yellow. The calyx or flower-cup is scaly, and contains an embryo, that turns to an oblong seed, which is black when ripe. It grows wild on the sides of highways, in fields, and on the edges of ditches; but it is every where planted in gardens, and flowers in July and August. The leaves have an acrid, bitter, aromatic taste, and are looked upon as stomachic, febrifuge, and sudorific, as well as althelminthic; for both the leaves and seeds have always been accounted good to kill worms. Some give the juice to three or four

ounces, in the cachexy, green sickness, and dropsy, in which last case it has succeeded, when other medicines have proved ineffectual. The seed of tansey may be used instead of wormseed; but is not so efficacious.

THALICTRUM LUTEUM, *five RUTA PRATENSIS*, *meadow Rue*, has a yellowish, fibrous, creeping root, with stalks that rise to the height of a man, which are stiff, furrowed, branched, hollow, and generally of a reddish colour. The leaves are large, of a shining green, and indented. The flowers grow on the tops of the branches, and consist of four petals, disposed in the form of a rose, about a cluster of green stamens, or chives, that surround a pistil, which afterwards becomes a fruit, in which the capsules are collected into a small head, that contain each an oblong, yellow, furrowed, small seed of a bitter taste; it has no flower-cup. It grows in meadows, and in moist marshy places, by the sides of brooks, and flowers in the summer. The root purges like rhubarb, for which reason it is called, in Germany, the rhubarb of poor people. It tinges the urine with a yellow colour, and is said to have the same qualities in all respects; but the dose must be three times as much. The juice of the leaves and flowers has been given, from one ounce to two, in all internal bleedings.

THLASPI, *Mitridate Mustard*, has a thick, woody, white root, with round, hairy, stiff, branched stalks, that rise to the height of a foot, which are furnished with leaves without pedicles, that are entire, and as long as the little finger, but broad at the base, and grow narrow by degrees to a point; they are crenated on the edges, and are of a greenish ash colour, or whitish, with an acrid pungent taste. The flowers are small, white, and disposed like those of shepherd's purse; they are composed of four leaves, placed in the form of a cross, with six stamens, that have pointed summits. These are succeeded by round or oval fruit, flattened in the shape of a purse, with a leafy border, slit on the upper side, and divided into two cells by a partition, placed obliquely with regard to the valve, and furnished with smooth, roundish seeds, that have an acrid pungent taste like mustard. It grows in uncultivated places, exposed to the sun, among corn, and on the tops of houses, and walls; it flowers in May, and the seed is ripe in June.

THLASPI ARVENSE, **SILIQUIS LATIS**, *Field Mitridate Mustard*, with broad pods, has a small, oblique, woody root, from whence arise angular, furrowed, winged stalks, that rise to the height of a foot. The leaves have no pedicles, and are long, broad, smooth, dentated, and of a blackish green, with a smell somewhat like garlick. The flowers grow in spikes at the tops of the stalks, and are composed of four white petals, disposed in the form of a cross, that are succeeded by broad, flattish, smooth pods, containing roundish, flattish, reddish brown seeds, of an acrid, hot, biting taste. It flowers in May, and the seed is ripe in June; it grows every where in the fields, and continues from the beginning of the spring to the end of autumn.

THLASPI ALLIUM REDOLENS, *Mitridate Mustard smelling like Garlick*, has a single white root, with a few fibres, that send forth several leaves, of which some are jagged, others are surrounded by small teeth, and others again are without teeth or jaggs; they have generally long pedicles, and are nervous and green. From among these arise small stalks with leaves that embrace each other alternately; the flowers grow at the tops, and are composed of four small white petals, like those of shepherd's purse, and are disposed in the form of a cross. These are succeeded by flat fruit, in the shape of oval purses, which contain roundish flat seeds. All three have the same virtues; but the seeds are only made

made use of. They are said to promote urine, and to dissolve coagulated blood. The dose is from one scruple to two; but it must not be given to women with child, for fear of causing abortion, nor yet to patients of hot constitutions. The seed of the first is an ingredient in mithridate and venice treacle.

THYMUS CAPITATUS DIASCORIDIS, the *true Thyme of the ancients*, has a hard, woody root, furnished with fibres, that sends forth a small shrub to the height of a foot, which is divided into slender, woody, white branches, with leaves placed opposite to each other, that are small, narrow, whitish, and fall off in the winter. The flowers grow in heads at the top of the branches, which are small, purplish, labiated, and consist of a single petal. There are stamina, with slender summits, and the pistil is attended by four embryos, which become so many seeds, inclosed in a husk, which before was the cup of the flower. It is common in Candia, Greece, Spain, and Sicily, and grows on mountainous places, exposed to the sun. With us they are cultivated in gardens, and were formerly set in pots and tubs; but of late they have been found to endure the winter.

Besides this there are common broad leaved thyme, narrow leaved thyme, and broad leaved striped thyme, which have all the same virtues, and may be used indifferently in medicine. They are said to strengthen the brain, and to attenuate and rarify clammy humours. They help digestion, and may be of some service in shortness of breath; but they are chiefly used in the kitchen as a pot-herb.

All these plants may be propagated, either by sowing the seeds or parting the roots; and the proper season for both is at the latter end of March.

THYSSELINUM, *Milky Parsley*, has a long, reddish, brown root, full of a milky fluid, that has a hot, sharp, strong, disagreeable taste. It sends forth a stalk to the height of four feet, which is hollow, channelled, and branched. The leaves are ferulaceous, that is resembling that of the ferula, and have a milky juice like the root. On the tops of the branches there are flowers in umbels, consisting of five yellowish white petals, in the form of a rose, with as many capillary stamina with roundish summits. These are succeeded by oval, large, flattish seeds, placed by pairs, and radiated on the back. It grows in moist, marshy places, on the sides of ponds and brooks, and of ditches full of water. It flowers in June and July, and the seeds are ripe in the beginning of August. The root has been used in decoction, to promote urine, but it is not very safe, on account of its acridity. Boerhaave affirms, that the milk has the same purging quality of scammony, and may be used instead of it.

TILIA, the *Lime*, or *Linden tree*, has a deep spreading root, that sends forth a very large trunk, so full of branches, that it is very proper for shady walks. It is covered with a smooth ash-coloured bark, which is yellowish, or whitish within. It is so tough and flexible, that in some places, where better materials are scarce, they make cords and cables therewith. The leaves are broad, roundish, and terminate in a point, and are a little downy on both sides, as well as dentated on the edges; the flowers consist of five whitish petals, which are placed orbicularly, and expand in the form of a rose. There is a long narrow leaf growing to the foot stalk of every cluster of flowers, each of which has a great number of stamina, with yellow summits, and are sustained by a cup cut into five white thick parts. These are succeeded by a pod of the size of a large pea, which are almost round or oval,

No. 39.

as well as woody, angular, hairy, and contains one or two roundish blackish seeds, of a sweetish taste. Besides this, there are the small leaved lime tree, the red twigged lime tree, the Carolina lime tree, the striped leaved lime tree, and the American black lime tree.

The three first sorts are common in England, and are cultivated in most nurseries; but the *Carolina* and *American* are not yet very common. They are all easily propagated by layers, which in one year will take good root, and then may be taken off and planted in a nursery, at four feet distant, row from row, and two feet asunder in the rows. The best time to lay them down is about Michaelmas, when the leaves begin to fall, that they may take root before the frost comes on; it is likewise much the best to remove them in autumn. They may remain here five years, and the large side shoots must be pruned off, to cause them to advance in height, but the small twigs must not be cut off from the stems, because they are necessary to retain the sap for the augmentation of their trunks. If the soil be a fat loam, they will in that time be large enough to plant where they are to remain. The timber of the lime tree is used by carvers, because it is a light soft wood; as also by architects for framing models of their buildings; not to mention the turners, who make bowls and dishes therewith.

With regard to their medicinal virtues, the flowers are said to be good in all disorders of the head, and may be drank like tea with sugar. Some make a conserve of them for the same purpose, and the dose is from half an ounce to an ounce. Some affirm them to be good in the stone and gravel, and to dissolve coagulated blood. The berries are astringent, and good against all sorts of hemorrhages and loosenesses; the dose is a drachm in powder.

TINCTORIUS FLOS, or **LUTEOLA**, *Dyer's Weed*, or *yellow Weed*, by some called *Weld* or *Wold*, has a root generally as thick as a man's little finger, which is single, woody, white, and has a very few fibres. The leaves are oblong, narrow, smooth, and not dentated, though sometimes they are a little curled. Among these there rise stalks to the height of three feet, which are round, hard, smooth, greenish, branched, and furnished with leaves that are less than those below; and on the tops there are flowers, composed of three unequal petals, of a beautiful yellowish green colour. These are succeeded by almost round capsula, terminated by three points, which contain several roundish, small, blackish seeds. It is very common in England, and grows upon dry banks, and on the tops of walls and buildings, almost every where. It is of great use among the dyers, and will grow on the poorest sort of land, provided it be dry. The seeds should be sown in the middle of August, soon after they are ripe; they will come up the first moist weather, and will grow very strong the same autumn, provided they are sown by themselves. When they are pretty strong, they should be hewed like turneps, to destroy the weeds, and to thin them where too thick. The seed must not be too ripe when gathered, for then it will fall out; nor yet must the stalk be under ripe, for then it will be good for nothing. It must be bound in handfuls, and then set to dry like flax, taking care not to shake out the seed; which is usually sold for ten shillings a bushel, and a gallon will sow an acre. It is used for dying bright, yellow, and lemon colours. A great deal of this is sown in Kent, especially about Canterbury; and they cultivate it in Languedoc and Normandy, in France, where they boil it in water with alum, and then it will colour white wool yellow, and blue stuffs green. It is said to be

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an opening medicine, and to be good against the jaundice and cachexy; but it is seldom or never used with us.

TITHYMALUS, *Spurge*, is of three kinds, namely, *German Spurge*, *Garden Spurge*, and *narrow leaved Wood Spurge*.

German SPURGE has a thick, white, woody, creeping root, which sends forth several stalks, to the height of two or three feet, about as thick as a man's little finger; these are reddish, branched, and beset with leaves alternately placed, and these are smooth, oblong, green, and perish in the winter with the stalks. The flowers grow on the tops of the branches, and are disposed in umbels. They consist of one single leaf or petal; in the shape of a slipper, whose pointal afterward becomes a tricapular fruit, divided into three cells, each of which contains a roundish seed full of a white substance. It grows upon the sandy banks of rivers, and other marshy places; it is common in Germany, on the banks of the Rhine, from whence it has its name. It is sometimes in gardens, and flowers in May and June. It is cultivated full of an acrid milky juice, like other plants of this kind.

Garden SPURGE has a single root, with a few capillary fibres, and sends forth a stalk to the height of two feet, as thick as a man's thumb, which is round, solid, reddish, branched at the top, and furnished with many leaves three inches long, in the shape of those of willow; they are of a bluish green, smooth, and soft to the touch. The flowers grow on the tops of the branches, and are each composed of four thick petals, with several slender stamina, and roundish summits; they are encompassed with two pointed yellowish leaves, which seem to be in the room of a cup. They are succeeded by fruits, that are larger than those of the other plants of this kind, which have three corners, divided into three cells, with a seed in each as big as a pepper-corn. The whole plant is full of a milky juice, and is almost every where cultivated in gardens. It flowers in July, and the seed is ripe in August and September. Beggars make use of this milk very frequently to disfigure the skin, in order to move compassion. If the leaves or fruit of this plant are thrown into ponds, it makes the fish rise to the surface of the water, where they lie as if they were dead; but they may be recovered speedily by changing the water.

TORMENTILLA SYLVESTRIS, *wild Tormentil*, or *Septfoil*, has a root about as thick as a man's finger, which is rough, unequal, sometimes strait, and sometimes crooked, of a dark colour without, and reddish within; it is a kind of a tubercle, and is furnished with a few fibres. The stalks are slender, weak, hairy, reddish, and about a foot long; they lie on the ground, and are surrounded with leaves by intervals, like those of six leaved grass; they are hairy, and there are commonly seven leaves at the top of the foot stalk. The flowers consist of four yellow petals, placed like a rose, supported by a calyx or cup, in the form of a basin, divided into eight parts, of which four are large, and four are small; they are placed alternately, with sixteen stamina in the middle. These are succeeded by a globular fruit, which contains many seeds that are small and oblong. It grows almost every where, in dry pastures and commons, in most parts of England; it flowers in May, June, and July, and the root is principally used in medicine; but the Tormentil of the Alps is much more valuable, on account of its superior virtues. The root has a styptic very bitter taste, and is accounted good to stop loosenesses, hæmorrhages, and the like. The dose in decoction is from half an ounce to an ounce, and in powder from half a drachm to a drachm.

TRIFOLIUM PRATENSE PURPUREUM,

common meadow Trefoil, with a purple flower, by many called *Honey-suckle*, has a root as thick as a man's little finger, which is long, round, woody, creeping, and fibrous. The stalks rise to the height of a foot, or a foot and a half, and are slender, channeled, and sometimes a little hairy. The leaves are partly round, and partly oblong, and there are three together on the same pedicle, marked on the middle with a spot, in the shape of a heart, which is sometimes white, and sometimes dark. The flowers grow on the tops of the stalks, and have some resemblance to the papilionaceous kind; are disposed in a head, or short thick spike, of a purplish colour, and have a juice at the bottom, as sweet as honey. They are succeeded by small round capsula, each of which is inclosed in a calyx, and terminated by a long pedicel, containing a seed, in the shape of a kidney. It grows almost every where in meadows and pasture grounds, flowering in April, May, and June. The flowers are greatly sought after by bees, and the whole herb is excellent for feeding cattle.

TRIFOLIUM ARVENSE HUMILE SPICATUM, *Hare's-foot Trefoil*, is the lagopus of the shops, and has a slender, woody, fibrous, crooked, white, annual root. It has several stalks, about six inches high, which are branched, strait, and covered with a whitish down. Three leaves are placed together upon one pedicle, which are smaller than common trefoil, and are downy and whitish, especially upon the back. The flowers are small, whitish, papilionaceous, and fixed on hairy soft spikes, which resemble the feet of a hare; the colour is ash, inclining to purple. These are succeeded by capsulæ, inclosed in a calyx, each of which contain a reddish seed like a small kidney. It grows every where in fields among corn, and flowers towards the latter end of summer, continuing till October. Most physicians affirm it is good to stop loosenesses of every kind, if the decoction be used as common drink. If the seed happens to be mixed with wheat, it turns the bread of a reddish colour, which had like to have caused an insurrection at Paris; for the people affirmed the bakers mixed blood with their flower.

TRIFOLIUM BITUMINOSUM, *Trefoil*, *Smelling of Bitumen*, has a hard, woody, fibrous root, which sends forth a sort of a shrub, about two feet high, and is divided into several stiff channeled branches, which are sometimes whitish, and sometimes blackish. The leaves grow by three's on the same pedicle, which, when they first appear, are round, but grow longer afterwards, and terminate in a sharp point; they are whitish, downy, clammy to the touch, and have the smell of bitumen. The flowers grow on the tops of the stems and branches, are disposed like an oblong head, and are papilionaceous, and of a violet purple colour; they are sustained by an oblong, channeled, hairy calyx. These are succeeded by a capsula inclosed by the calyx, which contains a rough, pointed, blackish seed, of the same smell with the rest of the plant. It grows in Candia, Sicily, Languedoc, and the southern parts of France; on stony hills near the sea, and is planted here in some gardens for the sake of variety, and kept in pots. It flowers in June, July, and August, and will stand the winter, if it is not too severe. The juice of this plant has been accounted a secret against a cancer, and has been given from one spoonful to two, for that purpose.

TRIFOLIUM HÆMORRHOIDALE, *pile Trefoil*, has a long, hard, woody root, with several stalks, which rise to the height of two or three feet, are slender, round, hairy, woody, branched, and make a kind of a shrub, furnished with downy, whitish, and roundish leaves, which grow by three's on the same pedicle, and have two appendages at the base. The flowers grow at the extremities of the stems and branches, and are papilionaceous, whitish, and supported

ported by a hairy calyx. They are succeeded by short thickish pods, of a reddish brown colour, that contain a round small seed, yellowish within. It grows in the southern parts of France, and flowers in the summer. It has been counted an excellent remedy for the piles; and some affirm, a drachm or two of these leaves, given in powder, has been of great service in that disorder.

Bird's-foot Trefoil is the *Trifolium Corniculatum* of the shops, and has a woody, long, black root, divided into several branches, and furnished with fibres. The stalks are slender, branched, and lie upon the earth; and the leaves are placed as in other trefoils, only there are two small flat leaves that grow underneath them, which are sometimes smooth, and sometimes a little hairy. The flowers are papilionaceous, grow in umbels, and are sometimes yellow, and sometimes greenish, like those of broom; the calyx is dentated, and in the shape of a horn; the flowers are succeeded by capsulæ or pods, in the form of a cylinder, which contain several roundish seeds, in the shape of kidneys. It grows almost every where, and flowers in summer; it is exceeding good for cattle, but is of little use in medicine.

TULIPA, *Tulip*, is a lily flower, generally composed of six petals or leaves, in the shape of a pitcher: the pointal, which arises from the middle of the flower, is surrounded with a stamina, which afterwards becomes an oblong fruit, that opens into three parts, and is divided into three cells, full of plain seeds, which rest one upon another, in a double row. The root is coated, bulbous, and there are fibres on the lower part. There are several kinds of tulips, which there is no occasion to enumerate, because they may all be seen in one good garden; but the best have a tall strong stem. The flower consists of six leaves, three within and three without, and the former should be longer than the latter. Their bottoms should be proportioned to the top, and their upper parts should be rounded off, and not terminate in a point. These leaves, when open, should neither turn inward nor bend outward, but rather stand erect; and the flower should be of a middling size, neither too large nor too small; the stripes should be small and regular, arising from the bottom of the flower; and the chives should not be yellow, but of a brown colour. They generally divide tulips into three classes, namely, the early flowers, the middling flowers, and the late flowers; but they are best divided into early and late, of which the last are the best.

TUSSILAGO, *Colt's-foot*, has a long, slender, whitish, tender root, with stalks that rise to the height of a foot, which are hollow within, downy, reddish, and covered with leaves without pedicles. These are long pointed, placed alternately, and at the top of the stalk there is a beautiful, round, radiated flower, resembling that of dandelion, with capillary stamina, that have cylindrick summits. These are succeeded by several oblong, flattish, downy seeds. After the flowers, the other leaves appear, which are very large, a little angular, almost round, green above, and whitish and downy below. It grows in moist places, and on the borders of rivers, brooks, ponds, and ditches. It flowers about the end of February and beginning of March. *Colt's-foot* is an excellent medicine to abate the sharpness of the humours, to cleanse ulcers of the breast, and to facilitate expectoration. There are a great many that are troubled with the asthma, who cut the leaves small, and mix it with tobacco for smoking; and affirm they find great benefit thereby. Both the flowers and leaves are used in pectoral decoctions; and Dr. Hillary, physician to the king of Prussia, cured a great many consumptive children, by feeding them with colt's-foot leaves, boiled and buttered.

VALERIANA HORTENSIS, *Garden Valerian*,

has a wrinkled root, of the thickness of a man's thumb, placed near the surface of the ground, and furnished with thick fibres, of a yellowish or brown colour, that cross each other. The stalks are about three feet high, and are slender, round, smooth, hollow, branched, and furnished with leaves, placed opposite to each other by pairs. Some are smooth and entire, while others are cut deeply on each side; generally terminate in a roundish point. The flowers grow in umbels on the tops of the stalks and branches; and are of a purplish white colour, with a sweet smell, not unlike that of jessamine. Each of these is a sort of tube, cut into five parts, with a few stamina that have roundish summits. They are succeeded by flattish, oblong, tufted seeds. It is cultivated in gardens, and propagated by parting the roots, either in the spring or autumn; they should be planted on beds of fresh, dry earth, about eight or ten inches asunder, and should be watered till they have taken root. The wild sort is now universally preferred for medicinal uses, and therefore no more need be said of this.

VALERIANA SYLVESTRIS MAJOR, *Great wild Valerian*, has a fibrous, whitish, streaked root; with a very strong smell when it is dry, and an aromatic taste; the stalks rise to the height of a man, and are strait, slender, hollow, channeled, knotty, and a little hairy. The leaves resemble those of garden Valerian, but are more divided, greener, and dentated on the edges; they are a little hairy or downy underneath, and have several large veins. The flowers grow on the tops of the stalks and branches in umbels, and are of a purplish white colour, like those of the former; the seeds are tufted or downy, for which reason they are carried about with the wind. It generally grows on dry chalky land, and shady places, in divers parts of England. It flowers in May and June, and the seed is ripe in July. The root is bitter, styptick, and has a disagreeable aromatic smell; it is much cried up against the epilepsy, and is sudorifick as well as hysterick; it is accounted good for the asthma, and all kinds of convulsive disorders. It may be taken in decoction, from two drachms to half an ounce, and, in substance, from one drachm to two. It should be taken up in the spring, before the branches appear, and dried in the shade. Several physicians affirm, they have cured a great number of epileptick patients with the powder of the root of wild Valerian, given to a drachm in a sudorifick decoction, and continued for some time.

VALERIANELLA, *Corn-Sallad, or Lambs Lettuce*, has a slender, fibrous, or white annual root, and a stalk about six inches high, which is weak, round, crooked, channeled, hollowed, knotted, branched, and commonly lies upon the ground. It is generally subdivided into two at each knot, and these last into several branches. The leaves are oblong, pretty thick, soft, tender, and placed by pairs, opposite to each other; the colour is a pale green; some of them are entire, and others crenated, without pedicles. The flowers grow on the tops of the branches, are small, of a purplish white colour, and placed in umbels; they each consist of one leaf or petal, cut into five parts, and are succeeded by roundish, flattish, wrinkled, whitish seeds, which fall off before they come to maturity. It grows almost every where, among corn, and is cultivated in gardens, where it is sown in September for winter use. It is usually mixed with salads, and will continue till April. It is said to have the virtue of lettuce, and to be good in the rheumatism, scurvy, and gout; but it is now never used for these purposes. Young lambs are said to be fond of it.

VERATRUM, *White Hellebore*, is of two sorts, one of which has a greenish flower, and the other a dark red flower. The former of these has been mentioned

mentioned before, in the first chapter; but as nothing was said of the cultivation, we shall take notice of it here, especially as it is accounted a pretty ornament for gardens. They should be set on the open borders of a pleasure garden, and from each head of the root, a flower stem will be produced, about three feet high, with a spike of flowers about a foot long at the top; the red flowers are generally preferred, on account of their colour. They may be propagated by parting the roots, either in autumn or the middle of March, just before they begin to shoot; and should be planted in a light, rich, fresh soil, in which they will thrive exceeding well. They should not be removed above once in three or four years, by which time they will be very strong, and afford many heads to be taken off.

VERBASCUM, *Great white Mullein*, has a single, oblong, thickish, woody, white root, with a few fibres; and the stalk, which rises to the height of four or five feet, is thick, round, hard, woody, and crooked, with a sort of wool or cotton; the leaves are long, broad, woody, white on both sides, partly lying upon the ground, and partly fixed to the stalk alternately, with appendages, which seem to render the stalk winged. The flower consists of one leaf, in a circular form, which is cut into five parts, and joined to each other by a tuft; it is yellow, and surrounds the greatest part of the tops of the stalk and branches. The flowers are succeeded by oval shells, terminating in a point, divided into two cells, which contain a great number of small, angular, blackish seeds. It grows in sandy places, by the side of highways, and sometimes on walls; it flowers in June, July and August.

VERBASCUM FŒMINA FLORE LUTEO MAGNO, *Female Mullein*, with a large yellow flower, has a long, thick, woody, single, white root, like the former, and the stalk, which rises to the height of four or five feet, is thick, round, hard, downy, and a little branched. The leaves are round, long, soft, downy, and white; and the flowers are like the former, having five stamina in the middle, with purple summits. These are succeeded by almost round capsula, pointed at the end, and divided into two cells, which contain several angular brownish seeds. This plant grows in the same places as the former, and flowers the second year after it is come up towards the end of summer, and in August. They both may be cultivated in gardens, by sowing the seeds in August, on a bed of light earth, and in an open situation; but it is seldom done except in botanick gardens for variety. They both have the same virtues, and the leaves and flowers are in use. The decoction has been given in disorders of the throat, in violent coughs, in the bloody-flux, the gripes, and a tenesmus. The flowers are said to be pectoral, proper to abate the acrimony of the humours, to cure itching of the skin, and the outward and inward piles.

VERONICA MAS, *common male Speedwell*, or *Fuellin*, has a slender, fibrous, spreading root, which sends forth several slender, long, round, knotty, hairy stalks, generally lying on the surface of the ground. The leaves grow by pairs opposite to each other, and are like those of a plumb-tree; they are downy, dentated on the edges, and have a bitter acrid taste. The flowers are disposed in spikes, like those of germander, and are small and bluish, and sometimes white, with two stamina of the same colour, with oblong summits. The flower consists of one leaf, which is divided into four parts, and is succeeded by fruit in the shape of a heart, placed in two cells, which contain several round blackish seeds. It grows wild in the woods, and other shady places in divers parts of England. There are some other species of this plant; but this is the only one used in medicine, and is said to have so many virtues, that an entire trea-

tise would scarce contain them; besides which some call it the European tea. In general, it is sudorific, vulnerary, detergent, diuretick, and proper to cleanse the lungs. Hence it is good in a dry cough, the asthma, ulcers of the lungs, and spitting of blood. It opens obstructions of the bowels, promotes the circulation of the blood and humours, and is excellent in the gravel. It is best used in the manner of tea, and is very good in sleepy disorders.

VIOLA MARTIA PURPUREA FLORE SIMPLICE ODORO, *common purple Violet*, with a sweet scented flower, has a fibrous, thick, or tufted root, that sends forth many almost round leaves, as large as mallows, dentated on the edges, green, and having long pedicles. From among these there arise slender pedicles, which have each a small flower, of a purplish blue colour, with a very agreeable smell. It is composed of five small leaves, with as many stamina, that have blunt summits, and a kind of a spur; the calyx or flower-cup is divided at the base into five parts. When the flower is gone, there remains a capsula, or oval shell, which, when ripe, opens into three parts, in which are almost round seeds, connected to the sides of the shell, which are less than those of coriander, and of a whitish colour. It grows in shady places, in ditches, and the sides of hedges, as well as against walls, where they readily multiply with their long creeping filaments, which take root here and there. They flower in March, and do not lose their leaves, nor the verdure, during the winter. Besides this, there are no less than twenty-eight sorts, and about eight of them serve to make agreeable varieties in gardens and wildernesses, by placing them under hedges, and other shady places. They may be easily propagated, by parting the roots; the best time for which is about Michaelmas. The leaves and flowers are used in medicine, and sometimes the roots, by infusion, three ounces of which will purge upwards and downwards. The flowers are a little purgative, and we are assured, that a drachm of their powder, taken in water-gruel, is a good purge; but they are generally used to make a syrup of, which, when well managed, is of a very fine colour.

VISCUM, *Mistletoe*, has a green root, which is a little woody in the middle, and sends forth a shrub about two feet high. The stalks, which are sometimes as thick as one's little finger, are woody, heavy, compact, knotted, and of a brownish-green. There are a great number of flexible woody branches. The leaves are placed by pairs opposite to each other, and are oblong, thick, fleshy, hard, and pretty like those of the great box, but longer, and roundish at the end. The flower consists of one leaf, in the form of a bason, and is generally divided into four parts, and beset with tubercles or warts. The ovary of the female flowers is placed in a remote part of the plant from the male flowers, and consist of four shorter leaves; these turn to a round berry, full of a clammy substance, in which is a plain seed, in the shape of a heart. It grows almost on all kinds of trees, according to some authors, and is always produced from seeds, which will not grow in the ground like other plants. It is supposed that the mistletoe-bird or thrush, which feeds upon the berries of this plant in winter, when they are ripe, often carries the seeds from tree to tree; for the clammy part of the berry, which immediately surrounds the seed, sometimes sticks fast to the outer part of the bill of the bird, which, to disengage himself from, he strikes it against the branches of a neighbouring tree; and by that means leaves the seeds, sticking on the bark, which will grow the succeeding winter. It may be propagated by art in the same manner. The trees it is found commonly upon, are the apple and ash; and it is sometimes, though but seldom, found on the

oak; which perhaps is the reason why that is cried up more than others; but without any sufficient reason. Mistletoe is looked upon as a great anti-epileptic, and the dose of it in powder is from one drachm to two. Simon Pauli cries it up against the pleurisy, and orders one drachm of the powder, in four ounces of barley-water. The berries purge upwards and downwards, with great violence, and therefore are not proper to be given inwardly.

VITIS, *the Vine*, has a long woody root, which sends forth a climbing tree, that has clasps at the joints, by which it fastens itself to whatever plant stands near it. The leaves are large, broad, and almost round, green, shining, cut, a little rough to the touch, and of an astringent taste. The flowers are small, and are each composed of five petals or leaves, disposed in a circular order. They are of a yellowish colour, with as many upright stamina. When the flowers are fallen, they are succeeded by round or oval berries, lying close to each other in clusters, which are green at first, and, as they ripen, become white, red, or black; they are also full of a pleasant juice. This tree is cultivated in most hot and temperate countries, and rises to a great height in a short time, if it be left to itself, and not cut. In some countries it will rise to the top of the highest trees, and have a stem of a prodigious size. It flowers in the summer, and the grapes are ripe in autumn.

All sorts of vines are propagated either from layers or cuttings, the former of which is greatly practised in England, but the latter is preferred by Mr. Millar; and he lays down excellent rules for their cultivation, which we have not room to take notice of here.

The buds of the vine, as well as the leaves, are astringent, and were used by the ancients to cure loosenesses; at present, there are some in France that give the powder of the green leaves, dried in the shade, to a drachm, for the same purposes. The use of the grapes is universally known, they being proper either for eating, or making of wine. When they are green, they produce the liquor which is properly called verjuice; and, in this state, it is a little astringent, serves to abate the heat of the stomach, and to stop a bilious looseness, as well as to recover the appetite. It is made use of in France in the same manner as our common verjuice made with crabs. Of the juice of ripe grapes they make a sapa or rob, by evaporating it over the fire, till a third part remains. This is a little astringent and styptic, which are made use of in France to prepare quinces with; and then it is said to be excellent to stop loosenesses, and to strengthen the stomach. As for wines, they vary greatly, with regard to their colour, smell, taste, and consistence; all which are different, according to the different kinds of grapes of which the wine is made. Good generous wine, of any sort, is an excellent cordial, if properly used, and of late has been found to be of great service in all slow nervous fevers; for they will recover the patient, when other things fail. However, there are some wines that are too astringent for common use, and consequently produce costiveness; for which reason they must be unwholesome, unless drank in small quantities; however, they are proper enough for those whose stomachs are relaxed. Meagre acid wines agree with those of a bilious constitution, to restrain the effervescence of the blood, but with none else. Strong spirituous wines are most proper to raise the spirits, and to restore the exhausted strength, especially when they are not drank too commonly.

VITIS IDÆA, FOLIIS OBLONGIS CRENATIS, *common black Wortle, or Bilberry*, has a slender, woody, hard root, often creeping under the ground, which sends forth a small shrub, about a foot in

height, with several slender branches, that are angular, flexible, and difficult to break, as well as covered with a green bark. The leaves are oblong, and about the size of those of box, but not so thick; they are green, smooth, slightly dentated on the edges, and have an astringent taste. The flowers consist of a single leaf, in the shape of a pitcher, and are connected to short pedicles, of a reddish white. There is a small lasting flower-cup, in which is the germen, attended by eight stamina, with forked summits. The germen afterwards becomes a soft, globular, umbilicated berry, of the size of juniper berries, and of a deep blue, or blackish colour. It grows very common on large wild heaths, in many parts of England; but it is never cultivated in gardens, because it will not thrive therein. In those parts where they are common, the poor people gather them, and bring them to markets to sell, or cry them about the streets. It is common to eat them with milk or cream. Some take the juice of these berries, and boil them to the consistence of a rob, with sugar, which is said to be good against a common looseness, and to temperate the effervescence of the bile. Several vintners in France make use of these berries, to colour their white wines red, as well as to increase the quantity thereof; and it were to be wished, that nothing worse was any where used to adulterate this liquor. Some likewise make use of the juice to colour linen, as well as paper, blue.

ULMARIA, *Meadow-Sweat*, has a pretty thick root, as long as one's finger, which is blackish without, of a reddish brown within, and has a few reddish fibres; it sends forth a stalk, to the height of three feet, which is strait, angular, smooth, reddish, firm, hollow, and branched. The leaves are placed alternately, and are composed of several other oblong leaves, not much unlike those of drop-wort. They are dentated on the edges, wrinkled, and green above, but whitish below. The flowers are small, and grow in bunches on the tops of the stalks and branches; they each consist of several petals or leaves, of a whitish colour, in the form of a rose, and have an agreeable smell. These are succeeded by a fruit, composed of many little membranaceous crooked husks, gathered into a sort of a head, each of which contains a small seed. It grows wild in moist meadows in most parts of England, and the flowers in the middle of June make a fine appearance among the grass. The seeds are ripe in autumn. This plant is said to be sudorific, cordial, and vulnerary, and some recommend its decoction in malignant fevers; others greatly praise it against fluxes, and internal hurts, but it is not to be depended upon on these accounts. A drachm of the extract of the root is sudorific, if it be taken for two or three days together. The tender leaves and flowers of this plant, put into wine, mead or beer, give them an agreeable taste and smell, which some are very fond of.

ULMUS, *the Elm tree*, has a thick, hard, woody root, which spreads greatly in the ground, and sends forth a large branched tree, with a thick trunk, covered with a chapped bark, which is rough, and of a reddish ash colour without, but whitish within. The wood is strong, hard, inclining to yellow, with a reddish cast, and the leaves are broad, wrinkled, veinous, oblong, dentated on the edges, terminating in a point, of a pretty deep green above, with short pedicles, and crossed longways by a nerve, which does not appear so much on one side as the other. The flower, which appears before the leaves at the top of the branches, consists of a single leaf, shaped like a bell, furnished with several dark coloured stamina, and from the bottom arises the pointal, which afterwards turns to a membranaceous and leafy fruit, almost in the shape of a heart. In the middle of which is placed a seed-vesSEL, in the shape of a pear,

containing a single seed of the same shape. This tree grows in plenty all over England, and is propagated by seeds, and suckers that rise from the roots of old trees in such plenty, as hardly to be rooted out, particularly in hedge-rows, which, when left undisturbed, will send forth young plants every year; from whence the people who supply the nurserymen gather them. It flowers in March and April, and the seeds are ripe in May.

Besides the common Elm, there are the witch hazel, or broad leaved Elm; the small leaved or English Elm, the smooth leaved or witch Elm, the Dutch Elm, the English Elm with beautiful striped leaves, the yellow leaved Elm, the Dutch Elm with striped leaves, the smooth narrow leaved Elm, the white barked Elm, and the French Elm. The three first, as well as the former Elm, are common in England, and so is the fourth, which is as hardy as the former. Those sorts with striped leaves are preserved by the curious, who collect variegated plants. The smooth narrow leaved Elm is common in some parts of Hertfordshire, and Cambridgeshire, and is a very handsome upright tree, which retains its leaves late in the autumn. They may be all propagated by layers or suckers taken from the roots of old trees; but the method by layers is best, because they come on faster than the others. The best soil for such a nursery is a fresh hazel loam, neither too light nor too dry, nor yet too moist and heavy.

With regard to the medicinal virtues, we are assured in the German Ephemerides of 1727, that several persons, afflicted with the dropsy ascites, have been cured by the decoction of Elm-bark, used as common drink for five or six weeks. There are sometimes on Elm leaves a sort of bladders, that swell to the bigness of a man's fist, which contain a liquor, in which are greenish insects. This must be strained through a cloth, and then several affirm it will be good for all recent wounds and bruises. Ray tells us, that the decoction of Elm-bark, reduced to the consistence of a syrup, and a third part of brandy added, is good to ease the hyp-gout, if used as a liniment.

UMBILICUS VENERIS, *Navel-wort*, has a tuberose, fleshy, white root, furnished below with small fibres, which send forth round thick leaves, full of juice, that are tender, hollowed like a basin, and fixed to long pedicles, of a sea-green colour; from the middle of these there arises a slender stalk, about half a foot high, which is divided into several branches, covered with small flowers, consisting of a single leaf, expanded in a circular order, and cut into several segments; the colour is white, or a little inclining to purple, with ten stamina, and strait summits. These are succeeded by a fruit, composed of four hollow, umbilicated capsula, somewhat resembling a basket, in the middle of which is contained one seed, that is almost flat. This plant grows naturally among rocks, and on old walls, in stony hot countries, and flowers in April and May, at which time the leaves decay. It begins to appear towards the end of autumn, and keeps its leaves all the winter.

UMBILICUS VENERIS ALTER, *creeping Navel-wort*, has a long creeping root; but the leaves are much the same as those of the former, only they are greater, thicker, open towards the pedicle, crenated on the edges, and from among them there arises a round, firm, reddish stalk, furnished with smaller leaves, divided into several branches, loaded with yellow flowers, in the form of a spike. They each consist of a single leaf, cut into five parts, supported by a long greenish calyx; these are succeeded by five oblong, pointed, greenish capsula, full of very small reddish seeds. This plant grows wild in Portugal, and is cultivated in the gardens of the cu-

rious. It flowers in June, and the leaves are green all the winter, but then entirely disappear in May. The seeds of the former should be sown in autumn, soon after they are ripe, at which time they will come up very well; but if they are sowed in the spring, they seldom succeed. The leaves are said to be very good in external inflammations, and they may be substituted in the room of house-leek. Some bruise this herb between two stones, and apply it to ease the pain of the piles; but there are more certain remedies for these purposes.

UNEDO, *five* ARBUTUS, *the Strawberry tree*, has a pretty thick, woody root, from whence proceeds a shrub or small tree, whose trunk is covered with a rough chapped bark, and there are many reddish branches towards the top. The leaves are oblong, somewhat broad, and almost like those of the laurel tree, for they are thick, smooth, always green, and finely crenated on the edges. The flowers consist of a single leaf, cut into five parts, which are white, beautiful, disposed in bunches, and have an agreeable smell, with ten capillary stamina. These are succeeded by fruits, that have some resemblance to strawberries; but they are larger, of an orbicular shape, with the flesh yellow before they are ripe, and of a fine red when at maturity; it is divided into five cells, which contain several small, oblong, bony seeds. This shrub is very common in Italy, Spain, and the southern parts of France; it flowers in June and July, and the fruit does not grow ripe in less than a year. Blackbirds and thrushes are very fond of these strawberries, as well as women and children. There are some of these shrubs planted in England, and it is very common in Ireland, where the fruit is sold and eaten. With us it has an austere sour taste, which perhaps may be owing to the coldness of the climate, and therefore only the branches are brought to the markets, with bunches of flowers thereon, to be made up into nosegays. They may be propagated by sowing the seeds, which should be preserved in dry sand till March, at which time they may be sown on a moderate hot-bed, covering them with about a quarter of an inch of light earth, screening them from frost, or great rains. About the beginning of May the plants will appear, and then they must be weeded, watered frequently, and shaded in hot weather. In autumn they will be about five or six inches high. The bed must be hooped all over against winter, and should be covered with mats and straw, to keep out the frost. About the middle of April, they may be transplanted into small pots, which should be plunged into another moderate hot-bed, to encourage their taking root, and they should be shaded from the sun in the middle of the day. When they are between three and four feet high, they may be shaken out of the pots into the open ground, where they are to remain; this is best done in September, when the blossoms are beginning to appear, and then, if they be kept moist, they will take root very soon; but in November the roots should be well covered, to keep out the frost.

URTICA, *the Common Nettle*, has a slender, fibrous, creeping root, of a yellowish colour, with stalks that rise to the height of three feet, which are square, furrowed, stiff, covered with a stinging hair, hollow, branched, and furnished with leaves, placed opposite to each other by pairs; these are oblong, broad, pointed, dentated on the edges, and full of small stinging prickles. The flowers grow on the tops of the stalks and branches, under the leaves, and are each composed of several stamina placed in a calyx, with four leaves of the colour of grass; but they leave no seeds behind them; for this reason, they are distinguished into male and female. The male does not flower at all, but forms pointed capsula, that sting when they are touched, and each of these con-

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tain an oval, flattish, shining seed. The female bears nothing but flowers without any fruit, according to the vulgar distinction; for the botanists call those male flowers that produce no seeds, and those female flowers that are succeeded by seeds. This plant grows almost every where, in great plenty; it flowers in June, and the seed is ripe in August. The leaves decay every winter, but the roots continue, and send forth fresh leaves in the spring.

URTICA MINOR, the *lesser stinging Nettle*, has a single, pretty large, white root, furnished with small fibres: the stalks are from half a foot to a foot in height, and are pretty thick, square, hard, furrowed, branched, and stinging, but not so strait as the former; the leaves are placed opposite to each other by pairs, and are more short and blunt than those of the common nettle; they are also deeply dentated on the edge, and sting greatly when touched. The flowers consist of stamina, disposed into small bunches, in the form of a cross, and of a grass green colour. Some of these are male, and others female, as in the former. These grow commonly by the sides of houses, and among the ruins of old buildings; both root and branches perish every year, and they are renewed by the seeds in the spring.

URTICA ROMANA, *Roman Nettle*, has a fibrous, yellowish, annual root, that sends forth a stalk to the height of four or five feet, which is round, branched, and furnished with stiff, stinging prickles. The leaves are placed opposite to each other, and are broad, pointed, deeply dentated on the edges, and are covered with a rough stinging, shining hair. The flowers are like those of the former, and are succeeded by small globes of the size of a pea, all rough with prickles, and composed of several capsulæ, that open into two parts, and have each an oval, pointed, flattish, smooth, slippery seed. It grows as well in cold as hot countries, in hedges, meadows, and among coppices. It is not so common as the two former, for which reason there are some that sow the seed in gardens; it flowers in summer, and the seed is ripe in July and August. Some call this the pill-bearing stinging nettle, with seeds like flax. These may be sown at the latter end of March, upon a bed of light rich earth; and when the plants are come up, they should be removed into beds on the borders of the pleasure garden, among other plants; because it is common for persons to gather sprigs of several sorts to smell to, and consequently this among the rest, and this is designed to sting them for the sake of mirth. The juice of nettles is recommended to stop spitting of blood, and other hemorrhages, and the dose is from two ounces to four. Some would have the infusion of the leaves of nettles, made like tea, to be given in the gout, the rheumatism, the stone, and gravel. It is common in many places to make pottage with the young shoots of nettles in the spring, to cleanse the blood. The roots of nettles made into a decoction, are said to be a good remedy against the jaundice, and to promote expectoration in an old cough, as well as in the asthma and pleurisy.

VULNERARIA RUSTICA, *Kidney-Vetch*, or *Ladies Finger*, has a single, long, strait, blackish root, with stalks that arise to the height of a foot, which are slender, round, downy, a little reddish, and lie upon the ground. The leaves are placed by pairs along one side, and are terminated with a single leaf like those of Goats Rue, but a little softer; they are hairy underneath, inclining to white, but of a yellowish green above, with a

sweetish acrid taste. Those which sustain the flowers on the tops of the branches, are broader than the rest. The flowers grow on the tops of the branches, and are yellow, papilionaceous, and have each a calyx like a tube, which are succeeded by short pods filled with roundish seeds, that are contained in a membranous bladder, and was before the cup of the flower. It grows in mountainous, dry, sandy places, or on chalky grounds in divers parts of England. It flowers in May, and June, and the seed is ripe in July and August. It has been accounted good for healing fresh wounds, but it is now out of use.

UVULARIA MAJOR, *Throat-wort*, has a thick, long, branched, white root, that sends forth several branches, to the height of three feet, which are sometimes as thick as a man's little finger, and are angular, furrowed, hollow, reddish and hairy. The leaves are disposed alternately along the branches, and are like those of the common nettle, but they are more pointed, and those below have long pedicles. The flowers are made like a bell, cut on their edges into five parts, and are of a blue or violet colour; but sometimes they are white, hairy within, and supported by a small calyx, cut likewise into five parts, and they have five short capillary stamina in the middle, with flat summits. The calyx is succeeded by a membranous, roundish, angular fruit, which is divided into several cells, with holes on their sides, and contain small, shining, reddish seeds. This plant grows frequently in woods, hedges, meadows, and in shady places; it flowers in summer, and the seed is ripe in autumn. Some cultivate it in gardens for the sake of the variety of the flowers. They are only propagated by parting the roots, for they do not produce seeds in England; the best season for removing them is about Michaelmas, when the roots may be separated and planted on the borders of the flower garden. This plant is astringent, deterfive, and vulnerary, and the decoction of it has been made use of against inflammations of the mouth and throat; but it must be only exhibited in the beginning of the disorder.

XYRIS, *five IRIS FOETIDA*, *stinking Gladden*, or *Flag*, has a round root, pretty much like an onion while it is young. But afterwards it grows crooked, knotted, and is furnished with pretty thick fibres; it sends forth many roots a foot and half or two feet in length, that are more narrow than the common Iris, and as sharp as the end of a sword; they are of a blackish shining green, and have a stinking smell like bugs. Among these leaves several strait smooth stalks arise, on the top of each of which there is a flower like that of the Iris, but smaller, and composed of six petals or leaves of a dirty purple, inclining to blue. These are succeeded by oblong angular fruit, which open like the male piony, and discover round seeds, as large as small peas, of a red colour, and of an acrid burning taste. It grows in moist places, on the sides of hedges, among bushes, and in shady valleys. It flowers in July and August, and the seed is ripe in autumn. It is cultivated in the gardens of the curious, and grows readily every where; however, it does not grow in many places spontaneously in England. The root and seed, taken in decoction, are said to be aperient, to purge off water, and to be good in the rheumatism and dropsy. A dose of the dried root, in powder, given in white wine, is a drachm. Some account it excellent in the king's-evil, and in the moist asthma; but its principal virtue is to purge off water, and to dissolve clammy humours.

OBSERVATIONS on HOT-BEDS,

A N D

WATERING of PLANTS.

HAVING frequently recommended the use of Hot-beds, for the raising of particular Plants mentioned in the preceding part of the Natural History of Vegetables, it may not be improper here to consider that subject more at large, as well as to give the inexperienced some idea of the proper observations to be made previous to watering of plants. Without a perfect knowledge of these subjects, it will be in vain to attempt to rear any tender plant, or, indeed, to make any tolerable progress even in common gardening.

A hot-bed is the common help made use of by gardeners to forward the growth of a plant, and force vegetation, when the season of itself does not afford a sufficient warmth. By the help of this, if it be skilfully managed, the hottest climate of the world may be so nearly imitated, that the seeds of those plants, which are brought from any country, may be here made to vegetate and flourish in England.

In order to have a right understanding of the hot-bed, we must consider what degree of heat is required for the growth of the plant we intend to cultivate; for nature must be imitated as near as possible, and not forced or exceeded, if we hope for success in our undertaking.

Heat and moisture are certainly the rudiments of vegetation; and therefore, whoever would promote the growth of a plant, must contrive how to have them in such due proportion, as that neither one nor the other exceeds those limits, which nature has allotted for the growth of plants. A dry heat, we find from experience, rather scorches and shrinks a plant, than make it grow; and wet, if it is not quickly exhaled from the root of a plant, chills it, and often injures it past recovery. A moderate sweating heat, therefore, is most desirable, such as is raised by the ferment of wet straw or horse litter, which for a time will send forth, from the earth lying upon it, that gentle steam, impregnated with vegetative salts, which we find contributes so much to the growth of plants, besides putting those juices into motion, which are lodged in the root, and circulating them through the proper vessels.

The steam, which is supposed to rise from the root into the wood vessels of plants, to furnish them with sap, will indeed of itself keep a plant alive; but then, at the same time, the bark, leaves, and other spongy part of a plant, which encompass the sap vessels, if they are too dry, will shrink and pinch those vessels so very close, that they then cannot admit the sap to circulate through them in such quantity, as is necessary to support the plant in vigour: on the contrary, when the spongy parts of plants are kept moist by the ascending vapours, which continually rise round about them from the earth, then the sap vessels are also more open, and at liberty to receive the nourishment rising from the roots.

To explain this, let us consider those plants, which are cultivated in pots, and set singly in chambers, and other places of the house, for ornament in summer, though we allow them large pots, fresh earth, and water enough, as well as air, as much as they have in a green-house, yet they sensibly decline in a few days. This happens principally for want of that steam, which is always abroad, more or less, rising from the earth in the day, and condensing and falling upon them at night. Nor can the pots, set singly in a chamber, have this help, as those have, which are set together for shelter during the winter, in a green-house; for the number of pots, in a collection of plants, afford steam enough to nourish one another, which one single pot cannot.

The like is to be observed in a dry season, when we are forced to water plants that stand abroad; they are by that help but just kept alive, because the earth round about them is so dry, that it hardly emits any steam, or at least not enough to support them. However, no sooner does the rain fall, than we find a contrary effect, as the vapours then rise from the earth every where about the plants, and make them flourish. Hence a hot-bed appears to be of use so long only as it can send out such vapours from the earth lying upon it, as are necessary for the support of the plants. When it wants the heat, which is required for that purpose, it must be renewed; otherwise the moisture, which must be maintained to nourish the roots of the plants growing in it, will chill and destroy them. We must not here be supposed to mean the steam, which arises from the dung itself, for that is known to be destructive to all plants; we mean the vapour only, which the heat of the dung evaporates from the earth lying upon it, and which will help the plants; but even this must be tempered and well qualified, lest it should scorch them. It may be moderated according to your desire, by laying on your earth of a thickness proportionable to the heat of the dung below it.

Having now considered the qualities required in a hot-bed, let us proceed to give proper directions for making it. Throw up a load of fresh horse-dung in a heap, mixing it well together, and then let it remain for a week or ten days, by which time it will ferment, and come to a proper heat. The bed then must be marked out, answerable to the size of your frames, the length of it running from east to west, so that it may face the sun. Some gardeners dig a trench a spit deep to make the beds in, and others save that trouble, and make it all above ground. The ingenious Mr. Bradley tried both ways, and found so little difference, that he could not say which was best. However, if the ground be wet and springy, it is best to make the bed quite above ground, otherwise the dung may be chilled. In the spreading of the dung, care must be

be taken to lay it equal in every part, that, when the bed comes to settle, it may not lie uneven; and, besides, that it may heat altogether.

Your bed being thus prepared, set on your frames, and put the earth you design for it upon the dung, laying it ridge-wise, that it may be more conveniently turned over, as you see occasion, if the bed should burn. When you find the extreme heat begin to abate, level the earth upon it, in order to sow your intended seed, always observing to have upon your bed the depth of six or eight inches of earth, to prevent the extreme heat of the dung from spoiling your crop; for, should the roots of whatever you sow or plant touch the dung, they will certainly be spoiled. To these directions should be added a careful observation of those, who make hot-beds; for theory and practice cannot be divided, and the one is indisputably necessary to gain a complete knowledge of the other.

As to the earth, proper to cover the dung of hot-beds, it should always be light, fresh, and well sifted; for you ought to consider how tender the roots of those plants will be, which you there intend to produce. The best composition for this purpose is sandy loam, mixed with an equal part of well-rotted horse dung; let these lie in a heap together, and be screened or sifted when wanted.

From these considerations on hot-beds, let us turn our attention to consider, what kind of water is the most proper to increase the health and vigour of plants. It has been found, from repeated experiments, that the clearest water is not to be preferred, nor such as comes immediately from a cold spring; neither should it be harsh, but rather soft and muddy. A stagnating water, that is well exposed to the sun, seems to be the best for the health of any plant. Pure rain-water, if it can be had without any mixture, is the best of all; for enriched or fattened water, becoming such from dungs or other forcing ingredient, proves always fatal to plants, if not rightly understood: at best, it can only contribute to make a plant grow something the quicker, and such forcing of nature always proves of ill consequence, as well to plants as animals, by shortening their lives.

Indeed, when annual plants are the objects of consideration, it may sometimes be of service to use these provocations, the better to bring them to perfection within the compass of our summer; but then they must be applied considerately, and a right kind of mixture prepared for each respective sort of plant; for we must not imagine, that one sort of mixture, however fattening it may be, will alike contribute to the welfare of every sort of plant. Mr. Bradley found, by experience, that the black water, taken from a dunghill, will make a cabbage, or any of that race, prosper extremely; but having used the same water to other plants that were aromatic, and whose texture of parts was more close, such as myrtles, thyme, and the like, it soon killed them. This shews, that gardeners ought not to confide in the richness of any one particular kind of water for the welfare of every sort of plant, any more than a skilful physician will prescribe always the same medicine for the relief of every kind of complaint.

There is another thing to be considered in preparing water for plants, which as yet seems to be very little regarded; that is, when we mix pigeon's dung, or rather such like ingredients in water, we must allow them due time to ferment before we use them, otherwise they will injure the roots watered with them, and that will distemper the plants, which in the end may kill them, as we find from experience is frequently the case.

Mr. Evelyn very justly observes, speaking of these
No. 40.

mixtures, that they should not be used till they are sufficiently sweetened and purged from their predominant acrimony. That gentleman saw many plants destroyed by the use of unripe mixtures, though the same preparations, when fully matured, performed wonders in forwarding the growth of the same kind of plants. The proportions of every ingredient ought to be reasonably considered, and the quantities not increased too hastily, merely because a moderate quantity has already begun to shew its good effects. However, a few observations, to an ingenious person, who loves a garden, will soon make him a proper judge of these matters.

Let us now return to plain water, which is undoubtedly the most natural to plants. Of this, use only such, if possible, that has stood in the sun some days to soften, either in cisterns, or pits dug in the ground, which last is preferred by Mr. Bradley; but even this should not be used inconsiderately: we should consider the most proper season for using it, and the best method of refreshing plants with it.

In the first place, we ought to water all plants in the morning, in such seasons when the nights are frosty, and in the evening in the warm seasons. The reason of the first is, that too much wet, lying about the roots of plants, chills and pinches them so much, if it happens to freeze, that they often perish; but, if it be given in the morning, where there is likelihood of a warm day, it gives the plant such nourishment as it requires from it, and is dried up before the frost of the evening can have power over it. Morning waterings should therefore be in August, September, and October, March, April, and the greatest part of May. From that time, to the middle of August, chuse the evenings for that work; because then the extreme heat of the sun would over-heat the water given in the morning to the plants, and scald their roots, besides drying it up too quick, before the plants could receive due nourishment from it. Observe never to use evening waterings after the sun is down, without great necessity.

In either of these waterings, care should be taken to do it as near the ground as possible, and not to hold the watering-pot too high; for that would wash the earth from about the roots of the plants, and contribute to make the ground hard, when the sun comes to shine upon it, and so bind the roots too much. Before you water, observe always, that the earth be open, and loose about the roots, and, above all, avoid, as much as can be, wetting the leaves; for, if the frost comes upon them before they are dry, it will pinch and rot them; and, if the sun shines hot upon them while they are wet, it will spot and change their colour.

Besides these simple waterings, cauliflowers, cucumbers, and those plants which have large vessels, should be floated; that is, the alleys between the rows should be dammed up at each end, and filled with water. One of these floatings will do more service than six waterings close to the stems; for they feed and nourish the extreme fibres, which alone want this help, and put the earth in such a condition, that the smallest warmth of the sun will evaporate that steam from it, which is so necessary to plump the principal parts of the leaves and stalks.

It is a rule to be observed in the watering of plants, that, while they are not growing, they should be kept as dry as possible; but, at the time of their growth, they should never want water, giving them frequently a little at a time, and chiefly when they are in blossom: for if, by accident of weather, the water lies long about the roots of plants, it chills them, and checks their growth. It is also to be observed, that such plants as are very succulent or juicy, such as house-leek, &c. must have little

water, as they contain moisture enough in themselves for their nourishment, and feed chiefly upon the air, which they imbibe and condense in their spongy parts, as having fewer sap vessels than any other kind of plants. Mr. Bradley, in his History of Succulent Plants, lays it down as a rule, that the more succulent any plant is, the less water it requires; while those, that have the greatest proportion of sap vessels, and the least spongy parts, require frequent waterings, which we find to be true from common experience in the garden, and by examining the struc-

ture of water plants, such as willows, &c. which are for the most part composed of sap vessels, and are therefore so tough, that they may be wrought into any figure without breaking; but all juicy plants are brittle for want of these vessels.

In short, if we were to examine with the microscope the numbers and sizes of the sap vessels, in every sort of plant we intended to propagate, we might come to a certainty of the proportion of moisture every plant required.



A NEW,

A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature.

B O O K V.

Containing the Natural History of **WATERS, EARTHS,**
FOSSILS, and MINERALS.

I N T R O D U C T I O N.

THOUGH the great Author of the universe has been pleased to cast a veil over many things, yet we are not to imagine, that he has for that reason forbid our enquiries into them. That veil is not always impenetrable: from whence we may infer, that there is implanted in our nature a thirst after knowledge; and, as we are surrounded with objects of admiration, though we are perfect strangers to their first principles and most secret causes, our gratitude is always increased, and our ideas enlarged, in proportion to the discovery we make of their structure, contrivance and grandeur.

It is to the Earth we are indebted for the conveyance of those particles of Water, which in particular places, by collecting themselves together, form springs and fountains. Let us pursue one of these springs, insignificant as it first appears, through its gradual progression and increase. It is at first nothing more than a vein of water, issuing from some hill upon a bed of sand or clay. The little stones that are dispersed around it are not sufficient to interrupt its current: it turns and winds, and murmurs as it rolls along. At last it clears its way, falls in a torrent down upon the plains, and swells by being united with some other streams. It hollows the ground by the rapidity of its fall, and throws up the earth on each side of it: it insensibly forces its way through every thing that obstructs its passage, and digs a bed or channel for itself. The overflowings of the adjacent ponds, the snow that melts and trickles down the hills, and the additional supplies of brooks and rills that fall into it, fortify and enrich it. Then it assumes a name, and steers its course along the sides of flowery meads, it takes a tour round the hills, and graces, as it turns and winds, the spacious plains. It becomes the general rendez-

vous of almost all kinds of living creatures: a thousand little party-coloured birds, of various notes, divert themselves upon its sandy banks, skim over its surface, and dip their wings in its refreshing streams. This is their favourite place all day, and, when the approach of night compels them to withdraw, they quit it with reluctance. Then the wild beasts enjoy it in their turn; but, at break of day, they leave the plains to man, and the free use of the river to the cattle. The numerous herds forsake their pastures twice a day to pay their usual visits to the streams, in which they quench their thirst, or seek some cool retreat. The river, in short, is as delightful to us as it is to them: for the most part, we reject the hills and woods, and fix our habitations on its banks. When it has enriched the fisherman with a profusion of its stores, and refreshed the farmer's thirsty plains; when it has adorned the pompous seats of the nobility, with the most delightful prospects, and made the country every where agreeable, it pays a visit to those large towns that are indebted to its friendly streams for all their wealth and commerce. It is probable, that the mighty waters of the Danube and the Volga of Europe, the Nile and the Niger of Africa, the Ganges and the Euphrates of Asia, and the Amazons river and Rio de la Plata of America, owe their first source to some such trifling springs.

It may nothere be improper to inform the younger part of our readers, in what manner springs receive their supplies. Hills and mountains contribute not a little to that purpose: At the bottoms of such mountains, whose tops are for ever covered with snow, (and of this kind are the Alps and the Pyrenees) we find springs, for the most part, which begin to flow in May, but run no longer than September, the

the cause whereof may be easily accounted for. As soon as the sun has advanced so near to one of the tropics, as to be able by its genial rays to warm the tops of the mountains, the snow which covers them dissolves, insinuates itself through the pores of the earth, and sinks either absolutely down to the bottom of those hills, or at least into their bowels, where its progress being obstructed by beds of clay or stone, it gathers together in a body, and there forms a variety of fountains; but no sooner does the sun deny its benign influence, than the fountains cease to flow. However, as there are many springs, which are never dry, and which are far distant from any hills or mountains, let us enquire from whence these receive their inexhaustible supply of water: This is undoubtedly from the rains that fall, which insinuate themselves into the bowels of the earth. It is an universal complaint, that moles, worms, field-mice, and a thousand other vermicelli, or little insects, are very pernicious to the earth in hot seasons, by their grubbing it up, and digging an infinite number of little holes in it of various depths; but the injury they do that way is amply recompensed by those numberless inlets, which they open for the rain, at such times when we stand most in need of it: and those crevices or chasms, which gape, as it were, on the surface of the earth in times of excessive droughts, render the passage of the water to the inferior layers more easy and expeditious. Those particles of water, which thus fall in showers, insinuate themselves with ease through beds of sand and porous earth, till they are obstructed in their passage by more compact beds of clay or stone, on which they rest, and there form one large basin or reservoir. The earth is almost every where full of those veins of sand, through which the water is perpetually passing; and some of those veins, having undoubtedly a communication with particular rivers, may either empty their own superfluities therein, or receive a supply in dry seasons. It is probable, that many of those springs, which do not vary in their height with the seasons, may receive their supply from some such source. That spring water should be warmest in the severest weather, seems easily to be accounted for: it is well known, that the earth abounds with particles of a sulphureous nature, which in warm weather escape through its pores, and exhale in vapours; but this is prevented when the ground is frozen so hard, as to form one solid impenetrable mass. The fire, thus confined deep in its bosom, will consequently act with more force on every thing it meets with, and will naturally give a greater degree of heat to the water that passes through it.

Hence we may conclude that those things, which we often look upon with indifference, may sometimes consider as prejudicial, are frequently of the greatest consequence and importance to us: the sea, though the saline particles it contains makes its waters very nauseous, is in reality the first spring which serves to quench our thirst; the wind, though we are very apt to complain of it, brings us our vapours from the sea; the lofty summits of the mountains, though considered by many as useless, help to settle and condense them; the holes, chasms, and crannies, which render the earth so hideous and deformed, serve as so many conduits to convey the waters to their proper stations; and the beds or layers, though sunk so much beneath our sight, are formed to retain them.

Let us now turn our attention from the watry element, and take a slight view of the different soils and moulds, which the Earth produces. In these we see ample provision made for the various plants and vegetables they nourish and support. Some trees, plants, and grains, dwindle and die in some soils, but thrive and flourish in others. If some de-

light in a warm, some in a cold soil, others do best in that which is lax, sandy, or clayish; some in a moist, others in dry places; still we find provision enough for all these purposes. Every country abounds with its proper trees and plants, and every vegetable flourishes and is gay somewhere or other about the globe. To this convenience, which the various soils of the earth are of to vegetables, we may add their great use and benefit to innumerable animals, to many kinds of quadrupedes, fowls, insects, and reptiles, who make in the earth their places of repose and rest, their retreat in winter, their security from their enemies, and their nests wherein to repose their young; some delighting in a lax and pervious mould, admitting them an easy passage, while others seek a more firm and solid earth, that will better secure them from injuries without. In one place we are provided with chalks, okers, and boles, of all sorts, for medicinal uses, and of all colours, proper for drawing the outlines or sketches of any designs we propose to accomplish, or for painting such objects as may contribute either to our profit or delight. In another, we have various kinds of marl, which is so justly admired by our masons for its incomparable chalk, and more particularly by our farmers, who look upon it as an inestimable treasure. In several parts of England, but particularly in the barren regions of the north, there are beds or strata of bituminous earth to be met with, commonly called either Sea or Scotch Coal. Thus Nature provides fuel for the inhabitants of those countries, whose climate requires a more powerful warmth than what is afforded them from the benign rays of the sun, and thus makes amends for the want of those blessings, which are bestowed on more southern countries. Exposed to the severity of the cold northern blasts, they stand more in need of what they dig out of the bowels of the earth, than of what we find on its surface. There, strangers to the delicacies of life, they are contented with humble necessaries.

Mankind, in order to live with decency and pleasure, must be supplied with a vast variety of accommodations: for this purpose they are furnished with an infinite number of Fossils, which are intended by Providence as a treasure that should never be exhausted. These are carefully lodged in spacious repositories under our feet, where we may infallibly find them upon all emergencies. These useful materials do not lie buried in the centre of the earth, nor so deep in the bowels of it, as to be inaccessible; but are planted at a convenient distance from its surface, that the soil may produce its proper fruits, in due season, without interruption. By this wise direction of Nature, our habitations are richly furnished both within and without, and the same spot of ground produces for our service a kind of double harvest.

From these considerations on fossils, let us turn our attention to those immense beds of Stone, which lie buried in the earth. Had all those vast masses, which lie under ground, been lodged up and down on its surface, we should have been much embarrassed, and had but little room left for the erection of our houses: had they proved as hard in the quarry, as they grow afterwards, all the art of man could never have been able to dig or cut them; and had they continued in their original state of softness, when exposed to the open air, our houses would have never been secure. When the descendants of Noah were reduced to the necessity of dispersing into distant countries, in order to seek out commodious settlements for themselves and their families, they found every place over-run with woods, and inhabited by an infinite number of savage beasts. By the help of a few boughs, and the skins of such beasts as they killed in the chase, they erected at first a few huts or tents, which

which served to shelter them from the injuries of the weather. As they were not, however, at that time, always safe and secure from the attacks of those devouring beasts, nor from the merciless insults of their more savage fellow-creatures, what a peculiar providence was it for them, who as yet lived in a restless uneasy state, to find under their feet, and at a moderate distance from the surface of the earth, such immense quantities of matter, that was soft enough to be cut and fashioned according to their pleasure, and yet so solid at the same time, when exposed to the open air, and disposed in a proper manner, as to secure them not only from the most outrageous storms, but from the insults of their private enemies; and, at last, to defend whole kingdoms from any hostile invasions! By this means, in process of time, both villages and cities arose out of the earth, and men attained to the art of lodging and cementing the most unwieldy stones in the closest manner; of building for themselves commodious habitations, impregnable fortresses, and magnificent palaces for the reception of their princes and rulers; and, in fine, those solemn and pompous temples, in which all the families then on earth met together at stated times, to pay their tribute of gratitude and worship to their common Parent, to visit one another without pride or respect of persons; and to lay themselves under the most solemn engagements, inviolably to perform all those good offices one towards another, on which the welfare of an amicable society entirely depends. We shall not here enter into any enquires, how these immense stones are formed, since that matter is fully explained in its proper place; we shall only add, that besides these huge masses, which the earth provides us for building our habitations, there are others, though less in bulk, of infinitely more value, such as diamonds, rubies, carbuncles, and a thousand other precious gems, which adorn the insides of the most sumptuous palaces, and grace the diadems of sovereigns.

We come now to the last point of consideration, that of Metals, of which gold is undoubtedly the first that claims our attention. The preference, which we give to this above all other metals, is by no means the effect of prepossession or caprice: the superior regard we pay to it is grounded on its intrinsic and inherent merit. There is no metal so solid and compact, so weighty, or so capable of being refined to so great a degree of perfection: it is, beyond all contradiction, of the most beautiful colour, and comes nearest to the radiancy of fire: it is the most ductile and obedient to the workman's hands of all metals whatever, and never soils or besmears them, as others will. The least particle of it gives an additional grace to every thing it touches, and has one other excellent quality, which is that of its never rusting, nor will it lose any thing of its weight while refining in the fire. It is therefore not at all surprising, that mankind should unanimously agree to fix upon a metal of so pure, so solid, and durable a nature, in order to pay for and procure such various accommodations as they indispensably wanted. Before the discovery of this precious ore, trade and commerce were carried on by way of barter: wine, for instance, was exchanged for oil, corn for flax, and one commodity was mutually agreed to be accepted for another, as occasion required. This method, however, of negotiating business, was attended with a thousand inconveniencies: two contiguous nations or provinces might possibly be over-charged with the same commodity; or, supposing the products of their grounds to be different, yet it created abundance of trouble to make a just computation of their real and intrinsic worth, insomuch that it was no easy matter to adjust an equivalent in the wholesale trade, though practicable in the retail

way; and men were often obliged, with reluctance, to dispense with many things, for want of such accommodations, as were agreeable to those who were possessed of them. Now, gold being a metal of a pure, ductile, and incorruptible nature, was considered by them as the most agreeable and proper substance, of which to make a general standard, and the most commodious equivalent that could possibly be given in exchange for all the accommodations and conveniencies of life whatever. As this radiant ore was very scarce, they agreed, with one voice, that a small quantity of it should be deemed a sufficient compensation for a large portion of any other merchandize. They wisely considered, how great would be their advantages, to be enabled, by virtue of a small portion of such precious metal, (which is little or no incumbrance to a traveller, and which he can easily conceal from the eyes of those, who might otherwise be disposed to oppress him) to take a tour all round the habitable world, in order to furnish them with whatever conveniencies they might want, and to defray all their necessary expences, without the least dependency, incumbrance, or enquiry. This method of transacting business was found to be so expeditious and convenient, that, in process of time, the practice became universal. There was one little inconvenience, indeed, that at first attended it: every merchant was obliged to carry his scales and weights in his pocket, in order to know the intrinsic value of the gold he received; but an expedient was soon found out to save him the trouble, by making little thin pieces of gold, which afterwards introduced those of silver, with some known and public figure impressed thereon by the authority of government, to settle and determine their real value, that he, who delivered his goods, might be well assured, that he received so much gold or silver, of such a weight and standard, in return. As gold, however, was reserved on account of the great scarcity of it, to discharge and pay off large sums, with the utmost expedition, they had recourse to baser and more common metals for their daily disbursements and their retail business.

The obedience of this metal, under the hands of the gold-beater and wire-drawer, is not only surprising, but a perfect prodigy; and, if we were not eye-witnesses of it, we should never be prevailed on to think it practicable. By the art of the gold-beater, a piece of this metal, of only an inch square, and not thicker than paper, is hammered out into a thousand leaves, each of four inches square. The following operation, though equally common, is much more surprising. A gold wire-drawer takes an ingot or bar of silver, of a cylindrical form, two feet and eight inches in length, and two inches and nine-twelfths of an inch in circumference. Upon this he spreads as many leaves of beaten gold as weigh, in the whole, exactly half an ounce. He then drives the extremity of this cylinder with force through a round hole that is made in a steel plate, the entrance whereof is wider than the other end, which is called the eye. After this the ingot is passed through several holes successively that are one finer than another. Thus, by slow degrees, it is reduced to the thinness of a reed, a coarse thread, and at last, after having passed through upwards of an hundred and forty holes, acquires the minuteness of the finest hair. The most surprising part, however, of this operation is, that the half ounce of leaf gold, which first covered the ingot of silver, should, notwithstanding its former degree of fineness, grow gradually still finer and finer as it passes through the different wire holes, and cover the surface of the silver so very exactly, as that no part of it whatever should be seen: it appears, in short, one entire thread of gold. Thus half an ounce of gold may be made

to extend itself into a surface of about seventy-three leagues in length. Hence we may plainly perceive, that the internal nature of this metal, and, in all probability, that of all other substances whatsoever, is beyond human comprehension.

The uses of copper and tin, for domestic purposes, are well known to every one; and there is not a metal that can be mentioned, but what has some useful property: yet that very metal, which to all outward appearance is the meanest and least polished, which abounds most with allay, is of a dark and gloomy hue, and the most liable to rust—yet that very metal, *iron*, is more beneficial and advantageous to us than all the rest. It has one particular quality, which alone is sufficient, in some measure, to give it the precedence to all others, and that is, it is more hard and tenacious, which renders it every way qualified for the most lasting purposes. By being thus able to resist the strongest efforts, it becomes the guardian, as it were, of our houses, and our most faithful trustee. By linking thus inseparably together the materials of which our habitations are composed, it secures our persons, not only from the injuries of the weather, but from the hands of merciless and violent men. To this metal we are indebted for the greatest part of our utensils, which are made use of, not only in navigation, husbandry, and clock-work, but in all other liberal and mechanical arts. Gold and silver, had we not iron implements to work and fit them for our several purposes, would be in a great measure useless. We are so much indebted to this particular metal, that our daily provisions could not be commodiously dressed, nor should we well know how to divide them for eating, without it: To sum up its superior excellency in a few words: all other metals, indeed, are useful; but this is absolutely necessary, and we can make no tolerable shift without it.

From all these considerations we may conclude, that we can neither look round about us, move one step upon the earth, or dig under our feet, without meeting with a profusion of those treasures, which Providence has provided either for our convenience or delight. The survey of Nature, therefore, when rightly pursued, is a kind of popular theology, where all human kind, even the illiterate, may learn those truths, the knowledge whereof is a concern of the utmost importance.

C H A P. I.

Of Medicated MINERAL WATERS.

AMONG Medicated Mineral Waters some are cold, and others hot; the former are called by physicians *ACIDULÆ*, that is, a little partaking of acid, because some of them have a subacid or vinous taste, especially when taken immediately from the spring. The hot springs are supposed by some to be owing to subterranean fires; because near those places where there are volcanoes they are most frequent; but others think they arise from the fermentation of the different particles of which they partake as they pass through different strata of the earth; as for instance, Iron and Sulphur. But, be this as it will, their virtues are not owing merely to the heat or cold, but to the principles of which they are composed; for which reason it will not be worth while to treat of them as such, but to take notice of their contents, to which their properties are owing. We shall therefore divide them only into four Classes: 1. Mineral Waters containing earthy Particles. 2. Waters impregnated with Salts. 3. Sulphureous Waters. And, 4. Waters impregnated with Metals.

1. There are mineral Waters, which have imbibed earthy particles that have the properties of Soap, particularly the Soapy Water of Plombiers in France, which at the spring head is warm, and tastes a little fat or soapy, with a small degree of roughness. This is supposed to run through a strata of Fuller's earth: it is prescribed in disorders of the stomach, proceeding from acidities, as well as in spitting of blood, excessive bleedings, a consumption of the lungs, and many other disorders, for which they are either drank or used as a bath. A large quantity is to be drank in a morning upon an empty stomach, and some make use of it for common drink.

2. Waters that have imbibed Rock Salt are not very uncommon, but they are not as some imagine of the same nature as those in which common Salt is dissolved; because this latter is not a simple substance, but contains a mixture of Rock Salt and fixed Alcalious Salt, imbibed in the bowels of the Earth; and that which is made with Sea Water partakes of a Volatile Urinous Salt, which is the produce of the putrefaction of fish, sea plants, and other marine substances, together with Bitumen and various Minerals.

It is but lately that Sea Water has been thought of any internal use in medicine, or at least its properties have lain dormant for a great number of years, except for diseases of the skin, for which it has been ordered as a bath; it has been recommended in all disorders of that kind, from the itch to the leprosy, as well as pains in the limbs; and some have thought, and still think, that it is a specific against the bite of a mad dog. It is now prescribed inwardly in all obstructions of the glands, in whatever parts of the body, and the diseases arising therefrom, for which it is both drank and used as a bath. It is also good against obstructions of the kidneys, when there is no inflammation, or the stone is not too large to pass; and likewise against recent obstructions of the liver, and consequently the yellow jaundice, when given with medicines proper for that disease. A person of twelve years of age may drink half a pint every morning, and an adult a pint.

The Waters of mineral springs, impregnated with Sal Gem, when given inwardly, open the body and promote urine; besides which they are drying, binding, and discutient, whence they are good in cachexies, and the dropsy.

Those Waters are said to be nitrous, which abound with a Salt like the Natrum of the ancients, which some have mistaken for Saltpetre; whereas it is a kind of Alcalious Salt. Those springs that abound with it, are good for dissolving thick clammy humours, for opening obstructions of the bowels, as well as in a decayed appetite. When used as a bath, they help to resolve swellings and obstructions of the nerves.

3. There are many mineral Waters that partake of Sulphur, which may be easily known by the smell, as also by the sediment that is left after it has been evaporated over the fire. These are commended in disorders of the breast, and foulnesses of the skin, whether drank, or used as a bath; as also in trembling of the limbs, contractions of the tendons, the rickets, and some kinds of palsies.

Our *Bath* Waters are thought chiefly to partake of Sulphur, mixed with an exalted Vitriolic Steel. They are good in all weaknesses and decays of the constitution, as well as for a debauched stomach. They likewise dissolve viscid and saline particles in the blood and humours, and sweeten the fluids in general. Hence they are good in dropsies and consumptions before they are too far gone; as also in catarrhs, cachexies, jaundice, scurvy, scorbutic rheumatisms, asthmas, and all diseases of the skin, as well

well as old pains and aches; nor are they less effectual in many womens disorders.

4. These in general partake of iron or steel, though there may be possibly some of other kinds which have not been taken notice of by naturalists. There are many of these in Hungary, Germany, France, and other parts of the world; but the Pyrmont and Spa Waters are the most famous we have from abroad; and in England we have the Tunbridge, Scarborough, Hampstead, and Islington. These in general dissolve gross humours, sweeten those that are salt and acid, and open obstructions. They are accounted good in all diseases of the head; whether they arise from the consent with the stomach, or not; they are also good in many diseases of the breast, particularly shortness of breath, coughs, and spitting of blood. In short, they are efficacious against all those distempers wherein iron or steel is of any use; and they must be much better, because the particles of the metal are become so volatile that they do not change the colour of the water; but then they are apt to fly off after they have been exposed to the air for a few days. Besides, as it is necessary to drink a pretty large quantity of these waters, the solution of gross thick humours is much better performed hereby, than by administering the metal in any other form.

CHAP. II.

OF MINERAL WATERS peculiar to ENGLAND.

HAVING taken a general survey of medicated Mineral Waters, in the preceding Chapter, we shall in this confine ourselves to those only, which are peculiar to England: We shall relate the chemical trials, which have been made to find out their virtues, and the good effects which they have been experienced to produce in the constitution.

It is usual to give an account of their contents, after the evaporation of the water; but this is not sufficient in all cases, because there is often a volatility, when just taken from the spring, wherein the principal strength of the water resides, and which is lost if not immediately drank. Hence it follows, that the nature of the contents will not always ascertain the virtues of the waters. However, in recounting the effects and properties of these waters, all the circumstances will be taken notice of, that may tend to give an insight into their operations; and that each spring may be more readily found, we shall place the counties in which they arise in an alphabetical order.

BERKSHIRE. In this county we meet with but two Mineral Waters, one at Sunning-hill in Windsor-Forest, which is of the same nature as the Tunbridge waters; and the other at Comner, or Cumer, three miles west of Oxford. This last water is always of a whitish colour, especially in the summer time when the well is low; the reason of which appearance is said to be owing to its proceeding from lime-stone. Oil of Tarter being dropt therein, causes it to let fall a white sediment; and Spirit of Hartshorn turns it to a pearl-colour; but with the Solution of Silver it turns to a purplish pearl-colour, and with Syrup of Violets, green. A gallon of this water will yield 296 grains of sediment, whereof 76 grains are lime-stone, and the remainder a calcareous nitre. The sediment is dark brown, with a saltish and very bitter taste; will ferment with Vinegar, as well as with Oil of Vitriol, and will turn green immediately with Syrup of Violets. The salt itself is of a yellowish brown, and has a saltish, nauseous, bitter taste. It is a kind of calcareous nitre, but inclines more to an alkali than

most others of this class. A quart of it will purge a robust country fellow.

CORNWALL. The mineral springs in this county have never been taken notice of till very lately; and that by Mr. Borlace, in his Survey of Cornwall. Madern Well is only a spring of pure water, which rises in the parish of Madern, four miles west of Penzance: However, it is resorted to by many people that are afflicted with pains, aches, and stiffness of the limbs; and it has done many cures, which may be only owing to the coldness and purity of the spring. Euny Well, once so famous, still preserves its reputation for drying up humours, and healing wounds and sores. However, as this has no evident mineral impregnation, these effects may be owing merely to the coldness of the water, which braces up the nerves and muscles, and strengthens the glands: Here is another well of this sort, called the Holy Well, which is about a mile and a half to the north-west of St. Cuthbert's church, in a cave that lies in a small sandy bay. In this cave, there are stones like icicles, that hang from the roof, and the floor of the rock is covered with the same substance. This water will not change the colour of green tea, nor curdle milk; from whence it is concluded, that it has neither alum nor steel in its composition. When this water is evaporated, it will deposit a small sediment, of the same colour and substance with the incrustations: it will neither melt nor flame, nor has it any particular taste or smell, and yet is in great use for fluxes and disorders of the bowels.

The most remarkable Chalybeate Spring in Cornwall rises in the tenement of Colurian, in the parish of Ludgvan. The bed through which this water runs is full of an ochreous, iron mineral, from which its taste and smell proceeds. It turns to a deep reddish purple with Galls, and with Oak-leaves it becomes of a bluish black, but has a purplish cast. When a thimbleful of Oil of Tarter was dropped into this water, it fell immediately to the bottom of the glass, which held about half a pint: but it precipitated no sediment, nor made any change in the water; only the colour was more inclinable to that of a bright oker, but was scarcely discernible. It will not turn silver black, and therefore it is concluded there is no sulphur in it; but in the morning, before the water is stirred, there is a film on the surface with all the colours of the rainbow, shooting to and fro, which occasions some to think, there is a naphtha in the water. It will mix with milk, and lathers readily with soap; and after it has stood 24 hours in the open air, it undergoes no alteration from Galls, which is owing to the flying off of the volatile spirit. The virtues of this water are very great; for persons have been cured of the King's Evil, by drinking it, and washing the parts affected, whom Mr. Borlace knew; and he heard of many others that were cured in the same manner. It is very diuretic, promotes perspiration, opens obstructions of the bowels, and restores a lost appetite. It also cures sores of every kind, and is a very good eye-water.

CUMBERLAND. At Stanger in this county, two miles south of Cockermouth, and three west of Keswick, there is a spring of clear saltish water, with the taste and smell of iron; it turns white with Spirit of Hartshorn, and lets fall a great sediment with Oil of Tartar: a gallon of this water will yield 1170 grains of sediment, whereof 1080 are sea-salt, and the rest lime-stone. It is white, hot on the tongue, and grows very moist in a damp air. There is a little mixture of nitre with the sea-salt, but this last predominates, and is joined to a considerable quantity of iron. Four or five pints will purge upwards and downwards; but it is an excellent remedy in surfeits, pains in the stomach and breast, the green-

green-sicknefs, fcurvy, fores, and breaking out of the skin.

DERBYSHIRE. Buxton Well lies at the bottom of a dirty village of the same name, and there is a large commodious house, to which much good company resort in the summer time. The water is neither so hot as that of Bath, nor so cold as that of Bristol. It has a sweet, pleasant taste, and a gallon will yield about 20 grains of a sediment, which consists chiefly of lime-stone, sea-salt, and a little calcarious nitre. It deposits a white sediment with Oil of Tartar; but it will not turn silver black, nor does it discover any signs of sulphur. It will not ferment with Spirit of Vitriol, nor turn green with Galls, till they have soaked four days therein. It is a temperate bath, and a very light water. It is of a relaxing, diluting, sweetening and attenuating nature, and will open obstructions of the smallest vessels. It is good in consumptions, for hot scorbutic humours, and all fluxions and bleedings, as well as in hypocondriacal and hysterical cases. It is of great use in the regular gout, in rheumatic and scorbutic pains, in vomiting of blood, and in all kinds of fluxes. It is good in internal inflammations, consumptions, the diabetes, and a bloody urine; as also in a bilious cholic, want of appetite, and in cold stomachs from hard drinking. To these may be added, contractions, cramps, convulsions, St. Anthony's fire, and all breakings out of the skin.

Matlock Bath is also in Derbyshire, near Warkworth, and ten miles north by west of Derby. The village is seated on the very edge of the river Derwent, is a very beautiful place, and is frequented by very polite company. The water of the bath is not so hot as that of Bristol, and it curdles with soap. It deposits a white sediment with Oil of Tartar, and the same experiments give the same appearances as in Buxton water. A gallon of water yields 40 grains of sediment, whereof 13 are salt, consisting of nitre and sea-salt; and the remainder is a rough, white, alkaline earth. The virtues of these waters are nearly the same as those of Buxton and Bristol, used either internally or externally. Both drinking and bathing are generally thought good for the cancer and the king's evil. Bathing is proper for rheumatisms, scurvy, and defecations of the skin. It is also used successfully in all sorts of bleedings, as well as hectic fevers and inward ulcers, with a milk diet. It also cures the diabetes, and the bilious cholic.

Westwood is another village in this county, near Tandersley, where there is a spring, which seems to be a solution of the pyrites, that generally attends pit-coal. It turns blue with Galls, and the salt separated from the earthy part of the sediment will shoot into beautiful crystals of vitriol, without any other salt. The water will cure stubborn ulcers, and particularly healed one in a maid-servant that was very frightful: it was washed twice a day with this water, and was cured in three months.

DORSETSHIRE has only one mineral water hitherto taken notice of, and this is at Nottinton, a village near Weymouth. The water has a strong sulphureous smell, with a flavour resembling that of boiled eggs, and the colour in a tin vessel is blue. At the fountain head a shilling put into this water, becomes of a gold colour in two or three minutes; and from various experiments it appears to be impregnated with sulphur and natron. It is remarkable for curing foulnesses of the skin, by internal use.

DURHAM. Hartlepool is a market-town in this Bishopric, 15 miles south-west of Durham. The water found here is a chalybeate, though as it rises it discovers a little steel and sulphur, which soon flies off after it is taken up. It lets fall a white sediment with Salt of Tartar, becomes whitish with

Spirit of Hartshorn, and turns of a pink-colour with Galls; but green with Syrup of Violets. A gallon yields 120 grains of sediment, whereof two parts are nitre, one sea-salt, and the rest lime-stone. The water is an excellent antiscorbutic, and cures habitual cholics. It is good in pains of the stomach, in indigestion, in the gravel, in women's obstructions, in hypocondriac melancholy, in the cachexy, in weaknesses of the back, hectic heats, and recent ulcers.

ESSEX. Here are several mineral waters in this county, of which one is at Upminster, seven miles south of Burntwood, and eight east of Barking. The water is bitter, and will curdle with Oil of Tartar, but more strongly with Spirit of Hartshorn, and will not lather with Soap. A solution of Alum causes it to let fall a large grumous sediment, and the solution of Copperas changes it to a dark dun colour. It appears to be a sulphureous water, of a considerable strength, and a gallon will yield 332 grains of sediment, which is of a nauseous bitter taste. It is chiefly a calcarious nitre, mixed with a little natron and sea-salt. The water is purgative and diuretic, absorbs acidities, strengthens the stomach, and checks vomiting.

Witham Water, when fresh, is perfectly clear, and has a very strong chalybeate smell and taste. It has a remarkable freshness when just taken from the spring, which renders it agreeable to the taste and stomach; but, after it had stood awhile, it loses that quality, and deposits a brownish sediment. A gallon, by evaporation, will yield 30 grains of sediment, which will grow damp in a moist air. However, this water is of no use, unless it be drank immediately at the spring, and then it is diuretic, and is good in hectic fevers, lowness of spirits, weakness of the nerves, and want of appetite. Witham is a market-town, which lies in the road between Chelmsford and Colchester.

Tilbury is a village, seated over-against Gravesend in Kent; the water here is somewhat of a straw-colour, and has a soft smooth taste. With Oil of Tartar, it will cause no immediate precipitation, though it will curdle with Soap, but not with Milk. A gallon will yield 180 grains of sediment, of a yellowish brown colour, with a sharp taste, like that of a fixed alkali. A quart of this is a middling dose; it generally passes off by urine and perspiration. It warms the blood, is good in lowness of spirits, and is a specific in loosenesses. It also cures almost all fluxes of blood, and is particularly good in an acidity of the stomach, and for some kinds of scurvies.

FLINTSHIRE is in North Wales, and Caergile, in this county, is about seven or eight miles south by west of Chester. The water found here is as clear as crystal, and yet it will turn whitish with Oil of Tartar; it also turns green with Syrup of Violets, and red with Logwood. A gallon will yield 220 grains of sediment, of which 66 are earth, and 154 are sea-salt and lime-stone. It appears to be impregnated with calcarious nitre and sea-salt, and, if drank to a quart or two, will purge pretty well. It has cured a woman that had a loathsome scurf all over her body, by drinking three pints of this water in a day. Likewise several children afflicted with scorbutic disorders, and the leprosy, have been cured by drinking and washing.

GLOUCESTERSHIRE has but one remarkable water, which is at Cheltenham, a town which lies in the road from Gloucester to Warwick. It was not much taken notice of before the year 1740, and then it was said to be the best purging water in England; but it begins now to be neglected. It is limpid, a little brackish, and nauseously bitter. It will curdle with Soap, and lets fall a white, grumous sediment with the solution of Salt of Tartar, and

and with the Spirit of Sal Ammoniac. It will ferment with Oil of Vitriol, Spirit of Salt, and Vinegar: beef and mutton boiled therein will become of a pale red, and it turns a deep green with Syrup of Violets. A gallon will yield 688 grains of sediment; which contains a little impalpable earth; mixed with a little salt, which is chiefly calcarious, and has a nauseous bitter taste. The dose is from one pint to three or four, nor is it ever attended with gripes; but creates a keen appetite. It has been used with success in the gravel; and will cure old scorbutic humours, St. Anthony's fire, and strumous inflammations of the eyes.

GLAMORGANSHIRE is in North Wales, and at Swansey, a sea-port town, there is a spring that has an acid stiptic taste like alum, though the predominant salt is a martial vitriol. It turns blue with Vinegar, and will not curdle with Milk. A gallon of this water yields 40 grains of sediment, of a highly acid, stiptic, vitriolic taste, and a light brown colour, which will ferment with Spirit of Hartshorn and Oil of Tartar. It is good in loosenesses, and will stop the bleeding of external wounds.

HERTFORDSHIRE has two medicinal springs, at Barnet and Northall. The first is called East Barnet, and is situated two miles south-east of High Barnet. Northall lies three miles north of High Barnet, and receives its name from Northaw, which is the same as North-grove, there having been a wood here belonging to the monastery of St. Alban. Both the waters seem to be of the same nature; that at Northall is a little brackish and bitterish in the throat; but is not so nauseous as that at Epsom. Barnet water is bitterer than the former, but they will both curdle with Soap, and let fall a grumous sediment with Oil of Tartar. With a solution of Alum they will let fall white grumes; which experiment shows they are not aluminous; but with Galls they turn of a wheyish colour, and with Logwood of a deep red. A gallon of Northall water will yield four drachms and twelve grains of very white sediment; and a gallon of that at Barnet, 20 grains of a brackish, bitter sediment. From other experiments it appears, that both these waters contain calcarious nitre, with a small mixture of sea-salt, and a little lime-stone. They have both a purging quality; but they are not half so strong as that at Epsom.

KENT has a remarkable mineral water, commonly known by the name of Tunbridge Wells, which is 34 miles south-east of London. In a warm season a gas of vitriol may be perfectly distinguished in this water; and it is generally allowed to be impregnated with volatile and spirituous exhalations. It turns of a blackish purple colour at the fountain-head with Galls, Oak-leaves, and Green Tea; but if a few drops of Spirit of Vitriol be added thereto, it will become clear again. In a rainy season in January, a gallon will yield nine grains of sediment; but in August no more than six grains. It is a light, and comparative pure chalybeate, and its virtues are most powerful at the fountain-head. It causes a blackish perspiration, which in time will change the linen of the drinkers to the same colour. It purges most by stool and urine; but if the stomach be foul, by vomit. In general, it is an effectual remedy in obstructions of the glands of the mesentery, as well as in recent dropsies, as also in phlegmatic patients, whose blood is very poor. It is good in all pains, and swellings at the pit of the stomach, though of many months standing. It is excellent in ulcers of the kidneys and bladder, and cures the cholic, vomiting, and the hiccough; it likewise kills worms. It strengthens the brain and nerves, and is good in convulsions, the head-ach, and vertigo; besides, it cures long and tedious agues, and is good in the

dropsy, black and yellow jaundice; hard swellings of the spleen, the scurvy, and green sickness, as well as helps sore eyes and red pimples.

Sydenham Wells are in the parish of Lewisham; and are seated upon a common near Dulwich in Surry. The water is a little bitterish, will curdle with Soap, and, with the solution of Pot-ashes, it will let fall a white grumous sediment. From these, and other experiments, it appears to be impregnated with a calcarious nitre and sea-salt; joined to a little natron and calcarious earth. A quart will yield above a drachm of a palish yellow sediment; with a nauseous, bitter taste; and the salt separated therefrom has the same taste, with a little brackishness. It produces much the same effects as Epsom water, though it is not half so strong.

Dulwich water has its name from rising in the hills nearly adjoining to that village in Surry; but in reality it is in the parish of Lewisham, in the county of Kent. The water is generally clear, has a brackish taste, with a little bitterness in the throat; and will curdle with Soap; but with Oil of Tartar it will let fall a white grumous sediment. A gallon will yield three drachms of sediment of a greyish colour, and a brackish taste, which will ferment greatly with Oil of Vitriol. This water is chiefly impregnated with sea-salt, calcarious nitre, and a little calcarious earth. It is a brisk purge, and will cure ulcers of every kind, by bathing therein, all defecations of the skin, and even leprosy itself. It is good in obstructions of the bowels, in the green-sickness, black and yellow jaundice, the cholic, gravel, piles, cachexy, scurvy, and removes difficulty and sharpness of urine, as well as strengthens the brain and nerves. The dose is three pints a day at first; but should be increased every day till it come to eight or nine pints.

LANCASHIRE has several mineral springs, among which is Carlton Water, so called from Carlton, a village ten miles south-west of Preston. This water is somewhat of a chalybeate, and when just taken up has a faint smell of sulphur. It will curdle with Soap and Milk, turns white with Oil of Tartar, has a pink sediment with Galls, and changes to a deep blue with Logwood. A gallon contains 236 grains of a white sediment; whereof one third part is earth. The sediment is of a brackish taste, and bitterish in the throat, and will ferment with acids. The salt is also brackish, very bitter in the throat, and emits an acid fume with Oil of Vitriol; but will not ferment nor change with Vinegar. It is a more powerful absorbent than many other nitrous waters, and three or four pints will purge briskly.

Rougham Water, so called from Rougham, a village in Lancashire, two or three miles from Cartmel. The spring rises from the bottom of a rocky mountain, and the taste of the water is a little brackish: it turns white with Oil of Vitriol, green with Syrup of Violets, and brown with Logwood; but it continues clear with Galls. A gallon of this water yields 300 grains of sediment, of a saltish taste, will ferment with Oil of Vitriol, and emit an acid fume. The water purges briskly by stool and urine, and the common people drink it from three to eight quarts. It is of great use in bad digestions, loss of appetite, and the scurvy. It has cured the jaundice, and a quartan ague, and is excellent in the green-sickness.

Crickle Spa rises in a village of that name, a mile from Broughton. It has a strong foetid smell, and will turn silver black in a minute. The earth it runs over is of a shining black, and yet it will turn rags, leaves, and grass, white. A gallon contains 320 grains of sediment, 12 of which are earth, and the rest are sea-salt and nitre. It is a purging, sulphureous water.

Heigh is a village not far from Wigan, where there is a water, which will ferment strongly with any alkali, will turn inky with Galls, and has likewise a vitriolic taste; a gallon yields four ounces of sediment, which consists of a variegation of white and green, with ochre, sulphur, and a little copper. It works plentifully by vomit and stool, and will stop any internal bleeding.

Burnly is a town also in Lancashire, whose waters will turn Galls of a deep red in a moment, and with Syrup of Violets to a very deep green. It works powerfully by urine, and is good in scorbutic cases.

Handbridge is seated between Burnly and Townly, which has a spring that changes Galls to a faint orange colour. The salt obtained therefrom yields a foetid, penetrating smell with salt of tartar. These two last Waters agree with the Pohun at Spa, in containing iron and natron as their principal ingredients. It purges by stool and urine, and is of great use in the gravel, scurvy, obstructions, and diseases from an acid.

At Ancliff, a village three miles from Wigan, there is a Spring called the Burning Well, which will take fire by holding a lighted candle near it. It will continue a whole day, and eggs and flesh may be boiled therein; but the water itself is cold. It is but a few yards distant from a rich coal mine, which renders it probable, that the inflammable vapour is rock oil.

There is a Spring two miles from Whaley, seven miles west of Burnly, whose stream renders Gold brighter; but turns all white metals black. The channel this water runs in is lined with a bituminous, stinking substance, and it is strongly impregnated with sulphur, combined with a little calcareous nitre, a mixture of sea-salt, and of absorbent earth; but we have no account of its virtues.

Inglewhite is a village in Lancashire, where there is a strong, sulphureous and chalybeate water, which is the product of marle. This partly resembles slate, will moulder, when exposed to the air, into exceeding thin flakes, like leaves of fine paper, and will afterwards turn to a black powder. A gallon contains 24 grains of sediment, of which 19 are earth and ochre, and 5 nitre; but it will not purge unless drank with salt.

LEICESTERSHIRE has one remarkable mineral Spring at Nevil Holt, a village seated to the south of Market Harborough: the water is exceeding fine and clear, and it has a styptic, bitter, sweetish and subacid taste, leaving the mouth somewhat dry. It is uncommonly brisk and sharp, when drank at the Spring-head; and then also it passes quicker than elsewhere: it curdles with Soap, and lets fall a gross, white sediment with oil of Tartar; but with a solution of Alum and Copperas, it will continue clear. Hence, and from other experiments, it appears to contain a calcareous nitre and alum, with a fat clay, a latent sulphur, and sometimes a little ochre. It will cure externally fresh wounds, and all sorts of ulcers; and is excellent for the eyes: used outwardly, and taken inwardly, it will cure hectic ulcers. When taken inwardly, as an alternative, an ounce or two may be taken five or six times a day, or four ounces night and morning; but when designed as a purge, it must be taken from one pint to three. If the constitution is cold and phlegmatick, it will be necessary to add four spoonfuls of brandy, and an ounce of sugar to each bottle of water. It is excellent in bloated, dropical constitutions: it has no parallel in all sorts of hæmorrhages, as well as in all great and natural secretions, of what kind soever. It also cures an inflammation of the lungs, attended with a cough and spitting of blood. It is very successful in the King's Evil, hidden cancers, as well as scrophulous inflammations of the eyes of many years standing. It also cures all dif-

eases of the skin, and has had surprizing success against rheumatisms; but it must not be drank in the increase and height of any internal inflammation.

LINCOLNSHIRE has several mineral springs, whereof one is at Cawthorp, a village seven miles north-east of Stamford, where the spring rises up in a large basin, in the middle of the street. It will turn very white with Oil of Tartar, and afterwards let fall a yellow sediment; but it will turn green with Spirit of Hartshorn. A pint will yield a scruple of a white sediment, whereof near one half is salt, and the other earth. It is a purging chalybeate, and is probably a great corrector of acidity.

In the parish of Strenfield, ten miles east of Lincoln, there is a water that is pleasant and sweet to the taste; but will curdle with Soap, and turns to a pearl colour with Oil of Tartar. A gallon of it contains four scruples of a white sediment, whereof 44 grains are earth, 30 nitre, and 8 sea-salt. It is found effectual in curing obstinate fluxes, and the diabetes; as also all internal hæmorrhages, and profuse night sweats.

Gainsborough is a market-town in Lincolnshire, seated on the river Trent, 14 miles north-west of Lincoln. The spring rises to the south-east of the town, and smells and tastes like steel and sulphur. A gallon yields 192 grains of sediment, whereof 120 are earth, and 72 calcareous nitre: it has somewhat of a purgative quality.

MIDDLESEX contains several mineral waters, of which one is at Acton, a large village, eight miles west of London, which is a purging water, though it is very clear and without smell. The taste is a little nauseous, like a weak solution of Epsom salt: it will curdle with Soap, and with Salt of Tartar it produces a white grumous cloud. Oil of Vitriol and Spirit of Salt will excite a small fermentation, and with Syrup of Violets it will turn to a light green. A gallon will yield 344 grains of sediment; it is very white, and of a nauseous bitter taste; it will ferment very briskly with Spirit of Salt, and the proportion of the salt to the earthy matter is as 73 to 4: from other experiments it appears, that this water is chiefly impregnated with a calcareous nitre, and a small proportion of absorbent earth. It is accounted one of the strongest purging waters near London, and is noted for causing a great foreness in *Ano*.

Pancras lies on the north-west side of London, and in the road to Kentish-town; the water here has scarce any taste, till one half is evaporated, and then it becomes bitter; with Oil of Tartar it will deposit a copious white sediment; but with the solution of Alum there will be a small grumosity. Acid spirits will produce a small fermentation; and with Syrup of Violets it will turn green. A gallon will yield five drachms of whitish sediment, which has a saltish and strongly bitter taste in the throat: from hence it is concluded, that the impregnating salt is a calcareous nitre, and it is considerably diuretick, and somewhat purgative.

Shadwell Water is found in the Sun Tavern Fields, about two miles eastward of the Tower of London, and about half a mile from the river Thames. It is of an amber colour, with a strongly acid and styptic taste. It ferments for some time with Oil of Tartar, and lets fall a large ochreous sediment; but with the solution of Alum it continues clear. It will turn a copper half-penny black on the surface, and a knife black, blue, and rusty. A gallon contains 1320 grains of a white and yellowish sediment, which has a highly acid and austere taste. The predominant salt of this water is highly acid and vitriolic, with a combination of sulphur. This water has been chiefly used externally; but if a pint of it

be used at twice, in the space of an hour, it will produce a gentle vomiting, and two or three stools: it has done a great deal of good in all diseases of the skin; and some say it will cure fistulas, stubborn ulcers in the legs, and sore eyes, by dipping linen rags in the water, and applying them to the parts affected: taken inwardly, it stopped internal bleedings, and has perfected the recovery from camp dysenteries.

Hampstead is well known to be a large village, or rather town, five miles north of London; and the water that is found there was formerly in as great reputation, as that at Tunbridge. It will lather with Soap, but undergoes no alteration with Spirit of Hartshorn; and yet it will ferment with Oil of Vitriol, and grow warm and smoky. It will keep milk sweet for four days, and will turn purple with Syrup of Violets; likewise with half a grain of Galls grated, it will turn of a fine deep purple. A gallon will yield about five or six grains of a kind of saline concretion, mixed with a yellowish earth, that will taste somewhat like vitriol of steel. It works chiefly by urine, and has been found good in want of appetite and indigestion: it is also good in vomitings, cholicks, nervous, and hysterical disorders, raising the spirits greatly. It is serviceable in the fluor albus, in weakness from miscarriages, and in the scurvy and all diseases in the skin: it is proper in obstructions of the mesentery, bladder and skin; and also in some paralytic disorders.

New Tunbridge-Wells are near the New-River-Head, at the entrance of Islington, on the side next London. The water has the taste of iron, and is a little styptic, with some degree of quickness both in smell and taste, especially in the summer season. It will lather with Soap, and turn a little milky with a large proportion of Oil of Tartar; but it will not let fall any sediment with volatile alcalies. A gallon will yield from 10 to 30 grains of a reddish earth, which will ferment with Oil of Vitriol. It is a light and comparatively pure chalybeate, of considerable strength at the fountain head; where it ought to be drunk. It is of great efficacy in all nervous disorders, and restores the strength after violent acute diseases: it opens all obstructions in women, and is excellent in a dropsy; in which case the dose is from half a pint to a pint, and no more. It opens obstructions of the glands, and is of some service in reducing corpulent habits.

NORFOLK has but one remarkable mineral Spring, which is at Thetford, a market town of great antiquity: the water appears to have somewhat of iron; for Galls will turn it first purple, and then black. It will let fall spontaneously a drachm of an earthy substance of the colour of ochre, which being calcined in a crucible, some of its particles may be attracted by a loadstone. From other experiments, it appeared to be impregnated with iron, sulphur and natron; it works gently by stool and urine, and sharpens the appetite: it restores lost strength, and cures pains of the stomach, and of the head, as well as fainting, vomiting, convulsions, and indigestions, difficulty of breathing, and the beginning of a consumption; it also kills worms.

NORTHAMPTONSHIRE has three mineral Springs, whereof one is at King's-cliff, eight miles south of Stamford, and it both smells and tastes of iron. It will let fall a white sediment with Oil of Tartar, and with Galls it precipitates a purple sediment; but turns of an opaque red with Logwood, and of a deep green with Syrup of Violets. A gallon yields 140 grains of sediment, 75 of which are limestone and ochre, and 65 a calcareous nitre. From various experiments it appears, that this water is of a chalybeate, laxative nature, impregnated with iron and calcareous nitre, with a small quantity of sea-salt, and a calcareous earthy substance. It will not purge a strong person, unless he drinks from three

to five quarts; but it has been used with great success, in disorders from obstructions, and in eruptions of the skin; it has also cured several lame persons.

Astrop is a village in this county, four miles south-east from Banbury in Oxfordshire; and the mineral water here is a brisk, spirituous, clear and well-tasted chalybeate. It lets fall a white sediment with Oil of Tartar; and a gallon, after evaporation, yields 17 grains of sediment, containing nitre and calcareous earth. Drank at the fountain head, it is a certain cure for all female obstructions, and in the first and second stages of consumptions. It seldom fails in the jaundice and beginning of a dropsy, and restores a constitution weakened by hard drinking: the dose is very large, that is, from three quarts to five in the forenoon; and some affirm it will cure madness and melancholy.

In the parish of King's-Sutton four miles south by east of Banbury in Oxfordshire, there is a mineral Spring, that has an intolerable strong smell like rotten eggs; but the taste is saltish, warm and pungent, like Salt of Tartar. A gallon yields 166 grains of sediment, of which 9 are earthy, and the rest salt, of a pungent, brackish and bitter taste, with all the characteristics of an Alkali. It is a purging water, strongly impregnated with sulphur, and an alkaline salt mixed with sea-salt. It is famous for discharging and healing of tumours, ulcers, and all diseases of the skin.

NOTTINGHAMSHIRE has a mineral Water at Kinalton, nine miles south-east of Nottingham. It is clear, pleasant, cooling, and a little saltish; it grows white and curdles with Oil of Tartar; but undergoes no alteration with acid spirits, and will turn of a beautiful light red with Tincture of Logwood. A gallon will yield 280 grains of a beautiful white sediment, the fourth part of which is a fine alkaline earth; and in the remainder is a remarkable pure, clear nitre. This is a purging water, that has not above half the portion of contents as Epsom water, nor will it work unless drunk plentifully.

At Orston, 12 miles east of Nottingham, there is a mineral Water, which, as it rises out of the spring, has a sweetish chalybeate, and a little roughish taste; but, when it has stood for some time, it becomes rough and harsh. A gallon yields 128 grains of sediment, of which the portion of the earth to the salt is as 27 to 9. The Water is a rich chalybeate, with a considerable quantity of sulphur, if drunk as it springs up; but the predominating salt is a calcareous nitre, mixed with a small quantity of sea-salt. It will purge those of a gross habit of body, and will turn the throat, tongue, and stools of the drinkers, perfectly black. It is good in the hypochondriac melancholy, scurvy, want of appetite, indigestion, pain of the stomach, costiveness and stoppage of urine. It is also good in the beginning of obstructions of the bowels, and likewise in ulcers of the lungs, and spitting of blood.

In OXFORDSHIRE is Chadlington Water, in a village of that name, three miles south of Chipping Norton. It smells like the washings of a foul gun, and a gallon yields 90 grains of sediment, of which 7 are earth, and the rest a peculiar sort of nitre. From other experiments it is found impregnated with sulphur, and an alkaline salt mixed with sea-salt: it is accounted a purging water.

Clifton is a village two miles east of Doddington, where there is a clear water that affords a sediment, which yields a peculiar kind of nitre, inclinable to an alkali. It is laxative, and is used to cure diseases of the skin in men and cattle, by bathing therein.

Doddington is a small market-town 16 miles north of Oxford, where there is a strong sulphureous water,

ter, that smells like the washings of a foul gun. A gallon yields 87 grains of sediment, whereof 44 are earth, and 43 salt. It is impregnated with sulphur and iron, both of which are very volatile; besides which, it has salt enough to give it a purgative quality.

RADNORSHIRE, in South Wales, has very remarkable mineral Waters at Llandridod, which is 24 miles west of Lempster in Herefordshire. Here there is a common six miles long and three quarters broad, and in that part of it lying in the above parish are the mineral Springs. These are the saline pump-water, the sulphureous water, and the chalybeate rock-water. The air is exceeding healthy, insomuch that weak and consumptive people, that come here to drink the waters, soon revive and gather strength. These Springs are now frequented by very genteel company, and in the summer time the common people resort here in crowds.

The Rock-water is so called, because it issues out of a rock, and a glass of it taken up in a clear warm day, is as bright as crystal; but after it has stood some time, it changes to a pearl colour. While it continues clear it has a strong chalybeate taste and smell, but they forsake it as it changes colour: at the spring head, it turns to a deep purple with powder of Galls, and becomes hot with Oil of Vitriol. However, it will not curdle Milk; but with Oil of Tartar it becomes as white as milk, which afterwards changes to a yellowish green. It preserves its transparency with acid spirits; but with Sugar of Lead it turns first milk white, and at length lets fall a yellowish grey sediment, from a quart of water, which after it has been analysed, is found to contain about 15 grains of crocus of iron, and about 5 of the bituminous mucilage of iron. From hence, and various other experiments, it is concluded, that this water contains iron, salt, sulphur and vitriol. It is good in all chronick distempers proceeding from a laxity of the fibres; particularly in scorbutic eruptions and weakness of the nerves, and disorders proceeding from the brain. It is also efficacious in obstinate agues, obstructions of the bowels, slow nervous fevers, and in all female disorders.

The saline purging water is called upon the spot the Pump-water, and from various experiments it appears to contain a neutral salt like native borax, a small quantity of bitumen, and an ethereal, elastick, volatile mineral spirit, and a mineral oil. It is excellent in all diseases of the skin, and in such disorders as proceed from corrupt humours: but if the disease is obstinate, it requires some time to cure it radically. Persons troubled with the scurvy, must use the water both as a purgative and alterative; and, for the last, a pint and a half should be taken at three doses, in the morning before breakfast. As a purge, half a pint must be drank at a time, till it begins to work. In diseases of the skin the patient must bathe frequently, and wash the parts affected with the water, and particularly in the leprosy, so much water must be drank, as to cause two or three motions every day; to which must be joined bathing twice a week in a warm bath, made with equal quantities of the pump and sulphureous waters. In the gravel, the patient must drink so much as will give him two or three stools, and when the gravel is discharged by this means, the patient must drink every morning half a pint of the rock water, and half a pint of the pump-water; also half the quantity going to bed.

The Sulphureous Water, commonly called the Black stinking Water, has its name from the strong smell, and the blackness of the channel through which it passes. It smells like the washings of a foul gun, and has the strongest smell in rainy weather. From various experiments, it appears to con-

tain ethereal, volatile, mineral spirits, a small quantity of a vitriolic acid, a mineral, unctuous mucus, a fine mineral oil, a subtle crocus, a perfect sulphur, and a neutral salt, of a briny, calcareous nature. It is of great use in all cases, where bathing is proper, made into a luke-warm bath. It is excellent in benumbed limbs, in wasting of the flesh, and in nervous disorders; as also in old sores, tetters, and in all diseases of the skin; as well as in the stone, gravel, rheumatism, and gouty distempers. Drank inwardly, and used outwardly, it cures the King's Evil, and is an excellent absorbent, insomuch that it is efficacious in soreness of the stomach, obstructions of the liver, and in the jaundice: it is also good in contractions and weaknesses of the limbs, and in broken constitutions from hard drinking. The dose cannot be determined, and therefore it is best to begin with drinking from a pint to a quart in a morning, that is, about half a pint at a time, with short intervals between the draughts: the quantity may be increased to as much as the constitution will well bear, that is, as much as will sit easy on the stomach, and pass off well.

SOMERSETSHIRE is remarkable for having two of the most noted mineral Waters in the kingdom, those of Bristol and Bath, besides others of different kinds: that at Bristol issues out of a rock, and in that city is called the Hot-well Water. It is seated on the north side of the river Avon, where there is a romantic and beautiful prospect. When first drawn off, it is of a whitish colour, at least sometimes, which it loses gradually as it grows cold, and many small bubbles arise in it when taken from the pump. The taste is exceeding soft; pleasant and milky, at the spring head, and is very agreeable to the stomach; but it leaves a sort of stypticity on the palate. It is entirely without smell, and is only lukewarm to the touch. It keeps well in bottles that are properly stopped, losing only a part of the elastick air, which flies off before the corks can be put in.

With regard to chemical experiments, if a glass of water is poured upon a few grains of Sal Ammoniac, it immediately dissolves it, with a very sensible effervescence. Oil of Tartar not only produces the same effect, but renders the water milky, which after it has stood a-while goes off, and lets fall a light earthy precipitate. Dissolved Soap, dropped into a glass of water, immediately curdles, and in a short time the surface is covered with a greasy substance, and the water below becomes turbid. Twenty drops of the Solution of Silver, mixed with three ounces of the fresh water, in three hours made it appear as if a small quantity of ink had been dropped therein.

These, and other experiments, seem to declare there is some degree of an acid in the Bristol water, though not discoverable by the taste; there is also a small portion of sulphur, because when bottles filled with this water happen to be broken, it will stink very much. A gallon contains about 34 grains of sediment, which is of a light grey colour, of a brackish taste, and bitter in the throat. This will ferment with acids, and turn green, after some time, with Syrup of Violets. The salt is white, but will not ferment with distilled vinegar; and in the air it will grow damp.

Bristol water is generally allowed to be cooling, cleansing and balsamick, with a considerable degree of astringency, which renders it excellent in the diabetes: it will also open the urinary passages, obstructed by gravel. It is useful in many chronic diseases, that will not yield to a common course of medicine, and it is serviceable in many internal inflammations. It strengthens the stomach, promotes an appetite, assists digestion, and will cure the first stages of a consumption. It is good in disorders of

the eyes, and will cure ulcers therein, if taken warm from the pump, and applied with a soft rag: it has also cured many scrophulous ulcers, by washing them in this water, others say those of the cancerous kind, drinking the water at the same time: it has also been found successful in the bloody-flux, all internal ulcers, preternatural discharges, and bleedings of every kind.

The method of drinking the water, when the patient first comes down, is to go to the pump-room in the morning, and drink a glass or two before breakfast, as also about five in the afternoon; the next day the patient takes three glasses before breakfast, and three in the afternoon: and this course is continued during his stay at the Hot Wells.

Bath water, when viewed by itself in a small quantity, appears clear and transparent; but when beheld in the Bath, the surface is of a sea-green colour. The smell is not very agreeable, especially in the Hot Bath; but when quite fresh it has a soft and milky taste. There are four Baths in this city, which differ from each other, chiefly in their degree of heat: namely, the Cross-Bath, the Hot-Bath, the King's-Bath, and the Queen's-Bath.

With regard to the experiments made with it, it is observable that when carried at a distance from Bath, it will precipitate Silver out of Spirit of Nitre into a hardish curd; but not so much as common salt: however, it is concluded from hence by some, that sea-salt predominates in Bath water. The King's-Bath, and Hot-Bath, will turn the solution of Silver white, with a bluish cast, which becomes gradually more dusk-coloured, and then deposits a dark grey sediment. The solution of English Vitriol, mixed with this water, turns to a pearl colour; that is, with the King's-Bath and Hot-Bath, and both will be covered with a thin variegated pellicle. With Oil of Vitriol, and other acids, the Bath waters will excite some intestine motion, and greatly blunt the acidity. If one part of boiling Milk be mixed with two parts of Bath water, a thin whey and curd will appear, if the water be just taken up. A drachm of Syrup of Violets will give a grass-green colour to an ounce of the King's-Bath water, as well as of the Hot-Bath in 24 hours time.

Some experiments shew there is a vitriolic principle in the Bath waters; for if they be taken fresh from the pump, in clear frosty weather, Galls will tinge them of a purple colour; but when cold, they scarce make any alteration at all. It is generally thought to be owing to the ferruginous principle of Bath water, that it will make better and blacker ink than common water. Likewise the sand of the Baths, exposed to the air for some time, will become vitriolic, and make ink with infusion of Galls. That there is an ochre in this water, appears from the yellow colour of the stones in the bottom of the Bath, and from the yellow matter like thin cream floating on the surface of the water, in the winter time.

From these and other experiments it is concluded, that there is a mixture of calcarious substance with the ochre; and the mud is found to consist of a bluish clay, with some testaceous particles; when it has been used as a cataplasm, it has somewhat of the smell of sulphur, and when rubbed on silver it changes it black. The sand, thrown on a red hot iron, emits a blue flame with a sulphureous smell, and being exposed to the air becomes vitriolic, as before observed.

A gallon of the Queen's-Bath water will yield 155 grains of sediment, the Hot-Bath 139, and the Cross-Bath 130. The quantity of a calcarious and argillaceous substance is double to that of the saline; the quantity of salt in each gallon scarce exceeds 43 grains, and the rest of the matter is a grit, with a blue sulphureous earth or marl. The gross remainder

No. 41.

emits a strong sulphureous smell, with a blue flame upon calcination, and by this operation a fourth part of the weight is lost, by burning away. The result of all the observations of different Physicians plainly shew, that the minerals in Bath water consist of a calcarious and marly earth and ochre, a marine or sea-salt, a little calcarious nitre, a glass of vitriol, a little bitumen, and a very small quantity of sulphur, which last can be made to appear no otherwise, than by consequences.

The Bath Physicians are agreed, that the Bath waters are useful in all diseases of the head and nerves, such as convulsions, palsies and epilepsies; in all diseases of the skin, obstructions of the bowels; in scirrhoties of the liver, spleen and mesentery; in most diseases of women, and in the scurvy and stone. The Bath waters are certainly a most powerful deobstruent, and their energy is so great, and their operation so sudden, that a very exact preparation of the body is required, and a stricter regimen than in drinking other waters. Likewise, a regard must be had to the habit of body, the season of the year, the symptoms of the disease, the changes of the weather, and the different degrees of heat in the several Baths. As for instance, the heat of the King's-Bath, without due precautions, is apt to inflame the blood, heat the bowels, and sometimes cause a fit of the gout. As to the manner of the operation of Bath waters, whether by bathing or drinking, or both, their effects are thus enumerated. Externally, they will heat, dry, attenuate, resolve and strengthen, and have a singular virtue in diseases from a cold and moist cause. They ease pains, disperse cold tumours, dry up moist ulcers, and are very advantageous in phlegmatic diseases. It is also remarkable, that nothing more effectually prevents too great a corpulency than the frequent use of these Baths. Bathing cures contractions and relaxations of the limbs, restoring lost sense and motion; but it is not proper in a fit of the gout, except in the decline of that distemper. It is also highly serviceable to those, whose sinews are impaired and crippled by the severe fits, and their frequent returns.

The Bath waters taken inwardly, to two or three quarts, commonly give two or three stools extraordinary; and it is remarked of the Hot-Bath, that it generally keeps the body open, while the King's-Bath has a contrary effect. When they are used as an alterative, they dilute, attenuate, sweeten, strengthen and heal, correcting the acrimony of the first passages, and curing the many disorders of those parts. They supply a want of spirits, and are good in diseases, where the secretions are diminished, as well as in all cachectic and scorbutic habits of body. They are very successful in hypochondriac disorders, and melancholy, as well as in disorders of the urinary passages, particularly sharpness of urine, the strangury, gravel, and ulcers of the bladder. The usual time of bathing and drinking these waters is generally five or six weeks, and, in obstinate cases, they must be repeated every year. The common quantity drank is from a pint to a quart and half a pint a day; but some have been allowed to drink a gallon every day, and then the patient must begin with small doses.

Alford is a village 24 miles south of Bath, and is remarkable for its mineral water, which has a nauseous bitter taste, and will curdle with soap, as well as yield a white grumous sediment with the solution of Pot-ashes. It turns of a dilute green with Syrup of Violets, and Galls will produce a greenish cloud on the surface, which descends deeper in two or three days. A gallon will yield six drachms of sediment, consisting of calcarious nitre and sea-salt, with a little lime-stone. It is cooling, cleansing, and penetrating; will attenuate gross humours, de-

stroy acrimony and temperate ebullitions of the blood; hence it is good in the scurvy, jaundice, and all sorts of obstructions. It cleanses the urinary passages, purges briskly, and promotes urine and sweat.

Lincomb Water is seated near Bath, and the water is by some called Lincomb Spa. When first taken up, it has a light, brisk, sulphureous smell, which it loses in six or eight minutes time; but its taste of iron is more lasting, that is, for the space of eight hours. It is transparent at first, but becomes bluish with standing, and throws up to the surface a thin, variegated unctuous scum. From various experiments it appears, that this water is impregnated with iron and a little sulphur, as also with bitumen, and a small quantity of alkaline salt. It passes off quickly by urine, mends the appetite, and raises the spirits. It is serviceable in disorders of the first passages, and is good in cachexies, the jaundice, and recent obstructions of the liver: it also deterges and heals ulcers of the kidneys, and removes the strangury. Outwardly, it cleanses and heals scrophulous ulcers, dries up sharp humours, and cures foulnesses of the skin.

Queen's-camel is a village five miles north of Sherborne, where there is a spring that proceeds from a hard rocky bank, and is called the Black-Well. It smells like the washings of a foul gun, and, from the trials made with it, appears to contain a considerable quantity of sulphur, some natron, and a calcarious earth. It cures, by bathing, scorbutic, leprous and scrophulous disorders; and it has been observed to cure dogs of the mange, by dipping them therein.

STAFFORDSHIRE has only three mineral waters, whose virtues are ascertained, one of which is at Codfall, a village 12 miles south-west of Stafford, that is in the wood adjoining thereto, which is a sulphureous spring, and the sulphur is mixed with salt, but not sufficient to restrain the volatility of the sulphur, so that in the winter, before rain, it may be smelled twenty yards off. It will lather with Soap, will not curdle Milk, and with Syrup of Violets will turn green; but neither Galls, Oak-leaves, nor a solution of Sublimated Tartar, would throw down the sulphur: however, Spirit of Urine did, and turned it of a faintish red. When leprosy was more frequent, this water was famous for curing them; but at present it is only used in scrophulous cases, and it operates both by stool and urine. They brew their beer with this water, and in Dr. Plot's time there was a house, called the Brimstone-Alehouse, where no one that lived there was troubled with diseases of the skin.

St. Erasmus's-Well is in the grounds belonging to the Lord Chetwynd, near Ingestre, two miles from Stafford. The water is clear, and of the colour of Sack, but has no remarkable taste, nor smell. A gallon of this water will yield 300 grains of sediment, whereof 272 are salt, and the rest moss. We are not told what diseases it is used for, nor indeed that it is used at all.

Willoughbridge is six miles north-east of Drayton in Shropshire, and in the park near it there is a well, whose water is as clear as crystal; but it renders the sides of the glasses, after they have been used awhile, a little oily, and of a bright yellow colour. If a few drops of a solution of Sublimate be let fall into this water, it presently becomes of a deep sack-colour, which seems to shew it has somewhat of a lixivial salt. It will lather with Soap, but will not curdle with Milk, nor change colour with Syrup of Violets. Contrary to most other waters, it leaves nothing behind it, after the evaporation of several gallons. Its oil or sulphur is so very volatile, that when distilled in a glass body and head, the Oil of Sulphur comes over the helm, upon the first heat, and is

always in the receiver, before the least drop of water appears. There is such plenty of this water, that at least 60 springs have been counted, that send forth plentiful streams. Dr. Plot informs us, that these waters have performed many wonderful cures, which he attributes to its balsamic virtue, and its great subtilty and volatility; and he farther adds, if we were to judge of the waters, from the many attested cures, it bids as fair for an universal medicine, as any thing else in the world.

SHROPSHIRE has a mineral water at Moreton, a village two miles west of Market Drayton, which will not lather with Soap, but curdles Milk, and yields a white sediment with Oil of Tartar; it turns green with Syrup of Violets, and scarlet with Log-wood. A gallon of this water will yield 277 grains of sediment, whereof 76 are earth, and the rest a calcarious nitre. It is an excellent cooling diuretic and cathartic, and purges very briskly. It bears a great resemblance to Holt water, only the taste is more pungent, and consequently it is very likely to have the same virtues.

Pitchford is a village six miles south by east of Shrewsbury, which takes its name from the pitchy spring that is found there, on the top of which there floats a liquid bitumen, though it is scummed off every day. It is found to be excellent for wounds, and will cure inveterate scrophulous ulcers.

Broseley is a village four miles north-east of Wenlock, and has a burning Well, which was discovered about the year 1711. A candle being put down into the well, it will take fire at the distance of a quarter of a yard, darting and flashing in a violent manner, to the height of 1820 inches. It is hotter than common fire, and boils any thing much sooner. It appears to be impregnated with a sort of liquid bitumen.

In SURRY there are several mineral waters, the most famous of which is at Epsom, a town about 15 miles south-west of London. The water is pretty clear and without smell; but if it be kept in covered vessels for some weeks in summer, it will stink, and acquire a nauseous bitter taste, with somewhat of a maukish saltness. It will curdle with Soap and Salt of Tartar, and with Spirit of Sal Ammoniac it will let fall a grumous sediment; but if mixed with lime-water, it will continue clear. A gallon will yield an ounce, sometimes an ounce and a half, of a sort of cream and sediment, which is of a greyish colour, almost impalpable, of a brackish, nauseously bitter taste, and an odd strong flavour. There are about eight parts of salt to one of earth, the former of which is of a whitish yellow colour, and of a singular strong smell, with a nauseous bitter taste. All authors agree, that the crystals of this salt will require but a small proportion of water to dissolve them, for an equal weight has been found sufficient. The salt has a purging quality, for half an ounce, dissolved in spring water, will work like other physic. The water itself is a diluent, and a mild absorbent: it is also diuretic and cathartic. Poor people formerly used to wash old sores with the water, with a good effect. A dose of the water, in summer, is two thirds of a pint, and in the winter, half a pint.

Stoke is a village two miles south of Cobham, where there is a spring commonly called Jessop's-Well. This water is thought to contain more salt than any purging water in England, and it has a taste much like that of Epsom-Wells. A gallon of this water yields an ounce and a half, with 22 grains of sediment, that is, 742 grains in all. It is very white, and has somewhat of a brackish taste, with a nauseous bitterness. The earthy matter bears but a small proportion to the salt, which, as Dr. Hales informs us, will shoot into very bitter, irregular oblong crystals, some of which have retained

tained their former firmness, for five years at least. Half an ounce of distilled water will dissolve only 10 grains of salt, though standing by the fire-side, in which it greatly differs from that at Epsom. From the experiments made with it, it appears, that this water contains a large proportion of calcareous nitre, a little salt and calcareous earth, and very probably a little natron. A less quantity will suffice for a dose than of any other; for which reason it fits better on the stomach, and enlivens the spirits of those that drink it. It has been long noted as a good purging water; for a single quart will purge pretty briskly, and promote plenty of urine without gripes. It cures obstinate scorbutic cases; and, as some think, there is a fine volatile spirit in the water; it may be drank for a considerable time, as an alterative, with happy consequences.

Stretham is a village six miles south of London, that has been long remarkable for its medicinal spring. The water has somewhat of a yellowish tinge, and throws up a scum variegated with copper, blue and green colours. At the spring head it has a saline nauseous taste, and a gallon will yield 200 grains of sediment, the salt of which has a penetrating, brackish taste, with a strong flavour, and in the air it will almost melt. This is partly marine, and partly nitre, enveloped with a little sulphur, and a greater proportion of absorbent earth. When it was most in vogue, three pints boiled to a pint and a half were given as a purge; for it operates both by stool and urine, and it has been found good in disorders of the eyes.

The Dog-and-Duck is a noted public house in St. George's-Fields, in the parish of Lambeth near London. The water is clear, and has very little taste; but a gallon will yield 200 grains of sediment, of a dirty colour, and a pungent, brackish taste. The earthy matter is as one to twelve, in proportion to the salt, and it will ferment strongly with Spirit of Salt and Spirit of Vitriol; but will not turn to perfect lime by calcination. This water has been noted for curing leprous disorders; and some have affirmed, that it cured an ulcerated cancer in the breast by drinking the water, and keeping a cloth, wet therein, always over it. Being drank from one pint to three, it generally purges easily and briskly, without affecting the strength, unless in very tender constitutions. It may be taken as an alterative, instead of common drink, for the cure of scorbutic pimples, tetters, the leprosy, and the king's evil. It is also a palliative cure in cancerous disorders, and has been the means of prolonging the lives of several. The only fault of this water is, its being too cooling, for which reason it is prejudicial to persons of phlegmatic constitutions, and of weak habits of body.

Cobham is a town seated in the road between London and Guildford, and is seven miles south-west of Kingston. The water has a sensible taste of iron; and a gallon will yield seven grains of a substance like ochre, which a loadstone will attract, without calcination. It is a strong chalybeate, and deserves to be more known.

WARWICKSHIRE has two mineral springs, one of which is at Lemington, three miles south-west of Dunchurch, and is of a saline nature. A gallon yields 960 grains of sediment, 30 whereof are calcareous nitre, and the rest sea-salt. It is a strong purge and vomit, and is drank by labouring people from two quarts to three. It is noted for curing sore legs, and diseases of the skin.

Ilmington is a village seven miles south of Stratford upon Avon, and the water found here, though it has a brackish taste, is one of the strongest chalybeates in England. It sparkles at the spring head like bottled cyder; but it will not curdle with Milk, and yet Oil of Tartar will procure a small coagulum.

It will turn purple or black with Galls, according to the quantity; but with Syrup of Violets it changes to a green. A quart of water will yield near a spoonful of a reddish white powder, that will ferment and fume with acids. Those that drink this water have their stools tinged blackish, and though it generally operates by urine, it will sometimes purge. Internally, it is good in the scurvy, obstructions of the bowels, the jaundice, and beginning of the dropsy; it is also good in the strangury, and difficulty of making water.

WESTMORELAND has a mineral water at Kirkby-Thower, a village eight miles east of Penrith, which is a weak purging chalybeate. It is exceeding clear, sweetish, and has a little taste of tea. It grows whitish with alkalies, and turns to a clear purple with the Solution of Silver; but it becomes of a pink purple with Galls, a red purple with Logwood, and a deep green with Syrup of Violets. A gallon contains 190 grains of sediment, of which 140 are lime-stone, and 50 a calcareous nitre. The salt will not dissolve entirely in 48 times its own weight of distilled water; but it will turn of a pale green with Syrup of Violets. This water is a more powerful absorbent than any other of this kind, and it will purge well, if drank to the quantity of three or four quarts.

Shapmore is a marshy heath, lying between the mountains to the north of Shap. The water here seems to be of a sulphureous nature, for it has a strong foetid smell, and a sensible bitterness; but this soon goes off when it evaporates over the fire. It will curdle with Soap, and let fall a large white sediment, with the Solution of Pot-ashes. A gallon will yield 376 grains of a saline sediment, with a small proportion of very white earth. It is very white, and has a salt, pungent, bitter taste, growing moist when exposed to the air. This water has been casually found to work by stool and urine, and three pints have proved a very strong purge. It will cure inveterate piles, and is used by the common people to cure rheumatic pains in the joints, by rubbing it warm on the parts affected.

Wisherlake is a village seven miles south-west of Kendal, where the mineral spring has a saltish taste, and in summer smells a little like sulphur, throwing up a whitish scum. With Oil of Tartar it lets fall a pearl-coloured sediment, and with Galls it precipitates one that is purple. A gallon yields 547 grains of sediment, consisting chiefly of sea-salt and a calcareous earth, with a little mixture of a bitter, purging salt. From experiments made with it, it appears that it is chiefly impregnated with sea-salt, combined with a kind of calcareous nitre, a little iron, and a small quantity of sulphur. It has been found of great use in the stone, gravel, worms, want of appetite, the cachexy, jaundice and dropsy.

WILTSHIRE has a mineral spring at Chippenham, lately taken notice of, and was found in a garden near the river. At the spring head it has a brisk ferruginous taste, and turns of a claret colour with Galls. A gallon will yield 39 grains of a sediment of the colour of ochre, which has a very brackish taste. It contains a strong sea-salt, and a natron combined with iron. It has cured scorbutic disorders, besides others that are not particularly taken notice of.

West Ashton is a hamlet in the parish of Steeple-Ashton, four miles east of Trowbridge, which has a spring that yields plenty of water all the year round. It is clear, and will deposit a small quantity of sediment, after it has been kept several months in bottles. It will curdle with Soap, and lets fall a white grumous sediment with the Solution of Pot-ashes. A gallon will yield two drachms and two scruples of a whitish sediment, with a saline bitter taste.

taste and warmth on the tongue. It is chiefly impregnated with sea-salt, nitre, and a little iron, with a small matter of sulphur. The water is best drank at the fountain head, and three pints is purging and diuretic.

Road is a village eight miles north of Bath, where there is a mineral Spring, whose water has a chalybeate and sulphureous taste and smell. A gallon will yield near a drachm of a yellow coloured sediment, that has a salt and pungent taste. The water appears to be impregnated with iron, sulphur, and a strong, native alkali or natron. It is a very gentle purge, and is good in scrophulous cases and diseases of the skin; it will also cure scorbutic ulcers.

Holt is six miles east of Bath, and is of note for its medicinal spring, first taken notice of in the year 1713. It will let fall a gross, grumous sediment with Oil of Tartar, and when mixed with Spirit of Sal Ammoniac, a white crusty substance adheres to the sides of the glass. It will not lather with Soap, but will ferment with Oil of Vitriol. With Syrup of Violets it will become greenish, and with Galls change to a green. Logwood turns it to a deep red, Brazil Wood to a scarlet, and Rhubarb to a pale amber colour. A gallon will yield 176 grains of very white sediment, which has a saltish, bitter taste, and will grow moist in a damp air; but the earthy part is nearly equal to the salt. This water principally contains a calcareous nitre, and the operation is more mild than other springs of this kind, on account of a large quantity of earthy matter contained therein. In small doses it is an alterative and diuretic; but two quarts will purge pretty briskly. It will dilute, cool, absorb and strengthen, and is used both externally and internally. Rags, or a sponge, dipped therein, will cure scrophulous ulcers, attended with carious bones; but then it must be taken inwardly at the same time. It will also cure inveterate running ulcers of the legs and other parts, and diseases of the skin, attended with great heat and corrosive humours. It is good for sore eyes, the piles, and ulcers of a cancerous nature, used outwardly and drank inwardly. It never fails of procuring an appetite, and will strengthen the relaxation of any part.

YORKSHIRE has several mineral Springs, of which the principal one is at Malton, otherwise called New Malton, that lies in the road from York to Scarborough. The spring lies at the west end of the town, and is so strongly impregnated with iron, that it is called the Malton Spa. Seven pints contain three drachms and a half of a reddish brown sediment, which has an austere bitterish taste, and a salt of a calcareous nitre, though different in some sense from others; for it will not ferment with Oil of Vitriol, nor Spirit of Salt; but it will turn greenish with Syrup of Violets. The mud and scum of this water will dry up and heal old ulcers, scabs and tetter to a wonder. Internally, the water works agreeably by stool and urine, unless the stomach be foul, and then it will vomit the first day or two. The common dose is from three pints to six; but some think smaller doses would be more proper. It is good in the hypochondriac melancholy, in an asthma with spitting of blood, and in internal ulcers and bleedings. It is also recommended in obstructions of the bowels, and in a relaxation, weakness, and languidness of the body, it being a strengthener and a deobstruent as well as a purge.

Croft is a village in the North-Riding of Yorkshire, on the confines of the bishoprick of Durham, where there is a spring of fine, clear, sparkling water, with a strong smell of sulphur. A gallon yields 177 grains of a very white sediment, which has a strong smell like that of hawthorn flowers. It consists of lime-stone, nitre, and sea-salt; but the nitre is double or treble to the latter. It is a purging wa-

ter, if drank from four pints to nine, and is said to have performed many eminent cures, both by drinking and bathing.

Harrowgate is two miles north-west of Knaresborough, in the West-Riding; it is supposed to be the strongest sulphureous water in Great Britain. A gallon of that commonly drank, for there are three wells, contains two ounces of pure sea-salt, and near two scruples of earth; therefore the predominating salt must needs be marine. A warm bath made with this water cures aches, bruises, strains, lameness, weakness of the back, beginning of the dropsy, and paralytic pains and weaknesses. It also dissolves hard swellings, cures old ulcers, and all diseases of the skin; it has also great power in easing the gout and sciatica. Internally, drank from three to four pints, it purges briskly, and raises the spirits. It powerfully cleanses the stomach and intestines, killing all sorts of worms; besides which it will cure the cold scurvy, and help the jaundice of many years standing. It also cures disorders of the spleen, the green sickness, cramp, the head-ach, and the king's evil.

Broughton water proceeds from a spring, in the road from Skipton in Yorkshire, to Coln in Lancashire, the village being in the mid-way between those two places. It is of a whitish colour, and colder than common water, as is observable in others of the sulphureous kind. A gallon contains four drachms of sediment, the fourth part of which is earth, and the rest sea-salt and nitre. The virtues are much the same as those of Harrowgate water, but weaker.

Wigglesworth is a village in the West-Riding, four miles south of Settle, where there is a spring remarkable for yielding an alkaline nitrous salt. It is very black, and has a strong smell of sulphur, with a saltish taste, and lathers with Soap; but will not curdle Milk. Three gallons yield seven drachms of sediment, of which six scruples and a half are black earth, and the rest salt. The country people drink four or five pints of this water as a vomit, and six or seven as a purge; but it seems strange that more should be required for the latter than the former.

Newton-dale is in the North-Riding, 12 miles west by north of Whitby. The water here is cold and very astringent; and it petrifies every thing in its course, producing various and beautiful incrustations and figures. It effectually cures loosenesses and bleedings of every kind, both in men and beast; and it quickly and wonderfully restores weakened joints, that are even beginning to be distorted, by bathing therein.

Knaresborough is noted for a dropping Well, so called, and is a market-town in the West-Riding. The water is very cold, extremely limpid and sweet, and it will let fall a white sediment with Oil of Tartar. It has a petrifying quality, and its particles consist chiefly of spar and some sulphur. A gallon of the water, that fell from the petrifying rock, yielded 185 grains of sediment, of which seven scruples and four grains left five scruples and four grains of earth, which would ferment with acids; and there were two scruples of salt, which shot into nitrous crystals. It cures inveterate fluxes of the belly, bloody fluxes, and the diabetes, as well as all preternatural discharges of blood; also colliquative sweats, as well as ulcers of the bowels, and hectic fevers. Three half pints are a dose.

Scarborough Water is the most noted in all Yorkshire, and was discovered about 160 years ago. It has been much used of late years, not only at the fountain head, but at distant places. The taste is bitterish and ferruginous; it curdles with Soap, and yields a large white grumous sediment with Oil of Tartar. A gallon yields about 284 grains of a red-

dish white colour, with a bitter, saltish and roughish taste. It destroys the sourness of acids, ferments strongly therewith, and turns of a light green with Syrup of Violets. The proportion of earth to the saline parts is as 66 to 150. The water has been found good in hectic fevers, the rheumatism, scurvy, preternatural thirst, recent and partial inflammations, and diseases of the skin. It is also good in disorders of the stomach from intemperance, as well as in hypochondriac and hysteric disorders; in asthma, in habitual costiveness, the heart-burn, and in all cases where purging is indicated.

CHAP. III.

Of EARTHS and CLAYS.

THAT sort of Earth, which we call SOIL, proceeds from the putrefaction of animal and vegetable substances, and will burn in the fire and swim in the water. Linnæus has nine sorts of these, whereof one does not properly belong to this class: the others are, the Marshy Soil interwoven with roots, and this is the same that we call Turf, which in many parts of England is used for such. The Vegetable Watery Soil is nothing else but Mud, and is to be met with every where in and about standing waters. The Spungy Soil of heaths will ferment with some sort of fluids, particularly acids. The Vegetable Soil of the Alps is to be met with every where among those mountains, and is a little reddish, or rather of a blackish brown. The Vegetable Common Black Soil is met with in various places, particularly in meadows, fields, and pastures. The Vegetable reddish Soil, partaking of Ochre, is particularly found in West Gothland. The Animal Soil of brute beasts may be met with in places where several of those animals have been laid in heaps, and have putrified and turned to Dust; that of human bodies may be seen in every church-yard.

A CLAY is a heavy, thick, fat, tenacious, smooth Earth, which when held in the mouth becomes like soap or suet; it is either soft or hard, in proportion to the quantity of Water that is mixed with it, for it readily dissolves in that fluid. When it is soft, it may easily be shaped into any form; but, when it is baked in the fire, it turns into a stony substance. There are a prodigious number of different sorts of Clay, and of different colours.

The Clay that is perfectly pure and white is of a very fine texture, and when cut, leaves a polished shining substance; when examined by a microscope, it appears to be of a close, even, regular texture, unless mixed with particles of a different kind. It will ferment pretty briskly with Aqua Fortis, as will most other kinds; for Linnæus makes it a characteristic of Clay. Whether we have here any of this sort is uncertain.

The CIMOLIAN EARTH of the shops is a sort of Fullers-earth, and is of a dull white colour, though the surface is tolerably smooth. When burnt in the fire, it becomes very white and hard, and in a violent fire will turn to a dirty sort of Glass. It is to be met with in several parts of England, particularly at Wedensbury in Staffordshire, where they use it for making tobacco-pipes, as they do another sort, which is hard, heavy, and of a greyish white, which is said to be the best of all Tobacco-pipe Clays. Besides these, there are the White Tough Clay, the Smooth Greyish White Clay, the Heavy Grey Clay, the Soft Grey Alkaline Clay, a Hard Grey Alkaline Clay, a Soft Ash-coloured Heavy Clay, and several other kinds, whose differences are not so considerable as to be particularly insisted upon. They are used for making tobacco-pipes, Dutch tiles, and several sorts of earthen ware.

The EARTH of MALTA, so called from the Island from whence it is brought, is a sort of Clay of a whitish ash colour, and is imported in small cakes, marked with various characters.

There are four sorts of YELLOW CLAY, all which will ferment with Aqua Fortis; one of these is entirely yellow, another yellow with blue spots; the third is a sandy Clay, and consequently brittle, as well as the fourth, which is of a brownish yellow. They are all of use for making some sorts of earthen ware.

The Hard Brown Spotted CLAY is in some degree transparent, and is of a fine shining pale brown, variegated and spotted with deep black. It does not stain the hands when touched, and yet it adheres firmly to the tongue, having a sort of an astringent taste, but without grittiness. This is what is usually called Lemnian Earth, or The True Sealed Earth, and is brought over in small cakes, weighing above four drachms each, and marked with several characters. The island on which it is dug was formerly called Lemnos, but now Stalimene. The virtues of this Earth, or Clay, were formerly much celebrated, and it was given as an antidote against poisons. It was supposed to be of an alkaline substance, but this is found to be a mistake; for it will not ferment or effervesce with Aqua Fortis, nor indeed several others, notwithstanding what Linnæus has said to the contrary. When analysed, it is found to contain a small quantity of an urinous volatile Salt, a small matter of bituminous oil, and a little Salt like common Salt. It may be easily dissolved in Water, and has been given in some disorders; but it is now not used with us.

There are three ENGLISH CLAYS of the brown sort, as the Brown Heavy Tough Clay, with which they floor barns in some places, and in others make earthen vessels. The Dusky Bluish Brown Tough Clay, which when burnt in the fire turns to a red colour, and in a violent fire to a deep grass green; however, it is most useful for making of tiles. The Hard Pale Brown Clay is generally full of shining particles, and is of a rough kind; but being mixed with tougher Clay in Staffordshire, it serves to make strong vessels of several kinds.

The Bluish Brittle Soft CLAY has somewhat of the nature of Marl, and when dry it appears to be full of shining particles. It burns to a darker colour, and is used in several parts of England for making a very strong sort of earthen ware. The Tough Bluish Clay has an even smooth shining surface, and when burnt in the fire becomes as hard as stone, and of a fine red colour. It is to be met with in Northamptonshire, but at present is made no use of. The Hard Tough Pale Blue Clay is extremely heavy, and of a close, even texture; being burnt it turns to a pale yellow, but it will not well endure the fire. It is used to make gally-pots, and the like. The Light Soft Blue Clay is of a loose texture, and burns to a pale reddish brown; there are but small quantities found of it at a time, and therefore it cannot be supposed to be much in use in making any sort of vessels. The Hard Tough Whitish Blue Clay is supposed to be that with which they make China ware here in England when mixed with other things; however, this is not certain.

The Green Heavy Turf CLAY is a fine smooth compact Earth of a dull dusky green, and very heavy. It has hitherto been put to no use. The Pale-Smooth Green Hard Clay is of a smooth, even, regular texture, very heavy, of a shining surface, and almost as hard as Stone. When a thin piece of it is held up to the light it is almost transparent; but in the fire it loses its green colour, and turns to a pale grey. It has been brought from Saxony in Germany.

VERDITER is a sort of bluish green hard Clay, and is usually dug out of the Earth in lumps of different

ferent sizes, that is, from half a pound to six pounds and upwards. It is a fine even glossy surface, and very smooth to the touch: it does not colour the hand: but when it is drawn along a rough surface it leaves a dusky green line. When burnt it is of a dusky brown colour, being entirely divested of its green or blue. It has been brought from several parts; but that from Italy is the best, and is much used by painters.

The ENGLISH VERDITER is got out of Mendip Hills in Somersetshire, and is a hard, heavy, firm earth, of a deep dusky green colour; when burnt it becomes as hard as stone, and of a very pale whitish brown colour. There is another Greyish Green Brittle Clay, that is met with in Mendip Hills, which bursts and crackles in the fire, though the change of the colour is very small; but it acquires a considerable hardness.

The Soft Pale Red CLAY is very clammy while soft, but when dry it is compact and hard, and of a very beautiful pale red, variegated with grey, at least sometimes. In the fire it grows as hard as stone, but the colour is much the same. It is brought to London from the Isle of Wight, and is said to be of some use to the workers in mahogany wood. The Pale Brownish Red Smooth Clay has somewhat of a Brownish cast, and is commonly veined with Pale Bluish Grey Clay; it is considerably heavy, and of a very close even texture. It crackles at first in the fire, but becomes pretty hard. In Staffordshire it is part of the composition of their finest earthen ware. The Dusky Brown Reddish Blue Clay is found in several parts of England, particularly in Staffordshire, where it is a principal ingredient in their fine earthen ware.

The Light Brittle Black CLAY is more dry than the generality of this sort, and not quite so tough; but it is seldom met with except in small quantities at a time. In the fire it emits a pale blue flame, with a sulphureous smell, and burns to a very deep red. It is common in many parts of England. The Tough Heavy Black Clay; while in the bed, is of a shining jet black, extremely heavy, and pretty moist, with a fine glossy smooth surface when cut with a spade; when dry, it becomes extremely heavy and compact, and will not dissolve easily in water. In the fire it becomes as hard as stone, and of a pale red colour; it was formerly unknown in England, but has been lately met with in Staffordshire and elsewhere. The Heavy Brittle Black Clay is very fine, heavy, and of a smooth compact texture. When burnt, it becomes perfectly white, for which reason in Northamptonshire it is used for making tobacco-pipes.

There are sealed EARTHS in Germany, so called, because they are marked with particular seals; the principal of which are at Gran in Hungary, and Goldberg in Silesia. That of Gran is called the Marrow of Gold; it is of a yellow colour and fat, seeming to be of a soapy substance, and melting in the mouth. It is got out of the gold mines near Gran, and is under the care of the magistrates, who have it made into round balls, and marked with the city seal. They suppose it to be impregnated with a golden Sulphur. The Goldberg Sealed Earth has the name of the Marrow of Silver, and is of a whitish grey colour. It is supposed to be derived from silver, from whence it has its name. It is not brought into medicinal practice.

CHAP. IV.

Of MARLS.

MARL is an earthy, brittle, light substance, between Clay and Chalk; for it is not so soft

and fat as Clay, nor so hard as Chalk, nor will it very easily dissolve in water.

CIMOLIAN EARTH is heavy, but loose and apt to crumble, for which reason, being thrown on the surface of the earth, it soon moulders away. It has not the least effervescence when put in water; for it only melts away, and turns to a sort of fizy liquor of a greyish colour. It is not at all affected with the oil of tartar, but spirit of salt poured on it causes it to ferment. It is pretty fat and soapy.

SAMIAN EARTH is very fine, pure, of a close equal texture, and yet remarkably light; when dry, it is of a fine bright white, with a smooth polished surface; it is very soft to the touch, and adheres firmly to the tongue; when burnt in the fire it becomes of a snowy white, and is found in the Isle of Samos; but this, as well as the former, is not at present used in medicine.

The SAMIAN ASTER is by some called Samian Earth, but it differs greatly from the former, it being of a loose texture, and will not cut into regular pieces. It is of a pale brownish white, and seems rough, dry, and dusty to the touch, but adheres firmly to the tongue. It turns to a pale ash colour in the fire, and is found between clefts of stone in the Island of Samos.

CHIAN EARTH is a dense compact substance, but of a soft texture, and easily broken in pieces. When dry it has an irregular surface of a pale greyish white, and seems to consist of numerous flakes. It is very fine and soft to the touch, adheres firmly to the tongue, and melts freely in the mouth. Thrown into the water, it causes it to bubble with a hissing noise, and melts into a substance like cream; in the fire it becomes perfectly white, and is found in the island of Chio; but it is of no use in medicine.

CELENEUSIAN EARTH, by some called Mineral Agarick, is found in the perpendicular clefts of the strata of stone, in irregular masses of a fine pure white colour. It is spongy, brittle, whites the fingers, and adheres firmly to the tongue. When thrown into water, it sends up a great number of bubbles with a hissing noise, and turns it white. It comes to a snowy whiteness in the fire, and is found in stone quarries almost all the world over.

The White Spongy Dense MARL is not so white as the former, but is of a more dense texture. It is frequently found in the cavities of stones, and, if alone, generally near the surface of the earth. When it is dry, it becomes of an uneven compact texture, moderately heavy, and of a dull dead white. It bubbles in the water like the former, with a hissing noise, and is found in many parts of England.

Hard Spongy Alkaline White MARL, called by some Native Lime, is a hard, dry, coarse earth found in the clefts of stone, and sometimes lying loose upon, or immediately under them. It is of a dull whitish colour, with a small mixture of greyish brown, and is of a more firm texture than the former earths. It bubbles and hisses like the former, and will cement like Lime. It is found in some parts of England.

MELIAN EARTH, found in the island formerly called Melos now Milo in the Archipelago, is not unlike the Cimolian, and is made use of there for washing of linen.

CRETAN EARTH, or CHALK, was so called by the antients, because it was found in the island of Crete, now Candia; but it is now to be met with in most parts of the world, and particularly in England, in very great plenty, where there are many large hills of it consisting of nothing else. It is an Alkali, and therefore is given in acidities of the stomach, and the heartburn, when properly prepared; though some take it as it is for that purpose without any preparation. It is likewise good in coughs that proceed from an acrid phlegm. It is commonly given from

from ten grains to a drachm, but there is no danger in taking larger doses.

Bluish Chalk MARL when dry, after it is taken out of the earth, is of a hard texture, of a bluish colour, generally veined or spotted with red. It is very soft and smooth to the touch, and will not adhere to the tongue, at least very little. Burnt in the fire, it turns to a palish brown, streaked with dark red. It is found in some parts of England, and in some places serves to manure land.

Bluish Brown Brittle MARL is of a loose texture, and very light. It is soft to the touch, and adheres a little to the tongue, melting freely in the mouth, it being a pure fine earth. It is somewhat alkalious, and when burnt turns to a dirty reddish brown colour. It has sometimes a great many sea shells found in it, and is a good manure for land.

Stony Bluish MARL is the hardest of this class, and is of a rough compact texture, with an unequal surface. It bubbles in water, but will not ferment with aqua fortis, and in the fire turns to a dull dusky red. This and the former are found in several parts of England.

Yellow Brittle Sandy MARL breaks into small pieces, when dug out of the earth, and when dry is of a brighter yellow than before it was dug up, which is the property of all colours; for a little water will turn them darker. It is spangled all over with small, flat, glittering particles, and is rough and dusty to the touch. When burnt in the fire, it turns to a fine deep red, and is a good manure for heavy stiff Clay lands.

Pale Red Brittle MARL is always found in the cavities of Stone, or in perpendicular clefts of the Earth, and has a fine, compact, close texture, with an even, smooth, soft surface. It is common in Germany, Italy, and France.

Red Brittle Heavy MARL is very common in England, and is a good manure for poor hungry land. It is of a crumbly texture, and commonly very dry; it becomes of a deeper red in the fire, and much harder.

Deep Dusky Red Sandy MARL is frequently found variegated with whitish, greyish, or bluish Earths, and is of a loose crumbly texture. It melts very readily in the mouth, but leaves a great deal of harsh, sandy matter between the teeth; when burnt it becomes of a deeper red, but not much more hard, and is found in our North American Plantations.

Stony Red MARL is greatly valued by the farmers for making a good manure: for, though it is almost as hard as a stone when laid upon the surface of the earth, it will crumble to bits, which perhaps is owing to the rain, as it will break to pieces in about ten hours time in water. Fire makes little alteration in it, and it is found in several parts of England.

RUDDLE, by some called Red Ochre, and by others Marking Stone, is a sort of Marl of a thin texture, and very brittle. It is of a red colour, and has a smooth soft surface. When burnt it becomes pretty hard, but does not change the colour. It is used in the country for marking of sheep, and by the painters for colouring of pales, window shutters, and the like. The best is said to be brought from Derbyshire.

Red Heavy Hard MARL is firmer and drier than the former, it being of a regular close texture, and composed of several thin plates lying close upon each other. In the fire it burns to a darker red, and grows much harder. It is used by the furriers to mark with.

Brown Brittle MARL is of a loose texture, and easily crumbles, but makes a very good manure. It is sometimes variegated with grey, and sometimes with black, and is a little dry and dusty to the touch. When burnt it becomes of a pale red, and somewhat more hard. It is used to manure grass land in Suffex.

Fullers EARTH is well known almost to every one, being commonly used for getting greasy spots out of cloaths. It is soft, and of a greyish colour; but sometimes paler, and sometimes of so deep a colour as to be almost black; though it has always a greenish cast. It melts freely in the mouth, and for its softness and smoothness is sometimes called Soapy Earth.

Green Fullers EARTH is the most dense and compact of all kinds of Marl, and is of an even smooth texture, being extremely soft and oily to the touch. It melts freely in the mouth, and in the fire turns to a very pale brown. It is found in Germany, where it is used as common Fullers Earth.

Green Sandy Brittle MARL, though very heavy, is of a loose texture, and easily crumbles in pieces. It is found in many parts of England, and is used in Suffex to manure clay lands.

Black Brittle MARL is of a loose texture, easily crumbles, and is very heavy; though it is of a brownish black, it does not stain the hands. It is found in Mendip Hills in Somersetshire, above twenty feet deep in the earth.

CHAPTER V.

Of LOAMS or EARTHS found in Strata or Beds.

THE WHITISH LOAM is coarse, loose, soft, and moist, while in the stratum; and though it is easily cut with a spade, it will not stick thereto. When dry it is of a loose crumbly texture, considerably heavy, hard, harsh, and gritty to the touch. It does not at all stick to the hand, but will melt freely in the mouth, and makes a slight hissing noise when thrown into the water, where it almost immediately falls into a loose powder. It is composed of a large coarse white sand, united to a greyish marly clay, and will burn to a pale brownish red. It is sometimes mixed with stiff clays in making of bricks.

The Brownish White LOAM is of a fine even texture, and consists of very fine white sand joined to a pale brown clay. When it is cut with a spade it leaves an even surface, and when dry it is of a whitish brown colour, but very pale. It does not break very easily between the fingers, nor does it stick to the hands; but it will melt in the mouth, though slowly, and makes a violent effervescence with aqua fortis. It is used for making bricks mixed with clay, and then turns to a pale red colour.

The Pale Yellow LOAM is of a spongy texture, and consists of white sand united to a yellow clay. When it is cut with a spade, it leaves irregular masses, with a rough uneven surface behind it, and when dry it is loose and spongy, and seems mixed with a great number of shining particles. It is harsh and dry to the touch, and crumbles readily between the fingers, but does not stick to the hand. It makes an effervescence with aqua fortis, and turns red in the fire; but it is never used alone for bricks.

The Rough Yellow LOAM consists of a coarse yellowish sand, joined to a pale yellow clay, which in a few places is white. It is smooth when cut with a spade, and when dry is extremely hard. It makes no effervescence with aqua fortis; but when thrown into the water it makes a little hissing noise, and soon falls into a loose powder. It turns to a deep red in the fire, makes excellent bricks for building furnaces for melting iron, and even endures the fires of the glass-houses; it also makes fine lutes for chemical vessels. It is met with near Hedgerly, five miles from Windsor, and bears a considerable price.

The Deep Dusky Yellow LOAM consists of a deep yellow and a whitish sand, with a very little clay, and is very harsh and coarse. It is moist in the stratum, and

and when dried is of a loose texture, readily crumbling between the fingers without sticking to the hands. It makes no effervescence with aqua fortis, nor does it hiss when thrown into water. It is used for making bricks when mixed with good clay.

The Hard Brown LOAM consists of large white sand and deep brown clay; it is very hard, but not tough, though it cannot be got up without pick-axes: when dry, it is very hard and heavy, and will not break between the fingers. It will not hiss when thrown into water, nor make an effervescence with aqua fortis. It is often full of small sea-shells; and in Northamptonshire it is so full of them that they make floors for barns therewith; it likewise serves to make roofs for ovens and other purposes.

The Light Pale Brown LOAM is the lightest and most spongy of any of this kind, and is composed of fine pale yellow sand, mixed with light brown clay. When dry, it crumbles easily between the fingers, and sticks a little to the hand. It will not effervesce with aqua fortis, but when thrown into water makes a little hissing, and almost immediately falls into a loose powder.

The Yellowish Brown LOAM consists of a white and yellow sand, together with a small quantity of fine brown clay. It is moist in the stratum, and when dry is of a loose crumbly texture, with a rough and somewhat dusty surface. It makes an effervescence with aqua fortis, and hisses a little when thrown into water. This sort alone will make fine red bricks.

The Greyish White LOAM is composed of a fine white sand and a pale bluish clay, spangled with a great number of small plates of talc. While in the earth it is moist and soft, but when dry is very heavy and compact, with an even smooth surface; but it will not break between the fingers, nor stick to the hands. It raises a great effervescence with aqua fortis, when thrown into water makes a slight hissing, and after a little time breaks into small lumps. When burnt it becomes very hard, is of an agreeable reddish colour, and will make good bricks when mixed with a proper clay.

The Pale Yellow LOAM is of a loose spongy texture, and consists of small whitish sand with a pale yellow clay. It is pretty tough in the stratum, as well as moist; but when dry it becomes firm and hard, and is spangled with talc. It will not break readily between the fingers, nor stick to the hands, nor yet make any effervescence with aqua fortis: when thrown into water it makes a very little hissing, and soon falls into a loose powder. It is proper for making fine red bricks.

The Yellowish Brown LOAM has a very loose texture, and is composed of yellowish sand with fine brown clay. It will not effervesce with aqua fortis, but it makes a very small hissing when thrown into water, where it moulders into powder after some time. Mixed with ashes it is greatly used near London for making bricks.

The Reddish Brown LOAM consists of a hard whitish sand, and a reddish brown clay. It is pretty firm in the stratum, and when dry becomes very hard and heavy. It will not effervesce with aqua fortis, and it hisses but little when thrown into water, where it falls into powder after some time. This Loam serves for making bricks in many parts of England.

The Red Sandy LOAM consists of fine pale yellow sand, and a bright red clay, mingled with fragments of a very red iron ore, and a great deal of reddish dusky spar. While it is moist it is quite loose, and of a very deep red; but when dry it is of a pale red, and of a very loose texture, for which reason it crumbles to powder between the fingers. It will effervesce with aqua fortis, and burns to a fine florid red. The land composed of it is very proper for rye, barley and pease.

The Brittle Brown Sandy LOAM is an earth partly sandy and partly stony, and when dry will not keep together in a lump, the texture being so loose and spongy. It makes a brisk effervescence with aqua fortis, and hisses pretty much when thrown into water. Those lands that consist of this are accounted poor and barren.

The Greyish Brown Sandy LOAM is composed of small white sand mixed with pebbles, and is full of cavities which are smooth and glossy at the bottom. It is pretty tough and very heavy, and has a rough rugged appearance, without any dust on the surface. It does not readily crumble to powder, nor does it stain the hands. It makes little or no hissing when thrown into water, nor does it effervesce with aqua fortis. Land consisting of this is very good for barley.

The Heavy Yellowish Brown Sandy LOAM is composed of a great number of different hard particles; a brown gritty stone, a yellow sand, pieces of spar, and a very glittering bright white sand, with a brownish spongy earth. It is hard, heavy and somewhat tough, and in dry seasons breaks into very large masses, though it is of a very brittle loose texture. It is very dusty and hard when dry, and very sticky in wet seasons, which renders the walking on it very slippery and troublesome. It makes a considerable effervescence with aqua fortis, and burns to a pale red with very little hardness. Some of these last are more properly called Moulds than Loams; though they are placed in the same class.

CHAP. VI.

Of OCHRES.

LIGHT Brittle Pale Yellow OCHRE is between the colour of brimstone and what is called a cream colour, and is of a loose crumbly texture, it being composed of very thin fine plates. It is extremely light, and separates into flakes, in the fire, of a dull reddish brown colour. It is found in Pennsylvania and Virginia, and with water makes a straw colour, but with oil a pleasant yellow.

Hard Heavy Pale Yellow OCHRE is well known to the painters, and is of a close, compact, firm texture, with a smooth even surface; when burnt in the fire it turns of a dull pale red, and becomes considerably hard. It is found in several parts of Europe; and particularly in Somersetshire.

Light Crumbly Yellow OCHRE is commonly seen at the mouths of the springs of the Spa kind, and at present is made very little use of; nor can it be expected in any large quantities. In the fire it turns to a pretty good red.

Light Brittle Gold Coloured OCHRE is found in small lumps in the earth, and is very light, being of a crumbly texture, and stains the hands of a true gold colour. It turns to a bright red in the fire, and becomes a little more hard. It is common among gravel in several parts of the kingdom, particularly on Mendip Hills, where it lies in the clefts of the strata. It is also in a gravel pit on the right hand of Oxford Street, about a mile from London. When burnt it turns to a red, and might probably be of use to painters.

Light Plated Saffron Coloured OCHRE is sometimes found making a stratum, and sometimes in the perpendicular clefts of other strata, and is of a soft crumbly texture, with a rough and even surface, but colours the hands with a very beautiful yellow. It burns to a dusky red, and is common in Northamptonshire and Staffordshire.

Common Yellow OCHRE is a dense heavy earth, of a dull yellow colour. It ferments pretty much

with aqua fortis, and burns to a pretty good red. It is greatly used for house painting.

Hard Heavy Clayey Yellow OCHRE is very compact, and when dry is of a very fine bright yellow, with a smooth glossy surface. It burns to a red, but crackles in the fire. It is found in Buckinghamshire and Yorkshire, and is sometimes used by the painters.

Stony Hard Heavy Yellow OCHRE is in great plenty about Oxford, but it is so hard that it is not to be cut with a spade, and therefore they are forced to use pick-axes. It crackles a little in the fire, and turns to a fine red. It is used by the painters.

Dull Dusky Yellow Clayey OCHRE is found in several parts of England, and is dense, compact, and heavy. It is of a dusky unpleasant colour, though it burns to a very fine pale red, and becomes almost as hard as stone.

Light Clayey OCHRE, of a brownish yellow, is sometimes found among other strata, and in their perpendicular clefts. The surface is smooth and glossy, and the texture very fine; it burns to a dead dusky brownish red. It is found in several parts of England, and being of a good body is used by the painters.

NAPLES YELLOW is of a bright beautiful colour, between that of gold and saffron; but it is very loose, spongy, brittle, and porous, and ferments pretty briskly with aqua fortis. When burnt it turns to a deeper yellow, and is found in Italy, particularly about Naples. It is generally esteemed a pretty good colour.

Brittle Heavy Red OCHRE is common in several parts of England, and is of great use among the painters. It crackles a little in the fire, where it becomes more hard, and of a paler colour. It is used by painters for priming the coarser sort of works.

Brittle Purple OCHRE is common in Spain, of a very fine colour, and, though of a loose texture, weighs very heavy. It is of a fine deep purple before it is dug up, and when dry it turns red. It is a strong Alkali, and therefore ferments greatly with aqua fortis; in the fire it turns to a paler colour.

INDIA RED is a very fine purple earth, of a firm, compact, and hard texture, it being heavy, and almost as hard as a stone. Before it is dug up it is of a blood colour, but when dry of a fine glowing red, and is full of bright glittering particles of a whitish colour. In the fire it burns to a greater hardness without much changing the colour. It is found in the Island of Ormus in the Gulph of Persia, from whence it is by some called the Persian Earth.

Bright Red Brittle OCHRE is found in Bengal in the East Indies, and though used in France is not much known in England. It is of a fine, bright, florid red, and pretty heavy, though it crumbles between the fingers, and stains the hands. It ferments with aqua fortis, but undergoes little alteration in the fire.

VENETIAN BOLE is a sort of an Ochre, and is well known among painters, it being of a fine bright pale red, being pretty nearly of the colour of Red Lead. It grows harder when burnt, but the colour is worse. It is brought hither from Venice.

Pale Red OCHRE is light, brittle, and of an alkalious nature, for it ferments very briskly with aqua fortis. It somewhat resembles the Venetian Ochre, only it is brighter, and of a little paler colour. It is found in Florida, and is very probably in other parts of America, though it is not much known in England.

Pale Red Clay OCHRE is found in North America, and, though pretty heavy, is of a loose, brittle texture. It is nearly of a flesh colour, and burns to a good red in the fire. It is at present made no use of.

No. 42.

EARTH of Sinope is so called from a town of that name in Natolia, and is a sort of a Bole, sometimes of a deeper, and sometimes of a paler colour. It has been sometimes used in medicine, on account of its being of a drying nature, and particularly in fluxes of the belly.

Red CHALK is of a very dense compact substance, and is of a dull red colour. Some use it in the manner of crayons, or rather like black lead pencils. It is very well known to painters, and therefore needs no farther description. It is found in several parts of Europe, and particularly in Flanders.

Red Stony Ochre is the hardest and driest of any of this kind, and is found in regular strata in the earth, but is so hard that it cannot be got up without pick-axes. It is of a fine purplish red, and is very heavy, being mixed with fragments of Lead Ore, of a bright bluish colour; as also a small quantity of pure native Cinnabar. It burns to a fine red, and becomes more hard in the fire. The painters call it Indian Stone Red, it being brought from China; but it is very scarce.

Brown UMBER is a sort of Ochre, and is greatly used by painters. It is found loose in small lumps among gravel, and sometimes in the perpendicular clefts of other strata. It is very light, though of a close compact texture, and burns to a deep brown in the fire. It is generally brought from abroad, there being very little of it in England, though it is thought to be in Mendip Hills in Somersetshire.

COLOGN EARTH, commonly called Cullens Earth, is well known among the painters, and is of a dusky brown, with a close, compact, fine texture, but extremely light. It is not at all gritty, and has the taste of oak bark. Being thrown into the water, it swims on the surface till it is quite wet, and soon breaks into a very fine powder. It is easily set on fire, and never goes out till it is reduced to pale yellow ashes; from whence it appears to be of a vegetable nature, owing its origin to wood long buried in the earth. It is brought to us from the city of Cologne.

The ARMENIAN STONE is very opaque, and mixed with green, blue, and black spots, somewhat in the manner of Lapis Lazuli. It is of an even, regular texture, and the general colour is a beautiful blue. Some think it differs in nothing from Lapis Lazuli but in hardness, and is like that very scarce. It was formerly used in medicine as a purge and vomit, and the dose was from six grains to a scruple; but it is now out of use, except among the painters, for when it is prepared it yields a fine blue colour, with a greenish cast.

Green OCHRE, or TINCAL, is of a dense, compact substance, though of a coarse irregular texture, the surface being rough and uneven, and the colour of a pale green. It is found in many parts of Germany in and near the copper mines, and it partakes very evidently of copper. By burning it turns to a hard dusky brown Ochre, and therefore is only used in its natural state, it being reckoned a very good paint.

Heavy Brittle Black OCHRE is found in masses of different sizes, in the perpendicular clefts of stone. It is of a fine deep black, and of a compact, even, close texture, though it breaks very readily into small pieces between the fingers, and slightly stains the hands. It is common about Mount Sorrel in Leicestershire.

Black CHALK is found in broad flat pieces from two to ten feet long in the earth, and from four to twenty inches in breadth. It is moist and flaky when just taken out of the ground, but soon becomes pretty hard, and very light. It will cleave very easily one way, and seems to be the offspring of wood buried in the earth; for it will burn, but not

so long as Cologn Earth. It is much used in painting, and is to be met with in Spain, Italy, and Germany.

C H A P. VII.
Of B O L E S.

A BOLE is a heavy fat earth, which readily adheres to the tongue, and colours the fingers. It is of various kinds.

ARMENIAN BOLE, or **BOLE ARMENICK**, is sometimes white, and moderately heavy, being of a close compact texture, and having a very smooth surface. It is very scarce, and therefore being quite unknown to the shops it need not be insisted upon.

White Brittle BOLE is moderately heavy, with a smooth surface, though it will crumble between the fingers. It will ferment with aqua fortis, and in the fire may be burnt to a sort of Lime. It is brought from Germany.

NOCERIAN EARTH is very heavy, and of a greyish white, but not so brittle as some of this kind. It has no taste, nor does it ferment with aqua fortis. It is met with in Italy, and some think it good for the bite of mad dogs, and in malignant fevers.

ERETRIAN EARTH is a fine kind of Bole of a greyish white colour, and pretty heavy, with a smooth surface, though it crumbles very easily between the fingers. It ferments very briskly with aqua fortis, and in the fire it turns perfectly white and as hard as stone. When a little wetted and drawn over a copper-plate, it will leave a line behind it, which in a short time turns bluish. It is dug up in Negropont, near the antient Eretria, from whence it has its name.

Whitish ALKALINE BOLE is hard, of a close compact texture, and like other Boles melts gradually in the mouth. It ferments but slightly with aqua fortis, but in the fire turns to a pure white. It is found in the East Indies.

The **Yellow ARMENIAN BOLE** is of a saffron colour, and of an earthy, heavy, fat, brittle substance, with an astringent taste, it is of a close compact texture, with an extremely smooth surface and very hard; but it melts on the tongue, though very slowly. It ferments briskly with aqua fortis, and in the fire becomes more hard, and of a deeper colour.

BOLE of Blois is of a pale yellow, and of a compact texture, but very light, and readily crumbles between the fingers. It ferments violently with aqua fortis, and becomes almost as hard as stone in the fire, turning to a much darker colour.

BOLE of Tokay is of a yellow colour and brittle, but very fine, and considerably heavier than the former. It melts easily in the mouth, and ferments violently with aqua fortis; in the fire it becomes considerably hard, but does not change the colour.

SILESIAN SEALED EARTH is a sort of Bole which is pretty heavy, and of a compact texture, with a smooth surface. It turns to a kind of chocolate colour, in the fire, and becomes considerably hard; but is a stranger to our shops.

LIVONIAN EARTH is a very fine Bole, and very brittle; it is of a dully dusky yellow with a reddish cast, and its surface is smooth and glossy. It becomes of a harder texture and a darker colour in the fire, and is usually sealed with the figure of a church, an escutcheon, and two cross keys. It is not only found in Livonia, but in Spain and Portugal, wherewith they make a sort of earthen ware.

BOHEMIAN BOLE is of a deeper yellow than that of Tokay, it having a small mixture of red. The surface is very smooth and shining, and it melts readily in the mouth.

Red BOLE ARMENICK is the hardest of all

Boles, and is of a reddish yellow colour, not unlike that of saffron. It melts readily in the mouth, and has an astringent taste. That is the best which will most readily beat to powder with a pestle, or dissolve in water, without the least sandy sediment. Its virtues have been greatly cried up in various disorders; but it is now seldom met with in the shops.

FRENCH BOLE is of an earthy substance, and of a pale yellowish red; it is heavy, brittle, and of an astringent taste. It ferments very slightly with aqua fortis, and in the fire becomes of a somewhat redder colour. It is often mixed with sand or small stones, and therefore it should be mixed with water before it is used, and poured off, after the grosser parts are sunk to the bottom. It is reckoned a good astringent, and is now used in the room of all other Boles, but seldom alone.

The **Sealed EARTH of Striga** is of a deep dull red, and has a tolerable smooth surface. It will crumble between the fingers, and melts readily in the mouth. It ferments a little with aqua fortis, and becomes harder in the fire, without any change of colour.

Red Sealed EARTH of Livonia is considerably heavy, though of a loose texture, and of a paler colour than the red Silesian Bole. It dissolves readily in water, and has a strong astringent taste. The fire makes little or no alteration in it.

TUSCAN Sealed EARTH is a heavy pale red Bole, with a smooth surface, and easily breaks between the fingers. It grows hard in the fire, and the colour becomes somewhat more dark. It is dug up near Florence, and is said to be good in loosenesses and excessive bleedings.

PORTUGAL EARTH is a brittle, heavy, fine red Bole of a close texture, with a smooth shining surface. It becomes a little harder in the fire without change of colour, and is very common in the northern parts of Portugal.

TURKEY Sealed EARTH is of a greyish red colour, and of a looser texture than some other Boles. The surface is soft and smooth, and it breaks easily between the fingers; in the fire it becomes considerably hard, and of a dusky yellow colour. It is said to be good in the plague, and to promote sweat. The hard pale red Bole is moderately heavy, and remarkably hard. It is of a beautiful pale red, or rather of a flesh colour, with a very smooth glossy surface. In the fire it becomes as hard as stone, and the colour acquires somewhat of a blue. This is found in North America among our plantations.

Pale Brown Hard BOLE is very pure, of a compact texture, and moderately heavy. It consists of thin plates laid closely upon each other, and has a smooth shining surface. It cracks and bursts in the fire, flying off in small flakes at first; but afterwards becomes considerably hard, and of a pale red colour. It is met with in Germany, as well as in America, and in some parts of England.

Pale Brown Heavy Dense BOLE is very compact, and speckled with white and yellow. The surface is a little rough, but it may be polished by rubbing; It burns to a dusky red, but does not acquire a much greater hardness; it is found in many parts of Germany.

Light Brittle Round Bole is of a looser texture than others of this kind, and is less weighty. It has a smooth equal surface, but readily crumbles between the fingers. It easily dissolves in water, and is a little astringent to the taste. It becomes considerably hard in the fire, and turns to a dark dusky red colour. It is found in several parts of England.

Greenish BOLE is very fine and beautiful, and considerably heavy. It is compact, and of a pale dusky greenish colour, with a smooth glossy surface. It has a brackish disagreeable taste, without any remarkable

markable astringency. It becomes considerably hard in the fire, and turns to a dusky brownish red. It is found in the West of England.

C H A P. VIII.
O F T R I P O L I E S.

SILVER CHALK of the antients is of a snow white, and its texture is somewhat loose and spongy; for it is very light, and has a rough uneven surface. It easily breaks between the fingers, and has a taste like that of Pumice stone, but with no sandy grittiness. It grows hard in the fire without changing colour, and is found in Prussia, where it is used for cleaning and polishing silver vessels, from whence it has its name.

The **Yellow TRIPOLI** is of a firm texture, moderately heavy, and is only yellowish in the Earth; for when it is dry it becomes white, and almost as hard as stone. In the fire it turns to a beautiful pale red: it is found in several parts of Europe; but the greatest quantity is met with in Africa. It is called Tripoli from a city of that name in that part of the world. This and the former, as well as all of this kind, are composed of harder particles than Ochre, for which reason they are of greater use in polishing metals.

Reddish White TRIPOLI never makes a stratum in the earth of itself, but is found in distinct masses among other strata. It is pretty hard; though of a loose texture, and consists of a multitude of plates or flakes lying upon each other. It is met with in Germany, and on Mendip Hills in England. It is used in polishing brass.

The **Melian EARTH** of Dioscorides is a hard, heavy, ash coloured Tripoli, and is of a loose, open, spongy texture, very readily falling into powder, it being very brittle. It consists of very harsh particles, and is extremely rough to the touch. It has a disagreeable styptic taste, somewhat like Alum; but the fire makes no great alteration in it. It is found in the islands of the Archipelago; but it is not much known in England, and consequently not used by workmen.

Light Brittle Greenish Red TRIPOLI is of a loose spongy texture, and remarkably light, with a rough uneven surface. It easily breaks between the fingers, but does not colour the hands, and undergoes no alteration in the fire. It is found in several parts of the world, as well as in Somersetshire.

ROTTEN STONE is a sort of Tripoli of a brown colour, and is very soft and light while in the earth; but out of it becomes more hard. Its texture is light and spongy, and it is dry, hard, and rough to the touch. It becomes a little more hard in the fire, and acquires a reddish cast. It is found in Derbyshire, Shropshire, and Somersetshire, and is of great use in polishing brass.

Hard Pale Brown TRIPOLI has sometimes a little cast of red, and is somewhat heavy, it being of a close compact texture, and almost as hard as stone; but it is more smooth than other Tripolies. In the fire it becomes more reddish. It is found in Wiltshire, and serves for the same purposes as the former.

Sparkling Brown TRIPOLI is the heaviest of this kind, though it is of a loose texture. It seems to abound with a sort of spangles that glitter pretty much, though the surface is rough and irregular. It ferments briskly with aqua fortis, and in the fire becomes of a fine red, and pretty hard. It is not very uncommon in England, but has never been put to any use.

Brownish Red Sparkling TRIPOLI is very light, it being of a looser texture than any of this tribe;

but it is full of a great number of large glittering particles, and has a rough irregular surface. In the fire it undergoes little alteration. It is found in Wiltshire, Suffex, and other parts of England. It is not fine enough to be used for any thing else but polishing Brass.

C H A P. IX.
O F I S I N G - G L A S S , M O S C O V Y - G L A S S , a n d
T A L C .

I S I N G - G L A S S consists of shining scaly particles, or flat plates, and that called Moscovy Glass is of the same nature; or rather, both these names are given to the same substances.

White Shining I S I N G - G L A S S is usually found in masses of a smooth and even surface, except at the edges; it is sometimes from eight to twelve inches broad, and from half an inch to three thick. It will cleave into innumerable thin plates or flakes, and is as transparent as the finest glass, instead of which it is used for putting before small prints generally designed for children, as also by some miniature painters for covering their pictures. They may be split, with care, so as not to be thicker than leaf gold, and yet still have a sort of springiness or elasticity, for which it is very remarkable. In the fire it becomes as white as silver, but then it ceases to be transparent. It is found in various parts of the world, particularly in Russia or Moscovy.

Bright Brown I S I N G - G L A S S is not so beautiful as the former; but it has much the same texture, and, like that, will cleave into plates or flakes; but the surface is not quite so even. It is very bright, though not so transparent as the former, and is more subject to flaws and cracks. It soon becomes white and opaque in the fire, and then readily breaks to pieces, though it seems to be adorned with silver spangles. It is found in Germany; and it is said, there have been small pieces of it met with in England.

Bright Purple I S I N G - G L A S S is as even and regular as the first kind, and may be cloven into as many flakes as that. While the flakes are pretty thick they are of a fine beautiful colour like an amethyst; but when split into thinner plates it becomes paler, and in the thinnest of all, the colour is wholly lost. It also loses its colour and transparency in the fire, becoming entirely white. It is found in Moscovy and Persia, and by some it is called Red Talc.

TALC is a shining stone, and will split into very thin plates, which are transparent and a little flexible. It will not melt in the fire, nor will it admit calcination, nor lose its colour. It is of various kinds.

VENETIAN TALC is well known for the several attempts that have been made to reduce it into a sort of paint to beautify ladies' faces. Linnæus calls it Whitish Talc, consisting of plates almost transparent, which feel like suet to the touch. The masses of Venetian Talc are from one to five or six inches in diameter, with a very rude irregular surface, full of prominences and cavities. It is of very little use in medicine, it being employed only as a cosmetic to render the skin more white and shining. The best way is to reduce it into an impalpable powder, the shortest way of doing which is to heat it red hot in the fire, and then quench it in cold water; this must be done several times, after which it may be ground upon a porphyry into an exceeding fine powder shining like silver. This, when mixed with pomatum, is what the ladies call cold cream. The chemists have endeavoured to get the oil of Talc, but without success; though they suppose it would

would turn brass into silver. If any thing of this kind has ever been procured, it has been owing to the additions, and not to the Talc itself.

Shining Black TALC, with small leaves, is of an irregular complicated texture, like the former, and is found in masses, which have a rugged surface from one to four inches in diameter. They are composed of a prodigious number of irregular scales very closely but unevenly laid together, which will easily split into irregular flakes. None of the Talcs, nor yet the Ising-Glasses, can be made to strike fire with steel, for which reason they are called by Linnæus, *Apyri*, that is, without fire. They likewise remain unchanged in the fire, and cannot be dissolved by acids.

Shining Gold Coloured TALC, with small spangles, is called by some writers *Mica aurea*, from its shining like gold. It is found in small masses of a loose, irregular, brittle texture, with an uneven surface, but never exceeding an inch and a half in diameter. It is composed of a multitude of small flakes or spangles, with sometimes a mixture of a sort of crystal. These flakes are very small, being seldom above a quarter of an inch broad; but they are extremely smooth and soft to the touch. It is found in several parts of Europe, particularly in England.

Shining TALC, with the appearance of silver, has spangles of various sizes, is known to some by the name of Glimmer or Cat-silver, and is very brittle, readily parting into flakes of which it consists. The masses are very small, being seldom above the fifth part of an inch in length. It is found in several parts of Italy, as well as in England, and in some places looks like shining sand.

Greenish Shining TALC, with very small spangles, is of a very pure kind, though it does not shine so much as the two former; but it is very brittle, and of an irregular shape, with a rough scaly surface. Its masses are found from one inch to eight or ten in diameter, which seem to be composed of very small spangles, which will readily stick to the fingers in handling. It is found in great plenty on the shores of Italy, and there has been some found in England, on Mendip hills, but in no great quantity.

Greyish Green TALC, with small scales, is of a very dull colour, and has a distant resemblance to the Venetian Talc, though the structure is very different. The flakes are of different sizes, but usually small, and lie in various directions, being of no determinate shape, and they are not so transparent as the other kinds. It is found on the shores of Yorkshire and Lincolnshire.

Grey Shining TALC, with very thin scales, is rather brighter than any of the former kinds, and consists of a vast number of plates or flakes, lying in a very confused and irregular manner, and of various sizes and shapes, the larger not being above half an inch in breadth. In the fire it turns as yellow as gold, and shines like it, it being the only Talc that changes in the fire. It is very common on the English shore.

Bright Green Shining TALC, with broad spangles, is found in masses that are composed of others that are smaller, and these consist of very fine thin plates, which are generally wrinkled and turned several ways. The colour is very beautiful when unbroken; but, when the flakes are separated from each other, it is quite lost. It is considerably heavy, and loses its greenness and transparency in the fire. It is found in the beds of rivers in Italy.

Shining Greyish Yellow TALC, with small scales, makes a very splendid appearance, and is found in masses of eight or ten inches in diameter, which are composed of a great number of very broad, thin, light flakes. The surface is bright and glossy, but never even. In the fire it loses all its

yellowness. It is found very frequently on the shores of Italy.

White Sweet-Scented TALC, with undulated scales, is by some authors called the Violet stone, on account of its smell. It is found in masses of a very compact and firm texture, though rough and irregular on the out-side; these are from an inch to twelve in diameter; they consist of a prodigious number of thin snow-white flakes adhering very closely to each other. These are of various sizes, without any regularity, and lie in all directions, being as soft to the touch as those of the Venetian Talc. In the fire it turns to a dusky brown red. It is common on the shores of Italy, and on the mountains of Germany.

Besides these, there are other TALCS not so easily cloven as the former, which consist of small plates in the form of spangles, and consequently are very distinct from the former.

The Shining Bluish Brown TALC is usually found in masses of a pretty firm compact texture, with rugged unequal surfaces, and in the shape of pebble stones, from the size of a horse-bean to five or six inches in diameter. It consists of small, but generally thick spangles cohering firmly to each other, and, though irregular, nearly of the same shape. They are very hard and harsh, feeling more like stone than common TALC, and consequently are hard to be separated from each other. They are very heavy, and yet will not strike fire with steel; but the fire will bring them to a pale reddish grey without transparency.

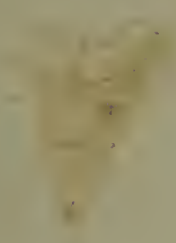
Dull Pale Red TALC, with scales of various sizes, is usually found in masses from two to eight inches in breadth. It is composed of a vast number of scales that lie closely together in a very agreeable order; but they are mixed with an opaque substance of the same nature with the scales, only they are not of the same shape, nor well disposed: They seem to have very smooth and even surfaces, and are as smooth to the touch as Venetian Talc, to which they seem to have some distant relation. Though this Talc is considerably heavy, it will not strike fire with steel, but will turn in the fire to a pale whitish grey. It is very common on the shores of Lincolnshire.

The East-Indians have a Heavy, Shining, Orange-Coloured TALC, which has a smaller number of plates than any of the other kinds. They have likewise another bright purple Talc, which is so clear and elegant, that it might not improperly be placed among gems.

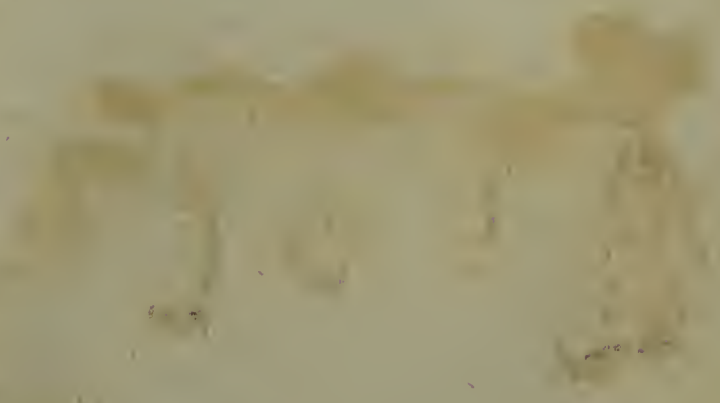
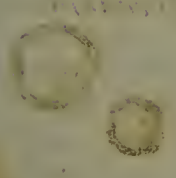
There are other TALCS that seem to be chiefly composed of fibres or filaments, and are, therefore, by authors called fibrous Talcs.

ENGLISH TALC, so called in the shops, is of a coarse, harsh, rough kind; with an unequal surface, and of a loose brittle texture. It is found in masses from one to eighteen inches broad, and seldom more than two inches thick. It has a rough, irregular, wrinkled surface, and consists of considerably long coarse fibres, that run pretty regularly through the whole mass. It may be easily cloven according to the directions of the fibres, which, however, are so brittle that they seldom come off whole. It is of a dull, dead, whitish colour, and the filaments, when separated, appear a little glossy. It will not strike fire with steel, but when calcined it turns to a perfect white. It is found in clay and marl pits, as well as among the strata of gravel; and the fissures of stone, and it will burn into a very good plaster, for which reason it is called the plaster stone; when burned it is used for cleaning silver lace.

Glossy Yellowish White TALC, with broad straight fibres, is of a very close texture, and is found in thick flat masses of a very beautiful straw colour, but is seldom three inches over either way. It is composed



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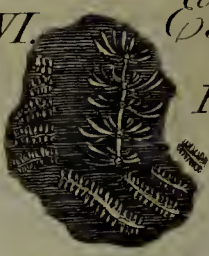
F O S S I L S .

Class VI. Extraneous Fossils.

Plants in Stone.



American Fern



Horsetail



Stellate Plants



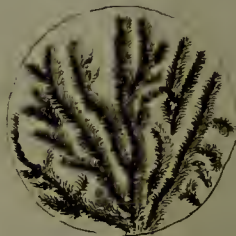
Mosses



Ear of Corn

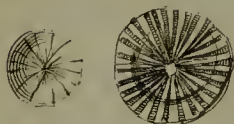


Leaves of Trees



Class VII. Corals

PORPITES



Astroites or STAR Stone.

PORUS



TIBULARIA



JUNCI Lapidei



CALAMUS Indicus



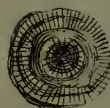
LITHOSTROTION



MYCETITES



CORAL

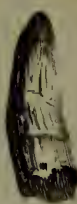


Class VIII. Fishes Teeth.

GLOSSOPETRÆ or Lamiodontes.



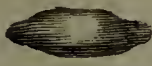
CONICHTHYDONTES or Plectronitæ



BUFONITE or Lycodontes



ICHTHYPERIA or Siliquastra



composed of filaments that are perfectly straight, and may be very easily cloven; but the fibres cannot be divided singly from each other, being so very brittle. It turns in the fire to a pure white, and is found in the stone pits of Northamptonshire.

Bright white TALC, with broad filaments, is of a loose brittle texture, and is found in large broad and pretty thick white masses, and where fresh broken it is very glossy and bright. The filaments are much broader at the top than at the bottom of the mass, it being above an inch upwards, and very even and glossy; they may be cloven very thin, but they will not bend, having no spring. It calcines in the fire to a white plaster, and is very plentiful in the alum pits of Derbyshire.

Flesh-coloured Fibrous TALC, with narrow filaments, is not so bright as others of this class; but it is of a fine smooth close and compact texture. Its horizontal surfaces, formed by the ends of the fibres, are smooth and even, but not glossy. The masses are from three to twelve inches broad, and sometimes five inches thick. It consists of single fibres, which run throughout the whole length of the mass without interruption; but they are very brittle, though smooth and glossy. It will easily calcine in the fire, and will turn into very good plaster. It is chiefly found in Yorkshire.

Dull White TALC, with very sharp narrow filaments, is of a very compact firm texture, though it is only found like white veins in other substances, particularly red marl. The fibres are of various lengths, but they are all continued without interruption through the veins, and are from the breadth of a horse hair to half an inch. It will not easily cleave, and when it does, it is not perfectly straight, because the filaments run a little obliquely.

The Greenish White Glossy TALC, with straight narrow filaments, is of a perfectly even and regular texture, being very firm, compact and hard. It is found in broad thin masses of a fine glossy white, with a greenish cast, from two to fourteen inches broad, and to an inch and a half thick. When held up to a good light it is pretty transparent, and in the fire turns perfectly white.

CHAP. X.

Of FOSSILE SUBSTANCES that are not elastick, and composed of short Fibres.

SOME authors call these Lachnides, from *Lachne*, a Greek word, signifying hair or down.

The Flesh-coloured Pale Glossy LACHNIS, with short, broad, and crooked filaments, is found in very broad flat masses of a whitish flesh colour, which have a very smooth, even, and somewhat glossy surface at the top and bottom; some of them are eight or ten inches broad, and from one to four thick; and they are composed of flat broad filaments, irregularly placed, and lying in oblique angles. These masses will cleave perpendicularly according to the direction of the filaments, though they adhere pretty closely together at their sides, and have very smooth glossy surfaces. They will neither ferment with aqua fortis, nor strike fire with steel; but in the fire they will turn to a perfect whiteness. It is found in the marl pits of Derbyshire, but is of little use.

Greenish-White Glossy LACHNIS, with broad oblique filaments, is found in large, broad, thick masses, with its horizontal surfaces very uneven, rough, and rugged. It is sometimes seen near two feet broad, and six or seven inches thick. It consists of pretty bright glossy filaments that are very broad, but placed in no regular order, nor continued through the whole thickness of the mass, which

separate it transversely into several rows, separated by narrow veins of greenish white marl. The whole mass is easily cloven and separated into transparent filaments that will not bend. When in the fire it soon calcines to a white plaster.

Dull Greyish White LACHNIS, with thick oblique filaments, is of an extremely compact and firm texture, and is found in very large, thick masses, from two to eighteen inches in diameter, and nearly as thick the other way. It is composed of eight or twelve rows of filaments, sometimes making angles with each other. It is not easily cloven, the filaments being so harsh and brittle, that they are separated with difficulty to any tolerable length. It is very heavy, and yet it will not strike fire with steel, nor will it very easily calcine into plaster.

Dull White LACHNIS, with straight broad filaments, is of a pretty close texture, and extremely brittle. It is found in short thick masses, from two to six inches in breadth, and sometimes four inches thick. It is only composed of two rows of filaments that are pretty broad and very irregularly placed, meeting each other at the centre; they are so extremely brittle that they can never be cloven directly. It will turn to a very good plaster very soon in the fire, and is found in the marl pits of Derbyshire.

The White Glossy LACHNIS, with broad oblique filaments, is of a very irregular texture, but very glossy. It is found in large flat masses, from two to ten inches broad, and from half an inch to above an inch thick. It consists of several rows of very broad glittering filaments, confusedly woven with each other at their ends, and they are all very short and broad, though bent and waved in different manners, making all sorts of angles with each other. It is hard to be cloven, nor can the filaments be easily separated, they have so firm a consistence. They are soon turned by fire into a fine white plaster. It is very common in Yorkshire in the blue clay pits.

Dull Flesh-coloured LACHNIS, with broad, short filaments, is very brittle, and of a coarse, harsh, irregular structure. It is often found from eight to twelve inches broad, and six inches thick. It consists of broad, short, and very obliquely ranged filaments, divided into three or four beds, by the thick horizontal earth it is lodged in. The filaments are short and crooked, and adhere slightly to each other on the sides, which render the mass very brittle and easily cloven. It is easily burnt into plaster, and is found in the alabaster pits in Derbyshire.

The beautiful Flesh-coloured glossy LACHNIS, with slender filaments, interwoven with each other, is of a very short, fine, smooth, equal texture, and is extremely firm, compact, and hard. It is found in flat masses, from four to six inches broad, and seldom above an inch thick. There are four or five rows of fibres that go to the making up less than an inch in thickness. It is difficult to cleave, the filaments being not easily separated from each other. It may be calcined very soon to a fine white plaster. It is found in Somersetshire and other places.

The Bluish-White LACHNIS, with very narrow straight fibres, is of a fine smooth texture, and pretty compact; it is found in flat masses from ten to fourteen inches in breadth, though seldom above an inch thick. It is composed of three or four rows of orders or filaments standing perpendicularly on each other; these filaments being straight render the mass easy to be cloven or split, and they have pretty smooth glossy substances. They soon calcine to a very white plaster. It is found in the marl pits of Staffordshire.

The Glossy Greenish-Grey LACHNIS, with broad and very thin filaments, is found in masses

four or five feet in breadth, being seldom above four or five inches thick. They consist of two rows or orders of filaments that are interwoven with each other at their internal ends; but they are always bent, and often placed obliquely. It will calcine, though but slowly, to a very white plaster.

The Glossy Greenish-White LACHNIS, with narrow bent filaments, is found in masses frequently as thick as broad, being sometimes no more than an inch in diameter, and at other times twelve inches. It is composed of many rows of interrupted filaments, variously bending and intersecting each other, which have very smooth unequal surfaces; though they are very hard and heavy, they will not strike fire with steel, and they calcine very slowly in the fire. It is found in the marl pits of Derbyshire. All these Lachnides may be accounted a sort of Talc, or at least akin thereto.

CHAP. XI.

Of FOSSILS, called ASBESTOS and AMIANTHUS.

MOST authors that have treated upon fossils make Asbestos and Amianthus to mean the same thing; that is, what some call Earth-flax, and others Plumous Alum; but this last name has been very improperly applied: for the Plumous Alum is a real salt, which is found in an island in the Archipelago, called Melo. However, Linnæus makes a distinction between Asbestos and Amianthus; for he would have the latter to consist of longitudinal fibres, and the former of those that are interwoven.

Incombustible flax is a sort of Amianthus, and consists of flexible fibres, like thread, lying parallel to each other, and easily separated. The ancients spun these fibres, and made a sort of cloth thereof, in which they wrapped up the dead bodies they intended to burn, that they might preserve the ashes; for, when the body was burnt, the cloth remained entire. The Germans call it mountain flax; and it is found in Lapland, Siberia, and in the vallies of the Pyrenean mountains; but the largest quantity is brought to us from Negropont. When handled it causes an itching in the skin, and sometimes blisters, which is owing to the fibres or down, of which it is composed, getting into the skin; however, it is easily cured, by rubbing the part with oil, which will soon blunt the points of the down.

There is another Amianthus, with angular, rigid, and opaque fibres, which some call Asbestos, with hard parallel fibres, not to be separated from each other. These are of an ash colour, and the whole has pretty much the appearance of wood. It is found in Lapland, Sahlberg, and other places. There is another Amianthus, consisting of stiff fibres that are easily separated from each other; but they are as brittle and transparent as glass, and of a greenish colour. A fourth sort is known in the shops by the name of Plumous Alum, and consists of exceeding brittle parallel fibres, that can hardly be separated from each other. It is found in Sweden.

Linnæus has also three sorts of Asbestos; namely, that which is heavy, and consists of hard fibres, formed into a sort of flakes or plates. It will readily cleave, and is of a pale colour; but is so heavy it will not swim in water. The Swedes call it mountain flax. Another Asbestos is membranous; that is, it consists of fibres so interwoven, that it resembles old leather. It will swim upon water, and the surface of it is hard, smooth, light and white. The third sort consists of flexible fibres that cross each other irregularly, and is so light that it is called by the Swedes mountain-cork; indeed, it looks like the

inward bark of cork, and is so porous a stone that it will swim in water.

Other authors have the Greenish Asbestos, which is extremely smooth, firm, compact, and exceeding soft to the touch. It is found in the form of veins in a sort of marble, and its filaments are slender and bent. It is met with in the isle of Anglesea, and other parts of Wales, in lumps, seldom larger than a nut.

Whitish-Brown Silky ASBESTOS is called in America petrified wood, its texture being even, regular and close. It is extremely soft and silky to the touch, and of a whitish-brown colour. It consists of long continued flat filaments, and is found from one to three inches long.

Greyish Silky ASBESTOS, with very long continued and roundish fibres, which run in straight lines the length of the whole mass, is found in lumps from two to nine inches long, and the fibres are so placed as to make it look like a piece of wood. It is found in the Highlands of Scotland.

Greyish-Green Silky ASBESTOS, with long continued and very slender fibres, is found in the isle of Cyprus, in bits not exceeding a quarter of an ounce in weight, though sometimes three inches long, and half an inch broad.

White, Loose, Thready ASBESTOS, with broad fibres, is found in length from two inches to twelve; and sometimes the fibres seem to be bundled up like the threads of cotton in the wicks of lamps. This is found in the Highlands of Scotland.

Soft, Reddish-Black AMIANTHUS, with short, abrupt filaments, is found in the strata of iron ore; sometimes forming veins of an inch in diameter, but seldom so large. In the fire it turns to a very pale red. It is common in Germany among iron mines.

Greyish-Green, rigid AMIANTHUS, with short, abrupt, and interwoven fibres, is said to be the Plumous Alum of the shops; though Linnæus affirms it is an Asbestos.

CHAP. XII.

Of the FOSSILS called GYPSUMS.

AUTHORS are not well agreed what Gypsum properly signifies; for some would have it to be the lime of alabaster, others a sort of plumous alum, others Ising-glass, and others again the lime of the stone called Selenites; but it is more generally taken for the lime of certain whitish stones, which when burnt, contain some shining particles like Talc, and which are required to be but a short time in the fire before they turn to lime. But the Gypsum that is meant here includes those sort of fossils that are composed of small flat particles, which are ranged irregularly, and give the whole masses somewhat of the appearance of softer marble, they being bright, glossy, and in some degree transparent. They will very easily turn to lime in the fire.

Hard white GYPSUM, or plaster of Paris stone, has somewhat the appearance of loaf sugar, it being pretty fine, and of a very close, firm, compact texture. It is found in masses from four inches to four feet in diameter, and, when broken, shines like crystal. In the fire it readily turns to a very fine plaster. It is chiefly found in France.

Hard Shining red and white GYPSUM, that has the appearance of marble, is found in masses four or five feet in breadth, and three in thickness, with a rough, dusky, dark surface; but when broken it is bright and glossy. It does not turn into plaster, when calcined, so soon as the former. It is common in Yorkshire and Derbyshire.

Hard

F O S S I L S .

AMIANTHUS

ASBESTOS

CLASS I. NATIVE FOSSILS

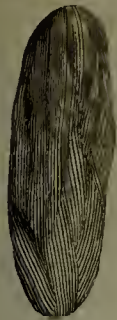
LACHNIS

TRICHERIA

ELASMIS

BRACTEARIUM HYALINA

SPECULARIS



CLASS II. SELENITÆ

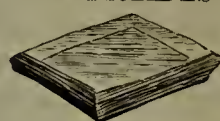
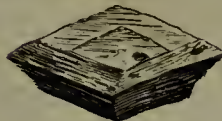
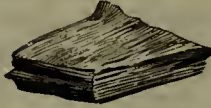
TETRADE-CARHOMBIS

PACHODE-CARHOMBIS

LEPTODE-CARHOMBIS

ISAMBLUCIS

ISCHNAMBLUCIS



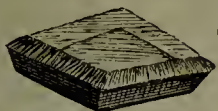
CATHE TOLIPES

SANIDIUM

LEPASTRUM

INOXUCIA

OXUCIA



SYMPLEXIUM

TRICHESTRUM



CLASS III. CRYSTALS

ELIPOMACROS-TYLUM

POLYAEDRASTYLUM

PAURAEADRASTYLUM

BRACHYTELOSTYLUM

MACROTELOSTYLUM

OLIGAEDRUM



MOLYBDION



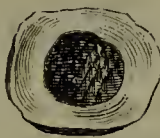
SIDERION



CASSITERION



ARTHRODIA



PANGONIUM



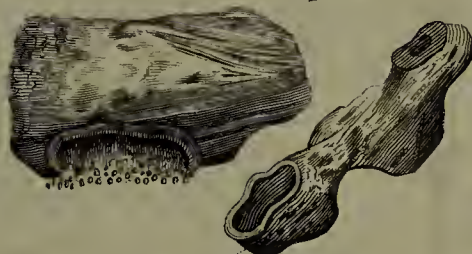
CLASS IV. SIDEROCHITÆ

ENHYDRUS

GEODES

HETEROPIRYA

EMPHEREPYRA



CLASS V. PYRITÆ

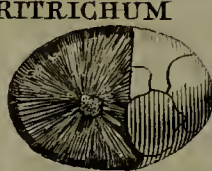
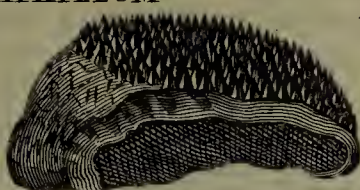
PYRICUBIUM

PYRITRICHIPHYLLUM

PYRITRICHUM

GYMNOPYRIS

PYRIPLACIS

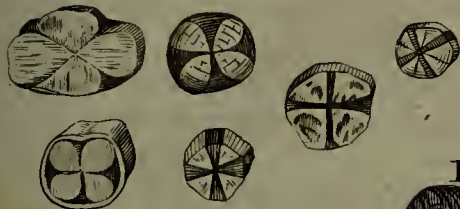


CROSS STONES

ÆTITES

PYRIPOLY-GONIUM

PYROCTOGONIA



LEPIDOTES

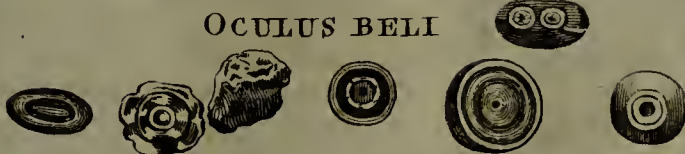
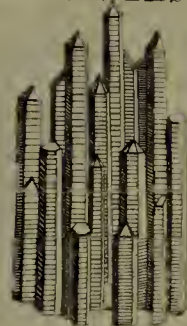
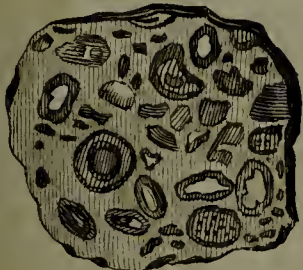
PISOLITHOS

DENDRITIS

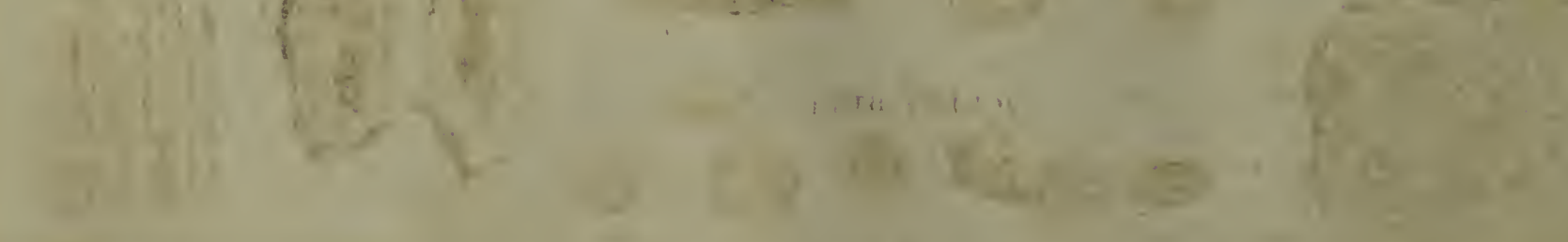
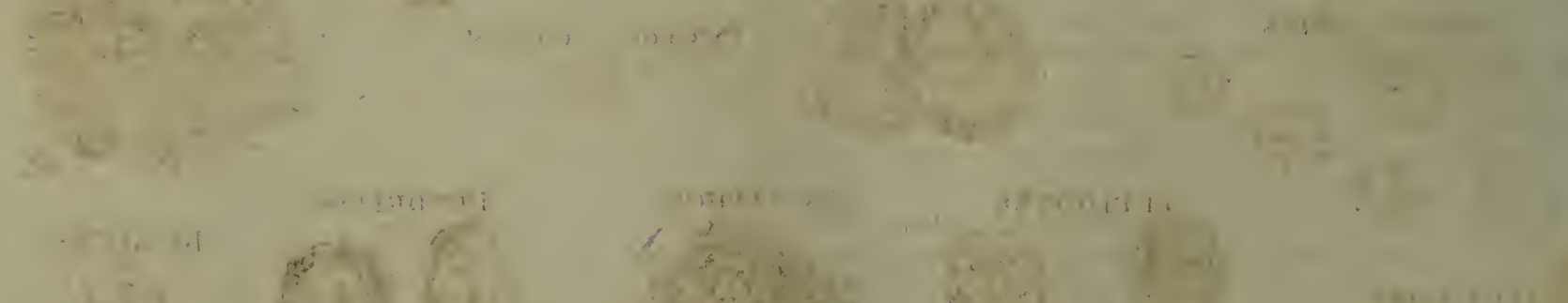
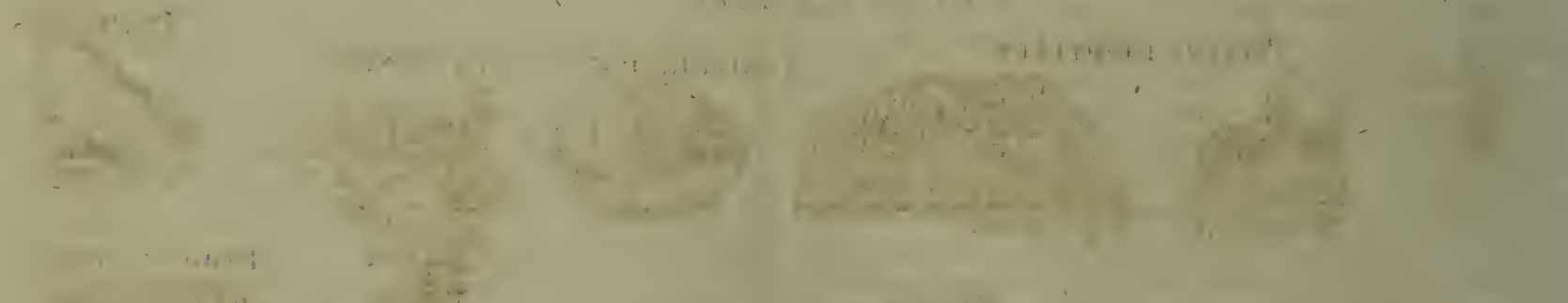
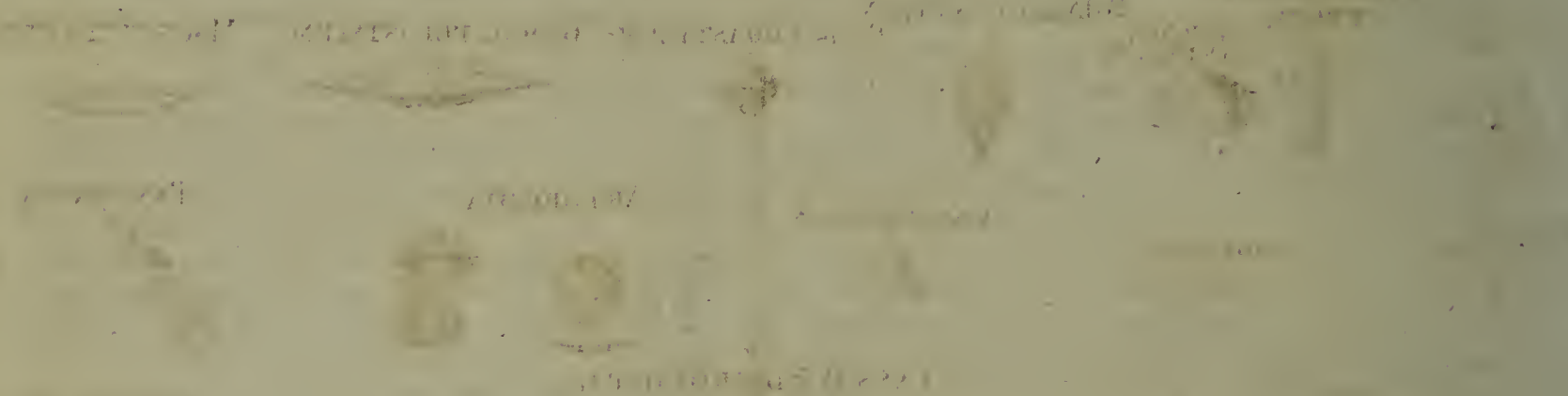
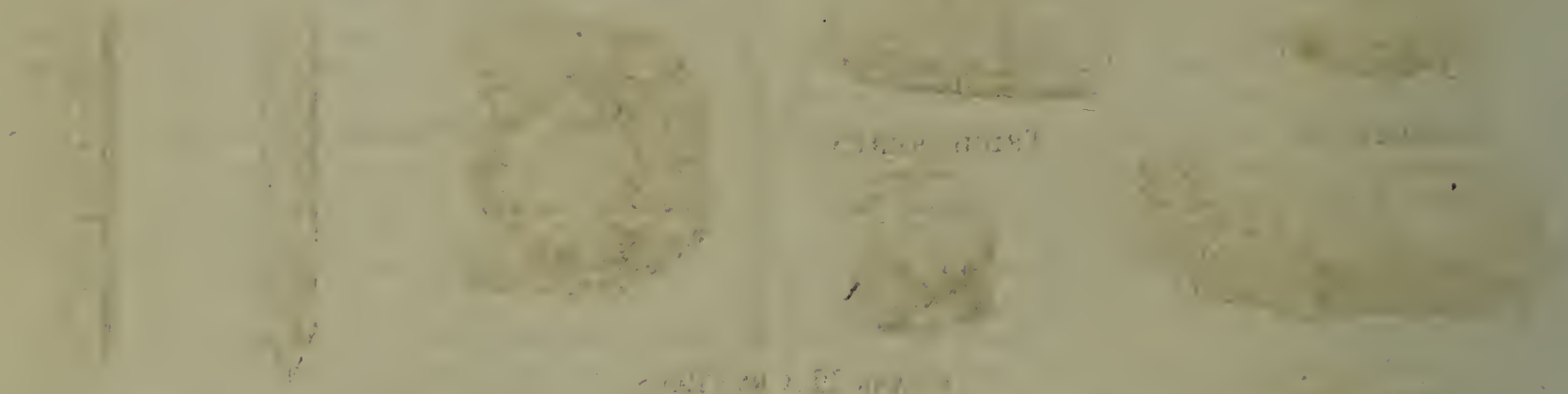
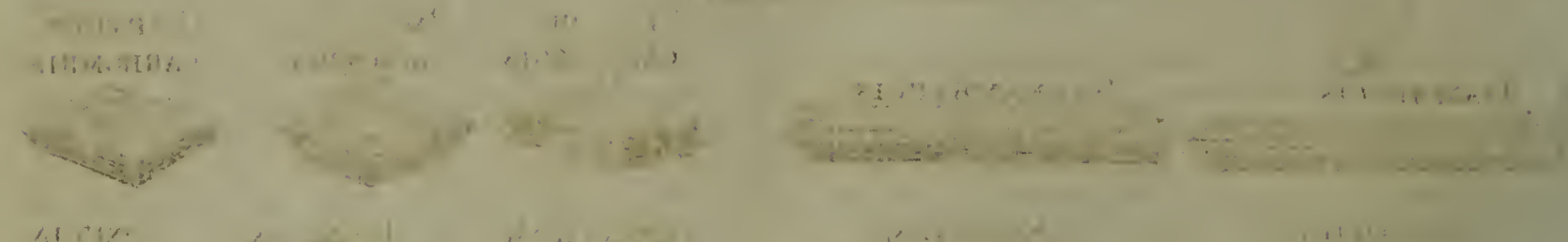
BASALTES

OCULATUS LAPIS

OCULUS BELI



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Hard Greyish-white GYPSUM is found in masses about six or seven inches broad, and three thick, with very rough, rugged, uneven surface, and a coarse, dull, dead look; when broken it does not sparkle like the other kinds. It is common in Germany and Derbyshire.

Soft, Shining, Green GYPSUM is found in lumps four inches broad, and more than one thick. It is of a very dull, dusky brownish colour on the outside, but when broken is very glossy, though it seems to be a little spongy. It is very soft and brittle, and loses its fine colour before it is quite calcined in the fire. It is found on the shores of rivers in the East-Indies.

Soft White GYPSUM, commonly called Derbyshire plaster stone, is found in lumps from the size of an egg to two or three feet in diameter, which are opaque, and of a dusky brownish-white; but, when broken, pretty bright and glossy. It is of so soft and brittle a texture, that it will break with a small force. It becomes very white when calcined, and makes a very valuable plaster. It is found in many parts of Derbyshire.

Soft, Pale-brown, Glossy GYPSUM, is generally found in thin masses, seldom above a foot broad, and three inches thick, with a rough unequal surface; but, when broken, it has the appearance of marble, being extremely bright and glossy, and composed of very large broad particles. It is very soft and brittle, as most of this kind are, and readily calcines into a pure white plaster. It is found in some parts of Germany as well as in Derbyshire.

Soft Red GYPSUM is sometimes met with in small lumps, not much bigger than a walnut, at other times in masses of ten pounds weight, with a very rough, dull, unequal surface; when broken, it sparkles, but not very much. The texture seems to consist of different rows of short lines or streaks, variously intersecting each other. It is very brittle, and calcines very easily in the fire, making an excellent plaster. None of these Gypsums will ferment with aqua fortis, or strike fire with steel.

CHAP. XIII.

Of the SELENITES.

THE Selenites are stones consisting of slender fibres, ranged in fine even flakes of different forms, according to their kinds. They will cleave like Talc, not only horizontally but perpendicularly; and though they will bend a little, they have no spring. They will not ferment with aqua fortis, nor readily calcine in the fire.

The Thin, Fine, Transparent SELENITE, with transverse streaks, is a common sort, and is met with from one tenth of an inch to five or six inches long. It consists of fine thin plates irregularly disposed through the whole breadth of the mass. These plates or flakes easily separate from each other in an horizontal direction, being almost as apt to cleave as Talc. It is pretty soft, and as void of colour as crystal; in the fire it turns to a pure opaque white. It is formed in the strata of clay in several parts of England.

The Thin, Dull, Opaque, Slender, Streaked SELENITE, is found from half an inch to three inches in length, and consists of a great number of even flat plates or flakes, each of which is of the same size as the horizontal surface. It is formed pretty much like the former, but not quite so regular, nor is the appearance so beautiful.

The Thin, Fine, Streaked SELENITE, with longitudinal streaks, is seldom broader than an inch, and above a seventh of an inch thick. It consists, like the former, of parallel horizontal plates; but

the fibres of which they consist, are slender, straight and exceeding regular, running in an oblique longitudinal direction, from one end of the stone to the other. It cleaves very easily, parting into flakes like Talc, and readily calcines to a fine white in the fire. It is found in the clay pit at Richmond, but at a considerable depth.

The Thick SELENITE, with transverse streaks and a rough surface, is usually met with of the size of about an inch and a half in breadth, and the plates and flakes, of which it consists, are remarkable for the largeness of the fibres that compose them, as well as the regular order in which they are laid. It calcines in the fire to a perfect whiteness, and is common in Yorkshire and Leicestershire.

The Short SELENITE, with thick plates, is of various sizes, but the most common is two inches in diameter. It consists of a smaller number of plates than others of this kind, because they are considerably thick, and are composed of bundles of fibres running longitudinally, and they are intersected with four or five transverse streaks. The whole stone is pretty bright and transparent. In the fire it turns to an opaque white, and is very common in the clay pits of Northamptonshire.

The Transparent SELENITE, with narrow transverse streaks, is generally between two and three inches long, and consists of very numerous horizontal plates, irregularly disposed, and of different thicknesses. They are composed of fine parallel straight fibres, running obliquely across the stone from side to side. It very easily cleaves into very fine flakes, and calcines in the fire to the whiteness of snow.

The Thick, Dull SELENITE, with very fine transverse fibres, is generally about two inches long, and consists of fine thin plates, evenly disposed, without the mass; these are made of exceeding fine slender filaments, running transversely in an oblique direction through the stone. The plates do not separate very easily, and the whole mass is dusky, being very little transparent. It is found in the clay pits in most parts of England.

The SELENITE, with fine longitudinal filaments, is composed, as well as the two former, of two horizontal, and two oblique planes. It is of various sizes, from a quarter of an inch to three inches in length. It calcines in the fire to a snow white substance, and is very common all over England.

The Brown Transparent SELENITE is generally three inches long, and consists of a greater number of fine, transparent, firm, parallel plates, joining exactly to each other. The plates consist of many fine filaments, all ranged in the same order, and not collected into separate bundles. It may be very readily cloven into horizontal plates that are very thin, and it calcines to a fine white in the fire. It is common in Germany.

The Thin Transparent SELENITE, with transverse fibres, is commonly about an inch long, and consists of many thin horizontal plates or flakes, made up of parallel fibres running obliquely across. It cleaves very easily, both horizontally and perpendicularly, and readily calcines into a white mass. It is common in Northamptonshire, and other parts of England.

The Dull, Thick SELENITE, with very thin transverse fibres, is generally between two and three inches long, and is composed of many extremely thin plates, that consist of an infinite number of parallel fibres that are connected into bundles, and run transversely in an oblique direction. It is very brittle; but it easily cleaves, according to the horizontal direction; and though it is as bright as the rest, it is not so transparent; but it calcines more readily to a perfect whiteness. It is found in Leicestershire in the yellow clay pits.

The Long Scaly SELENITE is commonly about three inches long, and has its horizontal plains very rough and scaly, it being composed of a vast number of oblong narrow plates, falling very irregularly one over another; it turns in the fire to a pure white.

The SELENITE, with thin flakes and transverse filaments, is generally about an inch in length, and is composed of six planes that are nearly equal; that is, a top, a bottom, and four sides. It is considerably long, in proportion to its thickness, and is composed of parallel plates lying evenly over each other in an horizontal direction, each making one whole surface of the stone. These consist of very fine slender fibres, laid obliquely across the flakes. It may be cloven very easily, according to the direction of the flakes; and in the fire it turns soon into a very pure white. It is sometimes found in Northamptonshire.

The Dull SELENITE, with thick plates and longitudinal fibres, is exactly of the same shape as the former, and is usually about two inches long, and a little more than a quarter of an inch in diameter. It is of an opaque whitish colour; but calcines very slowly to a fine white. It is common in clayey grounds in Yorkshire, lying near the surface.

The SELENITE, in the shape of a column, with very fine fibres, has six angles, and looks as if there was a part broken off at each end. There is no distinction of top and bottom, and all the planes are nearly alike. It is usually about an inch and a half long, and half an inch in diameter, consisting of a great number of very bright, and fine parallel filaments. It will cleave every way, but not into flakes, and the filaments are very flexible, but not elastick. It turns in the fire to a very pure white, and is found, but not commonly, in the clay pits of Northamptonshire.

The SELENITE, shaped like a column, with thick fibres, may be easily separated into filaments, for they will split off from many of its surfaces; but they will not bend readily, for they will easily break. They are neither bright nor transparent, but of a chalky whiteness, and turn to a pure white in the fire. It is found in the cliffs in the isle of Sheppy.

The Colourless Transparent SELENITE is of no regular shape, it being found in thin flat masses of different sizes and forms, that is, from one inch to a foot in length. It is composed of a vast number of minute and thin parallel flakes, not unlike Ising-glass. They are formed of a multitude of parallel fibres, ranged in a beautiful order. They are extremely bright and transparent, and the substance is very soft. It turns in the fire to fine pure white. It is found in several counties in England.

There is another SELENITE of this kind that is whitish and dull, but not so pure as the former; but it seems to be made up of plain even flakes, like those of Ising-glass. It is commonly long, in proportion to its breadth, but is a little thicker than the former. The sides are uneven and ridged, like the tiling of a house; and it is of various sizes, being from one inch to six or eight long. It calcines slowly, but at length attains a perfect whiteness. It is common in Germany, and is sometimes met with in the strata of clay in Northamptonshire and Leicestershire.

The SELENITE, with eight sides, is always short and thick in proportion to its breadth, and is from one sixth of an inch to two inches long; but when it is only an inch, which is the common size, it is about half an inch thick and broad. It is composed of a vast number of pretty thin plates, laid evenly and regularly in a transverse order, and these consist of moderately large fibres. The flakes are very flexible, but not elastick, and they are all

opaque and whitish while together. It is found in the clay pits of Staffordshire.

The SELENITE, composed of filaments that are ranged toward the surface of the body, into broader plates, which are notched at the edges, and seem to be radiated in the form of a star, is bright, and of a brownish white, and seems to be composed of fine thin plates, propagated from a single point, which is seldom placed in the centre of the mass, and the whole variously jagged. The stars are usually broad and flat, having but little thickness in proportion to their extent. This stone is of various sizes, namely, from that of a barley-corn to two inches in diameter. When broken it seems to be composed of straight, even, and very fine slender longitudinal fibres, proceeding from the centre, and form a mass of a very beautiful streaked texture. In the fire it turns perfectly white, and is found in the isle of Sheppy.

There are other species of the Selenite; but those we have already mentioned are fully sufficient.

CHAP. XIV.

Of CRYSTAL.

CRYSTAL is a soft transparent gem, that has somewhat the appearance of frozen water, and is sometimes like an hexagon column pointed at each end; or rather seems to be composed of two hexagon pyramids with a column placed between them.

It is the softest of all gems, and when it is coloured goes by another name, though it ought not to be substituted in the room of the more precious sorts of stones. When it imitates a Beryl, it is called a bastard Topaz, and the like.

Crystals, with a long intermediate column, are, the very bright CRYSTAL without any colour, which seems to be the most perfect kind, and is generally free from all kinds of blemish. It is pointed, as mentioned above, and consequently consists of sixteen planes or sides in all; but those on the pyramids are not of an equal breadth, two of them being narrower than the rest. It is found from the size of a barley-corn to three inches long, but the common size is an inch. It does not depend upon any other body; but where one is met with there are generally more. It is moderately heavy, will strike fire with steel, and when calcined, is of an opaque white. It is commonly met with in the mountains of Germany, but is very rare in England.

Blackish Bright CRYSTAL, with short pyramids, is always pure and without clouds. It is of various sizes, and is most commonly three quarters of an inch in length. The number of sides is the same as in the former. It is harder than common Crystal, and cannot be broken without difficulty. It is remarkably bright and transparent, and has what they call a black water. It is very uncommon, though it is sometimes found among other sorts in some parts of Italy.

Dull Whitish CRYSTAL, with irregular pyramids, has a longish and pretty thick column, and the pyramids are longer in some parts than in others. It is seldom quite an inch long, and is near half an inch in diameter. It will strike fire with steel, and calcines easily into a pure white. It is common in Germany, and is sometimes found in Yorkshire and Cornwall.

British colourless CRYSTAL, with long pyramids, and a short column, is very bright and transparent, and the thick short column has long pyramids tapering at the ends. It is usually about an inch and a half long, and three quarters of an inch thick.

thick. The planes are seldom regular, but four on the column and pyramid are frequently broader than the other two. It is so hard as not to be scratched, and is not easily broken: When calcined, which it is with difficulty, it is as white as snow. It is found in Bohemia.

Bright Brown CRYSTAL, with short pyramids, and a very short column, is always thicker than it is long, and is seldom or never either cloudy or foul; it is of various lengths, from the third part of an inch to three inches, and the diameter is always greater than the length. It is generally found in large parcels in the same place, and is extremely hard, breaking with difficulty, and in any direction; when calcined, it becomes perfectly white.

Yellow Bright CRYSTAL, with regular pyramids, and a short column, is seldom pure, there being cloudy spots, films and streaks therein; it is composed of eighteen sides or planes, like the rest; that is, six on each pyramid, and six on the column, and is found from a quarter of an inch to two in length. It is considerably hard, strikes fire with steel, and when calcined is entirely white. It is common in Silesia and Bohemia, and has been sometimes found in Yorkshire.

Bright Colourless CRYSTAL, with a short column gibbous in the middle, is a very fine sort, and has moderately long and sharp pyramids at the end; it is three quarters of an inch long, and a quarter and a half in diameter, and is found single, though sometimes it is met with among the strata of stones. It is very hard, strikes fire with steel, and calcines to the whiteness of snow.

Dull CRYSTAL, with large pyramids, and an extremely short depressed column, is a very foul opaque sort, and of a coarse texture, with a continual cloud throughout its whole substance. It almost entirely consists of pyramids without a column, and is found detached from all other bodies, but commonly in considerable numbers. It is not so hard as common Crystal, but will strike fire with steel, though not easily; and is very white when calcined. It is seldom or never found in England.

Small, Bright, Blackish CRYSTAL, with regular pyramids, is extremely clear and regularly formed; it is of various sizes, the largest among them not exceeding a sixth of an inch in length, but many are extremely small. It is very hard, and is calcined with difficulty. It is found in Germany in the cavities of a black fissile stone.

White CRYSTAL, consisting only of two pyramids, which are short, and joined base to base, is generally very pure, and is always found independent of all other bodies. It is not perfectly colourless, it being a little whitish; but it strikes fire with steel very freely, and calcines very slowly.

Brown CRYSTAL, consisting of two long pyramids, without a column, is perfectly pure, and regularly formed, and is of different sizes, from the eighth of an inch to three inches in length, and one third of its length in diameter. It is seldom found single, many of them being usually joined together in an irregular manner; and, when not joined, they are always pretty numerous. It is of a very fine water, and extremely hard, striking fire with steel, and calcining slowly to a perfect whiteness. It is found in Scotland on the sides of hills, and sometimes on the banks of rivers.

Crooked or Slanting CRYSTAL, consisting of two pyramids, without a column, is perfectly pure and transparent, and consists of an oblique, or slanting double pointed body, besides the pyramids being irregular. It is from a quarter of an inch to two inches long, and about three fourths of its length in diameter. It is of a very fine water, and is extremely hard, striking fire readily with steel. It is

found in the East and West Indies, and is common in New Spain, where it is highly valued.

Bright Blackish CRYSTAL, consisting of two very short pyramids, without a column, is a very fine sort, and appears as bright as any stone of this kind. The two pyramids join evenly base to base, though sometimes one is a little larger than the other. It is commonly found in lumps, consisting of several of these Crystals pretty close together; however, at other times, they are loose and independent of each other. It has a fine blackish hue, and is very bright, with a fine water. It is extremely hard, strikes fire with steel, and after a long calcination becomes white. It is found in Italy, Germany and France.

CRYSTAL, consisting of two pyramids only, with eight sides each, that is, having sixteen planes in all, and of a brownish colour, is of a very uncommon kind; it is fine and clear, though often spotted with large blotches of black. The pyramids are much of the same length, and the planes are extremely smooth; sometimes a hundred, or upwards, are found together, but detached from each other. It is considerably hard, strikes fire with steel, and calcines to a pure white. It is found in Virginia, on the sides of hills, among a sort of iron ore.

CRYSTAL without colour, consisting of two longish pyramids, with eight sides each, is a very pure sort, and very fine and clear; it is usually near an inch long, and a third of an inch in diameter, with the planes entirely smooth polished and even. It is usually found single, is very transparent, and of a very fine water, as well as extremely hard. It is exceedingly scarce, and, as yet, has been found only at Gosslear in Saxony.

CHAPTER XV.

Of Imperfect CRYSTALS.

SPRIG CRYSTAL is whitish and transparent, and has only one pyramid with six angles, besides the column; it is an exceeding common sort, and is very regularly formed, though it is subject to variety of blemishes. The column is always long and slender, and fixed at one end to some solid Fossil, consequently the hexangular pyramid must be at the other end. The length is from a tenth of an inch to ten inches and longer; the planes are irregular, as to length and breadth, and they differ so much from each other, that scarce any two of these Crystals are found exactly alike. They are, almost always, found in clusters, are very hard, strike fire with steel, and calcine after some time, to a pure white.

Bright imperfect CRYSTAL, without a tinge of any colour, is, by many, confounded with the former; but it is different from it, and is often sold by dealers for a white sapphire, because it is somewhat like it; it is perfectly clear, generally pretty regular, and has a long slender column with six angles, terminated by a pretty long hexangular pyramid; it is from one tenth of an inch to three or four inches long; but it is most commonly about an inch and a half. It is not found in such large clusters as the former, but is extremely hard, strikes fire with steel, and calcines very slowly to a pure white. It is found in the East and West Indies, as well as in Germany; sometimes it is so tinged as to imitate gems, and may be readily mistaken for them.

Dull Whitish imperfect CRYSTAL, with a very short pyramid, is remarkably coarse and impure, not with having films or clouds, but by being whitish throughout its whole substance; it consists of the same planes as the former, and is usually long in proportion

proportion to its thickness in the column; but the pyramid is always short. It is met with from a quarter of an inch to four inches long, and is generally found in large clusters; but it is not so hard as most of the rest; for it will not readily strike fire with steel, and yet it calcines slowly to a pure white. It is found in most parts of Europe, and particularly in Cornwall.

Bright Brown imperfect CRYSTAL, with a long pyramid, is generally known by the name of brown Crystal, and has a very fine clear texture. The form is generally regular, it having a long and pretty thick column, and is found from the size of an inch to an inch and a half in length, though some have been met with ten inches long. It is extremely hard, strikes fire with steel, and calcines, at length, to a pure white. It is found in the East and West Indies, as also in Silesia and Bohemia, as well as in the islands of Scotland.

Dull Brown imperfect CRYSTAL, with a short pyramid, is sometimes mistaken for the former, though it is not near so good, it having a dull and dead aspect. The column is regular, but always slender in proportion to its length, and is from half an inch to fourteen inches long. It is commonly found in clusters, but the columns do not adhere to each other, as in the former; and its brown colour is of various degrees, for some are pale, and others almost black. It is tolerably hard, strikes fire with steel, but will not readily calcine. It is very common in Germany, and is found in the cliffs of rocks.

Bright Brown imperfect CRYSTAL, with a short pyramid, is often tinged with various colours, but most frequently with a pale yellow; it is extremely pure, and of a bright fine texture, though often covered with a rough coat. The column is long and slender, and it is generally met with about two inches long, and not quite half an inch in diameter, but the planes are irregular; it is commonly found single, though sometimes in large clusters, and is extremely hard; it strikes fire with steel, and, after a considerable time, calcines to a pure white. It is found in the great mine at Gosslear in Saxony; as also in Virginia.

Bright Brown imperfect CRYSTAL, with a very long irregular pyramid, is called the Beryl by some jewellers, and has the greatest lustre of all the brown Crystals; but it is not very large, being only from half an inch to four inches long, and has a thinner column than others of the same length. The planes are the same in number as in others; it is very hard, strikes fire readily with steel, and calcines very slowly. It is found in Italy and Germany, and is commonly called by the jewellers, the Beryl Crystal.

Whitish imperfect CRYSTAL, with a very long pyramid, is, by some authors, called the Iris or Rainbow Crystal; it is remarkable for reflecting different colours, whence it has its name. It is not very pure, for sometimes there are large white flaky blemishes, but the form is perfect and regular; it is usually long and slender, and most commonly about three inches long. It is often met with in clusters of forty or fifty together; but the columns singly touch each other; it is pretty heavy, strikes fire with steel, and in the fire readily calcines and turns white.

Bright Yellow imperfect CRYSTAL, with a short pyramid, called Citrino by the jewellers, is very clear, pure, and of a fine texture, it being generally free from blemishes, and is from one to five inches in length; but commonly much thinner at the top than near the root. It is mostly found single, and is of a very beautiful yellow; it is not extremely hard, but it will strike fire readily with steel, and calcines slowly to a whiteness in the fire. It is found in Bohemia and the West Indies, and is made use of for stones to set in rings.

Short, Bright imperfect CRYSTAL, without any colour, may be distinguished from all others, by being very short in proportion to its thickness; it is almost always extremely pure and without blemish, and its figure has little variation. It is always fixed to some body or other, and is found of various sizes, from half an inch to three inches long, and the diameter is commonly two thirds of the length. A cluster of eight or ten of these is generally found together, but the columns seldom touch, and never adhere. It is remarkably hard, and will admit of a fine polish. It is found in New Spain, and other parts of America.

Brown imperfect CRYSTAL, with a rough coat, and five planes on the pyramid, as well as on the column, has a coarse and opaque coat, but the inside is never subject to any foulness. The column is thick and short, and the pyramid pretty long and slender; the most common size is three inches long, and near an inch and an half in diameter, and there are two broad planes on the pyramid, as well as on the column. The root is very small and inconsiderable; and it is usually found single, of a very beautiful brown, extremely transparent; and of a fine deep water. It is very hard, and calcines slowly to a pure white. It is found in the East Indies, and is in high esteem among the jewellers, it being the finest of all brown Crystals.

Brownish-white imperfect CRYSTAL, with a long pyramid, has twenty-four planes; that is, twelve on the pyramid, and twelve on the column. The texture is pretty fine, pure, and clear, though sometimes subject to foulness from flakes. It has a regular, pretty long and slender column, and is about three inches long, and little more than half an inch thick. The planes are all irregular with regard to breadth, and sometimes there is a part of them wanting. The root of this kind is long, large and whitish, and is usually found single. It is very hard, and calcines slowly into a perfect whiteness. It is found in the mountains of Silesia and Bohemia, as well as on the shores of rivers, and is in high esteem.

Yellowish-Brown imperfect CRYSTAL, with a short pyramid, having twelve planes on the pyramid, and as many on the column, is of a pure, perfectly fine sort, and is seldom subject to blemishes; though there are sometimes found very small flakes of a whiter substance. The column is long and slender, and the usual size is about an inch in length. The planes are very irregular, with regard to breadth; and the pyramidal planes differ greatly in length as well as in breadth. It is extremely hard, and will calcine at length to a pure white. It is usually brought over with the Saxon topazes.

Clear Colourless imperfect CRYSTAL, with a very short pyramid, and twelve planes on the pyramid, as well as on the column, is extremely clear, pure, and of a very fine texture, without the least spot or blemish. It is from one to two inches long; and some of the planes are broader than the rest. The surfaces of those on the pyramid are perfectly smooth, and those on the columns have deep ridges. It is commonly found single, is perfectly transparent, and has a fine bright water. It is remarkably hard, and is found in the East Indies.

Colourless, very Bright, imperfect CRYSTAL, with a pretty long pyramid, which has twelve planes, and the column as many, is generally found in clusters, and is a pure, elegant, regularly formed Crystal, though generally very small, it being not above an eighth part of an inch in length, though it has been found half an inch long or upwards. The planes seem to be nearly all of a breadth, and of the same length, and the top of the pyramid stands over the centre of the column; the planes of the pyramid are always smooth, having a high natural polish, and a

fine lively dark water. It is extremely hard, and is found in all parts of this kingdom, sometimes surrounding a single or double round ball, and at other times in the cracks, cavities, and clefts of flints, and other stones.

Blackish imperfect CRYSTAL, with very short pyramids, with twelve planes thereon, and as many on the base, is thought to be the hardest and brightest of all the class. The column is somewhat longer, and the pyramid shorter, than in others of this kind. It is so extremely small as sometimes not to be discovered, unless by its glittering, though there are some the tenth part of an inch in length, and a few the third of an inch. It is shaped like the former, and has naturally a very fine polish; it is extremely hard, and is found in great plenty in the forest of Dean in Gloucestershire.

Imperfect CRYSTAL, with a blunt pyramid, and a very short column, each of which has twelve planes, is pretty pure and clean, though sometimes subject to spots and white opaque flakes. The pyramid is blunt, broad, and fixed to a broad short column, that sometimes seems to the naked eye to be wanting. It is extremely small, the usual size being not above the twelfth of an inch in length, and nearly of the same diameter. There are various sizes in the same mass, there being small ones between the larger; but the surfaces are very smooth and pretty glossy. It is found together in large quantities, and is sometimes tinged with red or yellow. It is considerably hard and heavy, and found in Cornwall, Yorkshire, and other counties of England.

Whitish Transparent imperfect CRYSTAL is somewhat like the common Crystal, and, at first sight, seems to have the same number of planes. It is pretty fine and pure, and is of a perfect regular form, being in the shape of a pyramid with four sides, and is pretty broad at the bottom. It is generally about half an inch high, and almost as much in diameter; but there are some two inches high. However, it is often met with in large clusters, and the largest single Crystal is no bigger than a grain of barley. When it is found single, it always adheres to some fossile body at the base, and is principally met with in Devonshire and Cornwall.

Colourless, Transparent, imperfect CRYSTAL, consisting of six planes, is perfectly pure, fine, clear, and broad in proportion to its length. It is very small, being generally of the size of a grain of Wheat, and the largest is seldom more than the third of an inch in length. It is but thin in proportion to the size, and sometimes all the planes are perfectly smooth, and sometimes with ridges, appearing streaked near the extremities. It is sometimes found single and loose, and at other times in clusters that hurt each other. It is extremely heavy, very hard, and is found in pretty large quantities among the iron ores of the forest of Dean.

Black, Glossy, imperfect CRYSTAL, of a rhomboidal form, is extremely pure, and of a very regular shape. It is from a third of an inch to an inch in length, and is bright, smooth and glossy. The larger sort is usually single, and the small are in larger masses, of a fine blackish colour, and calcines to a fine purplish red. It is met with on the surfaces of the perpendicular cliffs, in the iron mines of Gloucestershire. There are many other sorts of crystals; but to enumerate them all would be tedious and useless.

C H A P. XVI.

Of SPARS, of various Figures and Shapes.

SPAR, with a narrow oblong pyramid, is very like Crystal with eight sides, and is of a pure

fine texture, it being the most perfect of all the whole class, having a column with single angles, with a pyramid, consisting of the same number. The column is pretty long, but not thick, and the pyramids are remarkably slender and pointed. The common size is the twelfth of an inch long, though some have been seen of three quarters of an inch. The larger specimens are generally found loose; but they are most commonly among the coarser strata of stones, and is sometimes tinged with a faint purple colour. It will not strike fire with steel, but will dissolve in aqua fortis, and will calcine easily in a moderate fire. It is found in the mountains of Germany, and in North Wales.

SPAR, with very short pyramids and a long column, is perfectly pure, and a regularly formed body, consisting of a pretty long and thick hexangular column, terminated by a very short pyramid with the same number of sides. It is commonly about an inch long, and the third of an inch in diameter. It will not strike fire with steel, but will ferment with aqua fortis, as will indeed every kind of Spar, and therefore this needs not be repeated. It is found in Saxony, and sometimes in Hartz forest.

SPAR, with short pyramids, and a very short column, may easily be distinguished from others by its shape, and is of a pretty pure and fine texture, but not so clear as the former. It is generally found in clusters of eight, ten, and twelve together, and has a dusky hue, with very little transparency.

SPAR, with very short and broad pyramids, is extremely pure, and of a perfect fine texture, having a pretty long and thick column, with a depressed pyramid at each end, each of which has five sides. It is sometimes met with an inch long, but the commonest sort is exceeding small, and is lodged in the strata of clay. It is found in Derbyshire, Yorkshire, and Cornwall.

SPAR, with long pyramids and a long column, which consist each of three sides, is pretty pure, but has a whitish cast and a dullish look. It is commonly about an inch in length, and half an inch in diameter. It is considerably heavy, but very soft and easily scratched. It is found in Germany, and sometimes in Cornwall and Devonshire.

Slender SPAR, with very short pyramids, consisting of three sides as well as the column, is generally pretty pure, and of a fine texture, though sometimes subject to blemishes. The common size is three quarters of an inch in length, and is of a bluish white, but sometimes approaching to a lead colour, or a yellowish brown. It is very soft, and is found in England, Ireland, and Germany.

SPAR, consisting of two long pyramids without a column, each having eight sides, is very pure and fine, and commonly about three quarters of an inch long. It is very transparent, though it is somewhat of a whitish colour.

SPAR, with short and sharp pointed pyramids, each consisting of eight sides and without a column, is very pure, and is remarkable for its short points and broad basis, and is often found half an inch thick, but never longer than two thirds of its thickness. This, as well as the former, is found in Hartz forest, in Germany.

SPAR, with long narrow sharp pointed pyramids, consisting of six sides each, and without a column, is generally fine, clear and pure, though sometimes cloudy. It is often an inch in length, but not a third of an inch in diameter, and is very soft. It is found in the mines of Mendip hills.

SPAR, with short broad pyramids consisting of three sides each, and without a column, is very pure, fine, and clear, and is very short in proportion to its thickness. It is from half an inch to an inch and a half long, with very smooth glossy planes. It is pretty transparent, and brighter than most other Spars,

Spars, as well as harder, though it will not strike fire with steel. It is found in Hartz forest.

Slender SPAR, with a long pyramid, consisting of six sides, has often been mistaken for a Crystal, it having a long slender hexangular column. The texture is extremely fine, though it is sometimes subject to flaky flaws, and is commonly two inches long, and a third of an inch in diameter. It is not so bright as Crystal, and is sometimes of other colours, which are very lively and beautiful like gems; but it is soft, and found in Mendip hills.

SPAR, with a very short pyramid, consisting of six sides as well as the column, is generally very pure and clear, though sometimes blemished, and the common size is about an inch and a half. It is naturally of a greyish white, very transparent, and pretty bright; however, it is sometimes tinged with other colours. It is very soft, and found in the mines of Derbyshire.

SPAR, with a very long pyramid, consisting of five sides as well as the column, always adheres to some solid body, and is of a clear fine texture. It is seldom more than a quarter of an inch thick, and the third part of its length high. It appears very smooth and glossy, and looks like Crystal, though it is sometimes tinged with other colours. It is pretty hard, and is found in Mendip hills.

Hard transparent SPAR, of the shape of a parallelepiped, commonly called Iceland Crystal, is extremely pure, clear and fine, and is found of various sizes from a quarter of an inch to three inches in diameter; but its usual size is two inches and a half. It seems to be smooth and even at first sight, though if nicely examined ridges will be found upon it; it is almost as transparent as fine Crystal, but is very soft, and generally found single. It is found in Iceland, as also in Germany and France; it consists of plates laid one upon another, and will cleave in the manner of Talc; and when it is reduced to powder it still retains its rhomboidal figure, which may be discovered by a microscope. It has this singular property, that all objects appear double through it, which is owing to the double refraction of the rays of light.

Milk-White Opaque Shattery SPAR has a pretty fine and perfectly equal texture; but has no determinate shape, and is found from an inch to a foot in diameter, with a rough irregular ragged surface; it is sometimes a little brownish, and sometimes inclining to a dusky red, and is pretty hard. It is found in France and Germany, and in some of the cliffs of the Welch coasts, as well as in Yorkshire and Scotland.

Hard, Grey, Transparent SPAR, is of a pure equal texture, and has the appearance of Crystal, though it is sometimes tinged with the colour of gems. It has usually the figure of common flints with very uneven surfaces, and the size is from two inches to six or eight in diameter; it is frequently tinged with green, and sometimes with yellow. It is pretty hard, and is found in the lead mines of Scotland, and in other places.

Transparent, Colourless, Shattery SPAR, is nearly like Crystal, and is of a pure, fine, regular texture; but it has no determinate figure, being found of various shapes and sizes, that is, from half an inch to five inches in diameter; it is dark on the outside, but when broken is extremely bright and glossy, and with a small blow it will fall into many rhomboidal thick masses. It is not very hard, and is found in Hartz forest.

Naturalists divide Spar into innumerable other classes; but, after the Reader is well acquainted with such as we have here mentioned, he will easily distinguish those of an inferior sort, without being burthened with a long account of them in print.

C H A P. XVII.

Of Crustated SPARS debased with Earth.

HARD, Semi-Transparent, Yellowish-Brown SPAR, has an equal regular texture; though not very fine, and the earth is regularly diffused throughout. It always conforms to the shape of the substance to which it is joined, and consists of a thin crust extended over flat, round, and irregular surfaces. It is from the twentieth part, to the third part of an inch thick, and is from a few inches, to many feet in breadth. It is very soft, and is found in many parts of England.

Brittle, Transparent, Whitish SPAR, is of a pretty pure fine texture, though sometimes transversely streaked with earth, rendering it red, yellow, brown or black; it is formed like a crust, and is sometimes flat. It is found on the sides of the perpendicular clefts of the mines in Germany, and the caverns of Mendip hills.

Hard, Whitish-Brown, Dusky SPAR, is foul and impure, though of a regular texture: it is extended over various bodies in the form of a crust, and is from an inch and a half broad to five or six feet. It is pretty hard, and is found in Hartz forest, as well as in the lead mines on Mendip hills.

Dull, Pale-Brown, Brittle, Coarse SPAR, is the most common of all the crustaceous Spars, and is very coarse, impure and earthy, being often tinged with various colours, by the different earths it is blended with. It is of no certain size, and it conforms to the shape of the mass to which it gives a coat. It has a pretty even surface, the wrinkles being never deep; and, when broken, it is of an irregular texture. It will readily crumble between the fingers, and is found as well on the inside of pipes for water, as in tea-kettles.

White, Light, Brittle, Earthy SPAR, is the coarsest of any of this kind, and the whole mass is light, loose and brittle; for some of this kind will not bear touching without crumbling to pieces. It has very luxuriant efflorescences on its surface, and more than any of these bodies. It is met with in various places.

Light, Hard, Pale-Brown, Earthy SPAR, with a smooth surface, often incrusts round moss, for which reason some have taken it for petrified moss. It is of an equal uniform structure, but foul, and always assumes the shape of the body it is formed upon. It is pretty hard for an earthy Spar, and is found in all parts of the world.

Whitish, Brittle, Crustaceous Earthy SPAR, with a rough surface, is of a very coarse, foul, impure texture, and of an earthy colour. It is always of the shape of the thing it incrusts, being sometimes met with on small stones, branches of moss and the like. It is of a dull whitish colour, without the least brightness, and is very soft and brittle. It is found in the subterraneous caves of various countries.

Hard, Pale-Brown, Thick, Rough, Earthy SPAR, which is the osteocolla of the shops, is of a very coarse, foul and impure texture, having the appearance of hardened marl. It is always found in long, thick, irregular, cylindrical pieces, usually hollow, and sometimes filled up with a softer substance. The surface is always rough and deeply wrinkled, being without the least brightness. It is very hard, and is found in many parts of Germany. It has formerly been much esteemed as a medicine, though it is now out of use.

Whitish-Grey, Brittle, Earthy SPAR, with a smooth surface, by some called the Fossile Unicorn, and by others Stone Marl, is of a stony substance, and in colour, smoothness, and form, represents the horns, teeth or bones of animals; but sometimes it is softer, with a hard yellowish, blackish, or ash coloured

coloured crust, while it is soft and brittle in the inside. This has an astringent taste, and adheres firmly to the tongue. It is frequently dug up in pieces resembling bones that are petrified; among which are the teeth called grinders and incisors, which are extremely large, to which there is a root plainly connected. Sometimes they look like the fragments of bones of the arms and legs; and sometimes they appear like the branches and trunks of trees turned into stone. They are found in various parts of Germany, as also in a hill near Paris, where they appeared to be real bones, covered over with a stony substance. It is commended by the Germans for being an astringent, promoting sweat, and for stopping bleedings and loosenesses. It is given in the epilepsy from half a scruple to a drachm.

Whitish-Brown, Tuberosé, Unequal SPAR, in the shape of coral, is of a pretty fine texture, and contains less earth than others of this kind. It is commonly in the shape of a small oblong cylinder, with a pretty even surface, though it has often several branches like the coarser white fossile corals. It is about two inches and a half long, and the third of an inch in diameter; when broken, it is firm, solid and compact. It is found lodged in the strata of yellow clay, and is very common in France and Germany; it is also met with near London.

Hard, White, Oblong, Conical SPAR, is extremely pure, and is as crystalline as any Spar whatever. It has the appearance of an icicle, broad at the base, and tapering towards the point; and its natural place is the arched roof of a subterraneous cavern. It is found from an inch to fifteen inches in length, and is sometimes perfectly round. These Spars are formed by water dropping from the roof of these caverns; and consequently it is often met with in a petrified state on the ground formed into various shapes; we have a remarkable instance of this in Pool's-Hole in Derbyshire, which is considered as one of the wonders of the Peak.

There are also other Spars of various colours, which are found hanging to the roofs of caverns; but which, in reality, differ very little in their nature from the former.

C H A P. XVIII.
Of S A L T S.

FOSSILE SALT, commonly called Sal-Gem, is of several kinds; it is almost as transparent as Crystal, and is sometimes as white as snow, at others grey, red or yellow. When dissolved in water and crystalized, by evaporating the moisture, it becomes of a perfect cubical shape. It is called Sal-Gem, because it has some resemblance to stones of that kind; but it may be readily distinguished from them, by applying it to the tongue. There are large rocks of this kind in different parts of the world, particularly in Spain near the river Ebro, and there is one of a purple colour in Portugal, and in Poland and Russia there are several. It is pretended in Spain, that it grows as fast as it is taken away; however, it is certain, the mine has been opened five hundred years. In Poland, six miles from Cracow, they hew the Salt out of the mountain, in the same manner as they do stone, in very large pieces. It has the same virtues as common Salt, and is used as well for clysters as suppositories to evacuate the hard excrements. But this must never be used where there is an inflammation of the intestines.

Common SALT is either made with sea-water, salt springs, or wells, by the heat of the sun, or by boiling. In some places they dig pits near the sea, and line them with clay; they afterwards fill them with sea-water at high tides, and the water being

exhaled by the heat of the sun, there is left plenty of Salt at the bottom. In Neustria, that is, in the western parts of France, they heap up the sand on the sea-shore, on which they pour sea-water often, and after the moisture has been exhaled by the heat of the sun, the salt is left behind. When there is a sufficient quantity, they boil it in fresh water, and then strain it off into leaden vessels, when they boil it again till it is become of a proper thickness; after which they remove the fire, and suffer it to coagulate into whitish crystals of Salt. They make Salt from salt springs much in the same manner, though there is a particular art in causing it to granulate; for some mix bullocks blood therewith, to cause a quicker separation of the Salt from the bitter. This likewise frees it from the bituminous and earthy particles mixed with the Salt, which are either carried off in froth, or remain in the bottom of the pans. But that is the best Salt which is made with lakes of sea-water, by the heat of the sun, because that which is made by fire has generally somewhat of bitterness. That made with the water of salt springs or wells is most pungent, on account of the alkalious mineral Salt mixed therewith; and is more apt to dissolve than the former, even with a moist air; therefore, that made with sea-water by the heat of the sun is more fit for medicinal purposes, and is commonly called Bay Salt. This Salt also, when dissolved and crystalized, is of a cubical form; but that made either with salt springs, or sea-water, by the assistance of fire, cannot be brought into exact cubes, on account of its mixture with other Salts. Bay salt dissolved in water, which being evaporated till a cuticle appears, will shoot to cubical crystals when cold; but that which is left, being of an alkaline nature, cannot be crystalized into any regular figure; however, there is a Salt made therewith, which is now generally known by the name of Epfom Salt. The spirit of Salt, when mixed with an alkaline Salt, as long as they will ferment together, will turn to common Salt, which in its taste, and its cubical shape, resembles Bay Salt; whence it appears, that sea Salt is an acid perfectly saturated with an alkaline Salt. The use of sea Salt is well known for its preventing flesh from putrefaction; and therefore is necessary to hinder the fermentation of victuals, and their corruption; it likewise restrains the heat of the fluids in the body. Besides, when volatile urinous salts are mixed with it, it turns into a Sal-Ammoniac, which is proper to temperate the sharpness of the humours, and to cleanse them by urine. People are in doubt whether it prevents or breeds stones in the kidneys, for many affirm, that the latter is true; but then it must be understood of meats that are rendered hard by being over salted. The spirit of Salt is proper to promote urine, to prevent the stone, to cure the dropsy, and to quench thirst in burning fevers. It is excellent against the scurvy, and is given from three drops to twenty or upwards; or as much as will make any liquor agreeably acid. Dulcified spirit of Salt is given from fifteen to twenty drops every morning, in a decoction of juniper berries.

NATRUM, or NITRUM, of the ancients, is vastly different from the Nitre of the moderns. By old authors, it is said to be an acrid Salt of an alkalious nature, brought from Egypt and other places, which would ferment with acid liquors, and was used for washing of cloaths and for making glass. Natrum is now found in Lesser-Asia, in little hills, like mole-hills, in the spring and summer, of which they make a lye for washing their linen. It is at present seldom seen in Europe, though it was of frequent use with the ancients, not only for medicine, but various other purposes. The natrum of the ancients was a native Salt of a whitish colour and a bitterish taste, which did not crackle in the

fire like common Salt, nor flash like Saltpetre; but it would melt and swell like alum and borax, as well as ferment with acids; whence it appears to be much of the same nature as pot-ashes.

NITRE of the moderns, commonly called SALT-PETRE, is a white crystalline substance, of an acrid bitterish taste, and seemingly a little cold. Its crystals are in the shape of prisms, with six sides, which are slender, long, equally thick, and terminate at each end, like a pyramid with a point. It dissolves readily in water, melts over the fire, and will not flash, unless mixed with sulphur or charcoal; and then it will with great violence. Saltpetre is often seen on old walls that are not washed by the rain, from whence it is taken off with brushes. Artificial Saltpetre is made with earth saturated with common or pigeons dung, whose salts will, in time, be converted into Saltpetre. As Saltpetre cannot be obtained, except from earth impregnated with urinous, animal, or vegetable Salt, some are in doubt whether it is a mineral or animal production; but it is generally reckoned among those that are mineral, because it may be extracted immediately from the earth, and not from any excrements themselves, unless they be mixed with earth.

The spirit of nitre will dissolve silver, whence it is called aqua fortis; and it will communicate the same power to spirit of vitriol and spirit of sulphur. However, aqua fortis will not dissolve gold; for that is only to be done with aqua regia.

NITRE is used in medicine to cool the blood, and to restrain the heat of a fever, to allay thirst, and to hinder putrefaction; for which reason it is commended in malignant cases. It is given from three grains to a scruple, three or four times a day. A drachm given every morning, dissolved in a draught of ale, has been found to cure the dropsy. When Nitre is put into a crucible, and placed over the fire, it will melt like water; and then, if powdered charcoal be thrown into it, it will deflagrate with a noise, which being over more powder must be thrown in, and this must be repeated till the Nitre will flame no longer. By this method, the Nitre will turn into an alkalious salt, which has the same virtue as salt of tartar. Every one knows, that Nitre mixed with due proportions of sulphur and charcoal will make gun-powder.

VITRIOL is either native or factitious, and, with regard to the colour, is distinguished into white, blue and green. White Vitriol is brought from Germany in large lumps, which look almost like loaf-sugar, and has a sweetish astringent taste. It is found in mines at Gloslaer in Saxony, where it springs forth from the sides, under the appearance of a woolly substance, which being dissolved in water, must be boiled to a due thickness; and at last, it will turn into a white mass like sugar. Sometimes there are found in the same mines pieces of Vitriol, which are already crystalized and appear transparent.

Blue VITRIOL is dry to the touch, and is formed into blue crystals, like sapphires, of a rhomboidal form, but flat, and with ten sides. It is prepared in various places, but more particularly in Cyprus and Hungary; whence it is commonly called Hungarian and Cyprian Vitriol. It obtains its fine colour from copper, and has an austere taste, with great sharpness.

Green VITRIOL is of an herbaceous colour, and has various names, according to the different places from whence it is got. It abounds with iron from whence it has its colour, and is either in large crystals of a rhomboidal form, or in bits composed of crystalline grains united together, which feel a little oily to the touch; it has a sharp styptic taste.

VITRIOL is nothing else but an acid vitriolic salt, which by corroding zinc, copper, or iron, co-

gulates with them, and so concretes into a transparent body, which takes its colour from the metal. Blue Vitriol is now got in Hungary from water in the copper mines, near Smolnik and Newfol, by evaporation; and green Vitriol is obtained in Germany after the same manner. But in England, at Deptford, near London, green Vitriol is obtained from a stone, called Pyrites, which is heavy and brown on the outside; and, when broken, there are rays that appear to run from the center to the circumference; and consist of particles that shine like brass, and yet are without any taste. These stones, after they have been exposed to the air for some time, undergo a sort of fermentation, and then crack into clefts, out of which a kind of white down of a saltish nature springs forth, which has an acid styptic taste; at length the whole substance dissolves, and turns into a fine saltish powder, of a vitriolic taste and sulphureous smell. If these stones are calcined in the fire, a copious smoke will exhale from them, with a sulphureous smell, and a red calx will remain behind, containing a little iron and copper.

White VITRIOL is extremely good for making an eye-water, which is, perhaps, the best hitherto known for abating inflammations of the eyes, and to repel fluxions thereon. It is made by dissolving a scruple of vitriol in hot rose water, and then passing it through a linen cloth: a few drops of this is to be put into the eyes. When blue vitriol is calcined, it is very proper for stopping hæmorrhages, by cauterizing the vessels, and condensing the blood therein. Spirit of Vitriol, like other acid spirits, restrains the heat of the humours, stops hæmorrhages, and promotes urine.

ALUM is either native or factitious; but the former sort is now little or not at all known. The factitious is distinguished by the name of the country it comes from, it being of several kinds; for there is scarce a country in which it is not made. One sort is called Roch, or Rock Alum, because it is sometimes got out of a rock, where it is often met with in very large pieces.

In Yorkshire and Lancashire they get their Alum out of a bluish stone, like slate, that is full of sulphur. It is a sort of Pyrites, which will kindle in the fire, and being exposed to the open air will break of itself. The fragments of these stones are laid in heaps, where they are burnt in the open air; and when the sulphur is quite exhausted, the fire will go out of itself, after which they steep the calcined stones for twenty-four hours in water, when it is drawn off into leaden cauldrons with the lye made with the ashes of a sea-weed. After the liquor begins to boil, they pour urine therein, which causes the sulphur, vitriol, and earthy matter to sink to the bottom. This done they take the liquor and pour it into vessels made with deal boards, where, in time, the Alum concretes to the sides, in white transparent crystals, which, after washing, are melted in iron cauldrons; after this it is poured into a tub, and forms a mass of the same size. However, in different countries, they have different methods of making Alum, which would be tedious, as well as useless, to relate.

Alum is of a very binding nature, and has always been looked upon as a great styptic. That of the ancients had a smell like aqua-fortis, but the factitious has none at all; and, when placed over the fire in an iron pan, it bubbles up and melts like water. When Alum is set to crystalize, it concretes into a figure with eight sides, which looks like a triangular pyramid, with the angles cut off; inasmuch that it is composed of four hexagon surfaces, and four that are triangular. From a chemical analysis it appears, that Alum consists of an acid vitriolic salt, and an astringent earth or bole intimately united. Alum is recommended for swellings of the gums, and against the fluxions upon the tonsils. When burnt,

it will take down proud flesh in wounds and ulcers; it is of no use internally, only it is sometimes given with a large portion of nutmeg for the cure of the ague.

SAL-AMMONIAC, of the ancients, was a sort of fossile Salt or Sal-gem, though Dioscorides would have it to be a kind of common Salt, which is dense, transparent, white, easily cloven, and dug out of the earth; all which have the properties of Sal-Gem; for it will readily cleave into plates.

Factitious SAL-AMMONIAC is of two sorts, one of which is brought from the East Indies in conical pieces like sugar loaves, of an ash colour; but this is very scarce. The other and common sort is brought from Egypt and Syria in flat cakes, convex on the upper part with a sort of a navel, and a little hollow on the other; they are about a palm in breadth, and three or four inches thick, of an ash colour without, and whitish within.

SAL-AMMONIAC is a very useful medicine, for it dissolves thick clammy humours, and carries them off by sweat and urine. Some commend it in agues, given to the quantity of half a drachm, with a scruple of crabs eyes before the fit. The Volatile Salt and spirit of Sal-Ammoniac are good in a lethargy, apoplexy, fainting, giddiness of the head, and hysteric fits, being held to the nose. Internally, the spirit promotes a diaphoresis, sweat and urine; it blunts acid humours in the body, promotes the circulation of the blood, refreshes the spirits, excites the oscillations of the nerves, and opens obstructions. Whence it is good in the apoplexy, epilepsy, lethargy, sleepy diseases, and in hysteric fits. It may be given from six drops to a drachm in any proper liquor.

BORAX is of two sorts, the one native, and the other refined. Native Borax is brought to us in bits of the size of large hazel nuts, and of a dark green colour, covered with a sort of earthy fat matter. It is found in various places, and is brought from the empire of the great mogul, and from Persia, where it is found in mines of metal, especially those of copper, from whence proceeds a saltish, muddy, greenish water, which is carefully caught, and being evaporated into a proper thickness, is afterwards poured into pits lined with a paste, made with the mud of these springs, and the fat of animals, which are also covered with the same paste. After some months they are opened, and find the water concreted into stones. When Borax is purified, it appears clean, white and transparent, somewhat like the crystals of Alum, with a slight saltish taste, and a lixivious sharpness. It is of the same substance with the native, and was formerly brought from Venice. It is imported to us from the East Indies, and principally from Bengal. When Borax is placed over the fire, it swells like Alum, and at length melts into a hard transparent mass, resembling glass, which, however, will dissolve in water. After examination, it appears that Borax is a sort of a fixed Salt not unlike that of Tartar; but differs from it in joining with acid Salts, without any effervescence. Borax is used by goldsmiths for soldering gold, and to render the melting of metals more easy; likewise, it is employed by some dyers to give a gloss to their silks.

C H A P. XIX.

Of SULPHURS, BITUMENS and COALS.

COMMON SULPHUR, or BRIMSTONE, is either native or factitious, or rather depurated. Native Sulphur, commonly called Sulphur Vivum, is either transparent or opaque; the transparent appears like a gem of a gold colour, though some is

met with that is yellowish or greenish. It is found in the gold mines of Peru, particularly in Quito, on the island of Milo, in the Archipelago, and in the canton of Bern, in Swisserland. The opaque is usually met with in hard solid masses of a greenish shining colour, or under the form of an ash coloured clayey glebe, inclining to yellow. It is in the greatest plenty at the feet of the mountains that throw out fire and smoke, such as Vesuvius, Etna, Hecla, and the like; as also in some parts of Europe and America, where there are sulphureous earths or fountains.

Factitious SULPHUR is prepared several ways; for in some places it is boiled in water, as at Buda in Lower-Hungary. At Aix la Chapelle, in the hot baths, Sulphur is raised in vapours from the water, and sticks to the cover of the spring in hardish lumps, that have the appearance of flower of Sulphur, and a great quantity of this is gathered every year. Sometimes it is extracted from a whitish clayey earth; and is as often obtained from the stone called the Pyrites, particularly in the diocese of Liege, where they are found like lead ore.

ORPIMENT is an arsenical juice, compacted into glebes, consisting of thin scales or leaves, almost like fling-glass, which may be easily separated from each other. There are three kinds, one of which shines like gold, another is reddish mixed with a citrine colour; the third is greenish and mixed with earth; but the first is best. They are found in mines of gold, silver, and copper.

ORPIMENT has a sharpish taste, will dissolve in oil, readily take fire, and emit a copious fume; between the smell of sulphur and garlick. By the heat of the fire it will dispense in plentiful fumes, which if collected, concrete in yellowish flowers, like sulphur; and at the bottom of the vessel there will remain a blood-coloured melted mass, which, when cold, becomes thick and solid, like cinnabar. This, by some, is called red Orpiment, or Realgar. If this mass be kept longer over the fire, in a sublimating vessel, it will rise to the upper part, and there concrete into a transparent, red, elegant substance, like a ruby; but at the bottom there will remain a little metallick earth.

Hence it is plain, that Orpiment consists of the same principles as common Sulphur, only it is mixed with some mercurial particles. Some take it to be of a very poisonous nature; but Hoffman, after many experiments, by giving it to dogs, has found that it is intirely innocent. It is made use of by some barbers, mixed with lime, to take off the hair where it is superfluous; but if it lies on long, it will corrode the skin, which doubtless is owing to the lime.

REALGAR, called ZARNICK by some, is, by others, named Red Orpiment. It is of two kinds; that is, native and factitious. The native, which is got out of mines, is of the colour of cinnabar, and smells like a mixture of sulphur and garlick when it is burnt. The factitious is made with Orpiment in sublimating vessels; for the yellow part will rise towards the top, and the mass that remains at the bottom is the Realgar. However, we are not to confound this with the red factitious Arsenick hereafter described.

Realgar is brought into Europe from China, in several shapes, which they call Pagods, these seem to be made by melting, not carving. Some ancient physicians have given this inwardly; the natives of the East Indies make cups herewith, and the water poured therein, after some time, is used as an excellent remedy against several diseases. Some think that it would not have the like effect on European bodies; for they suppose the nature of man in the East Indies and ours to be greatly different; but this is a mistake. However, it is uncertain whether
Realgar

Realgar be as innocent as Orpiment, or not; but that it is not poison is certain, for Hoffman gave two scruples of it to a dog, without the least bad consequence, and he was as well afterwards, as if he had taken nothing; but this is not the case with the flowers of Orpiment, for a scruple of these being given, it excited enormous vomiting; however, it did not kill, but if the flowers are obtained another way, that is, by mixing four ounces of Orpiment with three ounces of oil of Vitriol, they will yield an ounce of the flowers adhering to the neck of the retort, which are entirely innocent; for they are almost tasteless and promote sweat more powerfully, perhaps, than any other medicine.

ARSENICK, properly so called, is in Bohemia and Saxony extracted from a mineral called cobalt. If this be mixed with calcined flints and pot-ashes, the mixture, in a very strong fire, will turn into a glass of a bluish colour, that when reduced to powder is called smalt. In the preparation of this glass a copious smoke is exhaled, or rather flowers, which sticking to the sides of the furnace, and collected together, appear in the form of a white powder, which put into a crucible, and melted in an exceeding strong fire, turns into a white, heavy, hard, glassy mass; and this is named white Arsenick, which is a most dangerous poison. But when to ten parts of the former powder, one of sulphur is added, and melted, as before, then yellow Arsenick will be produced. Again, if two parts of the sulphur are added to ten of the powder and melted, as before, it will turn to a reddish mass, which goes by the name of red Arsenick.

COBALT itself is a fossile body, which is heavy, hard, and almost black, not very unlike antimony; it has a sulphureous, nauseous smell, when kindled in the fire, and is commonly mixed with a portion of brass, and sometimes of a little silver. Cobalt is found in some parts of England, and particularly in Mendip hills in Somersetshire; but some think it is not so good as that of Saxony.

NAPHTHA, or PETROLEUM, is a mineral oil of a bituminous nature, which is inflammable, and has a fragrant smell. It is of several colours, as white, yellow, red, and blackish. There is scarce any country where this bitumen is not to be found; but in the island of Sumatra there is an excellent sort, which by the inhabitants is called *miniac tanna*, which signifies oil of earth; and this is in high esteem in the East Indies. The Italians are lavish in their praises of the Petroleum found in Modena, and obtained from certain springs and wells. The earth of this dutchy abounds therewith; but that is most remarkable which is met with in the place called Il Fumento, where there is a well near forty yards deep, whose water is mixed with this oil. Twelve miles from Modena there is a noted rock, where there is a spring, on whose water a yellowish oil is seen swimming; and this will produce about twelve pounds of this oil in a week.

Petroleum readily flames, for which reason, in many places, it is used for lamp oil. It consists of fine volatile parts, upon which account, if a candle be held over the wells or fountains that yield this oil, the vapours will readily take fire. It is difficult to unite spirit of wine with Petroleum, it being of such a fat consistence. That Petroleum is generally counted best which is fresh, white, transparent, and has a subtle bituminous smell; the next in esteem is the yellow, then the red, but the black is worst of all. A few drops of this oil is given to children to kill worms; and it is used outwardly in the palsy, and for cold pains of the nervous parts.

Mineral PITCH is a kind of reddish or blackish bitumen, having a fragrant bituminous smell. It is of a middle consistence between petroleum and bitumen, and is not unlike tar. It grows more fluid

in heat, and thicker with cold; and it emits a flame when kindled. It is by some authors called Pissasphaltum, and springs out of the earth in several places between the chinks of stones. That at Castro near Rome rises through the clefts of stones, chiefly in the summer time, of the consistence of honey, and is of a black colour and a most subtle smell. In Auvergne in France there is a plentiful spring of this bitumen, which has the appearance of tar, it being black; but if it be kept a considerable time, it will grow harder, but not so hard as pitch. That most common in England is Barbadoes tar, which is a liquid bitumen, and is used externally, for all pains proceeding from a cold cause; as well as numbness, cramps, and palsies. It is given, inwardly, in pretty large doses, for the dry belly ach.

Jews PITCH is a sort of bitumen, which is solid, brittle, heavy, of a reddish black, shining, and inflammable, with a strong bituminous smell, especially when it is melted over the fire. It is found in several places, and particularly in Judea, from whence it has its name. It is found swimming on the top of the Dead-Sea, and is, at first, soft, thick, and may be readily pulled in pieces; but, by length of time, it becomes harder than common pitch; it is known in the shops by the name of Asphaltum. The true sort is seldom brought to us; for what we have is entirely black; only when it is broken, it has a saffron colour cast.

AMBERGREASE is of an ash colour, or grey, and is a fat solid substance, like suet, but light. It is variegated like marble, and is sometimes speckled with white; it springs from the bowels of the earth, is condensed in the sea, and is found floating on the water, though sometimes it has been met with on the sea shore, where it has been thrown by the waves. It is sometimes black as well as grey; but the grey is accounted best. There is little room to doubt that this is a sort of bitumen, which proceeds from the earth near the bottom of the sea; for it sometimes contains stones, shells, the bones of animals, and the bills and claws of birds, as well as honey-combs, from which the honey has not been all lost. Hence it appears, that this bitumen must have been first in a liquid state; it has been sometimes found in lumps of above two hundred pounds weight. A great deal of this is got in the Indian ocean, about the Molucca islands; though it has also been found near Africa, and sometimes near the northern parts of England, Scotland, and Norway.

Ambergrease will readily melt in the fire into a sort of gold coloured rosin, which will kindle and burn when held to a candle. It will not dissolve entirely in spirit of wine, but leaves a black pitchy matter behind it. The solution, after some time, will deposit a white cloudy sediment, which will coagulate by little and little, and grow thick, especially by the evaporation of the finer parts of the spirits of wine; this being dried becomes a shining sort of earth, not much unlike sperma-ceti. It consists of oily greyish particles, which are very fine and volatile, with others that are thicker, saline, and bituminous. Ambergrease is of great use among perfumers, and is recommended by physicians for raising languishing spirits, and increasing their motion; whence it is given for disorders of the brain and heart, as well as in fainting fits. The dose in substance is a pill of the size of a small pea, or from one grain to eight in a poached egg or wine.

AMBER is a hard bituminous substance, brittle, somewhat transparent, and of a yellow or citrine colour, though sometimes it is whitish and sometimes brown. The taste is somewhat acrid and bituminous, with a little astringency; the smell, when warm, is fragrant and bituminous; and when rubbed it will attract straws and bits of sticks by its electrical

electrical virtue. It is found in large quantities in Prussia, which is the country where it is chiefly got, particularly in the Baltick sea near the shore of Sudavia, where it is found swimming upon the water, and is taken in nets. However, this bitumen is not a production of the sea; for its water only serves to wash it off from the bowels of the earth, and remove it to places near the shore. The veins of this bitumen have been found, by the order of the king of Prussia. In digging for them they first met with sand, which being taken away, a stratum of clay appeared, and still deeper there was another like old wood, under which there was the mineral of vitriol, which being exposed to the open air, it was covered with an efflorescence of green vitriol. Still deeper there was a sandy mineral, out of which, with proper instruments, they got Amber in various places. By this means, in the March near Kustrin, as also in the Tract of Stolpen and Dantzick, it was met with among sand; and found collected in heaps; whence it appears they were greatly mistaken, who took it for the resin of trees that dropt from them into the sea. It seems to proceed from the bituminous fossile wood, just mentioned, by the assistance of the subterranean heat; which, at first, is probably like Petroleum, and after passing through the mineral of vitriol, by the mixing therewith, becomes coagulated into a hard body. There is no doubt that it has been liquid, because it is often found in a round form, containing several sorts of insects therein; besides, the oil which is obtained from Amber, is, for virtue and smell, like Petroleum. Charlton, who was a very great naturalist, has sometimes found real Petroleum included in pieces of Amber, which is a farther reason to prove what is asserted. The greatest plenty of this bitumen is found near the shore of Sudavia, after a violent north wind, attended with a tempest. Sometimes Amber is so transparent, as to serve to make burning glasses, one of which is kept in the cabinet of the Landgrave of Hesse-Cassel. Amber, properly prepared, becomes a medicine for opening the obstructions of the bowels, and promoting all sorts of excretions; and consequently is a very useful remedy in chronical diseases. It is likewise said to be very efficacious in curing cold disorders of the brain, and particularly in pains of the head, sleepy and convulsive diseases, as well as in hysteric and hypochondriac fits. The dose is from a scruple to a drachm in a poached egg, or any other proper vehicle. The volatile salt of Amber is diuretick, and accounted a specific in hysteric and convulsive diseases. The dose is from ten grains to thrity. The oil is commended in nervous disorders, particularly in the gout, palsy, and catarrhs, by anointing the parts therewith. It is given inwardly from two to twenty drops.

JET, called by some Black Amber, is a bituminous substance, dry, hard, black, smooth and shining, and being set on fire turns almost like pitch, emitting a thick smoke, with a bituminous smell. It differs very little from pit-coal, especially the finer sort, which we call Kannel coal, if it be not the very same. It differs from a bitumen in not melting as that will do, and when distilled it yields a sharpish acid phlegm, and then a black oil; but last of all a substance like butter, or thick oil. It leaves behind it a very black caput mortuum.

PIT-COAL is universally known in these parts, and when distilled in a retort, first yields a phlegm, then a sulphureous spirit that is a little acrid, which is afterwards succeeded by a subtil oil, and then one that is thick, which sinks to the bottom. With the greatest degree of fire there is produced a sort of an acid salt, like that of Amber, leaving behind it a light black earth. When the spirit is thrown on quick lime, it becomes volatile, and strikes the nose

No. 43.

with a strong smell; spirit of nitre being added to this, a white smoke will arise, which yield a very pleasant sight. The foetid oil being mixed with salt of tartar, has the smell of volatile salt, and when this mixture is distilled, it yields an alkaline, volatile, oleous spirit, which will turn syrup of violets green; but if it be mixed with an acid, it will immediately ferment, and become of a bright red colour. The thick oil of coals has a sulphureous smell, and being put into a silver spoon, with a gentle heat, will turn it blackish, which is a certain sign there is a true mineral sulphur contained therein, for common sulphur, dissolved in oil of turpentine, will do the same. Hence it is plain, that coals contain nothing that is unwholesome; nor is there any arsenick at all in them, though some have supposed the contrary. Nor yet is the mineral sulphur which they contain so hurtful as some have imagined; for those that are employed in the melting and preparing sulphur are as well, and in as good case as other people, and much better than miners of other kinds. Coals are so far from doing any harm, that they are rather beneficial, by drying up the too great humidity of the blood, and preserving the body from putrefaction; for it has been observed by Galen, that all bitumens, being kindled, mend the disorders of the air, by dispersing their too great humidity; which opinion has been hitherto followed by all phisicians. Where the atmosphere is very moist, and full of watery vapours, so hurtful to human bodies, the burning of Coals is certainly very proper. In former times, when the plague and other infectious diseases were common, they used to burn bitumen to purify the air; and this is certain, that in London, since the burning of Pit-Coal has been almost universal, no plague has ever affected that city; nor any disease of that kind; and therefore there is no reason to be afraid of it, unless it be brought from other countries.

There are mines of Coals dug in various parts of England, which generally differ, in some respect, from each other; those brought from Newcastle, improperly called Sea-Coal, are remarkable for their being generally small, and caking on the fire. These are the best for boiling flesh, which others, in various parts of the kingdom, will not do, particularly in Staffordshire. Kannel Coal, which is dug up in Derbyshire and other places, is famous for its fineness, as well as hardness, though it will burn like a candle; there are now several things made with it, such as the tops of snuff-boxes, salt-cellars, and the like. It is also found in Staffordshire, and it is remarkable, that the choir of the cathedral church of Litchfield is paved therewith; that is, the black part with Coal, and the white with alabaster, which look like black and white marble. It will turn like ivory, into ink-pots and candlesticks; and some have their coats of arms carved thereon. The other Coals most used in London are brought from Wales and Scotland, and are valued for burning clear without a great deal of smoke.

CH A P. XX.

Of METALS and SEMI-METALS.

ANTIMONY is a mineral, consisting of sulphur and a mercurial arsenical substance, as is universally allowed by the chemists. It is solid, heavy, brittle, of the colour of lead, consisting of long shining streaks, and will melt in the fire, but is not malleable, in which it differs from a metal properly so called. There are several kinds of it, one of which looks like polished lead; but it is brittle, and mixed with a sort of crystalline stone. Another consists of slender shining lines, that look like needles placed

placed in rows, in some places, and in others without any order. A third kind is made up of broader shining plates; and a fourth of small lead coloured rods, which melts in the fire as readily as sulphur, on account of the large quantity of that substance contained therein: this is found in Italy, near Massa in Tuscany. There is still another kind, which may be distinguished by saffron coloured, or reddish spots dispersed here and there; and this is met with in the gold mines of Hungary. In short, there is scarce any part of the world where this mineral is not to be found, and though they seem to be of so many different sorts, yet their natures are nearly the same.

The Glebe of Antimony is generally mixed with a stony substance, which it is freed from by melting. They first break it into bits, and place it over the fire in earthen vessels, with holes at the bottom, under which there is another earthen vessel in the form of a cone, and when it is in fusion it runs through the holes, and leaves the dross behind. That which is hard, heavy, of a lead colour, with shining streaks, placed like rays, is accounted the best, and the Hungarian Antimony, for this reason, is chosen for medicinal purposes. The sulphur in Antimony may be readily perceived, not only from the smell, but from the bluish flame it emits while it is melting. Besides, when nitre is thrown into the crucible, containing red hot Antimony, it flashes in the same manner as with common sulphur.

It was formerly thought, that the sulphur of Antimony partook of the nature of gold; for which reason they employed themselves to little purpose in making experiments to extract the fine sulphur therefrom. Notwithstanding this, it is now generally acknowledged, that the sulphur of Antimony is exactly of the same nature as common sulphur, though all the reguline parts are seldom extracted from it; nor yet can that be called the pure sulphur that rises in flowers, when sublimed; for, though it takes fire like sulphur, yet the fume is of a whitish-yellow like that of orpiment. Besides, that it is not pure, may be known by its effects; for it will occasion violent vomiting, which is a certain sign that it is not entirely freed from the reguline particles. If you take white arsenick and mix it with half sulphur vivum, and afterwards sublime the mass, there will arise reddish flowers, which, when taken inwardly, have a very violent operation, and when they are set on fire emit a reddish fume; for there is such a force in mineral sulphur, that it will readily join with the arsenical particles, and carry them up therewith, when sublimed.

There is no substance in the world that yields so powerful a poison, and such efficacious medicines, as Antimony; however, when crude, it has no violent operation, and yet, taken in a proper quantity, may be given very advantageously in many cases, both to men and cattle. But if crude Antimony be melted in the fire, and mixed with the like quantity of nitre, by little and little it turns to a poison; and yet, if Antimony is mixed with one part of common salt, and calcined over a gentle fire for some hours, continually stirring it with a spatula, and afterwardsedulcorating with water, there will remain an ash-coloured powder, which has no violent operation, but will promote a gentle sweat. Moreover, if you take four parts of Antimony, and four of salt of tartar, and melt them, and then pour them into a cone proper for that purpose, you will have the medicinal regulus of Antimony, which may be beaten into a reddish powder of extraordinary virtue. But if, instead of one part of the salt of tartar, two or three be made use of, and then melted, the regulus will be changed to a poison, which is occasioned by its being deprived of too much of its sulphur.

Crude Antimony, reduced to a fine powder, and taken inwardly, is very useful in several diseases; for it will dissolve the clamminess of the fluids, open obstructions, and is a good remedy in diseases of the skin. It is also excellent against the rheumatism, and will take away numbness of the limbs. The dose is about half a drachm. Antimony is also useful to various artificers; for pewterers mix it with tin and lead to make their pewter shine, and to give it the sound of silver; bell-founders mix it with other metals in making their bells; likewise the letter-founders constantly employ it in making their types. Add to this, that goldsmiths make use of it in purifying gold; for, when melted therewith, it will destroy all other metals, not excepting silver, and turn them into dross.

BISMUTH is a semi-metal, which will melt in the fire, but is not ductile; it is heavy, brittle, and differs from lead and tin in its colour and hardness; for it sometimes looks like silver, and sometimes is of a faint purple colour, not unlike regulus of antimony, though it consists of broader plates. Bismuth is sometimes found in so very pure an ore, that it stands in need of no other operation to fetch it out, than by breaking it in pieces. In the Museum of the Royal Society there are pieces of Bismuth sent from Cornwall under various names, which are so very rich, that, if a piece of it be only held with a pair of tongs against a clear fire, the Bismuth will run down in the form of melted tin, almost as soon as cheese will drop in toasting. Some call the ore of Bismuth the cobalt of Bismuth; because it contains the same principles as real cobalt, only in a different proportion. It is by some called tin-glass; and, when broken, appears to consist of small cubic particles, and these again of minute plates applied to each other. It is more brittle than zinc, though it differs little from it in external appearance, except in colour. It will cause metals, that will not easily melt, to be more fusible by a much less fire than they otherwise would. It mixes easily with any metal, and, according to the greater or less quantity added thereto, it renders them more or less white and brittle. But as Bismuth is easily destroyed, its mixture with metals, difficult to be melted, should be made in close vessels. It is very observable, that Bismuth melted with lead, tin, or silver, and afterwards amalgamated with Mercury, will pass through leather in much greater quantities, than they otherwise would. When this powder is washed it is very white, and used by the ladies as a beautifier of the skin. It is of little use in medicine.

ZINC is a semi-metal, of a blueish-white colour, brittle, and yet somewhat ductile and malleable, though much less so than metals. It melts in a gentle fire, after which it smokes, and then sticks to the furnace in the form of exceeding white flowers. In a greater fire it burns, and emits a flame of a most beautiful green colour. All the Zinc that is prepared in Germany, especially at Goslaer, is obtained by sublimation, and not by melting; nor is it got out of any single ore, but out of such a confused mixture of different ores, that several other metals and semi-metals may be separated therefrom at the same time. There is no particular kind of sublimation for the extracting of Zinc; for it is collected during the melting of other metals, especially lead. The ores that yield Zinc are, by long and repeated roastings, freed from sulphur, and in a manner from arsenic, by the same operation.

There are certain substances that may be more properly called ores of Zinc, such as lapis calaminaris, or calamine; as also native cadmia. This is of a very irregular figure, sometimes spongy, and now and then solid. It is sometimes of a gold colour, sometimes red, and at other times grey; or of
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the mixture of them all. It is not very heavy nor hard; and, when broken in pieces, it immediately emits a flame of a greenish colour, and exhales a white, thick, copious fume, of a smell peculiar to itself, which condenses into very light flowers, at first bluish, and then of a greyish white. But care must be taken that the calamine be not mixed with a yellow sulphureous pyrites, or the white arsenical one, nor yet with lead ore.

Zinc, by some called Spelter, and by others Tuttenag, mixes readily with lead and tin, rendering them more brittle and less malleable. When it is by fusion mixed with four times the quantity of copper, it becomes a brittle metal of a gold colour, which is well known by the name of Prince's or Bath metal. The white flowers of Zinc, taken internally, promote sweating, and sometimes they will work upward and downward. The dose is from four grains to twelve. The making of Prince's metal is by melting three ounces of copper with half an ounce of Zinc, and when the mass is cold, it will appear of a fine gold colour, remaining ductile with a hammer.

COBALT is a ponderous mineral finely streaked, or sometimes granulated. It is often smooth on the outside, of a light greyish, and almost semi-metallick colour, and sometimes of a dark blackish dye. It contains a great deal of arsenick, as well as a certain fixed earth, which being melted with flints, and fixed salts, turns into a glass of a fine blue, called Smalt, which has been taken notice of before. Cobalt commonly contains bismuth; however, there are several minerals which go by the name of Cobalt, that have different properties from the former. That called the flower-of Cobalt is finely streaked, lighter than the foregoing, and of a fine red purple colour, and belongs to this class; for it is a very arsenical mineral, and loses one half of its weight in the fire; but a great deal of bismuth may afterwards be melted out of what remains. This will likewise give a blue colour to glass, like the other Cobalt.

Native CINNABAR is a fossile metallick substance, heavy, but not very hard, which is either found pure, or mixed with stones. One of the sorts, when pure, is of a purple colour, inclining to red, and when ground, becomes of a beautiful red. There is another of a blackish, or of a liver colour, like blood-stone, and another yellowish. That sort of Cinnabar, which is mixed with stones, is often found in a fissile ash coloured stone, and sometimes in a very white metallick stone. It is sometimes met with under the form of pyrites, of a gold or silver colour. It is found in various places, as in Carinthia, Hungary, Bohemia, Italy, Spain and France.

It is known almost to every one, that it contains plenty of quick-silver, which is got from it by distillation, with the assistance of quick-lime or filings of iron. Sulphur may be extracted from it, though in a small quantity, if it be boiled in a strong lye, and separated from the quick-silver by pouring distilled vinegar thereon. Besides, Cinnabar may be made by art, not much unlike the native, as will be taken notice of hereafter. It is recommended by some physicians for internal use against the epilepsy, vertigo, madness, and disorders of the head; but the native Cinnabar is now very little used, the factitious sort being preferred.

QUICK-SILVER, or MERCURY, is a metallick fluid substance, cold to the touch, of a shining silver colour, very heavy and volatile, and readily mixes with most other metals. It is either found fluid in the bowels of the earth, in the chinks and veins of mines from whence it is collected, and washed with plenty of water to separate it from the earth, or it is dug up in glebes, consisting of a red mineral, sulphu-

reous, mercurial substance, called cinnabar. It is also found in the form of a slimy or stony glebe of divers colours, it being sometimes red, yellowish, brown, or of a lead colour. From this last, Quick-silver may be obtained by simple distillation, without the addition of any other matter, either by ascent in a retort, with a proper fire; or by descent, which is the common way, and is done in the following manner: They pound the mineral, and throw it into earthen vessels with a narrow neck, stopping it up with fresh moss from trees; then they place another over it, with a wider mouth, and bury them in the earth, with one of the mouths against the other, coating them all round with clay, and luting the mouths together, in such a manner, that the empty vessel is entirely hid under the earth, and that which is full placed above it. This is done in an open place, and many of them ranged in rows, after which they make fires all round them, by which means the minerals are heated, and the Quick-silver falls by drops into the lower vessel; but if the mineral abounds with sulphur, the Quick-silver cannot be extracted without the addition of some other substance, such as quick-lime and filings of iron, already taken notice of, as also wood-ashes.

Quick-silver exceeds all other metals in weight, except gold; for that will sink therein, while others swim at the top. The weight of gold, compared with Quick-silver, is a little more than four to three. It will mix with all metals, or semi-metals, though not without difficulty, with antimony, iron, and copper. It penetrates the metals, renders them brittle, and dissolves them; for which reason it is accounted by some the first matter of metals; but this opinion cannot be supported by experiments. It may be made to put on various appearances, which are all reducible to running Quick-silver again. It joins very readily with sea-salt, and turns therewith, by a gentle heat, into a white crystalline mass, called corrosive Mercury sublimated; but it will not do the same with nitre and vitriol. It will readily dissolve in spirit of nitre; but not without great difficulty with the oil of vitriol. It undergoes no change with alkaline salts; but it may be killed and fixed with salin-sulphureous bodies. Being ground some time with sulphur, it will turn into a very black powder, called Æthiops mineral; which, by the assistance of fire, may be sublimated into a very red radiated shining mass. Quick-silver being dissolved in spirit of nitre, and the acid spirit exhaled by fire, a red powder will remain at the bottom, called red precipitate; but if it be precipitated with salt of tartar, a brown powder will fall to the bottom, named precipitate of Wurtz; but with sea salt it will be white, and with lime water yellow.

The analysis of Quick-silver is very difficult; because it frequently flies away with the heat of the fire; however, if it be exposed to that heat in a glass vessel, with a long neck, it will, at length, become a grey powder, then yellow, and, at last, red; at which time it is somewhat more heavy than when fluid. But if this be exposed to a more violent heat, it will fly away, leaving only a little brown earth behind it.

Quick-silver, by the ancients, was accounted a poison, and Avicenna was the first who ventured to use it externally; but upwards of two hundred years ago some had the courage to use it internally, because they observed that it did sheep no harm, when it was given them by their shepherds to kill their worms. But Quick-silver cannot be said to have no bad effects; for those that are employed in digging for it, seldom continue four years without being affected with a trembling of the limbs and a palsy, of which they die.

However, Quick-silver has a remarkable virtue in opening all obstructions of the vessels and glands,

and of dissolving the thick gross matter contained therein, for which reason it is given in schirrosities of the liver, spleen, and mesentery, as well as in obstructions of the glands, and will also temperate the acrimony of the blood and humours. Quick-silver, not only taken inwardly, but applied outwardly in an ointment, will purge the body by stool, sweat and insensible perspiration; but its most remarkable effect is that of salivation.

That Quick-silver is counted best that is of a shining silver colour, very fluid, and, when held over the fire in a silver spoon, will fly away, without leaving any thing behind it. That which is of a livid colour, and does not separate into drops that are exactly round, is naught, and shews that it has been adulterated with lead or bismuth. However, it ought always to be cleansed, which may be done by squeezing it through shammy leather; but the best way is to distil it in a retort with quick-lime, pot-ashes, or iron filings. Crude Quick-silver may be given to kill worms, from a scruple to a drachm; and it may be rubbed on glass with sugar till it is dissolved, if a drop or two of oil of sweet almonds be added thereto. A pound of Quick-silver may be also boiled in pure water for an hour, and some of the clear liquor given to children for common drink. It will kill worms taken inwardly and lice when applied outwardly with an ointment. Crude Quick-silver is sometimes given to the quantity of two or three pounds, with oil, to force a passage through the guts in the iliack passion.

LEAD is of the least value of all metals, it being heavy, livid, and fouls the hand with a blackish colour; it yields little or no sound, and melts quickly in the fire before it turns red. Pure Lead is seldom found in the mines, but is extracted from ores of different kinds; for it is sometimes black, blue, yellow, or of an ash colour. It is sometimes full of shining minute particles, and sometimes again it is like a stone of a leaden shining colour, consisting of squares like dice, that lie in a white or reddish stone. The ore of Lead almost always contains a small quantity of silver; and particularly that of Cardiganshire in Wales has so much of it, that from two thousand pounds weight of ore, there has sometimes been extracted twenty pounds of silver.

When flints and the like are mixed with an ash or black colour, or are only marked here and there with veins and spots of the same, it is a sign that they contain either Iron or Lead. The green Lead ore is very rare; but when it is found it is variegated with a yellowish green colour and semi-transparent. It is likewise heavy but not hard, and one hundred weight of it yields from seventy to eighty pounds of Lead. There is also white and ash coloured Lead ore, but it is as uncommon as this.

There are several mines of Lead in Spain, Italy and Germany; nor is France without, though the metal be extracted with difficulty; but the best and richest are in England and Scotland. The method of obtaining the metal, is by placing the ore between strata of coals, and then when the fire is kindled the metal will flow; or pieces of wood may be used instead of coals or mixed therewith, according to the degree of fire that is required; for coals yield a more violent fire than wood.

The weight of Lead compared to Gold is as three to five. Lead is easily calcined and reduced to an ash coloured calx, which in a more violent fire turns yellow, and at length red, when it is called minium, or red lead, which may be easily reduced to Lead again, when mixed with combustible matter and melted. Lead mixed with nitre in a crucible will flash a little, and if the filings of Lead be thrown into the flame of a candle, it will tinge it with a bluish colour. From whence it appears, that there is a sulphureous principle in Lead, though in a small

quantity. When Lead is exposed to the focus of a large burning-glass, it will immediately smoke, and by little and little change into an ash coloured calx, then yellow and red, afterwards turning to a saffron coloured fluid, like oil, which in time will fly away in smoke; but if this fluid, before it is quite dissipated, be taken away from the focus, after it is cold, it will turn into a red, or reddish yellow mass, consisting of thin plates like orpiment, which are transparent and look like Talc. But if this be applied to the focus of a large burning-glass on coals, it will immediately melt, and turn to Lead again. From hence it appears, that Lead consists of a glassy earth, not much unlike Talc with a sulphureous principle, that is inflammable, and not mixed intimately with the earth.

Lead will dissolve all other metals, except gold and silver, and carry them off along with it, or turn into litharge or fly off in smoke; for this reason it is used for the purifying gold and silver. It will not rust in water like iron or copper, but will dissolve in vinegar, spirit of vitriol, and spirit of nitre; and the salt which is obtained therefrom, when the spirits are evaporated, will have a sweetish taste; whence it is called sugar of Lead. It will also dissolve in oil and all fat substances. When Lead is reduced into a calx, though it emits a copious smoke, and loses much of its substance, it will increase in weight, in so much, that an hundred pounds of Lead will increase to an hundred and ten, when it is converted into red Lead; but if this afterwards be reduced to Lead again, it will not yield near an hundred pounds. When red Lead is melted with sand, it obtains a yellow gloss, not much unlike amber. Several preparations of Lead have formerly been used as medicines; but, as it is an enemy to the nerves, it is in a great measure left off, and ought to be entirely abandoned.

Litharge is generally made in the furnaces of metals, when Lead is separated from silver, or when Lead is made use of to cleanse silver from other metals mixed therewith; and it sometimes is of a silver, and sometimes of a gold colour, whence it is called litharge of gold or silver, though it does not receive its colour from those metals. Litharge is of great use in making plaisters of which it is the basis, being mixed with oil. It is a moderate drier, cleanses with a little astringency, and is proper to bring ulcers to a cicatrix.

Cerufs, or white Lead, is a sort of rust of Lead prepared in the following manner: The sharpest vinegar must be put into wide mouthed vessels in the summer-time, over which a plate of Lead is to be placed so closely, that nothing can escape out of the vessel: In about ten days the plate will be dissolved, and fall to the bottom of the vessel, from whence it is to be taken and dried, and afterwards ground in a mill. It is also made from the filings of Lead put into very sharp vinegar for ten days together; or a plate of Lead may be put therein, and taken out from time to time to scrape off the white part; and so again and again, till the whole plate is dissolved; then all the scraplings may be collected, ground, and made into masses with vinegar.

TIN is one of the softer and more ignoble metals; and is white, shining, brittle, sonorous, and crackles when bent. It is the lightest of all metals, and never existed naturally in a true metallick form. The richest Tin ore is of a black or dark colour, with many sides of an irregular figure, and a glossy surface. It is heavier than the ores of all other metals, which is somewhat strange, because Tin is lighter than all the rest. It is indifferently hard, and bears a quick fire without melting or growing clammy. But the most common Tin ore is of a dark, yellowish, rusty colour, and is very like the ore of iron; it is like the former in shape, and seems only to differ from

from it in its degree of purity. The garnet is a sort of precious stone, and now and then contains Tin; so that, upon this account, it is reckoned among the ores of this metal.

Tin, in Cornwall, is extracted from its ore, after it is separated from the stone to which it is connected, by pounding it with iron pestles, and in the mean while it is continually washed with water, that the earthy parts may be carried away therewith, and that the metallick particles may sink to the bottom. This gross powder, after it is dried, is ground with stone mills, and then washed, till it is quite freed from all foreign matter. Then it is dried and thrown into a furnace, mixed with charcoal, which being lighted and blown with bellows, the Tin will melt and fall to the bottom of the furnace; when the workmen, opening the small door of the furnace, suffer the metal to run into sand prepared for that purpose, where it forms large masses. The upper part of the Tin is so soft, that it is not fit for use without copper; and therefore they mix three pounds of that metal with an hundred of Tin. The middle part only requires two pounds of copper; but the lowest is so brittle, and so unfit for use that they mix eighteen pounds of Lead with an hundred of Tin.

There is often an arsenical substance mixed therewith, which they call mundick, that is of a shining dark colour, and blackens the hands; but by the help of fire, it flies away in smoke. There is also another white saponaceous substance, which is soft, and may be dissolved in water at first; but soon after turns very hard. It is a kind of marl. The weight of Tin, with regard to gold, is as three to eight; and is easily melted and reduced into a whitish calx.

Tin will melt sooner than other metals, and will adhere to them very readily; for which reason copper and iron vessels are often tinned on the inside, to hinder them from rusting, and to prevent the bad effects of the copper. If it be mixed with these metals, it renders them more hard and brittle, and cannot be separated from them without great difficulty. Tin will not dissolve in any spirit, unless it be aqua regia; and its solution will tinge gold with an elegant purple colour.

The virtues of Tin are now well known as a vermifuge; for it will kill worms, taken either in powder or filings, from a scruple to a drachm for several days. Salt of Tin is made of that metal reduced to a calx, by exposing it to a reverberatory fire for two or three hours, and then throwing it into very strong distilled vinegar. This is recommended in hysterick fits, and is given from two grains to six. Mosaic, or musive gold is made in the following manner: take of fine Tin one ounce, of Mercury revived from cinnabar ten drachms, and make an amalgama, which must be mixed with ten drachms of common sulphur, and an ounce of sal-ammoniack. All these, being finely ground together, must be sublimed in a strong fire for four hours, and a sort of cinnabarine substance will be raised to the upper part of the vessel; but at the bottom a kind of spongy substance of a gold colour will remain, which being washed in several waters, is called musive gold. It is of great use to painters, and in medicine has a diaphoretic quality. It is accounted good in hysterick and hypochondriack disorders, as well as for killing of worms. The dose is from ten grains to thirty. Some have supposed this to be a mercurial preparation; but falsely; for all the mercury is raised from it in sublimation.

IRON is an ignoble metal, remarkable for its hardness; and is of a whitish livid colour when polished; but before that it is blackish. When it is cleansed it is called steel. The ore of common Iron is of no certain form; but is most commonly of

a rusty colour. There is also an ore which is very heavy, and of a red bluish colour when broken. It is very rich in the best kind of Iron, and usually yields at the first melting, from sixty to eighty pounds out of an hundred weight. There is also a singular kind of Iron ore, of a pale yellowish colour, though sometimes grey; and sometimes of a kind of semi-transparent white. It will yield, when melted, about thirty pounds of Iron out of an hundred weight.

The HÆMATITES, or Blood-stone, is also a sort of Iron ore, and is very smooth on the outside, when the rust is taken off; but the inside is composed of convergent streaks. It is of a dark red colour, very heavy and hard, and is one of the purest of the Iron ores, with a small mixture of arsenick. Smiris, called in English emery, is the hardest of all the Iron ores hitherto known, and is almost as heavy as the blood-stone. It is of a brown colour, and certainly contains Iron, though it is not worth while to employ it for that purpose; and therefore it is used by workmen, when pounded, to polish steel and other things. Magnesia, or Magnanese, has no certain figure, is of a greyish black colour, and contains Iron; but it is not worth while to make use of it on that account, because it will not answer the charges. It is used in glass-houses to take away the green or blue colour of glass.

When iron is melted, it is formed into large masses, which are long and thick, and commonly called pigs. These are melted over again, and stirred with an Iron rod, in order to render them malleable. While they are yet red hot, they are placed under hammers, and by that means the heterogeneous particles are forced away by the repeated strokes. One sort of Iron differs greatly from another; but that which is toughest is best; and that which is most brittle is worst of all. However, all sorts of Iron are of the same nature; and they are only more or less tough in proportion to the earthy, vitriolic, and sulphureous particles mixed therewith. Iron being often melted and cleansed is turned into steel; though, in some, little labour is required for that purpose, and in others a great deal. When Iron is very good, they melt it in a furnace, and throw in gradually a mixture of equal parts of an alkalious salt, and filings of lead, with the raspings of oxes horns; then they stir the melted metal, and at length place it on the anvil, where they beat it into rods. Some iron will not melt over again, and then they take Iron rods as thick as a man's finger, and place them in a proper earthen vessel, alternately with strata composed of equal parts of foot, powder of charcoal, and raspings of oxes horns. When the vessel is full, they put a cover over it, and lute the joints, placing it in a reverberatory furnace; the fire is kindled, and increased by degrees, till the vessel is hot, and after six or seven hours, they let it go out of itself, in which time the rods will be turned into steel. When this operation is not perfectly performed, and only the outside of the Iron is turned into steel, in some parts of England, it is called case-hardening, and this is commonly done with the leather of old shoes.

Iron is the hardest of all metals; but it will become harder still, if heated red hot, and quenched immediately in cold water. The weight of Iron when compared with gold is as three to seven. Iron may be converted into rust, by moistening it with water, letting it dry, and often repeating the same operation; but it may be preserved from rust by being smeared with fat. Iron, calcined in a reverberatory fire, will turn into a darkish red, or purple calx; but being heated so hot as to be ready to melt, it will turn into scales under the hammer, which is nothing else but Iron half turned into glass. That part of the Iron, which in furnaces is turned into a

fort of glossy froth, is called the dross of Iron. This metal will dissolve in all sorts of acids; but alkalious Salts will not touch it.

Iron is a most useful metal, not only on account of the various mechanical uses it is put to, but on account of the many medicines it yields. Iron has two remarkable effects, namely, that of opening and binding; for it opens the obstructions of the liver, spleen, and bowels, stops loosenesses and hæmorrhages, and restores relaxed fibres to their due tone. For medicinal purposes, Iron is better than steel; and the filings of Iron alone, when ground small, is better than any other preparation of this metal whatever. The dose is from twelve grains to half a drachm, once or twice a day, in the form of a bolus, pills, or lozenges.

COPPER is one of the more hard ignoble metals, is softer than iron, and, when polished, is of a shining reddish colour. It will melt in the fire, and is so ductile that it may be beaten into exceeding thin leaves. It is more frequently found in its metallic form than iron, in various shapes; but its ore never distinguishes itself by any certain figure, for it is almost always irregular. But the finest colours of any kind, except the red and transparent, most commonly betray the presence of Copper; for this reason there is hardly any Copper-ore that is not mixed with Iron in a larger quantity than the ores of other metals commonly are. However, there is not so much in some as in others, and those that contain the least Iron are naturally more easily melted than the rest. The vitrious Copper-ore is of a darkish violet sky-colour, like that of a piece of steel that has touched a red hot iron. It is very heavy, and of a moderate hardness; but it is commonly variegated here and there with spots and grey veins. One hundred weight of this contains from fifty to eighty pounds of Copper. The Azure Copper-ore is of a most beautiful blue colour, and is not soft, but very heavy, and when broken shines like blue glass. This is most free from iron, arsenick, and sulphur; and a great quantity of excellent Copper may be extracted out of it with very great ease. The Green Copper-ore is like green crystals, and sometimes very prettily streaked; but in other things it has the properties of the former. The light dusky blue concretes, as well as the green, called by some Copper-ochres, yield a great deal of very good Copper when they are pure, which may be known from their colour and weight; but those that are more light are mixed with unmetallic earth, and those that are yellow contain iron ochre; on which account they are the more difficult to be met with, and yield less Copper of an inferior sort.

The white Copper-ore has been hitherto found only in one single mine of Misnia, and is distinguished from the white pyrites by a somewhat yellowish colour.

The Sulphureous Copper pyrites is of a yellowish gold colour, with a light tinge of green, both within and without. When broken, the inside has a kind of granulated surface, and is easily beaten into powder. It contains sulphur and Copper in many different proportions; on which account its specific weight varies very much. If it is very rich in Copper, and at the same time is mixed with any quantity of arsenic, its gold colour becomes more yellow, and when it is broken, the surfaces are more smooth, neat and even. It is very often of a fine bright green, and blue on the outside, and between the chinks, though when broken, it appears of a different colour. When the Copper pyrites is mixed with a considerable quantity of arsenic, it will then look pale like the sulphureous Copper pyrites, and still whiter when there is more arsenic. However, it may be easily distinguished from the iron pyrites in being more heavy, and in

not sparkling so easily when struck with a steel. The yellow sulphureous iron pyrites belongs to this class, because it often contains a great deal of Copper, which may be known from its not being of a globular figure; for, when it is in that form, it is always destitute of Copper. There is likewise an unusual yellowish colour throughout its whole substance.

Copper is seldom found alone in its ore, for there are other metals along with it, as silver, iron, and lead; there is also a large quantity, generally speaking, of a combustible sulphur, not easily separated from it. That which abounds with most sulphur, must undergo different calcinations till all the sulphur is exhaled, and this the workmen call roasting. After this, the roasted ore is beaten into smaller pieces and calcined again, then it is beaten very small, and must undergo a third roasting, after which it will melt into a stoney red substance, which is called the stone of Copper. This done it must be roasted again, and then melted, when it will yield a black Copper. It must yet be roasted eight times, and then it will be thoroughly cleansed from all the sulphur.

There is a sort of Copper springs, out of which vitriol is made by boiling, and Copper may be extracted by precipitation, with the assistance of iron. There is one of this kind found near the town, called Smalnick, not far from mount Krapac in Hungary; in which there is Copper that will stick to iron when thrown into it; thus for instance, if you throw a horse-shoe into this spring, after a few days it may be taken out covered all over with Copper. There are Copper mines in various parts of the world, but the best and richest are in Sweden and Germany.

The weight of copper, with respect to gold, is a little more than four to nine; and if it be exposed to a moist air, it will contract a green rust. It has a disagreeable smell, and an austere acrid nauseous taste; it will, in time, dissolve in water, as well as in oil, and salts of all kinds will corrode it. Copper contains a portion of combustible sulphur, though not so much as iron, with a metallic red earth that will turn into glass. Copper will turn white with the fumes of arsenick or quicksilver; but it will not continue long. Being melted with lapis calimnaris, or zinc, it will turn of a yellow or gold colour, which is called Brass. Copper, on account of its ductility, is formed into various household utensils, and is melted into mortars, great guns, and the like; but it is seldom used in physic, especially internally, because it is of a poisonous nature; for which reason it is not safe to use it in pots, kettles, and the like, without tinning.

Verdigrease is the principal preparation, and is of great use to painters and dyers; but it is seldom or never given inwardly by physicians, though it is frequently used externally.

SILVER is a noble and perfect metal, of a white shining colour, sonorous and ductile, but not so perfect as gold. It is sometimes found in small masses of many different shapes, but most commonly like filaments and scales in several sorts of stones and earths, and in many sorts of land.

The Vitrean silver ore is of an irregular and uncertain form, is very weighty, and may be easily flatted with a hammer; for it is not much harder than lead, and is much of the same colour; for which reason it is often mistaken for lead. It melts presently, and soon grows red-hot. It consists of sulphur, and pure Silver, and above three quarters of it is Silver. The Horny Silver ore is half transparent, and is of a deeper yellow or brown colour, according as it consists of larger or smaller lumps. It looks like rosin, and is of an irregular shape. When carefully examined, it appears to consist of very thin plates; it is not very weighty or hard, for it may be easily ground; and when brought suddenly

to the fire, it crackles, bursts, and exhales a sulphureous smell, and sometimes burns lightly. This hard sort contains two thirds of Silver. The red Silver ore is sometimes of a lighter, and sometimes of a deeper scarlet colour; the first case is transparent like a garnet, and has been mistaken for transparent cinnabar; and in the second case it is of a deeper dye. It is heavier than the former horny ore, but bursts when brought near a candle or a mild fire, and the remaining part melts before it grows red-hot; then it emits a disagreeable smell of arsenic, together, with a thick smoke. It contains the same quantity of Silver as the horny ore just mentioned.

The White Silver ore is of a light grey colour of an irregular figure, pretty weighty, and very brittle. It has not only copper in it, but sometimes more of it than of Silver; for it differs from the white copper ore in nothing but in the quantity of Silver it contains. These are the principal Silver ores hitherto known, though many others are looked upon, by some, as such, because they contain a considerable quantity of Silver; but then there is always more of other metals along with them, and therefore they cannot properly be called Silver ores.

There are mines of Silver in many countries, as in Italy, Germany, Hungary, Norway and England; but the most remarkable are those of Peru and Mexico. In England the veins of lead always contain a small quantity of silver, particularly that in Cardiganshire. Silver may be easily extracted from lead, by melting it in channels, made with ashes in the furnace, and then blowing up the fire with bellows; till it turns into glass, sinks into the channels, and leaves the pure Silver behind.

Silver is harder than gold, but not so ductile, and is lighter than gold or lead, the weight, with regard to gold, being little less than five to nine. It will not rust, but will grow black by sulphureous vapours, and will dissolve in aqua fortis, but not in aqua regia. When it is mixed with common salt, and melted, it turns into a half transparent mass like horn, which is hard to be brought back to Silver again, because it is volatile, and in a violent fire will all fly away. When Silver is dissolved in aqua fortis it may be crystalized; and the crystals are very corrosive, and of an exceeding bitter taste; when applied to the skin, they leave an impression like that of a burning coal, and make an eschar of a black colour. The solution of Silver will turn any thing black, and therefore, when properly diluted, is often used to colour the hair. These crystals will melt in a very moderate heat before they grow red, and form a blackish mass; it is then proper for the use of surgeons, and is called the Silver caustic.

GOLD, the heaviest and most noble of all metals, is extremely ductile, and of a shining yellow. It is often found native, as it is called, but of no distinct figure, consisting only of small irregular masses. But there is a flint, in which Gold is commonly contained in very large solid masses. It is likewise concealed, but not so often, nor in so large a quantity, in a yellow and blue sort of stone, which some call the horny stone. Lapis Lazuli is a blue stone, and is often very elegantly variegated with very small specks of Gold; however, the quantity is not so large as in the former. Many sorts of gravels and earths often contain Gold; but they are seldom rich enough to pay the charges of extracting it. However, that kind of gravel, which is found in the channels of rivers and brooks, especially when they wind and turn very much, is richer in Gold than the rest. It has been found in the rivers of Scotland, of which medals have been made, especially at the time of the coronation of king Charles I.

Native Gold is not always found pure, for it is

often mixed with silver; and there has been no ore hitherto found, in which Gold constituted the greatest metallic part; so that no ore whatever can be properly called gold ore. However, there are Gold mines in Norway, Hungary and Guinea; but the richest of all are in Mexico and Peru. It is extracted from the substances in which it is contained; by roasting, pounding, washing, and mixing them with quick-silver.

Gold is not only the heaviest of all metals, but of all other substances yet known. It will not change with common fire, nor will it fly away in the focus of a large burning-glass, till it has continued there a long while. It will not rust, nor will it dissolve in any other menstruum, except aqua regia. It will mix readily with quick-silver, and turn into a soft amalgama. It may be calcined with common sulphur when it is made glowing hot, and held thereto. When gold is dissolved in aqua regia, and oil of tartar poured thereon, it will precipitate into a brown powder, which if heated at the fire, or lightly ground, will fly up with a great explosion and noise, from whence it is called fulminating Gold. All attempts to analyze this metal have hitherto been in vain. As for the use of gold in physic, notwithstanding the boasting of former chemists, it is little or none at all; for all its preparations have been hitherto found rather noxious than otherwise.

CHAP. XXI.

Of GEMS of all Kinds.

OF all the Transparent Gems, the DIAMOND is the hardest, the most beautiful and valuable. The best are those that are void of all colour; for if they are tinged with white, yellow or black, they are in some degree faulty, and considerably lower in price. It may be readily distinguished from all other Gems by its extreme lustre and sparkling, as well as the brightness of its reflections. If a little burnt ivory be laid upon mastic, in such a manner as to render it black, and the diamond be laid upon it, it will then reflect the most lively colours every way, which is a property belonging to this Gem, as all others will not bear the like trial; for, when they are laid upon the mastic in this manner, they either reflect no colours at all, or, if they do, they seem to be seen through a mist. There have been jewelers, who, designing to make other stones appear like diamonds, have taken a grain of wheat, and have pressed the oil out of it with a hot iron, and then have mixed it with lamp-black, or burnt ivory; then put it under the stone, but so as to leave a little room between it and the black tincture. Then the transparency, which is partly owing to the stone, and partly to the air, causes it in some degree to resemble a true diamond, inasmuch that some, though skilful in these matters, have been deceived thereby.

Those Gems that are most proper to counterfeit diamonds are the sapphire, the oriental amethyst, the topaz, and the chrysolite, because they are all hard, transparent, and may be deprived of their colour by means of fire; but this is most commonly done with quick lime, or the filings of steel; for when the Gem is buried in these, and put into a crucible with charcoal, it is put over the fire, and gently heated at first, and when the heat is increased the colour will vanish. When it has been in a sufficient time, they let the fire out by degrees, and do not take the stone out till it becomes lukewarm. If it is not entirely deprived of its colour, they repeat the operation as before; for if it was to be heated suddenly, or, when hot, immediately exposed to the cold air, it would certainly crack, or perhaps break entirely.

entirely. A topaz is more fit for this purpose than an amethyst, for this has been managed so artfully, that it could scarcely be distinguished from a Diamond by the best judges.

Diamonds sometimes receive their names from the places where they are found, as the Hungarian, Bohemian, and the like. Among these there are two differences worth observation; for some are found in the form of hexagons, and others almost round; but they differ greatly in hardness: those that have angles are softer, and are little better than crystal, as the Hungarian; those that are round, and in some sense resembling flints, are by much the hardest, and come pretty near the lustre and sparkling of oriental diamonds; but as they will not stand the trial of the maffick above mentioned, they cannot properly be called diamonds. The oriental diamonds are distinguished by the name of the places where they are found, for some of these are denominated from the old mines, and others from the new. However, they are not all equally hard, nor of the same colour, but they will stand the test of the maffick; and the harder they are the more they sparkle. Diamonds are not weighed like gold, but by carats, each carat consisting of four grains; and it has been said, that there was one found in Bijnagar that weighed an hundred and forty carats, that is, five hundred and sixty grains; it has also been reported, that there was one met with that weighed two hundred and fifty carats, and was of the size of a pullet's egg: However, the largest now known in Europe, is one that belongs to the great duke of Tuscany, which weighs an hundred thirty nine carats and a half; and that in the possession of the French king, which is equal to an hundred and six carats.

Diamonds are of such a nature that no fire will injure them, for when they have remained in one for several days, they rather come out with a more perfect lustre than otherwise.

The value of a Diamond arises partly from its sparkling and reflections, for it will imitate all the colours of the rainbow: and partly from its hardness, from whence it may be said to be almost incorruptible. Diamonds were formerly worn by kings, and other great persons only; but now they are very common, and may be easily purchased by people in moderate circumstances. A well polished Diamond formerly, of the weight of a pepper-corn, was sold for fifty shillings, but now it is not worth above two. A cut Diamond, weighing a carat, or four grains, has been valued at upwards of ten pounds; but now the price is extremely fallen.

With regard to the use of a Diamond, it not only serves for ornament, but, when reduced to powder, is extremely serviceable for polishing and cutting all other Gems whatever; and it is well known, that Diamonds themselves cannot be properly polished without it.

A Diamond seems to consist of several plates, laid one against another; for which reason, a skilful lapidary, with the point of a knife, can divide one into two or more tables. If one be placed in the focus of a burning-glass, with its plates perpendicular to the rays of the sun, it will receive no detriment; but if it be turned the other way, the rays will get between the plates, divide them, and afterwards turn them into a glassy substance, leaving not the least sign of the splendor of a Diamond.

The places from which Diamonds are brought, are the island of Borneo, and the kingdoms of Visapour, Golconda, and Bengal, in the East Indies, as well as from Brasil, in South America.

Tavernier, who travelled to the East Indies, chiefly for the sake of Diamonds, visited the places where they are chiefly to be found, in order to get the best knowledge of them he could. The first mine that he saw, was at a place called Carnatica, in the do-

minions of the king of Visapour, and at a place called Raolconda, five days journey from Golconda. This was found out above three hundred years ago; and about the place where the Diamonds are met with, the ground is sandy, and full of rocks and low trees. In these rocks there are several veins, sometimes half an inch, and sometimes an inch broad. The miners have small pieces of iron, crooked at the end, which they thrust into the veins to draw out the sand or the earth, which they put into vessels; and it is among this earth they find the Diamonds. But as these veins are not always straight, but sometimes ascend, and sometimes descend, they are obliged to break the rock to follow the course of the veins. After they have opened, and gathered as much sand as they can out of the veins, they wash it two or three times, in order to discover whether there are any Diamonds among it or not. This mine yields Diamonds of a very fine water; but they are often flawed by the bad management of their hammers in breaking the rocks to pieces. If the Diamond is good, they only polish the surface a little, because they are afraid of bringing it to a proper form that would lessen its weight. But if there be the least flaw or foulness, they give it variety of faces, or sides, in order to hide the defect. However, it is observable, that they would rather see a black speck in a stone than a red; and therefore, when there is one that is red, they put it into the fire, and then it becomes black. There are several men here, whose employment is to polish the Diamonds, and they have each but one wheel, which is made of steel, and about the diameter of a pewter plate. They apply but one stone at a time to the wheel, and sprinkle it constantly with water, till they have found out the way in which it will best work. This being found, they take oil and the powder of Diamond, which they never spare, because it is cheap here, that they may polish the Diamond the sooner. There is always a little boy, who continually supplies the wheel with oil and powder of Diamonds. However, they cannot polish the stones so well as the lapidaries in Europe, because as it is necessary to keep the steel rough by applying emery, or by filing it, and they are too lazy to do it so often as they ought, consequently the wheel will not perform the work so well, nor so soon, as those in this part of the world, where they take more pains.

The CARBUNCLE is a stone of a very deep red, with a mixture of scarlet, and has been formerly thought to shine in the dark like a lighted coal; but this is now known to be otherwise. It is said to be as hard as a sapphire, and to be found naturally of an angular figure, or smaller at one end than the other. However, as it is very uncommon, there needs no more to be said about it.

The RUBY is a transparent gem, of a reddish colour, with a small portion of blue, and cannot be touched by a file. The redness is not like that of vermilion, but of blood, or rather of cochineal, or kermes; but the less blue it has in it, the better it is. There are commonly said to be four kinds, the Ruby-cell, the Balas, and Spinel Ruby, which with the true Ruby make up the number; and the best are found in the island of Ceylon. In Pegu they are found in a river of that name, and the inhabitants try their goodness with their teeth and tongue; for they judge those that are coldest and hardest to be the best. They are said to mend the colour by the assistance of fire. They are usually met with in a stony matrix of a rose colour, and if they meet with one that is transparent, they then call it a Balas Ruby; but if it is otherwise, and has no resemblance of a gem, it is then the true matrix of Rubies, because it is formed, nourished, and increased therein. At first it is whitish, and assumes a red colour; as it ripens. It is generally found in the same mines with sapphires,

sapphires, and some of them are pretty large; for the Emperor Rodolphus had one that was as large as a small pullet's egg, and this was thought to be the largest that ever was seen in Europe.

When the value of a Ruby exceeds ten carats, it is thought to be very great, and is not exceeded by a Diamond. When a Ruby is deficient in its colour, that is, when it is not so red as it ought to be, some lapidaries endeavour to mend it, by putting a red foil under it, or glass of a beautiful red colour. Some have attempted to counterfeit a Ruby, with stones of a whitish colour, as a white sapphire, topaz, or crystal, by the assistance of a red foil, for then it will sparkle and seem to differ very little from a true Ruby; however, those that have judgment in stones will very easily distinguish it. There are other methods of counterfeiting this Gem, which we shall here omit.

The **BALAS RUBY** is the matrix of the true Ruby before described, and is supposed to have its name, from its being the house or palace thereof, for by some authors it is called palas on that account. This Ruby is of the colour of crimson, for it has a very little mixture of blue, and when it is polished, it is a very agreeable gem, and will sparkle almost as much as a true Ruby. It is found in veins of sapphire, and is to be met with in the same places as the other; though it is not so valuable by far. It may be adulterated like the true Ruby, and the fraud will not be so easily discovered.

The **SPINEL RUBY** is of a deeper colour than the true, but it has not the splendor, for which reason it is more easily adulterated. However, there are some so good as to come very near the value of the true Ruby, especially those that are said to be of the old rock, and are about half the value of Diamonds.

The **RUBYCELL** is a gem that seems to be between the Spinel and the Hyacinth, inasmuch that it is hard to say to which class it properly belongs. Likewise, they are sometimes exceedingly like Bohemian Garnets, and are not known from them till an experiment is made in the fire; for these will bear it without the least loss of colour, whereas the Ruby-cell will either lose or change it. They are not near so valuable as the Balas or Spinel.

The **GARNETS** have by some been taken to be carbuncles; for, when exposed to the sun, they will shine like a lighted coal, and much better than a ruby. They are brought from the East and West Indies, and from Ethiopia, where they are of three kinds; for some are darker than the rest, being of a blackish blood colour, and yet they will sparkle indifferently well. When a white foil is placed under them, they are of such a fiery colour, that some have mistaken them for true carbuncles. Many of these are large, some having been found bigger than a hen's egg. Another sort is of the colour of a hyacinth, and, if it was not for being redder, might be taken for a true gem of that kind. When it has a yellowish tinge, it may be placed among the class of hyacinths, and will be that stone called in Italy *Jacintha la Bella*. These sometimes resemble other gems so much, that even the lapidaries themselves are not certain what they are. Another sort of Garnets are of a violet colour mixed with red, and these are better than the former, inasmuch that they are called by the Italians *Rock-Rubies*.

The **OCCIDENTAL GARNETS** are often of a fainter colour, and particularly the Spanish, inasmuch that they appear like a pomegranate seed, and are pretty large. Some are of a yellowish red, and will not change in the fire, particularly the Bohemian, and they are all free from flaws. These are more valuable than the oriental, on account of their resisting fire, and resemble real carbuncles. These are found in the fields almost every where by the

country people, without any matrix; they are generally of the size of peas, and are carried to Prague to be sold. At first they are so black on the outside, that no redness can be perceived, till they are held up to the light. Others are found in Silesia, but these are rough, and generally full of flaws, inasmuch that they are seldom transparent. If a Garnet be exposed to the focus of a large burning-glass, upon charcoal, it will be reduced to a metallick mass of the nature of iron, for it may be attracted by a loadstone.

The **HYACINTH** is so called, from its being of the colour of a flower of that name, which is of a yellowish red. There are four kinds, as being of so many different colours; the first is as red as vermilion, and pretty nearly resembles Bohemian Garnets, but without any mixture of blackness. These are more valuable than the rest, and may be placed in the class of carbuncles. The second sort are of a reddish saffron colour; the third are like yellow amber, and could not be distinguished from it, unless by their hardness, and their want of electricity. These are of little value, no more than the fourth sort, which look like white amber, and are worst of all. The Hyacinth is found in the East and West Indies, as well as in Silesia and Bohemia.

The **AMETHIST** is a transparent gem, of a violet colour, arising from a mixture of red and blue. However, they are of different colours, for some, as the oriental, have a mixture of yellow, and some are purplish like red wine; but the best sort are those that shine most like a carbuncle, and are so hard that they may be turned into a sort of diamonds, so as to deceive the most skilful lapidaries. They are found in India, Arabia, Armenia, Ethiopia, Cyprus, Germany, Bohemia, and Misnia; but they are generally as soft as crystal, and are not in very great esteem. The oriental are hardest; if they are without spots they are of the greatest value. They are found of various sizes, and in various shapes, from the bigness of a small pea, to an inch and a half in diameter. They are adulterated with mastick tinged of a violet colour, placed between two crystals; but the Germans do not think it worth while to counterfeit them, because they are pretty common.

The **SAPPHIRE**, which is a hard gem of a blue or sky colour, is very transparent and sparkles very much; but some of them are whitish, and others of a deeper blue; and when they are destitute of all colours, they are called white sapphires, and are so like diamonds they may very well supply their place. They are either oriental or occidental; the former are brought from Calicut, Cananor, Bissnagor, and Ceylon; but the best are found in the kingdom of Pegu. It is very subject to flaws, and yet is so hard that a file will not touch it. The colour may readily be taken away by fire, and then it will be converted to a sort of a diamond, inasmuch that when it is set in a ring, it can hardly be known from one by a skilful lapidary. The value of a Sapphire is derived from its colour, purity, and magnitude; for if it has no flaw, and is of a deep colour, continuing transparent at the same time, it is then the best. It has been common to counterfeit Sapphires with a bit of blue glass placed between two Bohemian diamonds. Some tinge glass of a blue colour, and sell it to ignorant people for a Sapphire. They are found in various sizes; but seldom so small as other gems, and yet never more than three quarters of an inch in diameter; but the usual size is between the sixth and the tenth of an inch. The shape is very uncertain; for it is sometimes in one form, and sometimes in another.

The **OPAL** is a most beautiful gem, for in different lights it shews all sorts of colours, which is occasioned by the different refraction of the rays of light.

light. There are four kinds of this stone, the first of which is transparent, without any opacity, and yet reflects all the colours of the rainbow. Another sort is black, and yet sparkles so much that it appears like a carbuncle; but this is exceeding scarce and consequently highly valuable. The third species reflects various colours; but the yellow is predominant, and consequently this is not so valuable as the first sort. Almost all these are brought from Hungary, and are in very good esteem. The fourth sort is a bastard Opal, and is of the colour of the crystalline humour of the eyes of fish; for it is a little transparent, and is nearly of a bluish milk colour or yellowish; and when it is turned to the light, it seems to shine at the farther edge, by means of the reflection of the light. It is by some called an asterites, or the star stone, because within it may be seen a sort of star, which changes its place as it is turned differently to the light.

The CATS-EYE, by most jewellers, is not placed among the opal kind; but is thought to be a peculiar gem, and therefore will require a more distinct consideration. The opals of the first and second kind are seldom to be met with very large; but they are of very great value; for one in the possession of a Roman senator was said to be worth twenty thousand ducats. Those of the third and fourth kind are sometimes met with pretty large; for one of these that reflected various colours was of the size of a walnut, and was valued at two hundred crowns. All sorts of opals are found in the East-Indies; but those of the ordinary sort are to be met with in Cyprus, Egypt, Arabia, Natolia and Hungary; and in this last place some of the first sort have been found in opal stones, though very seldom. There have been also some lately found in Denmark, and they are all contained in a soft stone full of black, yellow, and fallow coloured veins. With regard to the value, it has been generally thought to equal that of sapphires. They cannot be counterfeited like other gems with a double glass, nor yet any other way.

The EMERALD is a green, shining, transparent gem, and has a very agreeable appearance. It is of two kinds, the oriental and occidental; the oriental are very hard, and of a meadow green colour, which never changes in any light. They are quite transparent, and are in very great esteem, they being of the very best kind. They are brought from the East Indies, as well as Tartary, Egypt, and other countries at a great distance from thence; however, they are very scarce, and there are very few of this kind seen in England. But the American Emeralds are more common, and are found principally in Peru in the earth of the mountains. These are of a very pleasant green, though they are but dull in comparison of the former; for they are neither so transparent, nor so sparkling, nor yet so hard; and comparatively the value is but small, with regard to the former. The European come principally from Silesia, and there are coloured crystals found in Germany, that commonly go under the name of occidental Emeralds. The oriental are seldom met with above the size of a hazel nut. When an Emerald is put in the fire it kindles like brimstone, and the green colour flies off in a flame, after which it looks like a bit of crystal. Hence it appears, that gems in general consist of two parts; namely the crystalline, which is fixed, and the sulphureous, that is volatile. An Emerald is not quite destitute of medicinal virtues; for what is done in the fire, may, in some measure, be performed by the heat of the stomach, and by the digesting fluid. However, it must be acknowledged, that the virtue of any sort of gem is not sufficiently apparent hitherto. The best kind of Emeralds have always been in high esteem; but these are exceeding scarce, as has been

observed: the occidental being more common, and by far not so good, are of little value with respect to the former. An Emerald may be counterfeited various ways, but the best is by melted crystal glass, with a small addition of red lead. By this method, practised judiciously, counterfeit emeralds may be produced as good as those of America.

The PRASIUS, or PRASSITE, is by many thought to be the matrix of an Emerald, and perhaps not improperly, because it is sometimes found within it: for the greener parts that are transparent, and without any mixture of yellow, may be properly called Emeralds; and those that are of a golden yellow, may have the name of Chrysoprasites. The colour of this gem is like that of leek, or a mixture of yellow and green. It is but semi-transparent, on account of the clouds that are visible in it; and sometimes it has a mixture of red, white, or black; according to the various stones to which it has been formed, such as jasper, crystal, and the like. There is one sort altogether green, another more yellow like dried fern, and a third is very little green, with a great deal of whitish yellow. This last kind is semi-transparent, and ought rather to be placed among the nephritic stones. This gem is very common, and so large, that statues have been made therewith, and therefore it can be of little value. The Chrysoprasius is nothing more than a Prassite, that has the colour of gold mixed with the greenness of a leek, and it looks very prettily, though it is not of much value.

The SMARAGDOPRASIUS is a gem between a Prassite and an Emerald, and is of a grass green colour, without the least yellowness in it; but it is not so green as an emerald. It is sometimes, though very seldom, almost transparent, and is called by some a bastard emerald. These stones are found in Bohemia and the West Indies. The Bohemian is generally opaque, and nearly resembles Roman vitriol. These are said to be the stones that the native Americans near the river of the Amazons wear in holes of their lips, in pieces about the length of a man's finger. Some take this to be the true nephritic stone; but this is doubtful, as well as its virtues.

The CHRYSOLITE is the topaz of the ancients, and is a transparent gem, shining with the colour of gold. It is of a fainter green than the emerald, and has somewhat of a yellowish tinge. Some take it to be the matrix of the emerald, and by many it is confounded with a chrysoprasius. This stone will not stand the test of the file, and sometimes there are such large pieces of it that statues may be made therewith. The topaz of the shops is the Chrysolite of the ancients, and is a transparent stone of a shining gold colour without any mixture. It is of two kinds, the oriental and the European; the first of which shines like pure gold. The European are as soft as crystal, and have a mixture of blackness with the gold colour; and there is sometimes so much of it, and so little of the yellow, that if it was not for the blackness, it could not be distinguished from crystal. Sometimes pieces of these have been found to weigh twelve pounds, and there was one brought from Bohemia that was two ells in length, and near half an ell broad. These stones may be counterfeited in the same manner as the rest; but the best way is to put a quarter of an ounce of saffron of iron, and a little red lead into a pound of melted crystal glass, or if one part of calcined crystal be added to three of lead, and then kept for a whole day in a furnace, a topaz will be formed without any other addition.

The BERILL is a gem of a bluish green like sea water, for which reason it is called by the Italians Aqua Marina. When it has rays of a gold colour, or the sparkles are of that colour, it is called a Chrysoberill,

Chrysoberill, and some place it in the same class as the chrysoprasius. All these stones are transparent, and have but a faintish colour, for when this is more deep, they are taken for other gems. It is found of various sizes and of different shapes, that are seldom more than a third of an inch in diameter; and the value is always in proportion to the fineness of the colour. It may be counterfeited by reducing burnt copper to an impalpable powder, and melting it with crystalline glass, or calcined crystal, in the proportion of one drachm to a pound of glass.

The ASTERIA, called by the Italians Girasole, is a sort of opal; only it is harder, and consequently may be placed by itself; especially as it may be distinguished from an opal very easily. The harder it is, the better it reflects the image of the sun, and so agreeably, that it is by some called the gem of the sun. This stone is transparent like crystal, but much harder. It has been named by some the cats eye, because the sparkling is sometimes greater and sometimes less. It differs from the eyes of Belus termed by the Italians Bellocchio, because it exactly imitates the iris of the eye and pupil. Specimens of this have been taken from the matrix of opal, and when exposed to the sun, they emit sparkles like so many small stars.

We now come to the semi-transparent stones, among which the SARDIUS, or CORNELIAN, is reckoned the chief. By some it is called the Carnelian, because it is of the colour of raw flesh, for *Caro* is Latin for flesh. However, it is more of the colour of bilious blood. It is semi-transparent like the washings of flesh, and is called by Pliny Sarda. It was in common use among the ancients, especially for seals, as it is at present. It was first found by the inhabitants of Sardis, a town of Lydia in Asia Minor, and from thence was carried to Rome; but there was a very good kind found near Babylon in the heart of a stone. There are three kinds of it; namely, the red, the demium (which looks duller or fatter than the former) and that which seems to have a mixture of silver films. Those of the East Indies are most transparent; and the thicker or fatter sort is brought from Arabia. It is also found in the West Indies, as well as Silesia, Bohemia, and many other places. There are three kinds of Cornelians, the first of which is the red, now taken notice of. The second is of a faint blood-colour, and semi-transparent; and the third is of a yellowish red. It is usually found in other stones. It was formerly in high esteem; but since other and better gems are more common, it is of little value, being chiefly made use of for seals, as was above hinted.

The SARDONYX seems to be of a middle nature, between the cornelian and the onyx, which its name seems plainly to imply. It is generally tinged with white, black, and blood-colour, which are distinguished from each other by circles or rows, so distinct that they appear to be the effect of art. There are many kinds, and great diversity in the colour of these stones; but the greater variety there is of these last, the more they are valued. They have sometimes purple, blue, rose-coloured, and yellow circles, whose ground is black, especially the Arabian; for in the East Indies it is of the colour of horn. When the circles are not distinct, but as it were separated, and of the colour of honey, they are of no great value. The best sort is brought from the East Indies, and the next to that is the Arabian. It is found also in Germany, Bohemia, Silesia, and the neighbouring countries; but it is seldom clear, nor are the circles distinct like those of the East-Indies. There are pieces of the Sardonyx found so large, that drinking vessels may be made therewith.

The CHALCEDONY is placed by Pliny in the

class of rubies of a darker aspect, and yet paler than a carbuncle; but this is evidently the characteristic of a garnet. This gem is generally of the same colour throughout; though it is sometimes a little clouded. It is semi-transparent, and so hard, that it is seldom or never made into seals. It was formerly placed in the class of onyx's, of which it is a species, and was called the White Onyx. It is either Oriental or European; and those that have a mixture of a faint colour are hard and beautiful, and are taken for the oriental. Such as these have a purplish or bluish mixture, or a redness like that of lac. Those that are earthy, or of a dusky whitish colour, are of little value, and are met with in all parts of Germany. There are always some found in the Netherlands. Those that are tinged with a disagreeable reddish or yellowish colour, though they are not of the oriental kind, are in higher esteem than the last. Some of these have been seen in Lorrain of a surprising magnitude, and when they have been struck with a hammer have yielded a ringing sound. Those are accounted best of all, in which there is blue, white, yellow, and red confusedly mixed together, and which exposed to the sun shew all the colours of the rainbow. This also served to make the Myrrhine vessels of the Romans, which were so highly valued, and at this day they are wrought into cups, heads of great men, and the like; but its chief use is for seals, because the wax will not stick thereto. Some of these stones, brought from the East Indies, are almost transparent, and of a whitish pale colour, and some are tinged with white circles or zones. They are now of little value, except when the pieces are large and fit for the making of figures.

The ONYX, which in Greek signifies a nail, is so called from its likeness to the colour of the nail of a man's hand. It is seldom transparent, and generally consists of a mixture of black and white colours, which are quite distinct from each other. The horny colour is often marked with whitish veins or zones, somewhat resembling an eye. The kinds of Onyx are distinguished, either from the places where they are found, or from their different colours. The Arabian Onyx is black with white zones, and a variety of other colours. When the white zone in carving any figure is placed on the top, and the black serves for a ground, it is called Camehuia by the jewellers, as if it was a distinct gem. When it is white, it is called a Chalcedony, before described. Some Onyx's are quite black, others are tinged with fallow colour, yellow, whitish, bluish, and horn colours, mixed in an agreeable manner. They have all zones or streaks, which distinguish one colour from another. The Onyx has been sometimes found so large, that columns have been made therewith; and there are now six of this kind in St. Peter's church at Rome. This likewise served to make the Myrrhine vessels before taken notice of, and is now made use of for cups, statues, and the like. It is of greater value than the sardonix; those are the best which are bluish at the top, and blackish at the bottom; and these are much sought after by the Jews. This stone does not stick to wax, and therefore is as often now, as formerly, made into seals.

The AGATE is very like an onyx, with regard to colour, but it differs from it in being adorned with zones, whereas the Agate has none; but instead thereof there are lines or spots of various colours, in such a manner as to represent the pictures of different things, as woods, rivers, fruits, flowers, herbs, and clouds, though not very distinctly. An Agate differs from a Jasper in hardness and smoothness; for though the jasper has all the same colours, it is softer, and consists of rougher particles.

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The White-veined AGATE, with delineations of trees and mosses, is most commonly known by the name of the Mocha stone. It is of a very firm compact and fine texture, though it is found in the shape of a flinty pebble-stone. The sizes are various, being sometimes only one, and sometimes eight inches in diameter. The veins of this stone are very beautifully disposed in different figures; but generally there are many concentric irregular circles drawn round from one to three points in various places. They are commonly a little whiter than the ground, though sometimes they can scarcely be seen. Those of this kind are of the highest value, and contain the figures of trees, mosses, sea-plants, and the like, which were just taken notice of. Some have supposed that these are only petrifications, and that real mosses and sea plants were included therein; but this is a mistake, which is evident from hence, namely, that the real things which they represent were never met with so diminutive as their images in these stones: for none can be so foolish as to imagine, that there ever was a perfect tree no more than half an inch high. These figures are generally black, or of a dusky colour, and appear with great advantage from the whiteness of the stone. This kind of Agate, when it is perfect, is only found in the East Indies; but there are some of an inferior sort to be met with in Germany. They are called Mocha stones, because they have been brought from the East Indies to Mocha in Arabia, and from thence transported into Europe. However, there are some that will not allow them to be found in the East Indies; which if true, they may as well have the name from the place near which they are found; or at least they may be brought to Mocha from other parts of Arabia, or even Asia.

The Dull Milky AGATE is not so valuable as the former, though it is of a very firm texture. It is found in the shape of common flint stones, and is from one inch to ten in diameter. It is of the colour of milk, or rather like that of cream; and, when it is broken, has a smooth, glossy surface. It is more opaque than the former, and yet it will bear a very fine polish. This species is common on the shores of the rivers in the East Indies, and there are some of less value met with in Germany and Bohemia.

The Lead-coloured AGATE, with black and white veins, is of a very fine, firm, compact texture, though it is found, like the former, in the shape of common flint stones, and of as rugged a surface. The ground is of a pale bluish grey, or rather of a dove-colour, and is often without variation, though it has sometimes black and sometimes white veins, which are generally towards the centre of the stone. This resembles an onyx very much, but is certainly distinct from it. It is very hard, and will bear a fine polish. It is found in the East Indies, as well as in Germany, where they make cups and snuff-boxes therewith.

The Flesh-coloured AGATE is not so valuable as any of the former, though within it has a pretty firm compact texture, and is from one to ten inches in diameter. The flesh colour is very faint, and almost whitish; but yet it is never entirely wanting. Sometimes it has no veins at all, and at other times it abounds in veins, spots, or clouds. The spots are generally very small, about the size of a pin's head, notched at the edges; though sometimes they are much less. When broken in pieces it is very smooth and glossy, though it is not always of the same transparency. It is found in Germany, Bohemia, and Italy, and is worked into various sorts of vessels: it is also often made use of instead of gun-flints.

The Blood-coloured AGATE is more beautiful than most of this class. It is always of a deep blood-

red colour, sometimes throughout, but more frequently variegated with a pale blue and brown. The blue always surrounds the red, and inclines to the colour of whey; but it is in no other part of the stone. The brown is of the colour of horn, and generally appears in irregular veins, sometimes in such plenty as to make the ground to the stone, and the red with its blue edges only the variegation. It is not very common, though it is found in the East Indies, America, and some parts of Germany. It is chiefly used for the tops of snuff-boxes.

The Clouded and Spotted Flesh-coloured AGATE is of a very fine close texture, though it is subject to flaws and cracks when the pieces are large; for which reason the lesser stones are most esteemed; but, in general, it is in very little esteem with us.

The Red AGATE, variegated with Yellow, is of the colour of red lead, has a fine pure equal texture, with a smooth regular surface, and is commonly found in the shape of a pebble stone. It is from one inch to four or five in diameter, and its ground is of a paler red with one that is deeper, disposed in concentric veins round from one to three points; but this does not appear without close examination. Besides these it has irregular bright yellow blotches, that are never intersected by the veins, but are either within or on the outside thereof; and they are always extremely short, being never above a sixth part of an inch in length. It is very hard, and will bear a very fine polish; it is found in the East Indies, though it is not very common there.

The Yellow AGATE has been found from one to seven inches in diameter in various shapes and sizes; but they are all of a very firm compact texture. It is sometimes of the same colour throughout; sometimes consists of irregular veins, and at others has a pale and almost white ground, veined and spotted with a strong yellow, exactly resembling that of a fine yellow bees-wax. It is very hard and capable of a fine polish; but the degree of transparency differs greatly, for sometimes it is as much so as any of the rest, and at others it is almost entirely opaque. It is found in the East Indies and America, as also in Germany, though not very good. In some places it serves to make knife-handles and the like.

The Pale Yellow AGATE, variegated with white, black, and green, is called the Leonina, from its likeness to a Lion's skin. It is more variegated than the rest of the stones of this kind; and has a fine compact close texture, though it is found in very irregular shapes, with a rugged outside. It sometimes seems to consist of an irregular mass, made up of the above-mentioned colours, and at other times is distinctly clouded therewith, and sometimes again it has black and green veins in the form of concentric circles running round a point. The ground is always of a pale yellow, but very differently disposed; sometimes more, sometimes less. Likewise in some, one or more of these colours are wanting, while others contain them all. The green is like that of Jasper, and the black is inclinable to brown. It breaks with some difficulty into pieces, with fine smooth surfaces, and is brought from the East Indies; but it is not commonly known, because it is very scarce.

The Blackish Veined Brown AGATE is found in stones that have a pretty smooth surface, though of an irregular shape, and from two to seven inches in diameter. The brown is pretty deep, and is finely clouded, spotted, and veined with a colour that is almost black, and the veins are generally paler and browner than the other variegations. The veins are disposed in irregular concentric circles, and the innermost are generally broadest. There have sometimes been vegetable substances found in the middle of it, such as the slender roots of moss, or of crow silk.

filk. It is capable of a very high and beautiful polish, and is commonly cut into seals, buttons; heads of canes, knife-handles, and the tops of snuff-boxes. It is frequently adorned with factitious colours, which sink into the substance so much, that they appear like the natural veins of the stone; and then it is of great value.

The Greenish Brown Variegated AGATE seems to be of a middle nature between Agate and Jasper. It is a beautiful species, and is found in roundish stones with a smooth even surface, from two to six inches in diameter. Its texture is very firm, and it is sometimes of the same colour throughout, being only distinguishable from the true Jasper by its hardness. But it has most frequently a brownish green ground, variegated with irregular concentric circles, of a red, or of a finer green; it is also found irregularly clouded and spotted, with the same or other colours, as white, flesh colour and yellow. It is never entirely transparent in those that are clearest; and it is found in different parts of the world, but not equally good; for the European are the worst, they being more coarse, soft, and opaque than those of the East or West Indies.

The JASPER differs little from an Agate, only it is softer, and will not bear so fine a polish, because it consists of grosser particles; besides, it is not so transparent, and is most commonly green; and the nearer it comes to an Emerald, the higher is the value. However it is of other colours, and on that account is divided into different species, among which are included the Nephritic Stones.

The White NEPHRITIC STONE has a very fine, compact, firm texture, with a smooth glossy surface, and is of various sizes; but the common sort are two inches in diameter. The shape is very irregular like a common flint, and it is naturally of a fine white, with great brightness and transparency. It has sometimes a bluish tinge, which makes it appear of a deep pearl colour, and upon that account is more valued by some; but when it is yellowish, it is not in great esteem. It looks pretty much like marble, but breaks into fine glossy bits, and is considerably heavy, as well as very hard. It is found in many parts of America, particularly near the river of the Amazons. It is often cut into small cups and other toys, which are extremely bright.

The Green JASPER is a bright semi-transparent stone, and of a close, very hard, irregular texture. It has been found in masses of many feet in diameter, sometimes no bigger than a horse-bean. It is of a deep beautiful green, and almost always of the same colour throughout; though it has been sometimes met with clouded with white. It is externally pretty, bright and glossy, and breaks into smooth pieces, seeming to be of a texture between flint and marble. It is considerably heavy, and its very great hardness renders it capable of a fine polish.

The Soft Dusky Green JASPER is not so heavy nor so valuable as the former, and is generally found in stones of a flat shape, from two to five inches in diameter. The surface is pretty full of superficial cracks, and the colour is always dull, with sometimes a bluish and sometimes a brownish cast. It is so common in Guernsey, that it is frequently brought over with other things, and is often made use of to pave the streets of London.

Hard Bluish Green JASPER, variegated with red, is called Oriental Jasper. It may be easily distinguished from all others by its blood-red spots, and it has a very firm and compact texture. It is found from two to six inches in diameter, and has a roughish irregular surface, but has no determinate shape. It is not at all transparent, except in very thin pieces, and is sometimes veined and clouded as well as spotted with red. It is most commonly

No. 44.

known by the name of Blood Stone, and will take a very fine polish. It is common in Egypt, Africa; and the West Indies, and is by some termed the matrix of the Emerald. It serves for various purposes, particularly cups, snuff-boxes, and seals.

The Hard Whitish Green JASPER is the nephritic stone of the ancients, and is generally of the same colour throughout. It is harder than a Jasper, and the surface seems as though it was smeared with oil. It is sometimes of a whitish green, which last colour is sometimes yellowish, and sometimes bluish; but generally it seems to be composed of greenish white, yellow, bluish and black colours; but not all at the same time. The common sort are from two to five inches in diameter, and the shape is very irregular like common flints. It is found on the surface of the earth, and in the beds of rivers in many parts of America, where they form them into the figures of birds, beasts and fishes.

The very hard Yellowish Green JASPER is more dull and opaque than the former, though the texture is very firm and close. The colour is properly a mixture of green and yellow, in which it differs chiefly from the former, and in its transparency.

The Bluish Green JASPER, variegated with blue and black, is a kind of nephritic stone, it being of a middle nature, between the oriental green Jasper, the green nephritic stone, and the marble Ophites. The texture is firm and compact, and is found from four to six inches in diameter, and generally of a flatish oval shape, with a rough surface. The colour is usually very agreeable, and is always made up of a mixture of green, grey and blue, which are sometimes paler and sometimes deeper, as well as inclining to other colours. Sometimes they are so blended, as to render it of one colour throughout, and sometimes they are disposed in clouds, spots and veins; and then the colours are as distinct as in the blood-stone. It is found on the banks of the great river of the Amazons in America.

The Hard Greyish Green JASPER is a very hard stone of a greyish green colour, approaching to that of an olive; but the green is of three different kinds. The finest sort is brought from the East Indies, and the Turks and Poles make handles of it for their sabres and cutlasses. It is capable of a very elegant polish, and is found from six to ten inches long, of an unequal shape with a rough surface. It has little or no degrees of transparency, but it is remarkably heavy, and is found only in the East Indies.

The Dull Deep Green JASPER is of a green colour like mallows, from whence it has its name, for *Malache* in Greek signifies Mallows. It is generally adorned with white veins, and the bluish colour that is intermixed is very ornamental; but when there is any black therein it debases the value. It is pretty heavy, and will take an excellent polish. It is brought from the East Indies and America, and is also found in Germany, and some other parts of Europe but is not so good as the former.

The Dusky Green JASPER, variegated with white and flesh-colour, is a rough, coarse and rugged stone, which is found from thirteen to eighteen inches in diameter, is generally of a roundish or oval shape, and always flatted more or less. The texture is firm and compact, and it is often mixed with a variety of colours disposed in a different manner. It is always green in part, and has often thin transverse veins of flesh-colour and white, with spots and clouds of black. The green is not always the same, for it is sometimes deep, and at other times light; but generally the variety is very agreeable. It is very hard, and for that reason will bear a good polish. It is common in the island of Jersey, from whence it is brought among other stones to pave the streets of London; but it might be put to a much better use.

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Hard

Hard Variegated Purple JASPER has been called the rose coloured Jasper by Pliny. It has a smooth, fine, hard texture, though the surface is rough and unequal like a flint stone; it is sometimes fifteen inches in diameter, and is variously tinged with colours, in which the red and blue are always predominant, which when uniformly mixed render it purple; but where it is blue, it is always most bright and transparent. It is brought from various parts of the world, as the East and West Indies, Egypt, Germany, Bohemia and Spain; in which last place it is cut into vessels and images, because it will bear a very fine polish.

Bright Red JASPER, variegated with white, is not so hard as the former, nor of so fine a texture, and is found from the size of a hazle-nut to that of a man's head. The colour is that of red lead, and the most certain colour of the variegation is white, which is almost always disposed in regular narrow veins, though sometimes in spots. That which comes from America is generally accounted best.

Dull Purple and White JASPER is of a coarse and irregular, though of a very firm texture. The purple colour sometimes insensibly changes into a pale red, and the white to a yellowish or bluish colour; it is hard to say which of the two is predominant. It is considerably heavy, and so very hard as to be capable of a good polish. It is brought from Italy and Germany, as well as found in England, and serves to make the handles of knives and tops of snuff-boxes.

Pale Brown Hard JASPER, with purple veins, has much the same texture as the former, but is more beautiful. It is usually found from two to four inches in diameter, and is commonly of an oblong flattish shape. Its ground is an agreeable pale whitish brown, and its variegations consist of regular horizontal and fine deep purple veins, or of a pretty pure white. It is common in Yorkshire and Suffex, and is sometimes met with in gravel pits near London.

Yellowish Hard Variegated JASPER has a very close, hard, and compact texture, though the surface is very rough and irregular. It is generally met with from three to seven inches in diameter, and the predominant colour is a pale dusky yellow, not unlike honey. It is variegated with white, brown, lead colour, and a very pale red, with which is mixed a cloudy crystalline substance. These colours are blended in the form of clouds; but sometimes one and sometimes another is wanting. It is extremely hard, will take a very fine polish, is common in the East Indies, and is also met with in several parts of Europe. The only use of it at present is to make handles for knives.

The Pale Bluish JASPER, with black veins and clouds, has a very close firm texture, and its size is from four to six inches in diameter. It is always of a dusky blue or lead colour, and the black clouds appear like curling smoke. It is but of little value, and consequently not much in use.

The Bluish Marbled JASPER, variegated with white, is of very little value. The colour is of a pale disagreeable grey, and a pretty clear white; but the former colour is the ground, and the other appears in veins or irregular clouds. It is pretty heavy, hard, and will bear a good polish. It is common in the gravel pits about London, and is generally taken for a bit of blue and white marble that seems to be worn by the collision of other stones, for it is rounded at the edges. There is also a black marbled Jasper, variegated with white, and another marbled with yellow.

The Hard Dull Flesh-coloured JASPER is extremely hard, of a very close texture, and is found from eight to eighteen inches in diameter. It is of an extremely pale whitish red or flesh-colour, which

is generally the same throughout, though there are sometimes horizontal veins of a darker red. It is found on the sea shore, and is commonly made use of in pavements. It must be observed, that all these Jaspers strike fire with steel, and will not effervesce with aqua fortis.

The TURKY STONE, called by some the Turquoise, is of two kinds, the oriental and the occidental; the first is rather blue than green, and the other is more inclinable to the latter colour, though it sometimes inclines to a whiteness. They are found in the East Indies, Persia, Spain, Germany and Bohemia. In Persia it adheres to blackish stones, and is very common; but it seldom exceeds the size of a hazle-nut. Those of the East Indies differ in their colour, for such as are said to be of the old rock, always preserve the same colour, but those of the new, are greener. This stone is in so high esteem among the Turks, that those of the better sort are seldom without one; but it is never worn by the women. It is generally valued in proportion to the brightness of the colour. Those that are of the size of a hazle-nut, are of a fine sky blue without any blackish veins; but the lesser sort are not so good. Those that have blackish veins, or are inclinable to greenish, or to the colour of milk, are of no value. There is another Turkey stone, which is nothing but ivory, a tooth, or a bone, which have lain in the neighbourhood of copper ore till they have been tinged with deep blue spots and veins; but when they are put into a gentle fire the colour diffuses itself throughout the whole substance, and becomes of a very fine pale blue. There are several mines of these stones in France; but they may be perfectly counterfeited by art with a tincture of copper in an alkaly.

The LAPIS LAZULI is an opaque stone of a sapphire colour, with golden spots or streaks. It differs from an Armenian stone in being harder, for this may be easily reduced into powder; and, besides, it is without veins of gold. This is the stone with which they make the colour called Ultramarine. It is of two kinds, one of which will remain unchanged in the fire, and the other not. It is found in various countries, and the Armenian stone is said to be its matrix, which is met with in gold mines. It is found in very large pieces; but the common sort are only big enough to make knife-handles and the tops of snuff-boxes. The best sort, which will not in the least change its colour in the fire, is brought from the East Indies; and this is the test whether it is right or not; for that in Germany, which is of a middle nature between an Armenian stone and the true Lapis Lazuli, alters in the fire, and is much more brittle than the true. However, they both will serve very well for the use of painters. Lapis Lazuli has the property of purging upwards and downwards, and therefore has been accounted good for melancholy disorders, quartan agues, apoplexies, and the falling sickness. There is no room to doubt that the blue colour arises from particles of copper, for which reason it is taken by some to be a copper ore.

The ARMENIAN STONE has a smooth surface, and is of a sky blue colour; but it is brittle, by which it may be distinguished from Lapis Lazuli; besides which it has no gold spangles, nor will it keep its colour in the fire. The blue colour has a greenish cast, and when it is made use of in painting, by length of time it changes to green. It is found in various places in Germany, as in the county of Tyrol, and in other silver mines. It is also met with in Hungary and Transilvania. Whenever it is used as a paint, it must be mixed with petroleum, or rock oil, and then it will keep its colour.

The ASTROITES, or STAR STONE, seems to be a kind of opal, and by some is called a Cat's Eye, or Gem of the Sun; but that which is properly so

called has been treated of before. It is a very beautiful stone, and is usually set in rings; it contains the figure of stars so exactly, that no painter can imitate them better. It is an opaque gem, sometimes of a white, ash, dusky, or grey colour. In this sort of stones are sometimes seen roses, sometimes waves, and at other times they contain all three together; which may serve as so many different distinctions of this stone. It is found in various places, particularly in Tyrol, as large as a man's head.

The TOAD STONE seems to be a kind of an astroites; for it is of the colour of that stone, and marked with dark spots, only the ash or grey colour has a reddish cast. It is convex like an eye on one side, and flat on the other. There are two kinds of these stones, the first of which is called by some Brontia and Ombria, and is of a dusky, reddish, yellowish, or greenish colour; sometimes of the size of an egg, and like one, only it is flat on one side. Some take these to be serpent stones or thunderbolts; but the common name is that of a Toad Stone. All these stones differ among themselves: however, that properly so called has the name of Batrachites, but the Brontia and Ombria are called Chelonites. It is now taken to be a petrified substance, and some suppose it to be the tooth of a fish; but this does not seem to agree with its shape. Indeed there may be some in the form of teeth comprehended in this general name; but that resembling an egg is the most common sort. They are all hollow more or less, only some are filled up with the stratum in which they lay, and some of them resemble the cup of an acorn. Another sort are of an oblong figure, but round at the top, and others swell a little in the middle. Many of them have an outward circle of a different colour from the rest, and this is sometimes streaked with very fine lines: some are also found very long in proportion to their breadth, and others perfectly round. They are all naturally of a very fine polish, and are worn in rings without alteration. They are of different sizes, from a pin's head to two or three inches in circumference; and are of a great variety of colours, as above taken notice of.

CHAPTER XXII.

Of the more ignoble STONES.

THE EAGLE STONE seems to consist of several shells or crusts laid one over another; but that which distinguishes it from all others is its being hollow on the inside, in which cavity there is another stone that is smaller: this, when it is shook, may be heard to rattle. It is of various colours, as white, grey, dun, or brown. Modern authors have only three sorts of this stone, the first of which is rough on the outside, and is of different colours, but commonly of a black dun: this makes a very distinct noise when rattled. The second is of an ash colour, and contains a sort of marl in the inside, which is sometimes white, yellow, red, or blue. The outside is rough and sandy, and seems to consist of the particles of flint. A third is of several colours; but has the like contents as the former. The first kind is no bigger than a peach-stone, but the other two are often as large as a man's fist. These sort of stones are found almost every where.

The GEODES is a sort of an Eagle Stone of a round shape, and contains sand or earth, which makes no noise when shook; for when it rattles it may be properly placed in the former class. It is found in Misnia, and near Pelsna in Bohemia. It is of a reddish colour, and of the size of a man's fist; but it is of no manner of use.

The ENORCHUS is another species of an Eagle

stone, and is generally of the size of a pigeon's egg. This contains one stone within another, as the yolk of an egg is contained in the white. It is not smooth on the inside, but is tinged with various dirty colours, and on the outside is of an ash colour.

Authors mention many other species of this Stone, such as the rough purplish, the red and dusky yellow, the yellow, brown, and black crufted, the purplish red, the coarse yellow and brown, and the coarse Eagle Stones.

There are also five kinds of the Geodes, which are distinguished by the names of the Cracked GEODES with ferruginous brown and yellow crusts. This is always hollow, heavy, and of a regular shape; it being oblong, and larger in the middle than at the ends. It is generally about two inches long, an inch and a quarter broad, and three quarters of an inch thick. The outer shell or crust is of a yellow colour, with a mixture of reddish brown, and is smooth to the touch, though it is all over cracked in different directions. However, it is very hard, and will not break without a strong blow; and, when broken, it is found to contain a yellow earth, with a little mixture of sand. It usually consists of three crusts, the innermost of which is of a bluish black colour, the middle of a deep brown, and the outermost yellow as above. It is met with among gravel.

The Wrinkled GEODES, with ferruginous, reddish brown, and gold-coloured crusts, is very heavy when pieces of it are considered apart; but when unbroken it is light, because it consists of a large hollow case. It is about three inches long, and two and a half in diameter, and has no distinct coat different from the general substance. It is of a fine gold colour, with a small mixture of brownish red, and is full of wrinkles or superficial cracks. The cavity is usually divided into several cells, and contains a small quantity of fine bright yellow earth. The shell, when perfect, consists of a great number of coats, some of which are of a ferruginous colour, others of a reddish brown, and others as yellow as gold.

The Sparkling GEODES, with ferruginous, purple, and orange-coloured crusts, is subject to great varieties, excepting the internal structure. However, it is generally oblong and flattish, and sometimes it is full of protuberances, sometimes branched, and sometimes again tapering to one or both ends. It is bred among gravel, and consequently has a very rough outside, it being covered with pebbles of different sizes. It is generally four inches long, two broad, and an inch and a half thick; though sometimes it is twelve inches long. Different stones contain earths of different kinds; and the shell is composed of eight or ten coats, which are all bright and sparkling. Some are of a dark iron grey colour, others of a dusky purple, and others of a saffron or orange colour.

The Long Rough GEODES, with a single purplish crust, is always of an oblong shape, of a firm substance, and considerably heavy and hard. It is yellowish on the outside, and is about four inches long, and three quarters of an inch in diameter; but the surface is strangely rugged and uneven. It has only a single coat of a mixed purplish iron-grey colour, and is a little sparkling.

The Long GEODES, with a single blackish crust, is always of an oblong irregular form, it appearing frequently twisted, and of a different thickness in the different parts of the same mass. The outside is generally so invested with a stratum in which it was formed, as to appear of a brownish yellow. It is sometimes two inches long, three quarters of an inch broad, and above half an inch thick; but it varies in size. It is very brittle, and when broken is of a blackish colour, a little sparkling; and the cavity

cavity is filled with very fine bright red earth, though sometimes it is not without mixture.

The stone called ENHYDRUS is a-kin to the Eagle stone, but it contains nothing but water. The first of these is the thick-shelled Enhydrus with black, reddish brown, and yellow crusts. It is of a close, even, compact texture, pretty heavy, and very hard; and always is of an irregular roundish shape, but very flat, rising in the middle, and thinner towards the edges. It is about four inches in diameter, and two thick where thickest. The surface is rough, and of a mixed yellow and brownish red colour. When broken it is found to be a very thick shell or case, containing a small quantity of water, which is generally muddy. The shell usually consists of three thick coats, of which the innermost is blackish and shining, but that in the middle is of a dusky brownish red, and the outermost of a bright yellow. The cavity is large, and generally divided into different cells.

There are still other stones of the Eagle kind, which may be referred to the Enorchus, of which the first is the very Hard Smooth ENORCHUS, with brown, yellow, and red coats. The texture is fine and compact, with a pretty smooth even surface, and is remarkably heavy. It is always of a roundish oblong figure, and is found from a quarter of an inch to four inches in length; but its usual size is that of a pigeon's egg. It is sometimes met with smooth and glossy, and sometimes covered with a whitish crust. It consists of only five or six coats, inclosing a firm, hard, and solid nucleus of the same nature and texture. This is of a deep dusky brown colour, sometimes of a strong red, and sometimes has a mixture of both. The coats are alternately dark brown and reddish.

The Hard Glittering Rough ENORCHUS, with brown, purple, and deep yellow coats, is much more rugged than the former, and of a coarse unequal texture. It is always of an oblong shape, and is found of several sizes, from half an inch to eight inches long. The surface is made up of small prominences and cavities, less than the heads of the smallest pins, which give it the appearance of shagreen. The nucleus is but small, and is surrounded with eight or ten coats, irregular in thickness and of several colours, as pale brown, deep brown, dusky and reddish yellow; and the nucleus is sometimes purple, but more generally of an orange colour. The substance is pretty bright and sparkling, not only within, but on the surface of the stone.

The Soft Brownish Yellow ENORCHUS is quite of a different nature from the former two; for this is only a composition of soft earth, though the texture is close and smooth. It is always of a flattish oblong shape, and is commonly four inches in length, two in breadth, and one in thickness. It is of the same colour throughout, and the nucleus is of the same shape as the stone, but of a very agreeable brownish yellow, as well as the coats themselves, which are almost innumerable. It has no manner of brightness, but looks like clay. There are two other sorts of the soft Enorchus, the one with a shining brown and dusky green coat, and the other with a shining whitish, yellowish, and red coat.

The HÆMATITES, or BLOOD-STONE, is so called from its colour, which is that of darkish blood; though it is sometimes black, sometimes yellow, and sometimes of the colour of iron; but its streaks always resemble antimony, and when it is calcined it turns to a reddish colour. It was formerly divided into several kinds, but now there is only one treated of by authors. It is found in various parts of Germany, in marl-pits and iron mines. It is now known to be a rich iron ore; for, when melted, a great deal of that metal may be extracted.

It is of various degrees of purity and hardness; for sometimes it is of a coarse texture, and seems to be composed of large filaments. With regard to its medicinal qualities, it is now generally used in some disorders of the eyes, especially to remove spots and films.

The SMIRIS, in English Emery, may be placed in the class of the Hæmatites. It is of an iron grey colour tending to blackness, and so hard that it is used by jewellers, glass-grinders, and smiths, for polishing their work. It will cut glass almost as well as a diamond, and is reckoned a sort of an iron ore. It is found in large masses, bespangled all over with shining specks.

The PUMICE STONE is spongy and full of small holes and cavities. It is of several colours, as ash-coloured or white, which are so soft that they may be crumbled to pieces between the fingers; but some are more hard, though they are all so light that they will swim on the surface of the water. It is found in divers places, but especially near burning mountains, from whence it is thrown out. It is used by various artists for different purposes; and in some places they use it in the baths to clean the skin.

The MAGNET or LOAD-STONE is well known for its property of attracting iron, and for its polarity; for, when suspended, one end always points to the north, and the other to the south. It is found in various places, and often in iron mines; which is no wonder, for it is a kind of iron ore. It is generally of an iron grey colour, with a bluish cast, and sometimes reddish without, and blackish within; but that which is bluest is best. When a needle is touched with a Load-stone, the Magnet will not attract both ends equally, but will repel the one, and draw the other, which is known almost to every one.

C H A P. XXIII.

Of SAND-STONES, ROCK-STONES, MARBLE and ALABASTER.

THE Bright White Brittle SAND-STONE is coarse, harsh and rough, and of a loose porous texture. The surface is of a dusky, dead white; but immediately after it is broken it glitters pretty much. It is composed of a large angular crystalline grit, which is very hard and firm in the mass; but when in small pieces as soft as loaf-sugar, and falls into a white sand like powder. Water, when poured thereon, will immediately sink through it, though it will strike fire with steel, and will soon blunt the workmens tools. It makes no effervescence with aqua fortis; but it burns to a beautiful pale red. It is used in building, and will bear the weather pretty well; but it will not take a polish. They build houses with it in Northamptonshire without mortar.

The Dull Greyish White Brittle SAND-STONE is coarse, rough, and of a loose texture. It is pretty heavy, without splendor, and is composed of a large irregular grit, mixed with a soft loose substance in the form of powder. When examined with a microscope, it appears to consist of an angular oblong transparent large grit, which adhere together in very few places; but the pores are filled up with a whitish powder, and while in the earth it is very moist and crumbly. It is much used in building, because it cuts very easily. When water is poured thereon it will become wet through; but it will hardly strike fire with steel, and yet it will make a violent effervescence with aqua fortis. It burns to an almost white flesh colour.

The Hard White Dull SAND-STONE consists of

of crystalline grits that are not very pure; but they are cemented together by a finer crystalline substance. It is very coarse and rough, and of a close, compact, dense texture, it being very hard and pretty heavy. It is penetrated by water very slowly, and will not readily strike fire with steel; but it ferments very strongly with aqua fortis, and burns to a pure white. It is common in Dorsetshire, and does not lie so deep in the earth as many others. It is a very good stone for building.

The Loose Dull Whitish SAND-STONE is very coarse and pretty heavy; it is composed of a very hard roundish grit, cemented by an earthy spar. It is not very hard in the mass, and when in small pieces it will crumble into powder between the fingers, and when water is poured on it, it will readily penetrate its surface. It will not strike fire with steel, but will effervesce violently with aqua fortis, and burn to a reddish white. This is known in London by the name of Portland Stone, where it is much used in building. It is so soft while in the earth, that it is usually cut into a proper form on the spot, for afterwards it becomes considerably hard.

The Hard Greyish SAND-STONE is composed of grit of an oblong angular shape, many of which are purely crystalline, and very bright and glittering when viewed through a microscope; but to the naked eye they appear like shining specks scattered here and there. The grits themselves do not at all cohere, but are cemented together by an earthy spar. It will not crumble when broken into small pieces, nor is it at all dusty; likewise water poured on it penetrates its substance very slowly. It will not strike fire with steel, though it is cut with some difficulty; but it will make a violent effervescence with aqua fortis, and burn to a white. This is what is called in London Purbeck Stone, and there are often shells contained therein. It is a good stone for building, but will take no great polish.

The Brittle Brownish White SAND-STONE is very coarse, rough and of a loose texture, being somewhat porous. It consists of a large angular grit, slightly cemented together by an earthy spar; when reduced to small pieces it readily crumbles between the fingers, and sticks to the hands. Water will penetrate it very freely, and therefore it is no wonder it will not strike fire with steel; but it makes a violent effervescence with aqua fortis, and burns to a pale reddish white. It is common in many parts of the kingdom; but it is chiefly brought to London from Portland, where it is much made use of in building, because it will stand the weather, though it cuts very easily.

The Brittle SAND-STONE, with a round grit, is known by the name of the Kettering Stone, though it is not only found about that town in Northamptonshire, but at Kerton in Rutlandshire. It is of a loose texture, and seems to be porous when broken, which is occasioned by the falling out of the inner part of its grit. It is pretty heavy, with but a little brightness, and consists of a roundish grit laid very closely together, as well as cemented by an earthy spar. In small bits it will crumble between the fingers, but not stick to the hand. It will not strike fire with steel, but it ferments violently with aqua fortis, and burns to a pale whitish colour. It is used in many places for building.

The Greenish White Brittle SAND-STONE is coarse and dusty, and its particles cohere so slightly, that they are continually falling off in powder. It is of a loose texture, though moderately heavy, and is full of glittering spangles of talc. The grit is pretty large and angular, cemented by a very loose coarse earthy spar. Water poured thereon will readily penetrate through it, and it cuts very easily. It will not strike fire with steel, but it ferments violently with aqua fortis, and burns to a reddish white. It

is common in all parts of England, and will bear fire better than many harder stones.

Hard Greenish White SAND-STONE is very hard, coarse and rough, though of a firm texture, and is spangled all over with broad glittering flakes of talc. In some places it is variegated with brown spots, and consists of large grit with irregular angles, lodged in a sort of crystalline cement. It is considerably hard in the mass; but small bits may be reduced to powder between the fingers, and it sticks to the hands. It will not strike fire with steel, nor make any great fermentation with aqua fortis. It burns to a pale reddish white, cuts easily, and takes a pretty good polish. It is sometimes brought to London, where it is used in building.

The Brittle Yellowish Brown Glittering SAND-STONE is very coarse, and of a loose texture; but it is considerably heavy, and very full of fragments of talc. It consists of large angular grit, lodged in a dusty cementitious substance, is soft and brittle in the mass, and will crumble between the fingers in small pieces. It will hardly strike fire with steel, and makes but a slight fermentation with aqua fortis. It is used in building, being cheap and easily cut.

The Brittle Pale Brown SAND-STONE is extremely coarse, rugged and rough. It is somewhat spongy and pretty heavy; but it has not so much talc as the former. It consists of oblong grits with obtuse angles, and is cemented by a sort of crystalline substance mixed with earth. It is soft and brittle in the mass, and is easily penetrated by water. It will not strike fire with steel, nor ferment with aqua fortis. It is common in the northern counties, where they make whet-stones of it, which are brought up to London, and much used by shoemakers; it also serves for grinding stones.

The Hard Red Glittering SAND-STONE is coarse and rough, though of a very close firm texture, and will bear a pretty good polish. It is remarkably hard and heavy, and of a deep reddish brown colour, with glittering spangles of talc. It consists of large oblong angular grits cemented with a sparry substance. It cannot be rubbed to pieces between the fingers, nor will water so much as penetrate its surface. It is cut with difficulty, and therefore it is no wonder it strikes fire with steel. It makes but a slight fermentation with aqua fortis, and undergoes little or no change in the fire. This is brought to England in large quantities from Norway.

The Hard Glittering SAND-STONE, of the colour of rusty iron, but sometimes more yellow and sometimes browner, is very beautifully spangled with talc. It consists of a small roundish grit, cemented by a firm deep brown earth, and is remarkably hard even in the smallest pieces, but will not strike fire with steel, though it cuts with great difficulty; nor will it ferment with aqua fortis, though it burns to a deep chocolate colour. It is very plentiful near Bristol, where there are strata twenty feet thick. It stands the weather very well, and is used in some places for building.

The Soft Brittle SAND-STONE, of a brownish rusty colour, is composed of large roundish grit, cemented with a loose ferruginous earth. It is common in most counties of England, and is of little or no use.

The Grey Brittle Dull SAND-STONE consists of large, coarse, obtusely angular grits, cemented by a loose earthy spar. It is very soft and brittle in the mass, and much more so when reduced to small pieces. It will readily split into horizontal plates, and burns to a pale whitish red. It will not readily strike fire with steel, but ferments greatly with aqua fortis. It will not stand the weather very well; being very apt to crumble after hard frosts, though in

some places they cover their houses with it instead of tiles.

The Brownish White Glittering SAND-STONE has a moderately smooth and even texture, and is pretty firm, compact and heavy, but varies in colour on account of the earthy particles that get into the pores of this stone with the water. It is the most bright and glittering of any stone of this kind, and is commonly known by the name of the Flag-stone. It is always found in flat plates from a quarter of an inch to four or five inches thick, and the thinnest of these always lie uppermost. It is considerably hard, and will not break in any direction. It will not easily strike fire with steel; but ferments briskly with aqua fortis, and burns to a greyish white. It is used in the north of England for covering houses instead of tiles; that is, those of the thin sort, for the thicker are employed in paving and building. It consists of grit with blunt angles, cemented with an earthy spar, and interspersed with flakes of bright talc lying in a horizontal direction.

The Greenish Grey Shining SAND-STONE is of a hard, coarse, rough and somewhat spongy texture; but is considerably heavy, and full of bright glittering spangles. It consists of large angular grit that lie very close together, among which are dispersed great numbers of fine small very bright flakes of talc, which, with the grit, are cemented with a small quantity of a very pure transparent substance. It will readily split in a horizontal direction, but not into very thin flakes. It does not readily strike fire with steel, and makes but a slight fermentation with aqua fortis. It is used in some places for covering of houses.

The Yellowish Grey Glittering SAND-STONE somewhat resembles the former; but is very rough, coarse and harsh, and considerably heavy. It is met with in many parts of France.

The Hard Purple and White Laminated SAND-STONE is the hardest and most elegant of this class, though very rough and harsh. It is of a very close texture, extremely heavy, and the colour is finely variegated with greyish white and purple. The plates or flakes are much thicker than many of the former, and is extremely bright and glittering, on account of the large quantity of talc contained therein. It splits very easily, and is composed of fine glittering grit, cemented with a pure shining substance. It is extremely hard, and consequently will strike fire with steel; but it will not ferment with aqua fortis. It is common in Italy, where it is used for pavements.

The Bluish Glittering SLATE STONE is pretty fine and smooth, and of a close compact texture. It is extremely heavy, and full of talky particles, and more easily cleaves into plates than any of the former, which are generally about one tenth of an inch thick. It consists of small irregular sharp grit, that is often entirely blended with the cement, which is of the same crystalline substance with itself, though debased by a mixture of earthy particles. It is extremely hard, strikes fire with steel, and ferments slightly with aqua fortis. This stone is common in Italy.

The Dense Dull Whitish ROCK-STONE is moderately fine, but of a very irregular texture. It is composed of a soft whitish earthy spar, intersected with flat plates of the crystalline sort. The earthy part of this stone is pretty dense, but not so hard as the crystalline, and there is no grit of any kind. It ferments greatly with aqua fortis, and burns to a bluish white, mixed with a little red. This is very common in many counties, and is brought to London from different places, where it is used in building.

The Hard Greyish White Dull ROCK-STONE

is of a compact texture, with a smooth surface, and is considerably heavy. It is composed of no visible grit, and is easily cut; it will not readily strike fire with steel, but ferments violently with aqua fortis. It is common in several counties of England, is used in buildings, and stands the weather pretty well: some burn it into a poor coarse sort of lime.

The Hard Porous ROCK-STONE is of a coarse spongy texture, and yet very hard and heavy. It is generally of a greyish white, though sometimes brownish, yellowish or black, from the different kinds of earthy particles falling into it with the rain. It has no grit, and is very hard, even so much as to spoil the workmens tools. It strikes fire with steel, but will not ferment with aqua fortis. It is common in Yorkshire, where the strata lie very deep. It is used for building in that county.

The Hard Bright Grey ROCK-STONE is more like crystal to the naked eye than the former, and consists altogether of a sparry substance. It is a very elegant beautiful stone, for it is bright, shining, and very heavy. It will hardly strike fire with steel, but ferments violently with aqua fortis, and burns to a pale bluish red. It is not very common; but there is some of it in Yorkshire, where they both use it for building and for burning into lime.

The Hard Bright Brownish White ROCK-STONE is very heavy, and of a close texture, consisting of a crystalline spar, which in thin plates is a little transparent. It will not strike fire with steel; but ferments very briskly with aqua fortis, and burns to a pale whitish red. It is brought from Purbeck to London, where it is used for building and pavements. It is also used in Northamptonshire for building and making tomb-stones.

The Dull Yellowish White Hard ROCK-STONE has a close firm texture, with an irregular surface, and is very heavy. It is of a pale dull white, with pale yellow veins and spots in several places; but it is not bright, though composed of crystalline spar. It will not easily strike fire with steel, but ferments violently with aqua fortis, and burns to a white colour. It is common in Dorsetshire, and sometimes contains shells. It is very useful in building, because it wears the weather very well.

The Dull Hard Brownish White ROCK-STONE generally consists of above half shells, and is a very coarse harsh stone without any brightness. It will not readily strike fire with steel, but ferments violently with aqua fortis, and burns to a greyish white. It is brought in great quantities from Purbeck to London, where it is used for flat pavements.

The Whitish Grey Marble ROCK-STONE is considerably fine, remarkably heavy, and of a fine firm texture. It has a somewhat sparkling appearance, and is entirely without shells. It is considerably hard, and will bear a pretty good polish; it strikes fire with steel, but will not ferment with aqua fortis. It is found in the Eastern countries, as well as Italy, and some parts of Germany.

The Yellowish White Flinty ROCK-STONE is very fine, smooth and glossy, and its texture is pretty much like that of common flint. It will hardly strike fire with steel, but makes a very great and lasting fermentation with aqua fortis, and burns to a greyish or bluish white. It is common in some parts of England, and is known by the name of the Rag-stone and Lime-stone. It is generally free from clefts; but when there are any, the sides are always covered with a crystalline spar. It is used in the pavements of streets.

The Brownish White Flinty ROCK-STONE is in some parts of England called Chert or Wern, has a very compact firm texture, and is considerably heavy. It has sometimes veins and spots of red, white or black. It breaks with an even glossy surface, like that of flinty pebbles: and strikes fire

with

with steel, but makes no fermentation with aqua fortis. It is often found among other strata of stone, and Dr. Woodward mentions one of three feet thick in Yorkshire.

The Bluish Flinty ROCK-STONE is very soft and smooth, with a close even texture, and is considerably heavy and hard. It has sometimes bluish white veins, and is found in most counties of England. It strikes fire with steel with some difficulty, and makes a strong and lasting fermentation with aqua fortis. In some places it is burnt into lime, which is very good.

The Hard Bluish ROCK-STONE is very rough, and is generally full of shells or spar. Its texture is firm, and is extremely heavy; it will not readily strike fire with steel, but ferments violently with aqua fortis, and burns to a pale whitish grey. It is brought from Purbeck to London, where it is used in pavements. It is hard to cut, and therefore not much used in building.

The Brownish Blue Dull Hard ROCK-STONE is coarse and rough, and pretty heavy. It is generally variegated with lines and spots of a pale red and of an opaque white. It will not strike fire with steel, but makes a strong and lasting fermentation with aqua fortis, and burns to a pale bluish white. It is called in Leicestershire the Blue Lime-stone, for it makes good lime.

The Dull Pale Red ROCK-STONE is pretty fine and smooth, of a firm texture, and considerably heavy. It is variegated in most places with lines and spots of a pale red, or of an opaque white. It will not readily strike fire with steel, but ferments violently with aqua fortis, and burns to a very pale whitish or greyish red. It is used for building walls in some places, and is also burnt to lime.

The Hard Shining Red ROCK-STONE is very heavy, and is spangled in many places with small bits of a very glossy spar. It is extremely hard, and will take a good polish; it will not readily strike fire with steel, but ferments violently with aqua fortis, and burns to a pale red. It is imported from Sweden, Norway and Denmark, and is used in pavements; it is also to be met with in Yorkshire. That of Norway contains fine straight shells, but that in England is without them.

The Green and Red Variegated ROCK-STONE has a rude irregular structure, and is but coarse for one of this class. However, it is not porous, is pretty heavy, and interspersed with blotches and soft uneven lines of a fine paler green spar, as well as a few fragments of a white and semi-transparent one. It is found in the lead mines of Derbyshire; but is of no use.

The Hard Black Dull ROCK-STONE has a close firm texture with a smooth surface, is pretty heavy, and extremely hard; but has no gloss, except a few shining specks in some places. It is not unlike black marble, but will not readily strike fire with steel: it ferments violently with aqua fortis, and burns to a fine bluish white. In Leicestershire it is burnt into lime.

The Hard Black Shining ROCK-STONE is somewhat coarse, but extremely hard, very glittering, and remarkably heavy. It does not ferment with aqua fortis, and burns to a pale brownish red. It is found in Derbyshire, but is hitherto of no use.

The Soft Dull Black ROCK-STONE has a pretty smooth surface, but no very firm texture, and though very heavy, has not the least brightness. It has somewhat the appearance of slate, though it will not cleave; nor will it strike fire with steel, nor yet ferment with aqua fortis. This is known every where by the name of Rag-Stone, and is more properly so called than the yellowish white one before mentioned, because when broken it has a ragged appearance. This is used as a whetstone all over England, for common knives and carpenters tools.

C H A P. XXIV.

Of S L A T E S.

THE Brittle White SLATE-STONE has a pretty close texture, and is considerably heavy, though dull. It consists of various plates from one sixth of an inch to an inch thick, and will split pretty easily. It will not strike fire with steel, and ferments strongly with aqua fortis. It is very common in England, and particularly in Northamptonshire, where it lies near the surface of the ground. It is made use of to cover houses.

The Purple SLATE is a fine beautiful kind, and is pretty heavy. It is firm and compact, and the colour is a fine pale purple, glittering all over with small glossy spangles which are very bright, and so minute that they are not to be seen distinctly without a careful examination. It consists of very thin plates or flakes laid evenly upon each other. It will not strike fire with steel, nor ferment with aqua fortis; but is greatly valued as a covering for houses in the northern counties of England, where it is found.

The Common Blue SLATE is almost universally known, and is a very useful stone. The texture is fine and smooth, and consists of even plates laid close upon each other, which will readily split. It will not strike fire with steel, nor ferment with aqua fortis. It is used almost all over England for covering of houses, and is much better than tiles.

The Brownish Blue Brittle COAL-SLATE, which is always to be met with in coal-pits, it of no manner of use.

The Greyish Black Brittle SLATE, by some called Shiver, is of a very loose open texture, though pretty heavy: but the structure is regularly plated, and the plates seldom cohere to each other. It is very soft, and is readily penetrated by water. It will not ferment with aqua fortis, and burns to a faint red. It is common in the northern counties of England, and is made use of for manuring land, in the same manner as marl.

The Greyish Blue Sparkling SLATE has a very compact texture, but somewhat uneven, and consists of irregular plates, which will split into those that are very thin. When large masses are found, they are often bent and undulated, and towards the upper part of the stratum are frequently observed to be defective. They are composed of regular oblong fibres, which are all very bright and glittering when the mass is just broken, having somewhat of the appearance of talc. It will not strike fire with steel, nor ferment with aqua fortis; but burns to a yellow spangled mass. There are large strata of this in some of the counties of England, and is sometimes found on the sea shore. It is often used as a whetstone to give a good edge to tools.

The Irish SLATE is the most soft and brittle of all this class, it being coarse, rough, and of a crumbly texture; but is pretty heavy, and of a brownish black. It consists of a multitude of thin plates laid evenly upon each other, and splits very easily. It will not strike fire with steel, nor ferment with aqua fortis; but will burn to a strong bright red. It is somewhat of the nature of alum, and is very common in Ireland; it is also found in Somersetshire and other parts of England, where it always lies near the surface of the ground in a very thick stratum. It is used in medicine against bruises, and is given by some from one drachm to two in curing quartan agues; but its principal use is for internal bleedings.

At Isleb, in the county of Mansfield, there is found a black Slate, which has the images of various fishes of a black or yellow colour; and they appear to be so finely done, that the very scales may be seen.

C H A P. XXV.
Of M A R B L E S.

THE PARIAN MARBLE is so called because it was brought from the island of Paros. It is of a white colour, extremely hard, and takes a very fine polish. It has a firm, compact, close texture, and is considerably heavy; its extraordinary whiteness has sometimes a bluish cast, with blue streaks of different breadths. It is not very hard to cut, and therefore is in great esteem among the statuaries. It consists of pretty large particles with flat surfaces, but much smaller and more regular in their size and shape than those of the alabaster kind. It will not strike fire with steel, but ferments violently with aqua fortis, and when burnt is almost as white as snow. Some say this marble receives its name from Agoracritus Parius, who first carved a statue of Venus out of it.

The Hard White MARBLE, called Carrara by the moderns, is whiter than the Parian, but is not of so great value, because it is more hard to cut, and will not take a fine polish; however, it is used for building, as well as to make statues. It has a more firm and close texture than the former, and is very heavy; besides, it has greater transparency than any other white marble. It consists of small glittering particles, many of which appear to have flat surfaces, and consequently lie close together; and it is supposed to consist of a perfectly white spar. It will not strike fire with steel, but ferments violently with aqua fortis, and burns to a pure white. This marble is found in Italy, from which country large quantities are brought to England.

The Hard Pale Yellow Glossy MARBLE is of the same colour throughout, and is considerably heavy, with a close firm texture. It is very fine and smooth, and between the colour of honey and Venice turpentine. It will readily break in any direction into a smooth glossy surface. It will not strike fire with steel, nor ferment greatly with aqua fortis; but burns to a fine pale red.

The Numidian MARBLE of the ancients is hard, shining, of a bluish colour, and is very remarkable for its hardness. It will bear an extremely fine polish, on account of its compact even texture. It is not at all transparent, unless in very thin pieces. It will not strike fire with steel, but ferments greatly with aqua fortis, and burns to a pure white. It is found in Italy, Spain, France and Germany, and is a fine strong, durable marble, though not in great esteem.

The Black Namur MARBLE is very fine and smooth, having a close firm texture, and is very heavy. It is full of fine small glossy particles, which look like so many spangles. It will not strike fire with steel, but ferments violently with aqua fortis, and burns to a pure white. It is a useful marble, though not much esteemed.

The Chian MARBLE is of a black colour, and very fine and hard. It is used in England, as well as in other places, for a touch-stone; and is in great esteem with the goldsmiths for that use, it being the best of this kind. It is perfectly smooth when broken, but is very dull, and does not shine at all. It appears to be one pure, unmixed mass; and cuts with difficulty, but very smoothly. It will not strike fire with steel, but ferments very strongly with aqua fortis, and calcines to a pure white. It was formerly brought from the Island of Chios; but we have it now from Italy. It is capable of a very high polish, insomuch that it has been used instead of a mirror.

The Lydian STONE of the ancients is a hard black Marble, in the shape of columns, and is called Basaltes by Boet. It is reckoned among the Marbles

by Pliny; and indeed it is the hardest of this kind, for a file will not touch it. It is also called Basanus, from a Greek word that signifies to examine, because this was the touch-stone of the ancients. It is now met with in various parts of Germany, and particularly in Silesia; but the greatest quantity of it known is the Giants Causeway in Ireland, which appears so regular that it was at first taken to be a work of art. This Marble is of a very fine, smooth, even texture, and is of so glossy a black that it resembles high-polished steel, without any foreign matter. It is always found in one smooth homogeneous mass, but not in quarries like other Marbles; for it always stands upright in regular columns, consisting of a great many joints, one of which is exactly placed and fitted to the other. A vast number of these are so regularly put together, and joined by their sides, that they seem to have been placed so by a very skilful workman. Many of these columns make large pillars, some of which are at small distances from each other. The single columns are all angular, and consist of from four to seven angles; but the first are most uncommon. It will not strike fire with steel, which must be on account of its smoothness, for it is certainly hard enough for that purpose; likewise it makes little or no fermentation with aqua fortis. This stone may be made use of on various occasions, and is well known to make the very best kind of burnishers for polishing silver.

The Lacedemonian MARBLE of the ancients is of the green kind, and is taken notice of by Pliny. It is different from the Ophites, because that is variegated with spots like serpents, from whence it took its name, for that word signifies a serpent; besides, the columns that are made with this last are always very small. There is also another of this kind, of a dark green, which is finely painted with crosses of a lighter colour, which are so fine that common spectators would take them for the effect of art. This Marble has a close compact texture, and is very hard and heavy. It is of a fine bright green, and takes a very good polish. It will not strike fire with steel, but ferments violently with aqua fortis, and burns to a pure white. It was first brought from Lacedemonia, afterwards from Egypt, and is now found in Germany, Sweden, and England. There is said to be a stratum of it near Bristol, and many in Wales, where it may be had in any quantity.

The Derbyshire MARBLE is of a whitish brown colour, and has a fine close texture. It will not strike fire with steel, but ferments violently with aqua fortis, and burns to a pure white. It is so full of marine substances, that four fifths of the whole mass seem to be composed thereof; it is particularly full of entrochi, which are a sort of shell of an oblong round form, furrowed on the outside, as if it was divided into joints, marked with a star at the end, which are supposed to be part of the Star Fish; but this is uncertain. They are of all sizes, from the thickness of a large pin, to half an inch or more. They will take a very elegant polish in the mass, and are much used for chimney-pieces, tables, and the like. It is found in vast quantities in Derbyshire, and some will not allow it to be Marble, but call it the Derbyshire Stone.

The Green MARBLE, thick set with small sea shells, is of a very beautiful kind, and will bear a very fine polish. It is of a delightful bright green; but does not sparkle. The roundish black lines, and pale brownish white specks that are found in it, are thought to be small sea shells, filled up with an impure white earthy opaque spar; but, be that as it will, it is a very elegant curious Marble. It ferments violently with aqua fortis, and calcines to a pure white. There are very large quarries of it in Germany, Bohemia, and some parts of France, where

where it is used in the ornamental parts of buildings.

The Greyish Green MARBLE, thinly set with shells, is somewhat coarse and rough, and of an irregular and pretty firm texture, moderately heavy, and considerably hard. It is of a dull dusky greyish green colour, and will ferment violently with aqua fortis. It is found in Derbyshire, Dorsetshire, and Essex.

The Hard Greyish Black CORALLOIDE MARBLE, has a very fine smooth even texture, and is considerably bright and sparkling; but does not seem to consist of a homogeneous mass when broken, but of many closely compacted particles. It abounds with a sort of coral called Porus, set at small distances and in all directions: they are generally about an inch and a half long, and three quarters of an inch broad, and are composed of longitudinal plates, which are very fine, thin, and of a snow white colour. In the most perfect specimens there are processes like wings, of a close irregular net-like texture, expanded on each side near the top, and of this sort of texture the whole body is full; the interstices are filled up with a greyish white spar, and form a very beautiful figure. It is found in great plenty in Derbyshire, and according to Dr. Woodward in Wales. The tomb of Sir Thomas Gresham in Great St. Helen's church is built with it.

The Black CORALLOIDE, marbled with shells, is of a very close, firm, even texture, and is very hard and pretty heavy; it will bear a very fine polish. It is variegated with a Coralloide Porus not unlike the former, but smaller. There are also great numbers of large sea shells of the turbinated and bivalved kinds, lodged in various directions, and of a clear bright white. The cavity of the porus and shells are all filled up with the black substance of the marble; but they retain their shape in a very perfect manner. It ferments violently with aqua fortis, and is common in Ireland, from whence it is brought to London.

The Purple and White Variegated MARBLE is generally pretty fine, with white veins, spotted and variegated with purple. In some blocks the purple makes the ground, and the veins and spots are white; there are also blotches of other colours, as pale red, pale brown, yellowish, greenish, and yellowish brown. The different substances, which compose this Marble, are generally distinct masses, particularly those of the purple and white kind. The whitest is most pure, and therefore is hardest, brightest, and most transparent. The pale red is next, the purple next to that; but the brownish, greenish, and yellowish, are very earthy, and almost perfectly opaque. There are silvery particles in this Marble, which are supposed to be a very pure spar. This is a common Marble in Italy, and great quantities of it are brought to England.

The Brown and White Brittle MARBLE is the softest of this class, and has a pretty coarse texture; but it is considerably heavy, and of a pure snow white, finely variegated with slender lines, and veins of a deep brown earthy colour, and in some places there is a faint cast of pale red: when broken, glittering particles appear as in the former, which are disposed in small flakes. The white parts or ground are extremely like the finest loaf-sugar, and is so soft that it may be cut with a knife. Water will readily soak through it, and it makes a violent effervescence with aqua fortis. It is common in Italy, and serves to make chimney-pieces.

Hard Variegated Red and White MARBLE is very fine, remarkably heavy, and is somewhat of a bluish ground, finely variegated with red, brown, and yellow veins. It is very glittering in many parts, and will take a very fine polish. It will not strike fire with steel, nor ferment greatly with aqua

fortis. It is a beautiful Marble, and is found in great plenty in Devonshire, from whence it is sent to London.

The Blue and White Variegated MARBLE has a large rough grain, is moderately heavy, and is of a bluish white, or of a fine bright pearl colour, variegated with broad veins of a dusky blue, which often make up the greatest part of the Marble. The white parts when broken appear bright and sparkling, but their texture is loose. The blue is of a smooth texture, and extremely dull. It is moderately hard, and takes a very good polish. It ferments violently with aqua fortis, and burns to a greyish white. It is common in Italy, from whence large quantities are brought to England; where it is used for monuments.

The Pale Brown MARBLE, with white and red veins, has great variations, both with regard to the ground and the veins. The texture is pretty fine, close and smooth, and is considerably heavy. The veins are sometimes of a bluish white, without any other mixture, and in some they are only red. The red is of all degrees, from the brightest colour to the purple of porphyry. It is considerably hard, and takes a very beautiful polish. It ferments violently with aqua fortis, especially in the red and white veins. It is a common English Marble, and there is great plenty of it in Cornwall, Devonshire, and Wales. It is used in London for tables.

The Brown MARBLE variegated with white and black is pretty fine and smooth, though subject to cracks and flaws. It is moderately heavy, and the brown colour is variegated with very beautiful whitish and black branched veins of various figures: sometimes it is difficult to determine whether the white or brown is the ground. The brown is of different degrees of colour, and is disposed in a very odd manner; for it sometimes, when black, seems to resemble rocks, clouds, rivers and landscapes. It is common in many parts of Italy, where it is in good esteem for ornamental works.

The Hard Brown MARBLE, variegated with white, and is the hardest of this class, is remarkably heavy. It generally consists of only two colours, yellowish brown, and a dusky white; but they are in many different proportions, and the veins are composed of very different shades, which generally resemble the windings of rivers, and seldom any thing else. It ferments but little with aqua fortis, nor will it readily calcine; it is very hard to work, therefore is not much in use; it is found in Italy, but not very common.

The Yellow and Purple Variegated MARBLE is a very curious kind, and the ground is of a beautiful pale yellow, with fine purple veins; there are others that are dark brownish, blackish and white. The structure is smooth and even, and it will bear a very elegant polish. It will ferment somewhat briskly with aqua fortis; and when calcined turns to a beautiful pale red. It is found in Italy, and with us bears a very great price.

The Blue and Yellow Variegated MARBLE would be very valuable, if it would admit of a fine polish; but, as it does not, it is not in great esteem. The ground, which is coarse, is of a deep yellow, mixed with a fine blue; which in some places is so deep as to be almost black, and in other places so light that it looks like a pale grey. Its texture is loose and open, and it is common in Spain, Italy, and Africa.

The Black MARBLE, with white veins, has a very firm texture, and is of a fine deep black, variegated with narrow white veins, running generally straight and even. It is pretty hard, and will bear a good polish, and when broken one way it is very bright and sparkling. It ferments but little with aqua fortis, and calcines to a dusky grey: it is com-

mon in Italy, and is used with us for chimneys and tables.

The Bluish Black Hard MARBLE, with snow-white veins, has a somewhat rough and harsh texture; but is considerably hard, and will bear an excellent polish. It is somewhat bright and glittering when broken in the black part, and the white veins glitter greatly. It ferments violently with aqua fortis, and when calcined is of a mixed grey. It is common in Italy, and is brought to us from Leghorn.

The Black and Yellow Variegated MARBLE has a very fine close texture, and is very heavy. The black is deep, and variegated with a great number of yellow veins. It will bear a very fine polish, and then the yellow veins look like gold; but when there is any white, they appear like silver. There are great quantities of this Marble brought from Italy, because it is of very great use with us, and highly esteemed.

The Black MARBLE, with white and red veins, is of an irregular but close texture, and is considerably heavy. The ground is black, and sometimes inclines to blue, and the variegations are chiefly of a clear bright white; but there are some of a beautiful red. Sometimes the white part is so great, that it is hard to determine whether the white or black is the ground. The red veins commonly appear of a granulated structure, and the whole is very hard, and will bear a very fine polish. It will not strike fire with steel, but ferments pretty briskly with aqua fortis, and burns to a mixed grey. There is a great deal of this Marble in Ireland, from whence it is sometimes brought, though very rarely.

The Black MARBLE, with red, white and yellow veins, is pretty coarse and rough, though of a firm texture. The ground is of a deep black, which is beautifully variegated with all degrees of red, yellow and white, dispersed in irregular veins. It is brightest in the white part, and the red and black sparkle, though very little; but in the red it is scarcely perceivable. It takes a pretty good polish, and ferments though but little with aqua fortis, except in the white veins.

The Green MARBLE, variegated with white veins, was in much esteem with the ancient Romans. It has a firm compact texture, is remarkably heavy, and green and white are of such different degrees, that they make a very agreeable variegation. Besides these, there are spots and veins of a blackish colour, and the whole is so hard that it will bear a pretty good polish. It ferments briskly with aqua fortis, except where it is green and flaky; and is brought from Egypt and other places.

The Greenish Black and White Spotted MARBLE is the black Ophites or Serpent-Stone of the antients. It was so called because it had spots in the form of serpents; for the name was owing to the figure of the spots and lines, and not of the stone itself. It is a very beautiful and pretty hard marble, of a firm texture, and remarkably heavy; the ground is a very fine green, variegated with small black spots and irregular lines, and sometimes with those that are white. They are sometimes pretty large, and half blended with the general substance of the mass, and sometimes there is the blush of purple throughout the whole. It ferments violently with aqua fortis, and burns to a mottled grey. This marble is now found in various parts of the world, and particularly in the islands of the Archipelago; there is also a sort of it in Wales, which is known by the name of the Anglesea Marble.

The Greenish Soft MARBLE, variegated with white and black veins and spots, is the white Ophites of the antients. It is of a pretty fine smooth texture, moderately heavy, and when pure, of a very elegant pale green, with spots, clouds and lines of a

fine deep black and whitish green, which is sometimes entirely white. It is soft and easily cut, but looks very bright when wrought. It ferments violently with aqua fortis, and burns to a dusky grey. It is found in France, Italy, and Germany.

The Ash-coloured MARBLE with small black spots, is the Tephria and grey Ophites of the antients. It is a fine smooth marble, pretty firm and compact, and considerably heavy. The ash colour is lively and beautiful, the black spots of irregular figures, and the sixth part of an inch in length. It is pretty hard, and takes a fine polish. There is a great deal of this in Germany, but it is not so good as that of the antients, which is brought from Ethiopia and Egypt.

The Greyish Brown MARBLE, with bright green spots, has an even texture, is considerably firm, and very heavy. The spots are small, generally of an oblong figure, and will take a very fine polish. The green parts especially ferment greatly with aqua fortis, and burn to a pale mottled grey. It is common in Egypt and Arabia, and is said to be met with in England.

The pale grey MARBLE, with green spots and veins, is extremely firm and very heavy, and in some places slightly tinged with a very faint red, and in others with a colour that is nearly white. It is variegated with a very beautiful pale green, consisting of small oblong irregular spots, and sometimes of narrow uneven veins. It is very heavy, and will bear a beautiful polish. It is common in Germany, and Dr. Woodward takes notice of a specimen found on the sea shore in Cornwall.

The Red MARBLE, with white and gold veins, is the Theban marble of the antients. It is a very beautiful marble, and of a very smooth regular texture. The red is variegated in some places only with white, and in others only with yellow or gold colour; these are very large and broad in some places, and very narrow in others, for they generally make up almost half the mass. It is found in Egypt, Italy, Germany and England; but the Egyptian is the finest, and the English the worst.

C H A P. XXVI.

Of ALABASTER, PORPHYRY and GRANITE.

THE Snow-white Shining ALABASTER is that called the Lygdine by the antients. It is not very compact; but is heavy, and consists of a multitude of broad, flat, large particles, which are very bright and perfectly white. It cuts very freely, and is capable of a fine polish. There are very large strata of it in Arabia, Egypt, and many parts of Italy; but it is seldom brought over to England.

Whitish Yellow ALABASTER, of a soft consistence, is of a loose open texture, considerably heavy, and nearly of the colour of honey; but the colour is more deep in some places than others. It consists of irregular pieces that lie in tables one over another, though with regularity; however, they all together compose a remarkably bright mass, which is very brittle. It is found in Cappadocia, and has been met with in Germany and France, as well as in Derbyshire.

Yellowish and Reddish Variegated ALABASTER is the common Alabaster of the antients. It is so soft that it may be cut with a knife, and has the same name in all languages. It is remarkably bright, glittering and almost transparent, and its texture is very loose and open, though it is moderately heavy. The ground is of a fine clear pale yellow, between that of honey and amber, and has the same texture as the former; but is beautifully variegated with crooked undulated veins, some of which are broad, and

and others narrow; some of a pale red, others whitish, and others again of a very agreeable pale brown. It will bear a very fine polish, and consists of large angular sparry concretions. It is not proof against water, ferments violently with aqua fortis, and burns to a pale grey colour. It was formerly found in Egypt, and is now met with in many parts of England.

Purple PORPHYRY, with pale red and white spots, is the Porphyry of the antients, by whom it was placed among the red marbles, of which it was reckoned the chief, on account of its hardness and splendor. It is named Porfido by the Italians, and there are two columns of it before the gates of St. John Baptist, in Florence. The texture is not so fine as many of the common marbles, and it always breaks with a rough irregular surface; but is remarkably firm, compact and heavy, and of a fine deep purple variegated more or less with pale red and white spots, as also a few flaky black spots. The purple is of all degrees, from the colour of claret to that of a violet, and the variegations are generally distinct spots of various sizes. It approaches the nearest to the hardness of a gem, and was always in very high esteem. It is found in great plenty in Egypt, which was always famous for this stone; but now it is met with in other places, at least with variations. They will all strike fire with steel, but will not ferment with aqua fortis. This is frequently made use of as a stone for grinding colours.

The PORPHYRY of the colour of red lead, variegated with black, white and green, has the hardness and all the other characters of purple Porphyry; but it excels it in brightness, and in the beautiful variegations of the colours. The texture is harsh, rough and irregular, but it is remarkably heavy. The ground is of a bright red lead colour, and in various degrees. It has very regular green veins, and some that are perfectly white, with a great number of small black specks; but these are never mixed with the green, that make a considerable part of the whole. It takes an exceeding fine polish, strikes fire with steel, and will not ferment with aqua fortis. It is found in the island of Minorca, and this might serve for many valuable purposes, if it was imported into England.

The Pale Red PORPHYRY, variegated with black, white, and green, is of a very compact firm texture, considerably heavy, and of a pale flesh colour, often approaching to white. The variegations are in large blotches from half an inch to an inch broad, and now and then disposed in irregular veins. The surface is bright but does not glitter, and its extreme hardness renders it capable of a very high polish. The red, white and green parts appear to be all tabulated, and the green has a tinge like that of gems, and is the brightest of all, it being nearly transparent. It is found in Arabia Petraea, and in Upper Egypt. There are also small pieces of it in Germany and Ireland, and they have been sometimes seen in Devonshire on the sea shore.

The Hard White GRANITE, with black spots, called in Cornwall Moor-Stone, is of a large and gross texture, and appears to be a rude, but beautiful mass of variously constructed and differently coloured particles, distinct from each other, though they cohere very strongly. It is considerably hard, and mottled with black and white, among which there are perfectly transparent particles that are very bright; there are great numbers perfectly black, and others of the colour of brown crystal: some of these intersect, and are divided by other granulæ; but others lie parallel with, and others evenly upon them; and others again are quite buried in the substance of the crystalline particles, like flies in amber. Some again are single and thin plates, and others large and broad laid singly on each other.

The whole is extremely bright and glittering, and will take a pretty good polish. It strikes fire with steel, but will not ferment with aqua fortis, and undergoes little change in the fire. There are vast quantities of this in some parts of Ireland, as well as in Cornwall and Devonshire, where it is found in exceeding large masses on the surface of the ground. It is used in London for the steps of publick buildings.

The exceeding Hard Red GRANITE, variegated with white and black, is the Syenites of Pliny, and the Oriental Granite of the moderns. It is called by the Italians Granito Rosso, and of this the obelisks are generally made in Egypt. Travellers tell us of an obelisk, in Alexandria, made of one solid block of this Marble, which measures eighty feet in height. The texture of this Granite is coarse, harsh and rough, but extremely heavy. It is of a very beautiful pale red, variegated with white and black. All parts of it are bright and glittering, being capable of a very fine polish. It strikes fire with steel, but will not ferment with aqua fortis.

The Pale Whitish GRANITE, variegated with black and yellow, is found in the island of Minorca, where there are vast quantities of it. It is often found on the shores of the island of Guernsey, and is used for pavements in the streets of London.

C H A P. XXVII.

Of Common Circumscribed STONES.

THE Brown STONE, grey on the outside and divided by partitions, has a very firm compact even texture, with a smooth surface. It is of various sizes, but generally between six and twelve inches in diameter. They are not always of the same shape, but are most commonly roundish, or inclining thereto. They have always a multitude of fine flaws like those of common flints, which chiefly appear upon breaking them; and they always break in these flaws, which are lined on both sides with an extremely thick crust of grey clay. Besides these narrow cracks, there were originally others, which are now filled up with a pure spar of a pale yellowish white, and pretty transparent. These are always thickest in the centre of the stone, and become thinner and narrower as they approach the surface. The stony matter of this kind is considerably heavy, moderately hard, and will bear a slight polish. It will not strike fire with steel; but ferments violently with aqua fortis, and turns to a whiter colour in the fire; the matter, which divides the several parts, burns to a pure white. It is very common in England, and sometimes contains shells, besides a beautiful delineation of shrubs, plants, and mosses.

The Hard Brown STONE, with few divisions, has not a grey crust like the former, but the colour within is nearly the same. The texture is firm, but the surface rough and irregular; and the usual size is from four to twelve inches in diameter. The shape is different, but it has always somewhat of an oval; and when broken there are small shining sparry specks. The divisions or septa are very few, which appear in the form of shining veins; and there are some that have none at all. It will not strike fire with steel, but ferments greatly with aqua fortis, and calcines to a greyish white. It is common in the clay pits between London and Islington.

The Hard Blackish Brown STONE, with whitish partitions, is coarser than the former; but the texture is firm, and it breaks with a rugged uneven surface. It is seldom above six or eight inches in diameter, and often no bigger than a hen's egg, but the

the shape is nearly round. It is always covered with a pale brown crust, about the third of an inch thick, where it is softer than within. The divisions are very numerous, and always filled up with a whitish spar. The inside of the stone is of a dusky brown, with irregular variegations of black. It is considerably heavy, and will take a pretty good polish. It will not strike fire with steel, but ferments with aqua fortis, and burns to a pale reddish white. It is found in most parts of England, and is common near London.

The Hard Brownish Yellow STONE, with yellowish white partitions, is very firm and hard, with a smooth compact texture. When broken it has a smooth flinty surface, is of various sizes from four to twelve inches in diameter, and generally roundish with somewhat of flatness. It is covered with a deep yellow crust, softer than the substance of the Stone, which will crack when exposed for some time to the air. This Stone is very hard, heavy, and will bear a tolerable polish.

The Hard Greyish Brown STONE, with brown partitions, is very close and compact, and has a very smooth surface when broken. It is met with from three to four feet in diameter, and the shape is always irregular. It is without a crust, and sometimes appears a little bright. The veins, which are few, are very broad; and, though it is remarkably hard, it will not strike fire with steel, but ferments violently with aqua fortis, and calcines to a greyish white. It is common about London and elsewhere.

The Hard Ferruginous Brown STONE, with brown partitions, is very firm, strong, and of a compact regular texture, with a smooth even surface when broken. It is two or three feet in diameter, is generally broad and flat, and most commonly without a crust. It breaks into thin flakes in a very regular manner, with a great many shining specks. It is remarkably heavy, very hard, and will bear a pretty good polish. It will not strike fire with steel, but ferments greatly with aqua fortis, and burns to a brownish red. It is common on the shores in Yorkshire.

The Soft Whitish STONE, with brownish yellow partitions, is of a very soft and loose consistence, and full of great numbers of empty cracks. It is seldom above eight inches in diameter, and is of a roundish shape. Sometimes it is invested with a crust a little paler than the inside of the Stone, and when broken a few shining specks may be seen. It ferments greatly with aqua fortis, and calcines to a pure white.

The Elegant Crustated STONE, with a bluish nucleus or kernel, is of a very close even texture, and is generally about eight or ten inches in diameter, and of a roundish flattish shape. The crust is about the sixth of an inch thick, and of a pale yellowish brown, as well as the rest of the mass. The nucleus in the centre is usually about four or five inches broad, and about half an inch in diameter. It is of a pale bluish grey, and round it the substance is disposed in regular crusts, which grow thinner as they approach the centre. It ferments with aqua fortis, and burns to a pale red. It is not very common; but is found in Leicestershire.

The Hard Dusky Brown STONE, with very thick partitions, has a fine close texture, and an even surface. Its shape has a tendency to roundness, and is generally between four and five inches in diameter, with a pale yellowish brown crust, though sometimes it has none at all. When broken the surface is irregular, and looks like flint; but it has few spangles. The partitions are numerous, broad and thick, of a pale brown colour, and pretty transparent. They are all irregular, and this Stone will bear a pretty good polish. It will not strike fire with steel, but ferments most strongly with aqua fortis.

The Hard Greyish Brown STONE, with thick whitish partitions, is different from all the foregoing; for it is divided into angular squares of irregular shapes. The texture is firm and compact, and the surface irregular and rugged. The size is from four to eight inches, and it has a tendency to roundness. It seldom has a crust, and when broken does not at all sparkle. It may be generally observed, that in these sort of Stones the softer they are, the more they are spangled; but the harder, the less spar they contain. This stone is very heavy, and takes a good polish; but will not strike fire with steel, though it ferments violently with aqua fortis.

The Brown Compressed STONE, with yellow partitions, is generally of a very large size, it being from one to three feet in diameter. It is of a broad and flat shape, and seldom above four inches thick. It is sometimes invested with a thin yellowish brown crust, but is most commonly found naked. It has a reddish cast, which is owing to a slight tinge of iron, though the prevailing colour is a pure brown. It has a smooth surface when broken, but has no shining specks. The partitions consist of fine glittering spar of the colour of honey, which is disposed into columns, and is regularly and beautifully dispersed throughout the mass of the stone, dividing it into oblong angular pieces with three or four sides, and from one to two inches in diameter. It is very heavy, hard, and will bear a fine polish; but will not strike fire with steel, though it ferments violently with aqua fortis. It is common on the shores of Yorkshire, Suffex, and Kent.

The Whitish Grey and very Hard STONE, looking like flint, is of a firmer texture than any of the former, with a pretty smooth even surface. It seldom exceeds six inches in diameter, and is always of a round or oval shape. It is mostly covered with a thickish brown crust, and on the inside it is sometimes very pale, and sometimes mixed with more or less brown. It appears like flint when broken, and has no shining specks. It has but few partitions, and those very thin, and of a very pale brownish white. It is remarkably heavy, and very hard, though it will not strike fire with steel; but ferments violently with aqua fortis, and burns to a pale greyish white. It is not very common.

Bluish STONE, brown on the outside, with white partitions, is pretty hard, with a rough irregular surface; and is of various sizes, from a few inches to two feet in diameter. It is always flattish, being seldom more than six inches thick in the middle, from whence it becomes thinner to the edges every way. It is sometimes invested with a pale brown crust of earthy matter, mixed with a little spar; but is most commonly entirely naked. Wherever this stone breaks with ease, it is always of a pale brown, but elsewhere of a dusky blue or lead colour, with a few shining spangles. The partitions are of a very pure white, though sometimes a little tinged with the colour of brimstone. They are very numerous, and divide the mass into many pieces, which consist of several sides, and are from one to three inches in diameter. It is capable of a good polish, but will not strike fire with steel, though it ferments violently with aqua fortis, and burns to a pale dusky red. This stone is very uncommon.

Hard Pale Yellow STONE, with a few thin partitions, is of a pretty firm texture, but the surface is rough and unequal. It is sometimes three feet in breadth, and very flat, for it seldom exceeds two or three inches in thickness. The pale yellow is sometimes mixed with brown, and when broken its surface is pure and regular. It has a few shining spangles in different places, and is sometimes covered with a thin shell of a pale grey earthy matter. The partitions consist of a pale brown spar, disposed in short irregular columns, and generally lie in
straight

straight perpendicular directions, dividing the mass into large pieces; and on each side of the cracks filled with these partitions there is often a coat of white sparry earth; for which reason this stone may be easily divided into pieces. It is pretty heavy, and will bear a tolerable polish. It is common in the middle counties of England.

Soft Dusky Yellow STONE, with very thick partitions, has a pretty smooth texture, but not very compact: the surface is uneven, and the size is from two inches to two feet in diameter. It is always flattish, though generally thickest towards the centre, and thinner at the edges. When it has any crust, it is always a little softer than the rest of the stone; and the disagreeable dusky yellow is mixed with a little brown. When broken it appears in irregular flakes, with a rough surface, on which are a few spangles like talc. The partitions consist of a pale yellow spar regularly dispersed through the stone, and are pretty numerous, many of which are no less than one third of an inch in diameter. It is pretty heavy, though soft, and does not ferment greatly with aqua fortis. It may be seen in the clay pits near Deptford.

The Hard Bright Yellow STONE, variegated with brown, is of a pretty fine close texture, with a very rugged unequal surface; and the size is from four to twelve inches in diameter. It is always oblong and flat, being no thicker in the middle than elsewhere. It has commonly a thick crust of the same substance with the stone, but softer; and is of a very bright beautiful yellow, with sometimes a brown coat, and at other times veined in different directions. When broken, the surface is tolerably even, and there are shining specks of spar in different places. The partitions are thin, but consist of a pale brown spar. It is moderately hard, and will take a slight polish. It is common in the tile clay-pits about Pancras.

The Very Hard, Brownish, Yellow, Undulated STONE, with a very few whitish partitions, is of a very even compact texture, with a smooth regular surface. It is from three to nine inches broad, of a flattish shape, and oftener square than oblong. When broken it has a tolerably smooth surface, with long specks of spar. The partitions are very few and small, and it is often without any. It is very heavy, extremely hard, and will bear a fine polish; but yet it will not strike fire with steel. It is common on Mendip Hills in Somersetshire.

The Hard, Greyish, Yellow STONE, is divided into pieces by thin yellow partitions, and has a very fine close texture, but the surface is irregular and unequal. It has been found from four to twelve inches broad, of a roundish flat shape, and seldom with any crust. It appears smooth when broken, with a few glittering spangles. The partitions are of a fine pale honey colour, and are very numerous, running among each other in all directions, and forming a sort of net-work, somewhat like a honey-comb, but of various shapes. The pieces contained in these are about an inch in diameter, having from three to six sides, and the partitions consist of a transparent spar. The whole is very heavy, considerably hard, and will bear a good polish; but it will not strike fire with steel. It is frequently met with on the sea shore.

The Round Yellow Ferruginous STONE, with thin straw-coloured partitions, has a smooth even texture, is about eight or ten inches in diameter, and in the shape of a round ball. It is always crusted with a paler colour, which is softer than the substance of the Stone, and near an inch thick. The colour is a mixture of rusty iron, and a pale yellow; and when broken the surface is smooth and even, with a few shining spar specks that look like talc. The partitions are of a beautiful colour, and

are composed of most bright pure spar, without any order. They are always thickest at the centre, and very few reach to the surface. It is considerably heavy, pretty hard, and will bear a slight polish. They may be seen in the clay pits between London and Islington.

The Roundish STONE, of a rusty red colour, with yellowish partitions, is pretty like the former, and is between six and twelve inches in diameter. It is always covered with a thick crust, of a whitish brown clayey earth, containing a good deal of spar, and is commonly about half an inch thick. When broken the surface is even, and has a few shining specks. The partitions are principally about the centre, and are of a fine bright yellow. It is very heavy, pretty hard, and will bear a tolerable polish. It may be seen in the clay pits near Islington.

The Rusty Brown STONE, with whitish partitions, has a pretty smooth texture, but not very firm; the size is from two to twenty inches, and always broad and flat. It is generally covered with a thick whitish brown crust, and the surface when broken has many shining sparry specks. The partitions are pretty regular, running through the stone in perpendicular directions. It is so soft as hardly to bear any polish, and is common on the shores of Yorkshire.

The Hard Blackish Brown STONE, with a yellow coat, has an exceeding fine texture, with a pretty even surface; and is from four to six inches in diameter, and always of an oval figure. The crust is of an ochreous clay, different from the rest of the mass, and is very brittle. It is commonly composed of thin coats laid evenly one upon another, and adhering but slightly. They are of a fine deep yellow, and are easily broken from the stone by a small blow. The body of the stone is a mixture of rusty colour and black, and when broken has a smooth flinty surface. The partitions are of a very pale yellow, and are pretty thick, dividing the stone into irregular pieces. This Stone is very common in many parts of the kingdom.

The Hard Brown STONE, with snow-white earthy partitions, has a very close texture, with a pretty smooth and even surface. It is commonly of a roundish or oval shape, and from three to twelve inches in diameter. It is sometimes naked, but oftener met with in strata, covered with a thin brown earthy crust. The colour is of a pale brown, and when broken the surface is pretty smooth, with shining specks of spar thereon. The partitions are soft and crumbly, and consist of a white marl. It is very heavy, considerably hard, and will bear a very good polish; but will not strike fire with steel. It is not very common, though it has been found in the counties of Somerset and Huntingdon.

The Hard, Rusty, Brown STONE, with yellow earthy partitions, is of a very firm compact texture, with a rough surface, and is generally flattish, and from four to ten inches broad. It has seldom any coat, but when it has, it is of a pale yellowish soft substance. The brownish rust colour is commonly spotted and clouded with black, which sometimes appears in the shape of shrubs, trees, and mosses, like those of the Mocha Stone. When broken the surface is smooth, and there are usually no sparry specks. The partitions are narrow, few and irregular; these consist of ochre and marl, of which the first is in the largest quantity. It is considerably heavy, hard, and will take a good polish, but will not strike fire with steel. It has been found in Leicestershire, Northamptonshire, and near Highgate.

The Hard, Pale, Brown STONE, with partitions of a clayey earth, is of a close firm texture, with a rugged surface, and commonly of a roundish or oval shape, and from four to twelve inches in diameter. It is often covered with a thin crust of a pale brown colour,

colour, though it is sometimes without it. When the substance of this Stone is broken, it appears with a coarse surface of the same colour; but if according to the partitions, it is of the colour of rusty iron. The partitions are of a clayey earth, tinged with iron particles; and they are irregular and few in number: besides these there are exceeding fine cracks, in which places the Stone naturally breaks. It is very heavy, considerably large, and will bear a pretty good polish, but will not strike fire with steel.

The Soft, Pale, Brown STONE, with partitions consisting of the same substance as the pyrites, is of a pretty coarse and loose texture, and somewhat porous, with a very smooth surface. Its shape is very uncertain, though most commonly roundish, or oval, and seldom exceeds six inches in diameter. When it is broad and flat it is most commonly naked; but when roundish, it has a thick whitish crust. The surface is irregular when broken, and has a taste of vitriol, which none of the others have: the partitions are pretty numerous and irregular, but never thick, and consist of a double plate of the vitriolic pyrites. This stone may be readily divided at these partitions, as well as the plates from each other, after it has lain some time in the air; for before that it will break more easily any where else. The substance is soft and brittle, and consequently will not bear a polish.

The Rusty Red STONE, with yellowish brown partitions, has a very fine compact texture, with a very smooth glossy surface. It is of various shapes, sometimes oblong or oval, but more generally pretty much flatted, and is from three to twelve inches in diameter, and from four to six thick. Its colour is of a dusky brownish red, not always perfectly mixed; for in some places they are almost distinct, and form a sort of clouds or spots. When broken it appears to have an even glossy surface, without shining specks. The partitions are many and pretty thick, with a streaked texture, composed of an arrangement of brownish yellow columnar spar, which is pretty hard, though not very bright. The pieces divided by these partitions are of different shapes and sizes, and from half an inch to four inches in diameter. This Stone is very heavy, extremely hard, and will bear an exceeding fine polish. It will strike fire with steel, but with great difficulty, and ferments briskly with aqua fortis. It is very common in Yorkshire, and in most of the northern counties of England.

The Brownish Yellow STONE, with whitish partitions, is of a very firm texture, with generally a perfectly smooth surface. It is of various shapes and sizes, and is sometimes found in continued strata, though more commonly in irregular shapes; but always compressed and flatted, from three to fourteen inches in diameter, and about five inches thick. It is met with on the sea coast, particularly near Scarborough in Yorkshire. They have seldom any crust, but when they have it is of a rusty colour, and about a third of an inch thick. The colour of the stone is of a very fine ferruginous yellow, and when broken the surface is smooth and glossy, looking almost like flint. The partitions are numerous, and in many places thick and broad; they consist of a semi-transparent spar, which is very hard, and by these the stone is divided into a multitude of irregular pieces, from one to four inches in diameter. It is very heavy and hard, and will strike fire with steel, but with great difficulty.

The Bluish White STONE, with straw-coloured partitions, has the same texture as the two former, with a rough rugged surface. It is generally found in loose marshes, of a flattish shape, with some tendency to round or oval; but generally with rough edges, and from four to eighteen inches in breadth,

and from two to six thick. It has seldom or never any coat, and the colour consists of a mixture of blue and white. When broken the surface is glossy, and without any shining specks. The partitions are of a streaked texture, and are composed of a fine transparent bright spar, with irregular columns. It is considerably heavy, pretty hard, and will bear a good polish. It strikes fire with steel with great difficulty, and ferments briskly with aqua fortis. It is common in Yorkshire.

The Pale Yellow STONE, with a rusty-coloured nucleus, is of a pretty close compact texture, and of a roundish shape. It is about four inches in diameter, and is covered with a thin pale crust, within which there are from three to five coats of a different thickness, but all of the same substance, and much of the same colour, that is, of an agreeable pale yellow. When broken, the surface is pretty smooth, with many shining specks of spar. These coats have a nucleus or kernel in the centre, consisting of a hard ferruginous stone, and are divided from it by a thin regular partition of a straw-coloured spar, from which there run a great many other straight partitions directly to the circumference, but growing narrower as they come near it. It is pretty heavy, but not very hard, for it will not strike fire with steel. The nucleus is of a different substance from the rest, is very heavy, and of a firm texture; it strikes fire with steel, but will not ferment with aqua fortis. It consists of a large quantity of ferruginous matter, with a deep brown clay. It is to be met with on Mendip Hills in Somersetshire, and in a clay-pit near Islington.

The Brownish STONE, with a blackish brown nucleus, is of a pretty fine close texture, with a smooth regular surface, and is always roundish, though generally a little flatted. The size is two or three inches in diameter without any crust, and there is a hard blackish brown nucleus in the centre, of a close texture, contained in a thin crust of a paler colour, but of the same substance. It is about half an inch in diameter, and the crust about an eighth of an inch thick. The stone is composed of two other coats nearly of the same thickness, and of different degrees of brown. They are divided from the nucleus by a fine thin partition of whitish spar, from which others run that are straight towards the circumference, and yet but seldom pass through the inner coat. The nucleus is hard and stony, but not so much as the former, for it breaks pretty easily, and is full of small specks of loose spar. It consists of earthy and ferruginous matter, and will strike fire with steel, though with great difficulty, and will ferment a little with aqua fortis. It is to be met with in Northamptonshire, Leicestershire and Yorkshire, and has been sometimes found near London.

The Hard Whitish Grey STONE, with a brown nucleus, is of a very fine close texture with a smooth surface, and is always roundish or oval. It is generally about two inches in diameter, and is covered with a pale whitish yellow crust. The nucleus is brown and covered with a crust as hard as itself, but somewhat of a paler colour, and on its outside there is a fine sparry partition, which is firm and hard; from this there generally runs three or four narrow partitions towards the surface, which seldom reach the outer crust. It is very hard, and capable of a good polish, but will not strike fire with steel, nor yet the nucleus. It is a very uncommon stone, and hard to be met with.

The Small Ferruginous STONE, of a roundish or oblong shape, is generally known by the name of Mineral Bezoar, because it has coats like Animal Bezoar. It has a close, firm, compact texture, with a smooth surface, and is always either of a round or oblong form, generally about three quarters of an inch

inch in diameter, and from half an inch to two inches in length. They are constantly covered with a crust of a pale whitish substance of about a sixth of an inch thick. They always consist of a large central nucleus, sometimes surrounded with two or three coats of ferruginous matter, and sometimes irregularly blended with it, making together a single nucleus surrounded with a crust. Both the nucleus and the crust are generally divided into three, four or five parts, by pretty large cracks, which are widest on the outside, and usually become narrower as they approach the centre. They are commonly empty towards the surface, but near the centre they are filled up with a fine transparent spar. The Stone itself is pretty hard, and will bear a pretty good polish. It will hardly strike fire with steel, and ferments but very little with aqua fortis. It is common in the brick and tile clay-pits in all parts of England.

The Oblong, Pale, Brown STONE, with a long hollow nucleus, is of a very close firm texture, with a rugged unequal surface. The shape is oblong and cylindric, only it is largest in the middle, and becomes gradually less towards each end; but for half an inch they each terminate in a small cylinder of almost a whitish colour, and of a harder substance than the other parts. This is nothing but a lengthening of the inward substance, being only the extremity of the nucleus. It is between seven and eight inches long, and yet the diameter is three inches where thickest. The nucleus consists of a long cylindric tube, terminating in a blunt point at each end, which is sometimes empty, and sometimes filled with a white marl, or the matter of the stone that contains it. It is of a ferruginous colour, and is inclosed in a thin crust of a brownish substance, which is surrounded with a single, double, or triple partition of beautiful spar, and this again with two thick crusts consisting of the same substance as the rest of these stones. It is divided by three or four partitions, running like rays from the circular partition straight towards the circumference, but they generally vanish in the first and second coat. The whole is surrounded with an unequal whitish brown coat about a third of an inch thick. The cavity of the nucleus is half an inch in diameter, and the nucleus itself about an inch. This Stone is subject to a great number of cracks lying in different directions, so that when struck it will fall into many pieces, not more than the tenth of an inch in thickness each. The nucleus is very heavy and hard, but will not strike fire with steel, any more than the body of the Stone. The partitions consist of a pure white spar, which appear very bright when just broken. It has been found hitherto only in a great tile clay-pit near Oxford road, about three quarters of a mile beyond Tyburn.

The Very Hard Smooth STONE, with yellow, brown, and red coats, has a very fine compact texture, with a pretty smooth surface, and is remarkably heavy. Its shape is roundish or oblong, and the size is from a quarter of an inch to three or four inches in length; but most commonly of the shape and size of a pigeon's egg. It is sometimes found naked with a somewhat glossy surface, and at other times covered with a whitish crust. It consists of five or six coats, which inclose a firm solid hard nucleus of the same substance, that is sometimes of a deep dusky brown, and sometimes of a strong though not bright red; at other times it is composed of both these colours, either blended or in spots. The coats are alternately brownish, yellowish and reddish, that next the nucleus being brown, the next yellow, and the third reddish, with another that is yellow, and over these one that is brown. However, they sometimes vary in the disposition. It is very common in clay and gravel-pits, and particularly about London,

when covered with a crust. One fourth part of this Stone is iron.

The Hard, Glittering, Rough STONE, with brown, purple, and deep yellow coats, is of a coarse, uneven, and very irregular texture. The shape is always oblong, but of different lengths and thicknesses; it is from half an inch to eight inches long, and about three quarters of an inch in diameter. It has a rough surface made up of small prominences and cavities, less than the heads of the smallest pins; but this is uncommon, for it is usually stuck full of small pebbles. It is pretty hard, and breaks with a rough surface, and there is a nucleus surrounded with eight or ten coats, some of a paler, some of a deeper brown; others of a dusky and somewhat reddish colour, and others again of a deep brownish purple; but they are placed without any order or regularity. It is pretty bright and sparkling, not only when just broken, but on the surface; and the whole substance of the coats is full of small shining spangles like talc. It is common in the gravel-pits about Oxford, as well as in other places, and contains a small quantity of iron.

The Soft, Brownish, Yellow STONE, is almost as soft as earth, but is very compact, of a smooth texture, and considerably heavy. It is of a flattish oblong shape, and round at the ends; and is most commonly four inches long, two broad, and one thick. It is oily to the touch, and breaks with an irregular but smooth surface. It contains a nucleus of the same shape as the stone, and of the same colour, surrounded with coats of the same, which are extremely thin and exceeding numerous. It has no crusty covering, nor does it at all sparkle. It ferments very briskly with aqua fortis, and burns to a beautiful pale red. It is very uncommon, but has been seen in the potters clay-pits in Staffordshire, and in the forest of Dean.

The Soft STONE, with shining brown and dusky green coats, consists of a coarse opaque substance, and is of a loose texture. It is remarkably heavy, of an oblong shape, and commonly about an inch and a half in length, somewhat in the form of a ninepin. It is harsh and rough to the touch, the surface being extremely uneven, and when broken it has an irregular and pretty rough surface. It is generally composed of four coats, surrounding a nucleus of the same substance and shape as the stone. This is surrounded by a brown broad coat, and that by another that is broader. The next is a very beautiful one, it making a fine glittering appearance, and is of a very pale brown colour; over all there is a coat of dusky brown clay, which is always rugged and unequal. It is very common in clay-pits in many parts of the kingdom, and particularly in a clay-pit near London behind Black-Mary's-Hole.

The Soft STONE, with shining, whitish, yellowish and red coats, is of a loose brittle texture, and moderately heavy. It is commonly oblong, rounded at the ends, and of the size of a pigeon's egg. It is very rough, and will readily break with a small blow; it has from four to six coats of the same loose texture, but of different colours; but there is always one that sparkles, and is composed of the matter of the common selenites. The nucleus is commonly whitish, though sometimes with a mixture of yellow, and is of the same shape with the stone. The coat which immediately surrounds the nucleus is generally yellow, the next red, and the next whitish; then one that is yellow, and over these is the outermost, which is composed of great numbers of small columnar selenites, that together appear almost like crystal. It is very common in the clay-pits of Northamptonshire, and may be met with in several other counties.

C H A P. XXVIII.

Of the harder Common STONES.

THE Hard, Shining, Black and White STONE, is of a very irregular structure, but extremely firm, with a smooth though not glossy surface. It is from eighteen to twenty-five inches in diameter; but of different shapes, which all tend to be round, oval, or flat. At first sight it appears to be only of a dull yellowish white, and a glossy black. The white specks are sometimes slightly tinged with a flesh colour, others are of a cream colour, and others again shine like pure crystal. The surface is of a dull dead colour, but it is very bright and sparkling when just broken. It is considerably heavy, very hard, and will take an excellent polish. It strikes fire with steel, but will not ferment with aqua fortis. It is common on the shores of the island of Guernsey, and is met with in many places on the English coast. It is used in paving the streets of London.

The Hard, Shining, Red and White STONE, is of much the same texture as the former, but of a better colour, and the shape tends to roundness or an oval. It is found often of twenty or thirty inches in diameter, with a very smooth surface; and the colour is a pleasant light red, and sometimes a flesh colour, interspersed with small parcels of a pure bright white, from one eighth to one fourth of an inch in diameter. When broken it is smooth, bright, and beautiful; and is so hard that it will bear a very fine polish, as well as strike fire with steel. It is brought from the shores of Scotland, and is used in London for paving the streets.

The Red STONE variegated with white and black is of the same texture with the two former, and has a smooth, bright, glossy surface. Some are eight inches in diameter, and the shape is generally oblong and flattish. The colours are all beautiful and bright, the ground being red, variegated with all the different degrees and forms of a white transparent and black crystalline talc, which are so various in different stones, that they do not seem to be of the same kind. It is considerably heavy and hard, will take a fine polish, and strike fire with steel. They are found on the shores of Guernsey island, and brought to London to pave the streets, where they may be easily distinguished by their surfaces after a shower of rain.

The Hard, Heavy, Greyish Black STONE, variegated with white, is of a more rude, irregular, and harsh texture than any of the former, though it is more compact and hard. The surface is smooth and even, but not glossy, and is generally about ten or twelve inches in diameter; but the shape is uncertain, though it is commonly flat on one side. It is not so beautiful as the former, being of a greyish or bluish black, with opaque but very bright white, distinct from each other, yet regularly intermixed throughout the whole stone, so that it seems to consist of a regular mixture of black and white. When fresh broken the surfaces are remarkably smooth and bright, and it will bear a high polish. It strikes fire with steel, but will not ferment with aqua fortis, nor suffer any great alteration by fire. It is found on many parts of the shores of Yorkshire, and is sometimes seen in the streets of London.

The Brownish Red STONE, variegated with white and yellow, is of a pretty even fine texture, sometimes from three to four feet in diameter, and of a somewhat oblong and flattish shape. The ground is of a reddish brown colour, which is variegated with an impure talcky crystalline matter, generally about an inch long and half an inch in diameter, that is either of a pure or yellowish white; and these variegations are often four or five inches distant from

each other. It is pretty hard, will take a good polish, and strike fire with steel, but does not ferment with aqua fortis. It is found on the surface of the earth in Yorkshire and other counties.

The Reddish White STONE, variegated with black and gold colour, is of a more loose texture than any of the former, and very coarse. It is generally found between four and eight inches in diameter, and is of a very irregular shape, being seldom round, oval or flat. The colour is either a pale flesh, a deeper red, or entirely white. The particles of which this stone is composed seem to be a crystal debased with earth, and more or less of a metalline tinge, of the size of a horse-bean. Among these, black and yellow variegations are dispersed; which are composed of crystal, earth, and talc, of different degrees of brightness. It is considerably hard, very heavy, and capable of taking a fine polish. It is common on the shores of Yorkshire.

The hard White STONE, variegated with brown, is of a very coarse harsh texture, but extremely firm and hard, with a smooth glossy surface. The size is from two to ten inches in diameter, and it is generally of a roundish or oval shape. The ground is of a dusky white, variegated with pale brown; but they are distinct from each other, and interspersed with a great many flakes, some of which consist of a pure crystal lined with talc. When fresh broken, it glitters very much, especially in the white parts; it strikes fire with steel, but will not ferment with aqua fortis. It is common in Westmoreland and Yorkshire.

The Bluish, White, Bright, Brittle STONE, contains more talc and less crystal than the former; for which reason it is of a flaky texture, though very irregular, and the surface is rough and uneven. It is from ten to fourteen inches in diameter, and of a very uncertain shape, being generally rough and jagged at the ends and edges. Its colour consists of a dark bluish grey, and a pretty pure opaque white; the former of which is the ground, though sometimes it happens otherwise. It is composed of different masses, as in the other kinds; and those that are stony or crystalline are much of a size, and seldom larger than a horse-bean. It is but light in comparison of the rest, and is very brittle. It does not at all seem proper for polishing, though its stony parts will strike fire with steel; but it will not ferment with aqua fortis, and when burnt it is whitish with a silvery gloss. It is common in Yorkshire and the neighbouring counties, where the common people make use of it in the winter nights to keep the bed warm, or rather their feet, to which it is laid after it has been heated; for it will retain the heat a considerable time; and they give it the name of the Warming-Stone.

The Brown Brittle STONE, variegated with yellow, is very beautiful, with a pretty fine even texture, but more loose than the former, and with a rough surface occasioned by prominences and cavities. It is of various sizes, but seldom exceeds six inches in diameter; and the shape is quite irregular, though it is sometimes flat, and tending to an oval. The distinct parts of which it consists are seldom above one twelfth of an inch in length; and they are all of the same colour in the same mass, which is of a pale brown; among these are a great number of talcky flakes that are extremely bright, which are sometimes intermixed with spangles of black and whitish talc; but they are so uncommon, that brown and yellow may be said to be the true colours of the stone. When broken it appears extremely beautiful; but it is so soft as not to be capable of a good polish, and therefore will not readily strike fire with steel. It is found in many parts of Suffex and Yorkshire, and has been seen on Hampstead Heath.

The Hard, Purplish, Brown STONE, variegated with white and yellow, has a very rough, coarse, uneven texture; but it is firm and hard, with a rough unequal surface. It is commonly found from ten to eighteen inches in diameter, and the shape always approaches to round or oval, with a smoothness or flatness on one side. The colours are generally brown and white, or brown and yellow. The brownish purple parts make the ground, and consist of considerably large pieces, that are perfectly opaque. Those that are white and yellow are smaller, more bright, and in some degree transparent, they being composed of a mixture of crystal and talc. It is a little bright when fresh broken, and is very hard; for it will readily strike fire with steel. It is common on the shore near Scarborough, and has been sometimes seen in the streets of London.

The Hard Bluish Green STONE, variegated with white, is the most beautiful of the whole class. It is of a pretty firm, fine, but unequal texture; and in many places is loose, irregular, and porous. The surface is very smooth; the usual size is from three to four inches; and it is of a round or oval shape, but always flatted on one side. The greenish particles, of which the Stone chiefly consists, are all of a crystalline substance debased with earth, and tinged with metalline particles. Its variegations are small masses of white, consisting of crystal and talc, and debased with very little earth. It is very beautiful when broken, and is extremely heavy and hard; but it will not admit of a perfect polish, because its texture is a little porous: however, it readily strikes fire with steel. It is found on the shores of Suffex, but is most common in Wales, and contains a pretty deal of copper.

C H A P. XXIX.

Of STONES approaching to the Nature of Flint.

THE Yellowish White STONE, filled with pebbles, commonly called the Pudding-Stone, is of various shapes, according to the various pebbles it contains. It has been by some ranked among pebbles, but improperly; for they are no part of the Stone itself, which is a distinct species, and different from all others. The fementitious substance is an opaque Stone, of a very fine, close, and firm texture, with a pretty smooth surface on the inside, though in the masses it is frequently very rugged and unequal. In size it is from that of a walnut to three or four feet in diameter, with some tendency to roundness. It is of a pale yellowish colour, and when broken the surface is smooth, even, and flinty. It is pretty heavy and very hard, and consequently will take a very beautiful polish. It will readily strike fire with steel, but does not ferment with aqua fortis. The pebbles contained in it are of various kinds and sizes, from that of a pin's head to the bigness of a walnut. It is found in many parts of England, particularly in Hertfordshire, and is used for the tops of snuff-boxes and other toys.

The Greyish White STONE, filled with pebbles, is finer and harder than the former, but is very opaque, and has an exceeding smooth glossy surface, for it resembles a smooth spotted pebble. It seldom exceeds ten inches in diameter, and its shape is almost always roundish all over. The pale greyish white colour often contains more of blue than pure white, and the surface is very smooth when broken. When cut into thin pieces it is somewhat transparent, and is capable of a beautiful polish. It readily strikes fire with steel, but will not ferment with aqua fortis. It is almost always found in gravel-

pits among flints and pebbles, and is used for snuff-boxes like the former.

The Red STONE, filled with pebbles, is of the same nature with the two former, and is very opaque, with a pretty coarse texture and a rugged surface. It is found from six inches to four feet in diameter, and of very irregular shapes. The colour is a deep red, and sometimes there are different shades in different parts of the same piece. When broken, it is scarce at all bright or glossy, and its fineness is generally in proportion to its colour, for it is greatest where that is least. It will readily strike fire with steel, but will not ferment with aqua fortis. The pebbles it contains are of various sizes and kinds, and not so perfectly joined to the mass as in the other species; they are, however, not easily separated from it, and therefore it is as fit for use as any of the former. It is common in Lincolnshire, Derbyshire, and Yorkshire, but is seldom brought up to London.

The Brownish STONE, filled with pebbles, is of the same kind as the former, but is more impure and coarse. It is perfectly dull and opaque, with a rough harsh texture, but yet pretty firm; and the surface is rough, rugged, and unequal. It is from two to five feet in diameter, and is of a very irregular shape, though it sometimes shews a tendency to roundness. The colour is always of a dusky brown, but in various degrees. It is not so heavy as the former, though it strikes fire with steel. It contains very small, as well as some large pebbles, which are generally a little flattish. It is common in Leicestershire.

The Flesh-coloured STONE, filled with reddish impure crystalline nodules, is of a coarse, harsh, loose texture, and somewhat porous, with a rough irregular surface. It is found from four to twelve inches in diameter, and the shape is almost always flattish. It is generally so full of the masses it contains, that it is hard to find a speck of the pure cement of the bigness of a pea. Its colour is a very pale whitish red, and the surface when broken is uneven without any gloss. It strikes fire with steel, though not without some difficulty; but does not ferment with aqua fortis. The nodules are all of the same kind, but of various sizes, from the bigness of a pin's head to an inch in diameter. There is a great number of them, and they lie in different directions. Those that are large are easily struck out of the cement, leaving a pretty smooth cavity behind. These nodules consist of a sort of crystalline particles. This Stone is common in the sides of hills in Yorkshire.

The Bluish Glittering STONE, filled with white impure crystalline nodules, is of a pretty coarse, harsh, uneven, and irregular texture, with a rough surface; and is of various sizes, from one foot to four or five in diameter, and generally of a flattish shape. The colour is a deep dusky blue or lead colour, and there are many bright glittering spangles. The surface is roughish when broken, and it seems to be a-kin to some of the lime-stones. It is very heavy, moderately hard, and capable of a very good polish. It readily strikes fire with steel, and ferments a little with aqua fortis. The crystalline masses are the same as those in the former Stones, only they are without any colour. It is found in many parts of Leicestershire, as well as on the shore near Scarborough; but is never put to any use.

The Whitish Green Beautiful STONE, filled with crystalline nodules, has a pretty fine, close, firm and hard texture, with a rugged unequal surface, without the least gloss or brightness; and the crystalline nodules generally stand pretty far out of their cement. Its size is from two inches to two feet in diameter, and its shape is generally flattish, seldom inclining either to round or oval. The colour is a pale whitish-grey, irregularly tinged with a very beautiful

beautiful green; though it is not diffused through the whole Stone, but appears in the form of specks and clouds. It has a rough and wrinkled surface when broken, without the least transparency; and in breaking of it the nodules get out of their places, leaving cavities behind. They are generally smooth, but not glossy; and they seldom exceed the size of a small pea. They are outwardly of a very deep green, but within are white and opaque. They consist of a tabulated spar, and the green colour is owing to the mass in which they are included. This stone is moderately heavy and pretty hard; but it will not take a good polish, nor yet strike fire with steel without difficulty. It is found on the shores of Minorca, and now and then on the English coast.

The Brittle, Pale, Red STONE, variegated with white veins, and containing red nodules, is the softest and most brittle of this class, with a coarse loose texture, and a rough irregular surface. It is of various sizes, for it has been found from one to thirty inches, and is always flattish. The red colour is different in different masses, it being sometimes of a brick colour, while other parts are of a pale flesh. When broken, it is in many places perfectly spongy, without the least brightness, except in the white veins, which are not many. The red nodules are from the size of a pin's head to that of a hazle nut, and consist of the same substance as the stone itself. The stone is not proof against water, and will scarce give fire with steel. It is common in the shores about Scarborough.

C H A P. XXX.

Of Flinty STONES.

THE Common FLINT is a stone universally known, and of a very fine compact texture, with a surface that is generally rough and rugged, with various protuberances. The size is different, from an inch to two or three feet in diameter. The shape is extremely irregular, it being in gravel-pits of the form of a common pebble; but in chalk, where it is found in greater plenty, it is met with in all shapes. It is always covered with a white crust, which is sometimes very thin, and sometimes one sixth of an inch thick. It consists of crystal, debased with a large mixture of white earth, of the clay kind. The substance of this stone is uniform and equal, and is generally blackish, though sometimes grey. When broken it is of a fine even glossy surface, is semi-transparent, and will bear a fine polish. It is met with in all countries, and is put to various uses.

The White Flinty STONE is pretty fine, with a smooth compact texture, and a smooth surface, only it is furrowed with shallow wrinkles. It is generally roundish, but sometimes oblong, and its size is from half an inch to eighteen inches in diameter. The colour is uniform throughout, which is always white, with a small bluish cast. It is not equally pure, nor of the same degree of transparency; for some resemble the white cornelian, and others the common ground of agate. The coat is sometimes a little reddish, but is more commonly grey, or of a greyish brown. When broken it appears to have a fine even flinty surface, and, as it is very hard, it will bear a good polish. It will readily strike fire with steel, but will not ferment with aqua fortis. This is a common stone in many parts of England.

The Red Flinty STONE is of a very fine firm texture, with a surface not so even as the former; for it has deeper wrinkles, and often many prominences and cavities in different parts. It is generally roundish, and from an inch to three inches in diameter. It is naturally uniform, being without

spots, clouds, or streaks, and its colour is very fine, but it is of different degrees of red in different stones, as well as of different degrees of purity. It has sometimes small, whitish, opaque spots, and some are brighter and more transparent than others. It often nearly resembles the different cornelians, and has generally a whitish coat, with a small mixture of ash-colour, or yellowish brown. When broken, it appears to have a flinty surface, is very hard, and capable of a good polish. It strikes fire readily with steel, but will not ferment with aqua fortis. It is very common in our gravel-pits, and many of the seals sold for cornelian are made there-with.

The Yellow Flinty STONE is of a very fine even texture, and is extremely firm; but the surface is rough and irregular, it being full of wrinkles and other inequalities, and the shape is generally rugged and unequal. The size is from one inch to seven in diameter, and it consists of crystal, debased with a yellow earth, to which it owes its colour. They are sometimes of a deep yellow, and sometimes inclining to a whitish grey. It resembles the yellow cornelian, and is often equal to the finest stones of that kind; but is sometimes subject to imperceptible flaws, which will make it fly to pieces when broken. However, the surfaces are fine and glossy, and it is more transparent than the former; as it is very hard, it will take a fine polish. It readily strikes fire with steel, but will not ferment with aqua fortis. It is not very common, but has been found on Hampstead Heath.

The Bluish Flinty STONE is of a pretty smooth and close texture, with a rough irregular wrinkled surface and a very uncertain shape. It is generally about two inches in diameter, and is not of so simple a colour as the former; for it is of different degrees of blue in the different parts, some of which are deep, and others approaching to white, appearing in clouds, spots, and short lines. It is without cavities or cracks, and its outer coat is of various colours, but generally with a white and chalk-like appearance; sometimes it is of a bluish brown, and sometimes very thick and yellow. It is pretty hard, will take a good polish, and freely strike fire with steel. It is very common in gravel-pits.

The Greenish Flinty STONE is not so close and compact as the former, nor yet so fine, though the surface is pretty smooth and even. It is generally of a roundish or oblong shape, and from half an inch to two inches in diameter. It is always of the same colour, without either spot or cloud, which is of a deep dusky and somewhat bluish green. It is sometimes of the colour of green jasper, but has a coarse look, as it contains a great deal of earth. The coat is generally thick and white, and sometimes of a bluish dusky grey. When broken the surface is even, and as it is very hard, it will bear a good polish. It readily strikes fire with steel, but will not ferment with aqua fortis. It is not very common, and consequently is but seldom found.

C H A P. XXXI.

Of STONES that outwardly appear like PEBBLES.

THE Stone called PEBBLE CRYSTAL has a very smooth equal texture, it being in reality nothing else but Crystal in this form. It is free from all mixtures, and is found from the size of a pin's head to twelve inches in diameter. It is generally pretty round, though sometimes not without irregularities on the surface, and is sometimes flattish. It has a close firm texture, is pretty heavy, and as transparent as water. It is very hard, is capable of

a very high polish, and when broken is very bright and glittering. It strikes fire with steel, but does not ferment with aqua fortis. They are found almost in all parts of the world; but are most common in America, where they are very large, and are generally known here by the name of Brasil Pebbles. They are found in that country on the banks of rivers, as well as in Germany, Italy, and France. They are also met with in England; but their size is very small. Spectacles are made with this stone.

The Purple, Half-transparent, Crystalline STONE, has a rough uneven texture, but it is very firm, with a smooth surface; it is generally between an inch and four inches in diameter, and of a roundish shape, a little flatted. It is of an unpleasant yellowish white on the outside, but is pretty heavy, and when broken the colour is a reddish purple, very bright and glittering. The colour is not uniform, but appears sometimes in blotches, and sometimes in veins, in such large quantities, that they seem to tinge the whole mass. It is not quite so hard as the former, but will strike fire with steel. This is found in rivers and gravel-pits, and has been brought from Germany and Bohemia. It is said also to have been met with in gravel-pits near London.

The Snow-white, Opaque, Crystalline STONE, is of a very smooth, firm, and close texture, with a smooth even surface: its size is generally between a quarter of an inch and two inches, and though it is sometimes round, it is more frequently oval and flattish. It is as white as chalk on the outside, is pretty heavy, and when broken the colour is bright and shining, and as white as snow. It consists of a homogeneous substance, and is extremely hard. It freely strikes fire with steel, but will not ferment with aqua fortis. It will take a very fine polish, and is common in the gravel-pits of Norfolk.

The Opaque, Whitish, Reddish or Yellowish Crystalline STONE, commonly known by the name of the red, white, and yellow sparry Pebble, is the most common stone we have. It consists of a rough irregular and opaque substance, which is pretty firm and compact in its texture, with a pretty smooth surface, though often full of cracks, which sometimes penetrate deep into the body of the stone. It is met with from the size of a pea to six or seven inches in diameter, and is inclinable to a roundish shape, though it is sometimes flattish, especially on one side. The colour is much the same without and within, and it is irregularly tinged with different colours. These are sometimes uniform throughout the whole substance of the stone, but sometimes appears in spots, blotches, and irregular veins. It has a little brightness when broken, and appears to be of a loose texture. They are to be met with in gravel-pits and other places all over the kingdom.

The Yellowish, White, Spungy STONE, has somewhat of the nature of sand-stones hewn out of quarries, inasmuch that it might be mistaken for a fragment of that kind. The texture is coarse, but pretty firm, though there are small cavities that give it some resemblance of a sponge; the surface also has the same appearance, and it is generally from half an inch to two inches in diameter. It is pretty heavy, and more or less of a yellowish white, without the least brightness. It is composed of an irregular crystalline matter, debased with a mixture of a whitish and yellowish opaque substance. Though it is pretty hard, it will not easily strike fire with steel, nor does it ferment with aqua fortis. When examined with a microscope it appears to be a petrified sponge, for there are more cavities than solid matter.

The Hard, Porous, Whitish, Crystalline STONE has a rough cavernous and spungy surface; but it has not so many pores on the inside as the former kind. There are veins on the outside, dispersed in

an irregular manner, of different breadths, and often interwoven with each other; likewise they all stand up in ridges above the surface of the stone. Sometimes the pores on the inside are wanting, which renders the texture the more firm; it is from one inch to six in diameter, and generally of a flattish shape, though somewhat roundish. It is naturally white, and sometimes has a mixture of faint red, or pale yellow. It is pretty heavy, very hard, and is glossy when broken; especially in its veins, which are more close and compact than the rest of the mass. It strikes fire with steel, but will not ferment with aqua fortis.

The Greyish, White, Opaque STONE, is of a very close texture, with a smooth even surface; but it is subject to cracks of various sizes, and is from an inch to a foot in diameter, sometimes roundish, and sometimes flat; but in this last case it is always subject to superficial cracks. It is perfectly opaque and dull when broken, though it consists of an uniform crystalline substance; debased by a mixture of white and grey clay. It is very heavy, pretty hard, and will readily strike fire with steel. This, as well as the two former, is commonly in gravel-pits.

The Brittle, White, Sandy STONE, is of a very loose brittle texture, with a pretty smooth regular surface, though it is somewhat rough to the touch; the shape is irregular, though generally flattish, and the size is from one to twelve inches in diameter. It is pretty heavy, and when broken appears of a bright glittering white. It consists of a great deal of pure white sand, to which it may be reduced, and it breaks with the slightest blow into a great number of pieces. It is readily penetrated by water, which will pass through it unchanged. It will not ferment with aqua fortis. It is not very common, but has been found in the gravel-pits of Northamptonshire.

The White Crystalline STONE, with yellow specks, is by some called the Worm-seed Stone. It is of a pretty hard compact texture, and generally has a smooth surface, though sometimes there are irregular cavities. It is of a roundish or oblong shape, and thicker at the middle than at the edges. It is commonly about three or four inches in diameter, and the colour is generally white, though it has sometimes a pale brown cast. The specks are about the breadth of a small pin's head, and are of a very bright pale yellow, by which characteristic it is easily distinguished from all other stones. The colour is dull on the outside, but bright and glittering when broken; and it consists of a large angular grit, extremely well united. It strikes fire with steel; but does not ferment with aqua fortis. It is common in Yorkshire, and is sometimes found in the gravel-pits near London.

Whitish, Brown, Dull STONE, is softer than any of the former, and yet the texture is pretty even and regular. It is generally above a foot in diameter, and its shape is always broad and flat, with deep longitudinal cracks on the surface, which are crossed with some that are smaller. It is of a very pale brown, and has sometimes a faint yellowish or reddish tinge. The surface is dull and opaque, and when broken is generally full of cracks, the largest of which are often filled up with crystals, which look very bright and glittering. It is pretty heavy, and is harder in some places than others. It is found in many parts of England, and particularly on Hampstead Heath, very deep in the ground. It sometimes contains large pieces of petrified wood, which are so stony that they cannot be perceived, except by the knots.

The Blueish, White, Hard, Crystalline STONE, is not of a very fine structure, but firm and close, with a smooth surface. It is generally from three to ten inches in diameter, and of a flattish shape, somewhat

what approaching to roundness. It is of a dull light lead colour on the outside, but when broken is bright and glossy, and the thin pieces are a little transparent. It is very heavy, will take a fine polish, and readily strikes fire with steel. It is very common on the shores of Italy, France, and England.

The Brownish, White, Hard, Shining STONE, is pretty coarse, but very firm, and has a rough irregular surface. It is about six or seven inches in diameter, though sometimes much smaller, and at other times extremely large. It is of a dusky white on the outside, with a small mixture of pale brown; but when broken it is bright and glittering, with an unequal surface. It consists of a grit with blunt angles, together with roundish bright particles, cemented together with a substance nearly as bright. It is sometimes full of black and green specks, of the size of very small grains of sand. It is pretty heavy, and capable of a good polish; but it will not strike fire with steel. It ferments violently with aqua fortis, which discovers its nature, which is that of consisting pretty much of spar. It is found in Derbyshire.

C H A P. XXXII.

Of Common PEBBLE-STONES.

THE Yellowish Green PEBBLE, with a bluish white crust, is of a fine close texture, and the surface, though regular, is a little wrinkled. The shape is roundish or oblong, and the size from one to five inches in diameter. It has commonly a large nucleus in the centre, inclosed in a broad coat, which is covered with a very thin crust. The nucleus is of a greyish yellow, sometimes perfectly blended together, and sometimes irregularly mixed in the form of clouds or large spots. There are often white opaque spots dispersed here and there, and the nucleus approaches to pure flint. The coat next to it is of a bluish white, and of a somewhat coarser texture. The external crust is of a whiter colour, and is of the same substance, only there is a greater mixture of earth. When broken it has a smooth glossy surface, and the nucleus is pretty transparent. It is very hard, will bear a good polish, and strikes fire with steel. It is found in the gravel-pits in Northamptonshire, and sometimes in those near London; however, when found, it is of no value.

The Whitish, Grey, and Reddish Coated PEBBLE, with a yellow centre, is more beautiful than the former, and has a fine close texture, with a pretty even surface, though full of wrinkles. It is of a flattish round shape, and the common size is about three inches in diameter. It is composed of a large nucleus, which is the principal part of the stone, and is of a deep bright yellow, and pretty transparent. It is sometimes marked with roundish white spots, from the bigness of a pin's head to that of a pea, and is surrounded with a coat of a pale greyish white, of a flinty substance, which sometimes receives the matter of the nucleus into itself in the form of clouds, making a broad undulated line. This is generally covered with a red coat, and that with the external crust, which consists of a great quantity of earth. When broken it has a glossy surface, and is hard enough to take a polish. It is very common on Hampstead Heath, and in many other places.

The White, Black, Brown, and Straw-coloured PEBBLE, with a yellow nucleus, is a very beautiful stone, and of a fine texture. It is generally of a roundish or oval shape, and seldom exceeds three inches in diameter. The nucleus is large, and is the principal part of the stone. It is surrounded with several coats, which resemble the zones of the

onyx. The nucleus is very bright, and pretty transparent, and of a deep but not bright yellow. It is sometimes of the same colour throughout, and has clouds of a different yellow and flint colour, also opaque specks of a palish white, and sometimes likewise the centre is transparent crystal. The nucleus is usually surrounded with a narrow black circular line, and is covered with a coat of a paler yellow than the nucleus, and that by another of an opaque white; the next is of a pale brown, besides which there are four or five others of the same colours placed alternately. These are all covered with a bluish crust, but sometimes with a whitish, and always greatly wrinkled. When broken, the surface is glossy and pretty transparent, is very hard, and will bear a good polish. It strikes fire with steel, but will not ferment with aqua fortis. It is common on Hampstead Heath.

The Whitish, Bluish, and Brown PEBBLE, with a dull brown nucleus, has a close firm texture, with an even surface, only it is wrinkled. It is generally of a roundish or oval shape somewhat flattened, and the size is from one to five inches in diameter. The nucleus is pretty large, of a deepish brown, and of a pretty fine texture, but not very transparent or bright. It is commonly surrounded with a broad whitish coat, then with a narrower of the same colour as the nucleus; after that is a third of the same substance with the inner-coat, and these are covered by one of a bluish colour, of a more flinty texture than the other part of the Stone, over which there is a crust like the rest, but more earthy. When broken the surface is very bright and glossy, and as it is pretty hard, it will bear a good polish. It is common on Hampstead Heath, and in the gravel-pits about London.

The PEBBLE, with white and brown coats, and a shining brown nucleus, is a very pure and beautiful Stone, and has a fine close texture, with the common wrinkled surface of other Pebbles. It is generally of a round or oval form a little flattened, and commonly four or five inches in diameter. The nucleus is very large and oblong, and of a deep bright pleasant brown. It is transparent, though sometimes subject to whitish specks. It is surrounded with a coat of a milky white, sometimes mixed with a little pearly blue; and next to that is one of the same colour with the nucleus, only it is not so transparent nor bright. Over this is the crust that covers the whole, and in general it is not inferior to an agate. When broken, it has a bright glossy surface, and where thin is pretty transparent; it is extremely hard, capable of a fine polish, and will strike fire with steel. It is found in gravel-pits, but is not so common as the former.

The PEBBLE, with white, brown and yellow coats, with a small brownish yellow nucleus, has a fine close texture, with the wrinkled surface of other Pebbles. It is commonly roundish or oval, and the common size is about an inch in diameter. The nucleus is about as big as a small nutmeg, and is surrounded by a coat of a dull opaque impure white, and that with one of a pale whitish brown; the next is of a pale red or flesh-colour, and the fourth of a blackish brown. The outer crust is a pale yellow, and as thick as any of the rest. The nucleus is pretty bright, but has little or no transparency; however, this Stone, as well as all others, is subject to some varieties. It is very hard, will bear a fine polish, and readily strikes fire with steel. It is pretty common in the gravel-pits about London, and might be put to good uses by the lapidaries.

The PEBBLE, with greyish white, pale brown, and reddish coats, with a small brown nucleus, is of a very fine close texture, and has the wrinkled surface common to other Pebbles. The shape is roundish or oval, and is commonly four or five

inches in diameter. The nucleus is usually of the size of a nutmeg, and of a deep brown colour. This is covered with a coat of a pale whitish grey, and that by another that is of the like but thinner, and next to these there are generally four or five of the same colour as the nucleus, and others of a very pale whitish brown alternately disposed. It is more transparent than most other Pebbles, and when broken has a flinty surface; it is very hard, will bear a good polish, and strikes fire with steel. It is common in the gravel-pits on Hampstead Heath.

The PEBBLE with yellow, red, and bluish white coats, with a reddish brown nucleus, is of an exceeding fine firm texture, and is not so wrinkled on the surface as most of the other kinds. It is of a roundish flattish shape, and commonly about three inches in diameter; the nucleus is pretty large, of a very fine texture, and pretty bright and transparent. It is of a pale red, and is inclosed in a coat of a fine pearl colour or bluish white, which is pure, bright, and transparent; next to this is a fine red coat, and after that several pearl-coloured and red coats alternately placed; over these there are three or four coats of a pale yellow, and the outer crust is of a pale bluish colour. It is more transparent than most other Pebbles, and when broken has an even surface; it is very hard, will bear the highest polish, and readily strikes fire with steel. It is common in the gravel-pits about Kensington, and many other places. It is in some use with our lapidaries.

The PEBBLE, with white, orange, brown, and dusky yellow coats, and a brown nucleus, is of a very fine close texture, with a wrinkled surface, like the rest of the Pebbles. It is of a roundish or oval shape, and from one to three inches in diameter. The nucleus is small, and the coat that immediately surrounds it is of a clear white. The next to that is orange, and then there are eight or ten of different colours, composed of brown or yellow, after which are colours of a dusky white, with a fine orange colour between them. The whole is very pure, bright and transparent, though it is subject to many variations. When broken it has a fine glossy surface, is extremely hard, and consequently will bear a very fine polish. It is common in the gravel-pits on Hampstead Heath, and in many other places about London.

The PEBBLE, with whitish, brownish, and yellowish coats, and a brown nucleus, is of a more coarse texture, than any of the former, though pretty firm and hard. The surface is more smooth than that of other Pebbles, and is generally pretty round, and between two and three inches in diameter. The nucleus seldom exceeds the size of a horse-bean, and is surrounded by an irregular undulated coat, composed of others that are narrow; next to this are three or four others, which are composed partly of a very deep brown, with some that are yellowish, and others of a dusky pale blue. They have all a mean appearance, and are perfectly opaque. They are very scarce, and are of no value.

The PEBBLE, with yellowish, brown, and ash-coloured coats, and a bluish white large nucleus, is a very beautiful stone, and has a fine firm texture with a wrinkled surface. It is generally roundish, and from one to four inches in diameter. The nucleus is large and very beautiful, and sometimes makes the principal part of the stone. It is of an exceeding fine texture, and very bright and transparent, approaching to a white cornelian. It is of the colour of pearl with a bluish white, which is often debased with clouds, spots, and veins of an opaque white. This is surrounded with a yellowish brown coat that is clear and transparent, and then there is another of a pale ash coloured grey as fine as the former: these are surrounded with the outer crust, which is of a bluish or ash colour; however, the coats and the

stones are met with in different proportions. It is more transparent than any of the rest, is very hard, will take a fine polish, and strike fire with steel. It is common in the gravel-pits on Hampstead Heath, and about Windsor.

The PEBBLE, with flesh coloured, brown, and bluish white coats, and a fine large white nucleus, has a fine, close and firm texture, and the surface has only some slight wrinkles; the shape is roundish or oval, and generally about two or three inches in diameter. The nucleus is oblong, and not so blue as that of the former, but is as fine, bright and transparent. It is encompassed with a great number of coats of a pale brown, bluish white, and a pale white light red placed alternately, and covered with a whitish crust. They seem all to be of an equal degree of brightness and transparency; but it is subject to great variations. It is hard enough to strike fire with steel, and will bear a very fine polish. It is common in the gravel-pits of Hertfordshire, and is used in London to make tops for snuff-boxes.

The PEBBLE, with red, flesh coloured and yellow coats, and a white nucleus, is a fine beautiful Stone, and of a very close texture, with a wrinkled surface like that of other Pebbles. It is generally roundish, though sometimes oblong, and is commonly about three inches in diameter. The nucleus is commonly pretty large and opaque, though of a very fine texture, and is frequently full of coarse roundish white spots. This is commonly encompassed by a thin bright red coat, and that by one of a beautiful bright yellow, next to which there is another of a flesh colour, and then four, five, or six others of the same colours, but not placed in an alternate order. They are all very bright, and more transparent than the nucleus. When broken, the surface is fine and smooth, is very hard, and will take an elegant polish, as well as strike fire with steel. It is common in the gravel-pits on Hampstead Heath.

The PEBBLE, with very thin, numerous, brown and yellow coats, and a greyish white nucleus, is of an exceeding fine close texture, with a surface not so much wrinkled as in other Pebbles. It is generally of a roundish shape, and from one to four inches in diameter. The nucleus is large and of a fine texture, but not quite so transparent as the rest of the Stone. The grey and the white are sometimes distinct, and at others blended together; but is subject to small grey opaque spots. The coats are many in number, but only of a pale brownish yellow and a dusky brown colour placed alternately. They are bright, beautiful, very transparent, and covered with white opaque dull crusts. It has a glossy surface when broken, is very hard, will bear a fine polish, and will strike fire with steel. It is common among gravel in Hertfordshire.

The PEBBLE, with brown, yellow and white coats, and a greyish white nucleus, is of a fine close texture, with a rugged wrinkled surface; is generally oblong and flattish, and from one inch to five in diameter. The nucleus is sometimes no bigger than a horse-bean, though the Pebble be large; and yet it is sometimes an inch broad in smaller. The surface is glossy, but very opaque, encompassed by many fine regular coats of a fine deep brown, a very pale yellow with a little mixture of brown, and a fine white. The brown is next to the nucleus, and the other colours are placed alternately, but tinged more than one at a time. Its surface is glossy when broken, and, as it is very hard, will bear a good polish, and strike fire with steel. It is common on Hampstead Heath, and in the gravel-pits about Islington.

The PEBBLE, with white, grey, and flesh coloured coats, and a very white nucleus, is of an even close

close texture, with a very rough wrinkled surface, and a flat roundish shape, from two to three inches in diameter. The nucleus is of various sizes, from the bigness of a pea to that of a walnut, and is of a fine texture, but opaque and dull, as are all the other colours. It is irregularly surrounded with many coats of different thickneses and different colours. When broken, it has a smooth but not a glossy surface, and is so hard as to be capable of a good polish, and strikes fire with steel. It is common in the gravel-pits about London.

The PEBBLE, with brown, ferruginous, and yellow coats, and a brownish white nucleus, is one of the coarsest of this kind; but the texture is hard and compact, and the surface is not so wrinkled as many others; however, there are several prominences and cavities, which render the shape irregular, though it is generally somewhat oblong. It is from one to four inches in diameter; and the nucleus is sometimes so pale, that it is almost white. It is encompassed with four or five coats, whose colours are very good: that next the nucleus is of a rusty coloured brown; the next to that pale brown; after which is another of a rusty brown, then one of a deep yellow; the next is brown, and then comes the crust, which is of a pale whitish grey. It appears rough when broken, and is so hard as to strike fire with steel. It is not very common, though it has been met with in different places.

The PEBBLE, with brown and grey coats, and a bluish nucleus, is of a very fine firm texture, with a smooth surface, and not so much wrinkled as many others. The shape is oblong, and from one to three inches in diameter. The nucleus is of a pure flinty substance, sometimes of the same uniform colour, but more frequently veined or spotted with a lighter or darker colour of the same kind. This is encompassed with a fine deep brown coat, which is very bright; and that is succeeded by one of an ash colour, as bright as the nucleus. The crust is next to these, which is pretty thick. It has somewhat more of a transparency than most of this kind; and as it is extremely hard, it is capable of a good polish. It is met with in some parts of Hertfordshire.

The PEBBLE, with thick, whitish, and red coats, and a grey nucleus, is of a very fine texture, but the surface is rough, irregular, and deeply wrinkled. Its shape generally tends to roundish, and it is most commonly an inch and a half in diameter. The nucleus is hard, bright, glossy, and transparent; the next coat is usually red, with a little mixture of rusty brown, and is not so transparent as the other parts of the stone; next to this is a coat of a bluish white or pearl colour, very bright; after this comes the crust, which is thick, coarse, of a very bright white, and of a loose stony substance. This is the common appearance of the stone, and sometimes the coats are more numerous. It is very hard, the substance being flinty, and capable of the highest polish. It is not common; but has been found in Northamptonshire, and near Paddington.

The PEBBLE, with white, flesh-colour, and bright red coats, and a bluish white nucleus, is of a fine close even texture, with a very rugged wrinkled surface, and a roundish shape. It is not above two inches in diameter, and the nucleus is surrounded with many white, flesh-coloured, and red crusts, beautifully disposed, but not always alternately; though that next it is generally red, and they all together have a very fine effect. This stone is generally very bright and transparent, and when broken has a smooth glossy surface; it is very hard, and will bear a fine polish. It is very common, on Hampstead Heath.

The PEBBLE, with brown, yellow, and flesh-coloured coats, and a greyish blue nucleus, is of an exceeding fine smooth texture, with a surface a little

wrinkled, and is of a roundish or oblong shape, but a little flatted, and seldom more than three inches in diameter. The nucleus is very beautiful, bright and transparent. It is encompassed with many coats of a pale brown, and a fine red, which sometimes is of a flesh colour, and also of a somewhat dark yellow. It is often debased with small coarse spots, and perhaps more than any other. When broken, it is of a fine glossy surface, is extremely hard, and capable of a very fine polish.

The PEBBLE, with white, yellow, flesh-coloured, and red coats, and a greenish blue nucleus, is undoubtedly the most beautiful of the English Pebbles, for it comes up to the German Agates. The texture is exceeding fine, smooth, and hard, with a surface less wrinkled than most other kinds. The shape is roundish or oblong, and from three to four inches in diameter. The nucleus is pretty large, and sometimes round, but more commonly oval. It is of a very fine texture, with a glossy surface, and in thin pieces quite transparent. It is generally of a deep bluish green, which is sometimes so dark as to appear almost black, and often of a dusky blue: it is likewise sometimes of so bright a green, that it is not inferior to the green jasper. The coats are fine, and beautifully disposed like the zones of an onyx, and are all bright and transparent. Some are of a bright white, others of a fine deep yellow, others of an agreeable pale flesh colour, and others again of a bright deep red. The coats are very thin, and lie evenly throughout the whole substance of the stone; but the flesh colour and white are most commonly near the nucleus, and the yellow towards the surface: however, like most others, it is subject to great varieties. It is more transparent than any other Pebble, and when broken is of a fine even flinty surface, capable of bearing the most perfect polish. It is common in many parts of England, in particular near London in the road to Highgate, and formerly was in great plenty among the gravel in the foot-path from Pancras to Kentish-Town. It is sometimes used by our lapidaries, but not so much as it deserves.

The PEBBLE, with whitish, brown, and yellowish coats, and a flesh coloured nucleus, is of a fine and smooth texture, with a very firm, rough, unequal, thick crust, it being full of prominences and cavities. The shape is very irregular and uncertain, it being ragged and uneven in several parts, and looking more like a flint than a pebble. The size is from an inch to eight in diameter, and the nucleus is pretty large, with a shape like that of the stone itself. It is of an agreeable flesh colour, with a slight tinge of blue, and the coats are not above three or four in number, which are of a fine deep brown, a dusky white, and a pale and darkish yellow. The yellow coat lies next the nucleus, the white next to that, and then the brown; and in some a thick yellow coat lies over these, bounded by a very narrow one of deep brown. The surface is of a pale whitish brown, and extremely coarse, being often half an inch thick. It is pretty transparent, when broken has a fine flinty surface, and is so hard as to bear a very good polish. It may be met with in Yorkshire.

The PEBBLE, with white and brown coats, and a white nucleus, is of a very fine close texture, with a rugged unequal surface, having prominences like warts, with small irregular cavities and deep wrinkles. It is commonly of a roundish, oblong, flattish shape, and from two to three inches in diameter. The nucleus is bright and white, but not very clear; and the number of coats is uncertain, being sometimes three or four, and at other times six or eight; which are all of two colours, a fine deep brown, and a very bright white. The brown parts are very bright and glossy, and pretty transparent; but the white is much

much more opaque. When broken it is bright and smooth, and being extremely hard will bear a pretty fine polish. It is very common in the gravel-pits of Northamptonshire and Leicestershire.

The PEBBLE, with black, white, and flesh-coloured coats, and a red nucleus, is of an exceeding fine close texture, with a smooth even surface, the wrinkles being very superficial. The shape is generally roundish, and seldom exceeds three inches in diameter. The nucleus is encompassed with many thin coats of a fine jet black, a clear white, and a flesh-colour. The black is commonly next to the nucleus, then the flesh-colour, and after that the white; but it is sometimes one, and sometimes the other: the rest follow alternately, though not always. The outermost coat is generally of a flesh-colour, and over that is the crust, which is very thin. The nucleus is of a fine bright transparent red, and equal to many of the best cornelians. The flesh-coloured parts are the most opaque of any in the stone; but the black coats are extremely beautiful, being very bright and glossy, and when thin are pretty transparent. When broken the surface appears to be flinty, it being extremely hard, and capable of an excellent polish. It is not very common; but it has been found on Hampstead Heath, and in the gravel-pits of Northamptonshire.

The PEBBLE, with yellow and greenish white coats, and a yellow nucleus, is of a very fine close texture, with a remarkable smooth surface, it having only a few superficial wrinkles. It is generally pretty round, and between one and three inches in diameter. The nucleus is small, but of a fine texture, a glossy surface, and pretty transparent. It is of the colour of the common yellow cornelian, and encompassed generally with but a small number of coats of two colours, namely, a yellow, a little deeper than the nucleus, and a very pleasant whitish green, of which colour the coat next the nucleus always is, and after that is a yellow, next a green, and so on alternately. The outer coat, on which the thin crust is laid, is sometimes of a pale brownish white, but not always; besides which there are often other varieties. The nucleus and the yellow coats are transparent, and much more so than the green. It is extremely hard, capable of a fine polish, and readily strikes fire with steel, like the rest of this kind. It is very uncommon, but has been seen on the shores of Yorkshire.

The PEBBLE, with purple and pale yellow coats, and a red nucleus, is of a fine firm texture; but the surface is remarkably rough, being full of inequalities, though it has but a few deep wrinkles. The shape is irregular, and the size various, some being less than an inch, and others four inches in diameter. The nucleus is also irregular, and of a strong deep red, though pretty bright and glossy, but with little transparency. It is surrounded by two or three coats of a fine pale yellow, and a purplish black colour; which last, held up to the light, appear of a fine deep purple. All parts of the stone are bright and glossy, but those that are yellow are most transparent, and there is generally a yellow coat next the nucleus: those that follow are commonly placed alternately, and are pretty thick; there is likewise a yellow one next the outward crust, which is white within, and yellowish on the surface. This stone is always exceeding hard, and when cut into plates is very transparent. It is very uncommon; but some have been found on the shores of Sussex, and in the gravel-pits about Oxford.

The PEBBLE, with grey and pale red coats, and a yellow nucleus, is pretty fine and firm, with a smooth even surface, only there are superficial wrinkles. It is generally roundish, and from one to six inches in diameter. The nucleus is of a dusky yellow, and commonly about the size of a hazle nut.

It is opaque, has a curdled look, and is surrounded by several coats of a pale red, placed alternately with some that are thicker, of a pale ash-colour or bluish grey, not unlike some of the paler flints. The pale red or flesh-colour is made so by a mixture of grey, and the outermost coat is usually of this last colour, over which there is a pale bluish grey crust. This is coarse in comparison with one of the former, though it is pretty hard, and takes a tolerable polish. It is found in great plenty on the shores of Yorkshire, and sometimes in the gravel-pits about London.

The PEBBLE, with red, purple, bluish, and brown coats, and a pale grey nucleus, is not of so fine a texture as any of the rest, though it is pretty smooth, and very firm, with a surface furrowed with deep wrinkles. It is commonly of a roundish shape, and about four inches in diameter. The nucleus is of a pale grey, or whitish ash colour, encompassed with a great number of thin coats of several colours, as a deep red, a bright purple, a greyish blue, and a glossy brown; these last are more transparent than any of the rest: but these, upon the account of their coarseness, have but a dull look, which renders the stone less beautiful. The coat next the stone is of a red colour, and thickish, but not clear or bright; next this is one of brown, but the rest of the coats are disposed without any regularity, though they are very prettily variegated. The outer coat is generally of a bluish grey, and thicker than the rest; but the crust is commonly very thin and whitish. It has a smooth flinty surface when broken, and is so hard as to take an even polish. It is not common, though it has been sometimes met with in Hertfordshire.

The PEBBLE, with black and white coats, and a black nucleus, is of an exceeding fine close texture, with a rough surface, generally full of deep wrinkles and protuberances, of the size of a horse-bean. It is of a flattish round shape, and commonly four or five inches in diameter; the nucleus is pretty large, and of a fine glossy black. The coats are of a pearl colour, and black like the nucleus, and placed alternately; but the whitest are the thinnest, and the outermost is always black, and thinner than the rest. The crust that covers the whole is generally very thick, and seems to be of a coarse chalky substance. It is more transparent than any of the former, it being extremely hard, and when broken has a fine glossy surface. It will bear a very good polish, and like the rest strikes fire with steel, but will not ferment with aqua fortis any more than they. It is pretty common on the Sussex and Yorkshire shores. It is sometimes made into seals and other toys, and looks like an oriental stone.

The PEBBLE, with brown and greyish black coats, and a yellowish brown nucleus, has a pretty fine firm texture, though the surface is rough and unequal, and deeply wrinkled. It is commonly of a flattish round shape, and from two to six inches in diameter. The nucleus is large, and of a brownish yellow, or tawny, surrounded with a few thick coats, some of which are of a greyish black, and others of a pretty clear brown. The nucleus is generally surrounded with a pale grey coat, after which the brown and darker grey are placed alternately. The outermost coat is always brown, though but thin, and the crust that covers it is thin and bluish, but of a much paler colour on the protuberances, than on the other parts. It is not very transparent, but has a glossy surface when broken, and is so very hard as to be capable of a good polish. It is to be met with in the gravel-pits of Hertfordshire, Buckinghamshire, and Northamptonshire.

The PEBBLE, with white and greenish coats, and a pale grey nucleus, is of a pretty fine texture, and very firm, with a smooth surface, without many wrinkles.

wrinkles. It is almost always round, and is from one to three inches in diameter. The nucleus is small and round, and encompassed with coats of two colours, some of which are entirely white, and others of a faint greyish green; but a white coat is generally next the nucleus. Sometimes these colours are blended with each other, and have undulated edges running through one another, to the succeeding coat; the outermost coat is of a paler or greyer green than the rest, and but thin, as well as the crust that lies over it, which is of a pale bluish ash colour. It is but little transparent, though it breaks with an even surface; however, it is so hard as to bear a pretty good polish. It is found on the shores of the river Thames, and sometimes in the gravel-pits about Islington.

The PEBBLE, with yellowish brown and black crusts, with a brownish white nucleus, is the Egyptian Pebble of the lapidaries. It has an exceeding fine close texture, and the surface is not so wrinkled as many of our Pebbles. It is commonly of an oblong shape, though sometimes very irregular; it is of various sizes, but the most common seems to be about four or five inches long. The nucleus is of a very irregular shape, and of different sizes, but is always of a pale whitish brown, and sometimes with veins or spots of a dusky colour. It is also often variegated with the colours of black trees, shrubs and mosses. When it is large, it spreads itself so much as to have some resemblance to a beast or fish, or at least some of their parts; likewise some have had the distinct representation of a human face. The nucleus is commonly surrounded with a pretty thick crust, of a pale brownish yellow, and that by one of black; these are encompassed with others which are many in number, partly black, and partly of a deeper or paler yellow. Every part is much of the same degree of purity; but, if any, the black is finer than the rest. It is met with in Egypt, Arabia, and some of the islands of the Archipelago. There is a species of this kind in Germany, and some parts of Suffex, but they are not so fine as the Egyptian.

The PEBBLE, with yellow and pale brown coats, and a deep green nucleus, is very beautifully variegated, but is not so pure as some of the former, and is of a pretty coarse, rough, unequal texture, though it is tolerably firm, and has a smooth surface, with very few wrinkles. It is generally roundish, and from one to five inches in diameter. The nucleus is large, and of a dark dusky green, surrounded by a number of crusts in different tones, which are also different in their thicknesses. Some are of a deep yellow, and others of a pale whitish brown, disposed alternately; but one that is whitish, or very pale, usually surrounds the nucleus, and the outer coat is commonly yellow, and pretty thick; the crust is always whitish, and has a chalky look, but not very thick. The surface when broken is not very smooth, and yet is so hard as to bear a good polish. It has been found on Hampstead Heath, and about Kennington.

C H A P. XXXIII.

Of SANDS and GRITS.

FINE Shining White SAND is generally made use of to dry up the wetness of the ink in writing, lest it should blot, and for this reason is almost universally known. It is pretty fine, and is generally found very pure, and of a pretty fine white. It has some brightness, and, if it be very good, is a little sparkling, and the particles seem to be much of a size. It feels a little rough between the fingers, and settles very quick when mixed with water; but

viewed through a microscope the particles appear to be of very different sizes and shapes, though they are all somewhat angular. They are all white, and though some are opaque, many are as transparent as crystal glass. It makes no fermentation with aqua fortis, nor yet any of the rest, and therefore this circumstance needs not be repeated. It is found in many parts of England, in strata of great depth; but as there are some of yellow sand lying near it, it is no great wonder it should be sometimes mixed therewith. It is of great use in making glass, but not so good as that with flint; however, it does not require so laborious a process. Sands in general will serve for the same purpose, and they are made use of in some counties to manure stiff clay lands; for though they are barren of themselves, the lands are rendered fertile by their mixture, because they are thereby made more susceptible of water, which otherwise would not penetrate stiff clay. This likewise is the principal part which bestows firmness to bricks, tiles and stone. It is also of great use in making mortar, which commonly unites the joints of bricks and stones, and renders them immoveable. Likewise Sand mixed with mud or clay will make a sort of mortar, but less durable, though often used in the country for the walls of cottages. It is also Sand that gives a consistence to potters clay; for otherwise it would crack when wrought into vessels, and consequently fall in pieces, or at least the vessels would be useless. It sometimes serves for polishing the hardest bodies, and for cleaning those that are tarnished.

The Large Shining White SAND is coarse, with respect to the former, though it is generally very pure. It is of a pretty good white, with some brightness and sparkling, and seems to consist of regular uniform particles, which are harsh and rough to the touch. When mixed with water it settles immediately, leaving no foulness behind it. All the particles are of a somewhat oblong and irregularly angular shape, and when viewed through a microscope, the surfaces appear to be smooth, and as transparent as white glass. It is of great value among those that make glass, and is commonly brought out of Kent to London.

Fine White very Shining SAND is the best of all of that colour, it being perfectly pure, pretty heavy, and of a pure white, and is very remarkable for its lustre. It is composed of very uniform particles with even surfaces, and is extremely hard. When thrown into water it sinks immediately, without leaving foulness behind it. When viewed through a microscope, the particles appear to be a little oblong, and of irregular angular shape, with a fine clear water, it being little inferior to the purest crystal; and indeed this and the two former are entirely of that substance, except, as some suppose, there is a small mixture of white earth. It is found on the shores of most of the rivers in Italy, and is of great value in glass-making.

Fine brownish white dull SAND is pretty heavy, but does not shine to the naked eye, for it appears rather like a heap of fine dust. The particles seem to be very regular and uniform, with regard to their size and shape; however, when it is mixed with water it does not subside with such speed as the former, and leaves a whitish muddiness behind it. When viewed by a microscope, the particles appear to be of different shapes and sizes, but chiefly roundish, some of them having rough surfaces, and others flattish; but they are all more or less transparent. It is found in Suffex and Kent, but is not made use of for glass, because better sorts are plenty.

Yellowish White Fine Dull SAND is pure, and pretty heavy; but has no brightness. The particles are very small, and seemingly very uniform and regular:

regular: to the touch it seems to be softer and finer than most other sands, and yet mixed with water it soon subsides to the bottom, but leaves a yellowish muddiness behind it. When viewed through a microscope, the particles appear to be of irregular shapes, though they have somewhat of a roundness, and the surfaces of many are rough; they are transparent in different degrees, and the colour is not quite the same in all, for some are almost without any. It is met with in all parts of the world.

Reddish White very Fine Dull SAND, is pretty heavy, and of a whitish colour, tinged with a little flesh-colour. It has not the least brightness, and the particles seem to be all of a size, though they are exceeding small, and feel harsh to the touch. Shaken together with water, it subsides very slowly, but when thoroughly settled it leaves no muddiness behind; however, when viewed through a microscope, the particles appear to be of different shapes and sizes, some of them being at least twenty times smaller than the rest. They are all more or less transparent, and some of them are perfectly so. There are some of this sort in England, particularly in Suffex.

Large Brownish White Shining SAND contains a mixture of coloured particles, and is coarse, heavy, and of a colour which seem to be made up of a mixture of brownish, yellowish and whitish, with a faint reddishness. It is very bright, and its particles, though of different colours, seem to be much of a size to the naked eye. When shook with water it immediately settles, without leaving any foulness. When viewed through a microscope, the particles still appear to be much of a size, and of an oblong shape with angular edges; but there are some that are roundish, and of a fine clear yellow; some dusky, but very beautiful, and some of a pale flesh-colour. The white particles are perfectly transparent, but the reddish are almost opaque. It is found at Hedgerly near Windsor, where it lies among loam.

Large Yellowish White Shining SAND consists of pretty large coarse particles, which are very heavy, though somewhat less than the former. It is very clean, and remarkably bright and shining, and feels very harsh between the fingers; when mixed with water it subsides immediately, without leaving any muddiness. When the particles are viewed through a microscope, they appear to be of all shapes and figures, though in general they have a tendency to roundness; but they are much of the same size. They are generally transparent, and are chiefly white, mixed with some of a pale yellow or lemon colour. It is found all over England, and particularly near Deptford, Highgate and Hampstead.

Large, Coarse, Shining, Variegated SAND, is a very common sort, and is a beautiful Sand, though not pure. It differs in its coarseness and fineness, and in the different shapes of the particles. It is pretty heavy, and of a transparent white colour, variegated with black, red and brown, and of a chalky white, as also with different shades of yellow. The white particles, which are much the most numerous, have a considerable brightness, and feels very hard, though not so rough as some others. When viewed through a microscope, it appears to be mixed with small pebbles, that are opaque and of different colours, besides fragments of larger pebbles and flints, with many pieces of the white opaque crusts of flints. It is sometimes found in strata by itself, and at other times mixed with gravel. That on the sea shore is always clean and bright, and mixed with fragments of shells; in this last case it will ferment with aqua fortis, which is owing to the shells mixed therewith.

Fine, Dull, Brownish, White SAND, with heterogeneous particles, is of a dead disagreeable colour; but is pretty fine, though not so heavy as many other

Sands. There is little or no brightness, excepting a very few white glittering particles, which are here and there interspersed, and which are certainly of a different nature from the other particles. The principal part seem to be pretty uniform with regard to their size, and the whole does not appear so harsh as other Sands; when shook together in water it subsides but slowly, and leaves a brownish foulness behind it. The shining particles, when examined by a microscope, appear to be fragments of talc, for they will not ferment with aqua fortis. It is common almost every where, and is mixed with lime and hair to make mortar for plastering walls and ceilings.

Fine, Dull, Greenish White SAND, with heterogeneous particles, is pretty fine, though it has a dirty look, and the heterogeneous particles are not many. It is very heavy, is of a deep brownish white, with a sort of a greenish cast, and does not at all glitter except where the heterogeneous particles lie, which are certainly of a talcky nature. The other particles are not all of the same size, and the whole feels hard and harsh between the fingers; when mixed with and shook up with water it settles but slowly, and leaves a whitish brown muddiness. When examined by a microscope, it appears to consist of particles of all shapes and sizes, but mostly with smooth surfaces, and of a different colour. They are generally transparent and of a glossy white; but there are many of a sort of greenish brown, and not so transparent. It is common near Deptford, Black Heath and Woolwich. This is pretty much used for the making of green glass.

Fine Glittering Greyish White SAND, with heterogeneous particles, owes its brightness to the great quantity of talc it contains; for the sandy particles are small and fine, and seem to have little or no transparency. It is pretty heavy, and the particles are irregular in their sizes, but all of them small. The talc also is of different sizes, but larger than the sand, though at the same time very thin. It feels hard and harsh between the fingers, and when it has been mixed with water and shook up, it subsides in a short time, and leaves the water clear. When examined by a microscope, the particles seem to be of three different kinds; for besides the talc, there are some that have a glossy appearance, and a few that consist of an opaque spar; for which reason it will ferment a little with aqua fortis. It is found on the shores of the islands of Scilly.

Large Shining Red SAND consists of coarse heavy particles, and is of a strong red, approaching to a deep orange colour. It is not quite so bright as some of the white sands, but the particles which compose it seem to be pretty much of the same size, though of various shapes, with a tendency to roundness. It feels extremely hard and harsh, and when mixed with water subsides immediately, leaving it clear. It is a foreign sand.

Large Shining Flesh-coloured SAND is pretty coarse, very heavy, and is of a bright agreeable pale red, or rather of a flesh-colour. It is remarkably bright and sparkling, and the particles appear to be pretty much of the same size, though not all exactly of the same colour. It feels very harsh and rough, and when mixed with water subsides immediately, leaving no foulness behind. When examined with a microscope, some have glossy surfaces, others are quite transparent, and others again entirely opaque; many are semi-transparent; and, with regard to the colours, some are white, others yellow, and others of a pale red. It is common near Naples.

Coarse Shining Brownish SAND, with a reddish cast, consists of large but pure particles which are very heavy, and seemingly roundish. It is remarkably bright and sparkling, and the particles are of very different sizes. It is no wonder it is very rough to the touch, nor that it subsides immediately in

water. It is common on the heaths of Suffex and Buckinghamshire.

Fine, Bright, Shining, Brownish Red SAND, is very heavy, and the brown colour is more predominant than the red. The particles seem to be nearly of the same size and shape, and it feels harsh to the touch; when mixed with water it sinks pretty soon, and leaves a whitish muddiness behind it. It is met with in many parts of England, and particularly on Hampstead Heath.

Very Fine, Pale, Shining, Brownish Red SAND, is not of an agreeable colour, but is pure, though not so heavy as many other Sands. It is pretty hard to the touch, and subsides but slowly in water, leaving a reddish brown muddiness behind it. It is common on the heaths of Suffex.

Very Fine Pale Red SAND, with heterogeneous particles, is heavy, and of a very pleasant colour, which consists of a mixture of white, pale brown, and pale red. It glitters pretty much, and is composed of small uniform particles, with a slight mixture of talc. It is harsh to the touch, and when mixed with water settles but slowly. When examined by a microscope, the particles appear to be roundish and quite transparent. In the fire it loses all its redness, which is a circumstance not very common.

The Fine Palish Brown Yellow SAND makes but a dull appearance, though it is pure, fine, and pretty heavy. The colour seems to be made up of white, pale brown, and pale yellow, which are all very dull. The particles are of different sizes, and so small that they seem soft to the touch, and settle very slowly in water, leaving a whitish muddiness. When examined with a microscope, some of the particles appear to be perfectly transparent, and others almost opaque. It is very common all over the kingdom.

The Fine Shining Pale Yellow SAND, is pretty heavy, and of a fine colour, made up of white, yellow, and reddish brown. It is bright and shining, and the particles seem to be tolerably uniform. It is rough to the touch, and settles but slowly in water, leaving a yellowish muddiness behind it. When examined by a microscope, the particles are found to have different degrees of transparency, and those that are angular are as clear as crystal. It is found about Hampstead and Highgate.

The very Fine, Shining, Pale Yellow SAND, is considerably heavy, and there is no mixture of any other colours with the yellow. It is also very clean, with uniform particles, which shine pretty much. It is harsh to the touch, and when mixed with water quickly subsides, and leaves it clear. It is found in Kent and Suffex, and other parts of England.

The Fine, Shining, Gold-coloured SAND, is very pure, and heavy, and is of a fine bright yellow resembling the colour of gold. It glitters pretty much, and seems to consist of uniform particles. It is harsh to the touch, and settles immediately in water, leaving it clear. It is common on Hampstead Heath, and in most other parts of the kingdom.

The very Coarse, Shining, Pale Yellow SAND, consists of very large heavy particles, and is generally pure, with an uniform colour. It glitters very much, but the particles are irregular with regard to their size. It is very rough to the touch, and subsides in water immediately. This is commonly called Scouring Sand, and is used by stone-cutters in cutting their hard stones: it also serves to polish those that are designed for the more curious sorts of pavements. It is common in most parts of the kingdom, and particularly may be met with at Hampstead and Highgate.

The very Coarse, Dull, Whitish Yellow SAND, is generally found among gravel, and is remarkable for its coarseness. It seems to have no brightness,

unless viewed very nearly, and its particles are of very different sizes. It is common about London, and in most other parts of the kingdom.

The Large Shining Yellow SAND, is also common among gravel, and is quite pure, though coarse and heavy. It shines pretty much, and the particles are tolerably regular with regard to size. It is extremely coarse to the touch, and when mixed with water settles immediately, leaving it clear. When viewed through a microscope, it seems to consist of particles like small pebbles, with pretty smooth surfaces. It is common about London and other places.

The very Coarse Bright Yellow SAND, is always found at considerable depths, and is perfectly pure, though remarkably coarse and rough. The particles are heavy and regular in their size, and perhaps it feels the roughest of all Sands; when mixed with water, it settles immediately, leaving it clear. Viewed through a microscope, it appears to consist of large crystalline particles of an amber colour, and of the shape of pebbles. It is found in Northamptonshire, and other places, under the strata of gravel.

The Large Dull Yellow SAND, is of a disagreeable colour, though generally pure. It is considerably coarse, very heavy, and of a little deeper yellow than the former, but is very far from being so bright. The particles are of a very irregular size, and though considerably hard they do not seem so harsh as any of the former. When mixed with water they quickly subside, leaving a little yellow muddiness. When viewed by a microscope, the particles seem to resemble pebbles; but many of their surfaces are very unequal and somewhat flattish, and others crooked. It is a common Sand, and is found not only in pits, but on the shores of the English rivers. It is used by the plumbers in London as a bed whereon to cast their sheet lead, and is generally brought from Hackney river. It is also used by stone-cutters, in sawing their marble.

The Fine Dull Deep Yellow SAND, is pretty fine, though the particles are of different sizes. It is lighter than most other Sands, and the deep yellow colour is entirely without brightness. It is soft to the touch, and when mixed with water subsides very slowly, leaving a yellow muddiness behind it. When viewed through a microscope, the particles seem to be of the shape of common pebbles, with very irregular surfaces; they are pretty transparent, and of an amber colour. Some of the particles are so small, that they appear like dust sticking to the surfaces of the rest. It is common in Wiltshire, and is found in other parts of England.

The Very Large Dull Saffron-coloured SAND, is very pure, hard, coarse, pretty heavy, and of a deep strong bright yellow. The particles are not all of the same size; it is hard and rough to the touch; and when mixed with water subsides immediately, leaving it clear. It is found on the Gold Coast of Guinea in Africa.

The Coarse, Shining, Dirty, Yellow SAND, is very pure, large, heavy, and of a deep dusky yellow. The particles glitter pretty much, and seem to be regular and uniform, with regard to their size. It is harsh and rough to the touch, and when mixed with water quickly settles, leaving it clear. When viewed by a microscope, the particles appear in the shape of pebbles, and are pretty transparent, though of different degrees of yellow. It is common on Hampstead Heath, and many other parts of the kingdom.

The Very Coarse Brownish Yellow SAND, is very large, harsh, and considerably heavy; the colour is of a deep, dusky, brownish yellow, but very bright and sparkling. The particles, with regard to size and shape, are very regular, and exceeding harsh to the touch; when mixed with water it soon subsides, and

and leaves a brownish yellow muddiness. When viewed through a microscope, the particles appear to be uniform, and in the shape of pebbles, with very uneven surfaces, but pretty bright and transparent. It is common among the gravel in many parts of England.

The Fine Greenish Yellow Pale Dull SAND is of a faint straw colour, with a mixture of green particles, which are generally the largest. The sizes are very irregular, and it is soft to the touch; when mixed with water, it subsides slowly, and leaves a white muddiness therein. When viewed through a microscope, the particles appear to be different in shape, size and colour, and the greatest part have uneven surfaces. Some are of the colour of sulphur, others without any colour at all, both of which are very transparent; but the largest are in shape like common pebbles, without much transparency, and of a deep dusky green. It is found on Hampstead Heath, and many other places.

The Fine Greenish Red Pale Dull SAND, in many respects, resembles the former; but it is considerably lighter than most others, and of a pale yellowish flesh colour, with a mixture of green specks. The particles are of different sizes and shapes, those that are green being considerably larger than the rest, and it is hard and rough to the touch. When mixed with water it subsides but slowly, and leaves a yellowish brown muddiness therein. It is common in Suffex.

The Very Coarse Shining Blackish Yellow SAND is large, considerably heavy, and of a deep yellow, but mixed with black particles. It is very bright and shining for one of this kind, and the particles are nearly of the same size, only those that are black are a little smaller than the rest. It is remarkably rough, and harsh to the touch, and when mixed with water settles immediately, leaving it extremely clear. When viewed by a microscope, the particles appear in the shape of common pebbles, and are very bright and transparent, except the black, which are almost opaque. It is common in sand-pits.

The Fine, Shining, Blackish, Straw-coloured SAND, is neither large nor heavy, and the straw-coloured particles are mixed with those that are black. It is very bright and shining, considering the smallness of its particles; but these are of different sizes, and those that are black are somewhat larger than most of the rest. It is hard to the touch, but not very rough, and when thrown into water subsides very soon, leaving a little brownish muddiness therein. When viewed through a microscope, the particles appear to be of an oblong, blunt, angular shape, and are all very transparent and bright; and even the black particles, which are not very numerous, have some degree of transparency; but they are of a roundish shape, with smooth surfaces. It is common in Suffex, and may be met with in many other places.

The Shining, Coarse, Blackish, Sulphur-coloured SAND, is hard, heavy, and of a fine brimstone colour, with a considerable mixture of black. The particles are bright and shining, but irregular with regard to size, and are very harsh and rough to the touch; being mixed with water, it subsides immediately, leaving it clear. When viewed with a microscope, the particles appear to be in the shape of pebbles, but are very transparent, and the black seems to be nothing else but fragments of dark coloured flints. It is common in the sand-pits on Hampstead Heath.

The Shining Fine SAND, of a rusty yellow colour, is very heavy, and of a deep dusky yellowish brown, with a mixture of white particles, and others that have no colour at all. The brightness is owing to the last mentioned particles, for those that

are yellow and brown are entirely dull. They are all very irregular, with regard to their size and shape, and are very harsh to the touch: being mixed with water, they subside very soon, and leave a muddiness therein, as if mixed with ochre. When viewed through a microscope, they all appear to be somewhat angular, and the greatest part are of the colour of rusty iron, and entirely opaque.

The Finest Brown Yellow SAND, with heterogeneous particles, is light, and of a pale brownish yellow, with small spangles of talc, which are not very numerous; is sharp and harsh to the touch, and when mixed with water subsides slowly, but leaves it clear. When viewed with a microscope, the particles appear to be roundish, with unequal surfaces nearly of the same size, and very bright and transparent. The spangles appear to be thin flakes of fine talc, having the appearance of silver. It is common in the sand-pits on Hampstead Heath.

The Very Fine Yellowish Flesh-coloured SAND is very heavy, and the colour seems to be made up of a pale yellow, and a very pale red: when mixed with a great number of small glittering particles, those that are sandy have also some brightness, and are pretty uniform with regard to size; when mixed with water, it subsides very slowly, leaving a yellowish muddiness therein. When viewed with a microscope, the particles appear to be pretty much of the same size and shape, but of different degrees of transparency; some are reddish, others yellowish, and some transparent; they are of the shape of common pebbles, and the yellow much more bright and transparent than the red. The spangles are exceeding small, and appear to be thin flakes of talc. It is common in America, and is to be met with in some parts of England.

The Coarse Straw-coloured SAND, with heterogeneous particles, is very heavy, and of a pleasant pale yellow, with a considerable brightness, and pretty large white spangles. It looks very clear, and consists of regular particles, with regard to the size. It is sharp to the touch, and, when mixed with water, it subsides immediately, leaving it clear. When viewed through a microscope, the particles appear to be roundish, very bright and transparent, and the spangles are pretty large thick flakes of talc. It is common in the sand-pits about London.

The Coarse Sulphur-coloured SAND, with heterogeneous particles, is pretty heavy, and of a fine pale colour, somewhat between sulphur and saffron; it abounds with a great number of flat glittering spangles, which are broader than the other particles. It is harsh and rough to the touch, and when mixed with water subsides immediately, leaving it clear. When viewed through a microscope, the particles appear to be irregular in their size and shape, and many of them are not very transparent, though most of them are very bright. The shape is like that of common pebbles, and the spangles appear to be fine thin flakes of talc. It is common in Italy, and may be met with in Suffex.

The very Coarse, extremely Shining Yellow SAND, with heterogeneous particles, is very heavy, and of a fine yellow, though a little deeper than the ordinary pale gold colour. It glitters very much, and has also a great number of glittering spangles. The particles are regular and uniform, with regard to size, and it is rough to the touch; being shook in water it subsides in a moment, and yet leaves a little yellow muddiness therein. When viewed through a microscope, the particles appear to be very like small pebbles, and are all pretty transparent. The spangles are pretty numerous, but more white and less transparent than in many other of these Sands, because they are more thick. It may be met with on Hampstead Heath, and in many other parts of the kingdom.

The Fine Dusky Yellow SAND, with heterogeneous particles, is not heavy, and somewhat of a brownish yellow. It has a very dull look; but is mixed with glittering spangles, and the particles are very irregular with regard to their size; however, the spangles are very few, upon which account it has a more dead look than many others. It is soft to the touch, and subsides but slowly in water, leaving a yellow foulness therein. When viewed through a microscope, the particles appear to be of various sizes, with unequal surfaces, resembling small pebbles. The spangles consist of very thin talc. It is common in the sand-pits about London, as well as in many other places, and is generally mixed with ochreous clay, unless when found on the shores of rivers.

The Large SAND, of a yellow gold colour, with heterogeneous particles, is hard, coarse, and pretty heavy, and of a deep yellow colour, between saffron and gold. The particles are pretty bright and shining, but irregular, with regard to their size, and the white spangles which are large and bright are but few. It is harsh and rough to the touch, and subsides immediately in water, leaving a little yellow foulness therein. When viewed through a microscope, the particles appear in the shape of pebbles; are very transparent, and of a fine yellow: the spangles consist of flat fragments of selenites. It has been met with in Northamptonshire, Kent, and Suffex.

The very Coarse Saffron-coloured SAND, with heterogeneous particles, is pretty heavy, and of a fine strong saffron colour, or rather of a deep reddish yellow. The particles themselves are without brightness, but it is full of glittering spangles of talc. The particles are very irregular with regard to size, and they are pretty harsh to the touch; when mixed with water, they settle very slowly, leaving a yellow foulness therein. It is common in Germany, and has been found in Suffex and Leicestershire.

The very Fine Dusky Saffron-coloured SAND, with heterogeneous particles, is not heavy; the colour is a dusky brownish yellow, with somewhat of a brightness; but the numerous spangles of talc make it appear greatly so. The particles are pretty regular, with regard to size, and the spangles are but little broader than they. It is harsh to the touch, settles slowly in water, and leaves a brownish muddiness therein. When viewed through a microscope, the particles appear to be small, and in the shape of pebbles, but not very transparent; the spangles appear to be thin flakes of talc. It is common in the sand-pits about Highgate and Hampstead, and in other parts of the kingdom.

The very Fine Brown Dull SAND consists of fine particles, which are not very heavy nor bright, inasmuch that they appear like a heap of dust; however, they are pretty regular and uniform, with regard to size, and are harsh to the touch; in water it subsides but slowly, and leaves a muddiness therein. Through a microscope, the particles resemble small pebbles with unequal surfaces, and are pretty transparent, but not bright. It is met with in the sand-pits about Woolwich and Blackheath.

The very Coarse Shining Pale Brown SAND is one of the coarsest that is met with in this kingdom, though it is not remarkably heavy. The particles are pretty bright and sparkling, and regular with regard to size. It is very coarse and harsh to the touch, and mixed with water subsides immediately, leaving it clear. It is common about Woolwich.

The very Coarse Shining Dusky Purple SAND is very large and heavy, and of a deep purplish brown or chocolate colour, interspersed with white. The brightness is in a great measure owing to the white particles, and it is very rough to the touch; when

mixed with water it subsides almost immediately, leaving a somewhat yellow muddiness therein; through a microscope, the particles appear to be much of the same size and shape, being roundish. They are of two different colours, namely, chocolate colour, and white, which last are always smooth, and the former rough. It is to be met with near the Hot-Well at Bristol.

The Dull Brown Coarse SAND, with heterogeneous particles, is pretty heavy and of a pale brown, but very dull. The particles are irregular with regard to size and colour, some being much browner and coarser than the rest. When mixed with water, it subsides immediately, leaving it clear. When viewed through a microscope, the particles appear of different shapes and sizes, but chiefly like pebbles, and pretty bright and transparent. There are flatish fragments among them, which seem to be a sort of flint of different shapes, and there are others which are fragments of spar, upon which account it will ferment with aqua fortis. It is met with near Oxford.

The very Coarse Shining Pale Brown SAND, with heterogeneous particles, is large, pretty heavy, and of a faint pale brown colour; the particles are bright and pretty uniform, with regard to size. It is harsh to the touch, and mixed with water subsides immediately, leaving it clear. When viewed through a microscope, the particles appear to be of different shapes and colours, some being opaque and bluish, others transparent and inclining to yellow; but the greatest number are in the shape of pebbles with smooth surfaces, and of different degrees of a pale brown. Also there are many fragments of white brown transparent spar, upon which account it will ferment a little with aqua fortis.

Small Shining Greyish Black SAND is perfectly pure, and considerably fine and heavy; the colour is of a bright greyish black, and has a very agreeable look, the particles being uniform, both with regard to shape and size, and of a considerable brightness. It is harsh to the touch, and when mixed with water settles but slowly, though it does not leave the least foulness therein. When viewed through a microscope, it seems to be very bright and quite transparent, the particles appearing to be of an obtusely angular figure, and without any manner of colour. It is brought from Italy, where it is common.

The Fine very Shining Reddish Black SAND is clean, heavy and variegated with pale red, flesh-colour and white. The brightness is inherent in the particles it consists of, which are nearly of the same size, though different in shape, those that are black appearing roundish, and the others flat. It is sharp and harsh to the touch, and when mixed with water settles immediately, leaving it very clear. Viewed through a microscope, the particles appear like different gems; those that are black are almost opaque, with smooth surfaces and pretty round, but the others are all very bright and quite transparent, some being roundish and others flat. It has been hitherto found only in America, on the sides of hills and the shores of rivers.

The Coarse Dusky Green SAND, variegated with white, is pretty heavy, and of a deep dull green, with a considerable number of white particles. They are all nearly of the same size, but of different shapes. It is commonly harsh to the touch, and when mixed with water settles immediately, leaving it entirely clear. Viewed through a microscope, the white particles appear to be of two sorts, some of which are half transparent and cloudy, with obtuse angles, and others have sharper ridges, but are bright and quite without colour, besides which there are a few tinged with a faint yellow. The green particles, which are most numerous, are of a deep yellowish green, and

and of various shapes. It is brought from Virginia, where it is common.

The Fine Snow-white Stony GRIT is a perfectly pure and homogeneous substance, and small in proportion to its weight. Its particles are very bright and sparkling, and very regular in the size. It is harsh to the touch, subsides immediately in water, and leaves it quite clear. It ferments violently with aqua fortis; for which reason it seems to be composed of a very fine spar. It has been found in Mendip Hills in Somersetshire, in the perpendicular fissures of the strata of stone.

The Dull, Coarse, White, Stony GRIT, is much inferior to the former; for though it is perfectly pure, it is very hard and coarse. The colour is dull, there being little or no brightness; but the particles are very regular, with regard to their size. It is harsh to the touch, and in water subsides immediately, leaving it of a sort of milky colour. This also ferments briskly with aqua fortis, and therefore must consist of spar. It is met with in the same places as the former.

The Fine Cream-coloured Stony GRIT is pale, very heavy, and of a yellowish white or cream colour. It is very bright and sparkling, and consists of particles that are irregular with regard to size. It is harsh to the touch, and in water subsides immediately, leaving it a little milky. Viewed through a microscope, the particles appear to be of different shapes and sizes. They are all pretty transparent and bright, and seem to be without any colour. It consists of spar, for it will ferment violently with aqua fortis. It is found in one of the islands of the Archipelago.

The very Coarse Bright White Stony GRIT is very impure, and consists of two sorts of particles. It is very heavy, and of a dusky white colour, which however glitters in some places. The particles are all large, but very different in size, shape and colour. It is hard and harsh to the touch, and in water leaves a little milky foulness. Viewed through a microscope, it appears to be composed of a confused mixture of crystalline and sparry particles. It ferments strongly with aqua fortis, and a thin stratum of it has been found near Loughborough in Leicestershire.

The Very Coarse, White, Stony GRIT, with heterogeneous particles, is considerably heavy, and of a pure white, with black, yellow, and white flakes of talc. It is harsh and gritty to the touch, and subsides immediately in water, leaving a little whiteness therein. When viewed through a microscope, it appears to consist of large irregular particles, pretty transparent, and very white. The particles of talc have all very glossy surfaces, though of different kinds; but will not ferment with aqua fortis. It is common in Wales on the sea shore under cliffs.

The Dull, White, Fine, Stony GRIT is heavy, and of a dull whitish colour, with particles that appear to be much of the same size. It is rough to the touch, subsides quickly in water, and leaves a foulness therein. Viewed through a microscope, it appears to consist of opaque particles with rough surfaces, and of no certain shape. Among these there are a few loose specks, with surfaces as bright as crystal. It ferments violently with aqua fortis, and is entirely white when burnt. It is common in Derbyshire, and other places, where there are strata of stone.

The Dull, White, Coarse, Stony GRIT, is hard, pretty heavy, and void of brightness, and the particles are of different sizes and shapes. It is hard to the touch, and when mixed with water subsides immediately, leaving a muddiness therein. Viewed through a microscope, the particles appear to have rough surfaces, and are quite opaque; but there are

a few very small shining crystalline specks. It ferments very strongly with aqua fortis, and when burnt is entirely white. It is common in Yorkshire, and some other counties, where there are very large strata of it.

The Brownish, White, Fine, Stony GRIT resembles the former, is not very heavy, and void of all manner of brightness. The particles differ both in shape and size, and are not very rough or hard to the touch. When mixed with water, it leaves a muddiness therein after the subsidence. When viewed through a microscope, the particles seem to be of a loose spongy texture, and opaque, only there are a few shining specks in some parts. It is met with in the great stone quarry near Bath in the cavities of the stone, and ferments briskly with aqua fortis. It is also common in Liecestershire.

Glittering, Greyish, White, Fine, Stony GRIT, with heterogeneous particles, is pretty heavy, and of a pleasant pale greyish white. The particles are mixed with fine shining white spangles, and are different with regard to size, without the least brightness. The glittering proceeds from a mixture of a considerable quantity of talc. It is hard and rough to the touch, and when mixed with water subsides but slowly, leaving a whitish muddiness therein. When viewed through a microscope, the particles appear to be different, both with regard to size and shape, and besides the talc there are a few crystalline specks. It ferments violently with aqua fortis, and is common in the hills of Yorkshire.

Greenish, White, Stony GRIT, with heterogeneous particles, is pretty fine, very heavy, and of a dusky greenish white colour. The particles are different, both with regard to size and shape, without any brightness; but there is a mixture of broad flat particles of talc, which makes it glitter very much; it is not very rough to the touch, and when mixed with water subsides but slowly, leaving a greenish muddiness therein. When viewed through a microscope, it appears to consist of stony particles, which are different both with regard to their shape and size; but they are pretty transparent and bright, and the white talc appears in flakes. When burnt, it is of a pale brownish colour, and is met with in some parts of this kingdom.

The Coarse, Greenish, Grey, Dull, Stony GRIT, with a few heterogeneous particles, is very large, harsh, pretty heavy, and of a dull greenish grey colour, intermixed with a very few talky spangles, which are much less than the stony particles, that are alike both with regard to their size and shape. It feels pretty harsh and rough, and subsides immediately in water, leaving it quite clear. When viewed through a microscope, the whitish coarse particles, though not bright, are a little transparent, and there is here and there a crystalline speck, besides the particles of talc. It burns to a pale dusky red, and is common in Yorkshire and other places.

The GRIT, called the Puteolan powder by the antients, is a sort of greyish powder, composed of particles which are so exceeding small, that, when viewed through the best microscopes, no distinction appears among them. It looks perfectly dull of itself, for what brightness there is may be probably owing to the talky particles. When mixed with water, it subsides very slowly, leaving a great whitish muddiness therein. When mixed with salt water, it soon dries into a hard stony mass, which will not afterwards easily dissolve when mixed with common water. It was used by the antients as a mixture for their cements of buildings near the sea. It is now known by the name of the Pozzolane, and is an ingredient of hard plasters, in several parts of France and Italy.

Fine Pale Reddish Stony GRIT is heavy, and of a

very pale whitish or brownish red; it is very bright and sparkling, and even to a greater degree than many of the sands. It is harsh and rough to the touch, and mixed with water subsides immediately, leaving it entirely clear. The particles, when viewed through a microscope, appear to be of irregular shapes, some of which are of a pale red, others brownish, and others without any colour at all. It ferments slightly with aqua fortis, and undergoes little change in the fire. It has been found near Bristol.

The Pale Red, Shining, Coarse, Stony GRIT, is pretty heavy, with particles that are irregular, with regard to their size, and remarkably bright. It is very harsh to the touch, and immediately subsides in water, leaving it extremely clear. When viewed through a microscope, the particles appear to be crystalline and quite transparent, but of irregular shapes; some of them are without colour, and others are of a very pale red. It will not ferment with aqua fortis, nor will the fire produce any great change. It is found on the coast of Fife, in Scotland.

The Greyish Red, Coarse, Shining, Stony GRIT, is very heavy, and the particles are of various shapes and sizes, many of which are very bright and shining, and others quite opaque. It is very harsh and hard to the touch, and immediately subsides in water, leaving it very clear. When viewed through a microscope, some of the particles appear to be white, and very opaque; others are without colour and transparent, and others again are stained with a pale red. It ferments strongly with aqua fortis, and burns to a fine red. It is found on the shores of the island of Minorca.

The very Coarse Greenish Red Dull GRIT is very heavy, and of a fine flesh colour, variegated with green. The particles are pretty uniform and regular, with regard to their size, and they are of an irregular angular shape. It is very hard to the touch, and subsides immediately in water, leaving it clear. Through a microscope, some of the particles appear to be whitish, others of a pale red, and others of a fine light green; but they are all pretty transparent. It is found on the shores of the Mediterranean sea.

The Fine Shining GRIT, of the colour of rusty iron, but darker, is full of spangles that appear bright and glittering, which are not talc but crystalline, and without any colour. They are much of the same size, and extremely harsh to the touch; they subside very soon in water, leaving it extremely clear. Through a microscope, the particles appear to be of different colours; for some are whitish, others yellowish and semi-transparent, and others without any colour, and as bright as crystal; but the greatest number are brown. It is found near Lisbon in Portugal.

Fine Red Stony GRIT, with heterogeneous particles, is very heavy, and of an agreeable red colour, with a whitish cast. The stony particles are a little bright, but the mixture of glittering flat spangles renders the mass extremely so. All the particles seem to be uniform with regard to their size, and are very rough to the touch; in water they subside immediately, leaving it quite clear. Through a microscope, the particles of this grit appear to be transparent crystal, of a pale red, and all somewhat angular, interspersed with very bright transparent particles of brownish white talc. It is found on the shores of the island of Minorca.

The Coarse Red Variegated GRIT, with heterogeneous particles, is very bright and heavy, though light and coarse; the colour is variegated, though the red predominates, and the particles of that part are very bright and sparkling; besides these, there are many white crystalline fragments, and a vast

variety of yellow and black flakes of talc, all which glitter very much, and give the whole a pretty pleasing appearance. They are all nearly of the same size, feel extremely harsh and rough, and in water subside immediately, leaving it clear. It is found on the coast of Scotland.

The very Coarse, extremely Shining, Flesh-coloured, Variegated GRIT, with heterogeneous particles, is more beautiful than the former, and pretty heavy. The flesh colour or pale red is very lively, and variegated with black and brown particles of talc, besides some that are white and crystalline; and all the particles in general are very bright and glittering, but irregular with regard to their size. It is hard and harsh to the touch, and subsides immediately in water, leaving it clear. When viewed through a microscope, the particles all appear to be large and coarse, but of very different shapes and colours, though some are reddish and yellowish, others without colour, and others again, that are blackish and reddish, or opaque. The talky spangles are brown and black, for there are none that are white.

The Fine Brownish Red Variegated GRIT, with heterogeneous particles, is not so glittering as the former; but it is very fine, heavy, and of a faint brownish red, variegated with white, black and yellow. The particles are all bright and shining, and much of the same size. It is sharp to the touch, and in water subsides but slowly; however, it leaves it clear. The particles, when viewed through a microscope, appear to be of irregular shapes, some of which seem to be spar, are semi-transparent, and whitish, reddish, or brownish; others are crystalline without colour, though some are reddish or brownish and very bright, and others opaque and stony, and of a blackish or reddish colour. Those with the talky flakes make a very agreeable appearance; for they are of different colours, as white, yellow, and black. It ferments a little with aqua fortis, but undergoes no change in the fire.

The Fine Flesh-coloured Variegated GRIT, with heterogeneous particles, is not so beautiful as any of the former, though it is very fine, pretty heavy, of a bright flesh-colour, and very glittering. The particles are all nearly of the same size, and there is little variegation of white and black. It is sharp to the touch, and subsides immediately in water, leaving it clear. When viewed through a microscope, the particles appear to be of very irregular shapes, and some are white, others reddish, and others without any colour at all. They are not all equally transparent, but the greatest part of them are very bright, and there is a mixture of flaky spangles of talc, of white, brown, and black colours, with a few blackish stony particles. It burns to a paler colour.

The extremely Pale, Whitish Red, Variegated GRIT, with heterogeneous particles, is not so finely coloured as some of the former; but it is extremely fine, very heavy, and of a pale whitish flesh-colour. It is variegated with many black spangles, the particles are all very bright and glittering, and are nearly of the same size. The talky spangles are black, and remarkably thin. It is sharp to the touch; and, though it subsides slowly in water, it leaves it very clear. When viewed through a microscope, all the particles appear to be transparent, except a few that are black, and the fire turns it to a grey colour. This and the four former are common on the shores of islands in the northern parts of the world.

The Brownish Red Coarse Stony GRIT, with heterogeneous particles, is considerably heavy, and of a fine pale flesh-colour, variegated with brown, and there are a few glittering plates of white talc. The particles are regular with regard to their size, and pretty bright and shining, which render the

whole

whole mass very glittering. It is sharp and harsh to the touch, and subsides immediately in water, leaving a little muddiness therein. Through a microscope, the particles appear of different shapes; but most of them are flattish and bright, though not very transparent. Some are of different degrees of flesh-colour, others of no colour at all, and there are also brown particles that are more transparent than the rest. There are a few spangles of white talc, which are very thin, and smaller than the other particles. It burns to a little pale red. It is met with on the shores of the Red Sea.

The very Coarse Shining Blackish Flesh-coloured GRIT, with heterogeneous particles, is remarkably heavy, and of a mixed colour; between pale red and black, and the particles are bright and shining, besides which there are a few black flakes of talc, but not so large as the other particles, though they are of different sizes. They are very hard to the touch, and subside immediately in water, leaving it clear. Through a microscope, the particles appear of various colours, shapes and sizes; for some are white, others of a pale red, and a great number are black, and though they are not transparent, they shine more than the rest. It does not undergo any change in the fire. It is found on the shores of the islands of Sicily.

The very Coarse Shining Reddish Green Stony GRIT, with heterogeneous particles, is considerably heavy, and a reddish green, or rather of a greenish red. The particles are partly green and partly red, intermixed with many that are white, and all together are bright and sparkling: there are also a few spangles of greenish white talc. All the particles are nearly of the same size, and are very hard and sharp to the touch; they subside immediately in water, leaving a reddish muddiness therein. It is found on the shores of the Mediterranean sea.

The CRYSOCOLLA of the ancients is a beautiful green, though dull Grit; it is somewhat coarse, moderately heavy, and of an exceeding lively and agreeable green, with very uniform particles, which are nearly of the same size, but of little brightness. It is not very harsh to the touch, and subsides immediately in water, leaving it quite clear. Through a microscope the particles appear to be pure, and in angular figures, generally approaching to a rhomboidal form. It ferments strongly with aqua fortis, and tinges it with a bluish green. It is found on the shores of New England, and is taken to be green sand; it has also been brought from the shores of the Red Sea. It is used by goldsmiths for the foldering gold, and by painters as a colour. That is looked upon to be the best, which comes nearest the colour of an emerald.

The Fine Shining Pale Green GRIT is very heavy, and variegated with white; it is very bright and shining, the particles are regular in their size, and it is harsh and sharp to the touch; it subsides immediately in water, leaving it entirely clear. It is found upon the shores of the Red Sea.

The Shining Gold-coloured GRIT, with heterogeneous particles, is light in comparison of many others. The flakes are of different sizes, and it is softer to the touch than any other kind; it subsides slowly in water, and leaves a whitish yellow muddiness therein. Through a microscope, the stony particles appear to be reddish, whitish, and seemingly transparent. It is found in Virginia, Germany, France, and England.

The very Hard Fine Black GRIT, variegated with white, is the hardest, heaviest, and brightest of all the Grits, and is of a fine jet black colour, with a few specks of white. It consists of particles nearly of the same size, and is exceeding hard to the touch; it subsides immediately in water, and leaves it entirely clear. Through a microscope, the particles

appear to be all angular, of which some are whitish, and others greyish, but both are very transparent; yet those of a jet black, which are most numerous, are entirely opaque. It is met with in France.

The Fine Black and White GRIT, with heterogeneous particles, is pretty heavy, and the principal particles are bright and shining, but they are rendered more so by the mixture of fine white flakes of talc; it is harsh and sharp to the touch, and subsides very soon in water, leaving it quite clear. Through a microscope, the black particles appear to be opaque, and there are a great many transparent, without any colour, and exceeding bright; the flakes of talc are also transparent. It is brought from the shores of the Mediterranean sea.

The very Coarse Black and White GRIT, with heterogeneous particles, is extremely heavy, and its particles seem to be all nearly of the same size; the greatest part seem to be coarse and dull, but there are a few that are bright; however, the quantity of talc makes it glitter pretty much; for they are white and glossy. It is rough to the touch, and subsides immediately in water, leaving it very clear. Through a microscope, it seems to consist of a great number of white semi-transparent particles, of which there are some as clear as crystal, and very bright, besides many of coarse white talc, and a great many others that are black and opaque. When burnt it is of a flesh colour, with black and white spots. It is found in Wales.

The Shining GRIT, of a rusty black colour, with heterogeneous particles, is considerably fine and heavy, but entirely dull of itself, though the great number of black flat shining particles make it shine very much. It is harsh and rough to the touch, and settles immediately in water, leaving it entirely clear. Through a microscope, it appears to consist of different particles; and those without colour, as well as the yellowish and reddish, are like small pebbles; these are bright and pretty transparent, besides which there are many others of uncertain shapes, and quite opaque: these seem to be fragments of stones of different kinds; and there are a great many that are dusky, with somewhat of a reddish colour, supposed to be pieces of iron ore. Besides these, there are multitudes of spangles of different shapes and sizes, which are all very bright, and are taken for fragments of lead ore. In the fire it becomes blacker, and is known in England by the name of black writing sand.

The Coarse Sparkling Brownish Black GRIT is much like the former, but is more coarse, and remarkably heavy. It owes its sparkling to flat shining particles like the former, though they are not so many in number. It is very sharp to the touch, and subsides in water immediately, leaving a little blackness therein. Through a microscope, the particles appear to be various, of different shapes and figures, but nearly of the same size. They are partly fragments of stone, and partly iron and lead ores; but they are not so bright as in the former, they having smaller surfaces. The iron ore is discovered in this by means of a loadstone, as well as in the former. It is common on the shores of Wales, and serves for the same purpose as the preceding.

The Fine Brownish Black Sparkling GRIT is pretty fine, and remarkably heavy, with an agreeable bluish black bright colour. The particles are of various shapes and sizes, and it is pretty harsh to the touch; it subsides immediately in water, and leaves it quite clear. Through a microscope, the particles appear to be of various colours; for some are reddish, some greenish, and others blackish, mixed among a vast number of particles of various sizes and shapes, but all of a bluish black, with glossy surfaces. It ferments slightly with aqua fortis, which is probably owing to the sparry matter

ter contained therein. It is common on the shores of Wales.

C H A P. XXXIV.

Of MARCHASITES and PYRITES,
or FIRE STONES.

THE generality of Authors think Marchasites and Pyrites to be the same substance, and others distinguish them, making two different species thereof. Boet observes, there are several kinds of Pyrites, and that all stones, that strike fire properly, deserve that name. Some are bright like silver, others consist of several coats, others are like dice. Some are like red marble, and shine with a metal-line splendour, others are purple, quadrangular and transparent, and others again are spongy and shining or pumictous. Some have eight angles, others have twelve, others are like bismuth, and others again are tinged with a gold colour, from whence they take the name of Marchasites. Some are of a copper-colour; others are of various colours and forms, and others are mixed with stones. Among these, some will melt in the fire, and are added to metals instead of lead, to render them more fusible, and when they are broken they shine like sugar-candy. He adds to this, that there are stones called Pyrites, which will not strike fire with steel, and these he thinks ought not to be placed in that class. Among the Marchasites so called by some there are,

The Silver-coloured MARCHASITE, which is of a very firm and compact texture, and remarkably heavy. It is found making strata of itself, which though very broad are thin, being from three inches to a foot in thickness. Sometimes there are pieces found by themselves, and in general they have a very irregular and unequal surface, they being made up of great numbers of irregular flakes, and of various sizes; they being bent, undulated, and sometimes infold each other. However, these plates are not at all distinguishable by the naked eye, but seem to constitute one solid mass. The colour resembles that of silver, but is more glittering. It readily strikes fire with steel, but will not ferment with aqua fortis; and when put into the fire it cracks and breaks, emitting a blue flame with the smell of brimstone. After it has burnt a considerable time, it turns to a deep red. Sometimes this Marchasite is mixed with lead ore, sometimes with that of tin, and very often a dusky brown ferruginous substance. It is found in great plenty in lead and tin mines.

The gold-coloured MARCHASITE is more glittering than the former, but not so compact, though pretty heavy. It is commonly found in thin strata, and sometimes in pieces. It seems to be composed of flat flakes, not unlike great numbers of irregular fragments of leaf gold, placed together without the least order. However, some parts of this Marchasite are more loose and open than others, though it is all in its natural shape of a deep yellow gold-colour; however, it is sometimes paler, sometimes deeper, and at other times will reflect all the colours of the rainbow. It will not strike fire with steel so readily as the former, nor will it ferment with aqua fortis. When thrown into the fire, it will slowly emit a blue flame from all parts of its surface. It is plenty in Germany, particularly in Hartz forest, and has been met with in England, but not so often as in the former.

Heavy white MARCHASITE is very firm and solid, and more heavy than the other two. It is often found in strata by itself, and sometimes in detached pieces; but is more commonly met with in the cavities of other strata, of the breadth of several

yards. It has a smoother surface than the others, and is more uniform in its composition; though, if it be carefully examined, it seems to consist of undulated flakes laid closely upon each other. It strikes fire with steel; it will not ferment with aqua fortis, and when put into the fire burns pretty briskly, emitting a blue flame, with the smell of brimstone. It is found in Devonshire, Cornwall, and some other counties. These are all the Marchasites properly so called, taken notice of by authors.

The Flat Pyrites or FIRE-STONE, with a rough coat, can hardly be distinguished from other Stones by its external appearance. It is pretty firm and hard, as well as heavy, and is of no certain size, being found from one inch to ten in diameter. It is always flat and thin, and has very unequal and irregular edges. When it is about four inches long, it is half an inch thick, and requires a strong blow to break it in pieces. When broken its texture seems to be regular and uniform, consisting of one homogeneous mass, of a dusky brownish green colour, surrounded with a coat of a dusky ferruginous substance, which is rough and beset with small pebbles of different shapes and sizes, though generally no bigger than grains of sand. It is always of the colour of rusty iron, and is thicker in some than in others. It will strike fire with steel, but not ferment with aqua fortis; and in the fire it emits a blue flame which soon goes out, and when sufficiently burnt it turns to a deep purple. It is found in gravel-pits all over the kingdom.

The Round PYRITES, with a cracked coat, is coarser than the former, it being composed of visible grit. It is very heavy, and of various sizes, from half an inch to twelve in diameter, and requires a strong blow to break it. The colour is pale, with a mixture of dull whitish green, and a dusky brownish cloud. The outer coat or crust is of a brownish yellow, and of different thickness; the surface is divided by shallow cracks, and after it has been for some time in the air, they become deeper. It readily strikes fire with steel, and in the fire emits a strong blue flame, and last of all calcines to a purple powder. It is common in the chalk-pits of Kent, and many other places.

The Flat PYRITES, with a very thick whitish brown crust, is extremely hard and firm, though moderately heavy. It is commonly flat and round, or oval, and its usual size is two inches and a half in length, two in breadth, and one in depth. The surface is rough, it being full of small tubercles, and it has the look of a lump of brownish clay; it requires a smart blow to break it, and when broken, a nucleus is found of the same shape with the whole stone. This is very compact, firm, and hard, and of a deep dusky green. The nucleus will strike fire with steel, and burns to a red; but the crust itself turns to a pale brick colour. It was found in a clay-pit near the end of Gray's-Inn-Lane, and very probably may be met with in many other places.

The Green PYRITES, without a crust, is met with in a great variety of different shapes. It is of a hard firm close texture, and very heavy, and is found from half an inch to ten inches and upwards in length. Sometimes it is in the shape of a common pebble, but it is more generally flat, with an uneven undulated surface, and seems to consist of many plates laid one upon another. It is extremely hard before it has been exposed long to the air, and is, both within and without, of a pale silvery green. It readily strikes fire with steel, but will not ferment with aqua fortis; it readily cracks and breaks in the fire, emitting a fine deep blue flame, and turning at last to a florid red. It is very common in all parts of England, particularly in strata of blue clay.

The PYRITES, resembling a bunch of grapes
without

without a coat, is of a firm hard structure, and remarkably heavy. It is commonly small, and of a longish form, though sometimes round, and many pounds in weight. It is most commonly without any crust, and requires a strong blow to break it. When broken, it appears to be a kind of a metallic body. It is most commonly of a very pale green, though sometimes deeper, and the surface is always covered with tubercles of various sizes, so as to have a distant resemblance of a bunch of grapes. It strikes fire readily with steel, emits a blue flame in the fire, and soon falls to pieces; but at length turns to a beautiful purple. It is common in many parts of England, and when it has been long exposed to the air, has often a thin coat of a rusty colour.

The Round PYRITES, with a streaked structure, and an irregular surface, is very heavy, and is usually found in a roundish shape. The general size is from four to six ounces in weight, though there are some of two or three pounds. The surface is irregular, and sometimes beset with flattish tubercles, and sometimes raised in ridges, on account of their being placed in distinct rows, which meet in various angles. It is pretty hard, and when broken appears to be of a streaked texture, and the streaks run from the centre to the circumference. It is of a whitish green within, is covered with a brown crust, and is very bright and glittering when just broken. It strikes fire with steel, and burns to a purple powder. It is common in chalk-pits.

The Round PYRITES, with angular tubercles, is remarkably heavy, and is found from an ounce to a pound or upwards in weight. It is generally roundish, and the surface is remarkably rough. It is of a rusty colour, and is covered over with short quadrangular pyramids, which are broad at their basis, and blunt at their points, commonly standing very upright and close to each other. It cannot be broken without a strong blow; but when it is in pieces, these are found to be streaked, and of a greenish colour, with some small mixture of yellow. It strikes fire with steel, and will flame soon in the fire, with the smell of brimstone, and bursts to pieces; after which it calcines to a fine deep purple. It is common in England in the strata of chalk.

The Silver-coloured Round PYRITES, with a smooth surface, is of a pretty firm texture, and remarkably heavy. It is commonly round, and the usual size is about an inch and a half in diameter; but it is sometimes met with to the weight of two pounds. It is always without tubercles and ridges, and the surface is of the same colour as the inside, though not quite so bright. It breaks with a small blow, and when broken appears to be of a streaked texture, of a beautiful silvery green colour, and the streaks run from the centre to the circumference. It strikes fire with steel, and in the fire emits a blue flame, with a strong smell of brimstone, after which it bursts and calcines to a deep purple powder.

The PYRITES, with a foliaceous surface, is of a very firm though uneven texture, but very heavy; it is of various shapes, but commonly round. It is of different sizes, but generally large, though those of six or eight inches are commonly round. It is harder than most other stones of this kind, and when broken appears to be of a streaked texture, and the extremities of the surface are seen in rows of thin leafy plates, which cover the whole. They generally lean one way, but are of unequal thicknesses, and sometimes notched at the end. The colour is a dusky green, which when broken is very bright and glittering. In the fire it emits a deep blue flame and bursts, after which it calcines to a purple powder. It is found at Goslar in Saxony, and in Hartz forest, and sometimes in England, particularly Mendip hills, Derbyshire, and Cornwall.

No. 47.

The PYRITES, with a smooth glossy surface, is of a very firm coarse regular substance, and remarkably heavy. It is of a very particular shape, being always more or less hollow, and in various forms, often like pebbles, but more particularly rugged and knobby. The common size is five or six inches in diameter, and the surface is so glossy, that even the tubercles thereon appear to be so. It is very hard, and when broken appears to be streaked with irregular cavities, and the streaks are more narrow than in other stones of this kind. On the inside they commonly terminate in broad plates, nearly of a square figure, and are disposed in rows. The general colour is greenish; but if it is broken where these plates are, it is commonly of a bright beautiful yellow. It emits a blue flame like the rest, and calcines to a fine red.

The Large Foliateous PYRITES, in the shape of a cube, is of so regular a figure, that it has by many been thought to have been the effect of art. It is of a firm regular structure, very heavy, and is commonly found about one third of an inch in diameter. All sides are perfectly smooth, and it breaks in all directions; for it consists of plates in the direction of all the surface. It is glossy on the inside when just broken, and seems to be composed of plates like talc. It is of a fine whitish green colour, with a small mixture of yellow. In the fire it emits a deep blue flame, with a strong smell of brimstone, and calcines to a deep purple. It is found in Germany, Hungary, and the East Indies.

The Small Solid PYRITES, in the shape of a cube, is not unlike the former, it being firm and hard, and very heavy. The shape is regular, and the size is commonly about an eighth of an inch in diameter. It is perfectly smooth on every side, and when broken is very bright and glossy. Its colour is commonly a pale yellowish green, though in those that are large it is somewhat of a rust colour. It cracks and bursts in the fire, emitting a deep blue flame, and at last calcines to a fine red. It is frequently to be met with in the northern parts of England, and many other countries. It is here found in common black slate, but in Germany about the earth on the mountains.

The Bright PYRITES, with eight sides, is very firm and compact, of a pretty even texture, and very heavy. It is always composed of eight triangular planes, though it is subject to some varieties. Its most perfect shape is when two pyramids are placed evenly one against the other; but they are more commonly set uneven and slanting, and their planes are very irregular, with regard to their size. It is from the bigness of a large pin-head to that of a walnut; they are naturally smooth, and of the colour of polished iron. When broken the pieces appear very bright and sparkling, and often much paler than the outer surface. They seem to be composed of irregular thin undulated plates, laid more closely together than in the marcasites. In the fire it cracks and bursts, emitting a blue flame, with the smell of brimstone, and at last calcines to a deep purple. It is found in Cornwall, and is very common in North America.

The Hard Shining PYRITES, with twelve sides, when perfect, is extremely beautiful, but is seldom met with in that state. It is pretty hard, of a regular texture, and very heavy. It is subject to great irregularities; but often wants one or more of its sides, and has commonly other bodies of its own substance sticking fast to it. It is of various sizes, it being from one inch to four in diameter; but is more frequently about the third part of an inch. The surface is smooth and shining, and generally of a pale yellow, sometimes of the colour of rusty iron, and sometimes of polished steel. When broken it appears to be of a foliaceous substance, and to consist

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of

of very thin plates irregularly placed, and may often be distinguished by the naked eye. In the fire it emits a blue flame, with the smell of brimstone, and calcines to a bluish purple. It is found in Cornwall, but is more common in Germany, as well as in the East and West Indies. It is observable, that all these kinds of stones strike fire with steel, and will not ferment with aqua fortis.

C H A P. XXXV.

OF FOSSILE PETRIFIED BODIES.

BEFORE we come to particulars, it will not be improper to take notice of petrifications in general, some of which are performed, as it were, within our sight, and therefore are most easy to be understood. The first of these is the stalactites, which is a kind of cylinder formed on the roofs of some caves and grottos, and which has been already taken notice of in its proper place. This is evidently brought to pass by means of the water, which carries with it very fine sand, that by length of time increases to different sizes, and forms the different layers which are successively produced one over another.

Another kind of petrification, which is well known, are the crusts of stone, which the water of some springs fixes by little and little to the pipe through which it passes; for these are almost every where to be seen. From these it plainly appears, that the matter of the petrifications, let their nature be what they will, is driven by water to the sides of the pipe in small particles; which being applied to each other without any regularity, forces the water itself to turn from the centre of its course, to make a passage for itself; because the stony matter is applied as it were by chance.

Another sort of petrification, also very well known, is that of the pieces of wood, shells, and other substances, that are petrified in the bowels of the earth, or in springs, without losing their shape, or distinguishing marks by which they are commonly known. These may be distinguished into three kinds; that made in plates or layers, that done by pellets or balls, and that by penetration.

The substances by which these are brought about, are water, salt, oily juice, sand, mud, and clay. The water seldom penetrates the substance of stones to no purpose, but carries with it and mixes the materials of which it is composed; much in the same manner as the masons make use of water wherewith to blend and intimately unite the materials of which they make mortar or cement, that grows hard in proportion as the water flies off.

The three different petrifications are performed likewise by minute masses or lumps, and a very fine cement. The masses to be incorporated are the sand, clay, and loam: the most durable cements are the salts, and several kinds of bitumen. Sometimes the salts, intermingled with the clay, serve as a cement for the sand; at other times, the mass is composed of clay, or loam alone, without any intermixture. From the different degrees of these several bodies, thus differently intermixed, proceed a vast variety of productions.

To the first kind of petrification we may refer tals, slates, plumous alum, and plaster. As for crystal, it is nothing but a heap of sand, perhaps in a pyramidal or triangular shape, which the water applies successively one upon another, uniting them together with a little salt, and very fine mud; this is the more probable, because when crystal is decomposed in the fire, there remains nothing but calcined sand, earth, and a little salt. We need not wonder that crystal should be thus formed into a transparent mass, because several sorts of white sand,

viewed through a microscope, appear to be nothing else but true white crystal. The earth or mud, that is joined thereto, only hinders them from shining like a diamond.

It is easy to imagine, that a fall of water may bring into any place a layer of sand and blackish earth, and that a second may throw another upon the former, and so on; insomuch that, in length of time, slate may be produced of different thicknesses. In the same manner different substances may form talc, plumous alum, and plaster.

The second sort of petrification is that, which is performed by small bullets or balls, and often by bunches composed thereof. It is probably by this means that gems receive their formation; because many of them are found in the chinks and cavities of certain rocks, where the water can bring nothing with it but sand, salts and a little bitumen, and by chance some metalline particles. These small congelations of matter, coming to sink and harden by degrees, may carry along with them the very fine particles they meet with. The generation of irregular flints, and all other stones that will strike fire with steel, seems to be the same as that of gems; for the water meeting in its course certain cavities more or less wide, in marl, chalk or clay, that are in rocks, there deposits the salts, the oily fluids, and the fine sand with which it is imbuted. This water afterwards evaporating, the sand, and every thing that is introduced within the cavity, becomes hard as in a mould, and forms a mass which takes the same figure. When fine sand is the principal ingredient, the concretion is more or less transparent and hard, as are all sorts of gems. The colours are dull; variegated, or marbled with veins, in proportion to the different mixtures of the substance of which they are formed. When there is a great deal of salt or sulphur, which are well known to contain particles that strike the nose and yield fire, then the stone will have a strong smell of sulphur, when it is broken or struck, and will sparkle when it meets the blows of another stone as hard as itself, or when it is struck with the steel or hammer, that by its extraordinary hardness discomposes the pores wherein the particles of fire are lodged. These sorts of stones very evidently contain a great deal of fire, and therefore they might be supposed by some to be electrical, and yet it is plain they have no such quality, which may be owing to the earthy particles in which the fire lies hid; and which may prevent the effects of rubbing, in the same manner as a lock of wool placed against a glass, or when tied to the string of a musical instrument, prevents the vibrations, and consequently the sound.

There are a great many flints and flinty stones that are exactly round or oval, or approaching thereto, and of all sizes, which seem to be composed of, or form small pellets or plates, by means of a nucleus which is the basis of the whole. When the water is loaded with a small bit of marl, or some small stone, as it repasses through this small mass, it will fill up its pores or inequalities with the clay or other particles contained therein, and will bestow upon it a smooth and pretty regular surface. If this is repeated several times by the application of the water to the mass, it will always leave a small layer or coat of sand, before it flies off. These circular layers or coats growing hard, by the evaporation of the water, will form a small arch, which will grow still stronger and stronger, by the successive application of several other layers or coats. The whole will grow more thick in proportion to the number of times that the water returns, and deposits fresh matter. It may so happen that the nucleus of chalk, marl, stone, or clay, which has been as it were the foundation of the first arch, being rendered hot by some external means, all the moisture will evaporate

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and diminish the size. By these means it may often come to pass, that there may be a nucleus in the middle of the stone, as we often find by experience; which may be sometimes chalk, sometimes common earth, or other substances, quite different from that of the stone; so that at length by shaking the stone it may be easily found by the rattling, that some substance is contained therein. Thus the formation of round and oval stones becomes much the same as that of certain stones which are known by the name of Bezoars, and which are found in the bellies of several animals, both in the East and West Indies, and to which great virtues are attributed.

Some of these stones, that have a cavity in the middle, often contain a hard substance, or another stone, which may be easily known from the noise it makes when shaken; and this is commonly called by the name of the Eagle Stone, to which most extraordinary qualities have falsely been attributed.

The third manner of petrification is what is called by some penetration, and this is the most common; thus a large bed of sand, clay, or other matter, may be petrified by the salts and other particles which with the water is imbued when it sinks therein. The water will carry with it all the fine salts it has dissolved and taken up by the way, as well as the exceeding fine earthy particles which have remained therein. This water will readily pass, as well as every thing it contains, through a bed of sand, that is too full of pores to stop it; but it will fill by degrees all the interstices of more compact sand, and will closely unite all the particles; and by this means we may understand the formation of what we commonly call free-stone. A bed of earth or of sand will be changed into a stone more or less hard in proportion to the quantity of clay or sand contained therein. Marl and potters clay thus mixed with sand will be changed into marble, whose ground may be either red, green, or black, according to the nature of the petrified bed. Perhaps the ground of any marble may be nothing but very fine sand, into which the water has penetrated, and carried at many thousand different times the fine particles of marl and potters clay, and which in process of time may obtain the hardness in which they are found; and consequently their natures, colours, mixtures, and clouds, may vary to infinity. If the potters clay has been dried and cracked by some subterraneous heat, the fine sand, or marl, or other substances which are carried by the water, and deposited in the chinks or cracks, may produce veins of all colours, and of all shapes. Likewise, when there are particles of gold, or any other metal, that are fine enough to be dragged along by the water, they may serve to augment the richness of these variegations. The drops of oily fluids, which the water carries along with it, may expand and form a multitude of small spots, which may be round when they are at liberty, or oval when they are a little confined on each side; or, in short, they may be angular, or of any other shape, according to the impediments they meet with. All the winding veins, on the sides of which we sometimes see rows of small specks of gold, or other metals, extremely fine, serve to shew very evidently the progress that the water has made; for when it happens to be stopped, and obliged to turn, it penetrates wherever it can, and so produces very irregular variegations. The particles which the water contains, being naturally a little more heavy than itself, must needs be deposited in time, and stopping by the way, must penetrate the very first cracks or other cavities that they meet with. We may compare the formation of a marble, or other stone, to that of cloth or tapestry; for the body of the sand or clay, which is capable of penetration by water, may be compared to that

which weavers call the warp, and the water to the shuttle, which passes across the other without stopping. The fine sand, the particles of common clay, the colours of potters clay, the fine threads or small leaves of metallic substances, may all together be compared to the wool, which is introduced into the body of the work, and which fills it by little and little.

However, it sometimes happens, that there are thin plates or layers of clay between the different beds or strata of stone, and which are free from any mixture at all; from whence it appears, that they have hindered the progress of the water, for they only served to sustain, and could not be penetrated by it. Perhaps it may be thought a wonder, why there should be any stratum of stone or marble under this clay, since the water could not get through it; but this will soon cease, when we consider, that many parts of the clay may be very thin and full of cracks, and consequently will admit the water to pass very freely through it. All the water with its contents may run over the clay, and may be shed, at the extremity of this layer, into the bed which lies beneath; and it has been found by experience, that many rocks of an enormous size will not prevent the water from passing through their bowels, and falling into beds of sand that are placed underneath.

That which the water performs, by the penetration of the different strata contained in the earth, it brings about in some degree with regard to pieces of wood, bones, and other substances which it enters into; and which affords us a reason or method of explanation of all the different petrifications, though never so odd, which are to be met with in all parts of the world. We cannot determine whether there has ever been an universal earthquake or not, which has changed its primitive form; for we find several sorts of animals, and sometimes mankind, in small islands at a vast distance from the main land, which can hardly be accounted for, but from some extraordinary cause, that has produced great irregularities in the face of the earth, making that to be a sea, which was dry land before, and raising up mountains out of the bosom of the deep; especially since we find, from some such change, that there are a vast number of marine bodies at a great distance from the sea, and a great deal higher than its surface. However, this is certain, that many substances, which seem to have been proper only to the sea, are now found in the bowels of the earth; and which have perhaps been petrified by degrees, by the insinuation of water, salts, and exceeding small crystalline or stony particles, proper to fill up their pores, without alteration of their shape. To this all the productions which some have looked upon as *lusus naturæ*, or sports of nature, are evidently owing. Besides the bones of crocodiles, the skeletons of sea horses, the entire bodies of petrified fish, there are almost every where found sea shells of all kinds, and all sorts of the parts of sea animals, converted into stone. Some are very wonderful with regard to their situation, and others as to the oddness of their shapes. However, some are of opinion, that if these changes have been in reality produced by earthquakes, it will not from thence follow we should find them converted into stone; but this may be easily accounted for, if we reflect a little on what has just been said: for their situation is no more difficult to be comprehended than that of flints, which are generated in the middle of other substances; for, though they undoubtedly were in their natural state before the alterations were made, yet it is easy to conceive in what manner they have been petrified since that time. These petrifications have had different names bestowed upon them by naturalists, and therefore it will be necessary to give a more distinct account thereof.

thereof. They are principally of two kinds, that is, animal and vegetable substances; some of which have remained in the earth a vast number of years without any great alteration, and others have been covered with or turned into stone; however, they all come under the denomination of Fossils.

With regard to trees, there have many been found buried under ground in many parts of the world, and particularly in England; as on the coast of Suffolk near Dunwich, in the fens of Lincolnshire and Yorkshire, and more particularly in the isle of Axholm, which is made by rivers, and lies between Nottinghamshire, Lincolnshire, and Yorkshire; as also on the coast of Pembrokehire in Wales. These have not only been found near the sea, but in inland countries at the depth of ten or twenty ells.

In England, there are some that lie at a distance from the sea, as in Chatmoss in Lancashire, several parts of Yorkshire and Cheshire, as well as in Staffordshire. The places in this last county where they are found are Laynton, and the old Pewit Pool in the parish of Norbury; Shebben Pool, in the parish of High Offley; the mosses near Eardley, in the parish of Audley, and near the town of Betley; all which lie in the high country of the moor lands. They are found still farther from the sea in Cranmoor near Wrottesly; in Rotten Meadow under Wednesbury Hall; on Dorley Common in the parish of Gnosal; in a place called Peat-Moor, and in the moors of Handsworth; none of which are less than thirty, and some are above fifty miles from the sea. Some will have these to have been originally formed in the earth, especially because they resemble firs, of which sort none ever grew naturally in England, if we may believe the account that Cæsar gives in his Commentaries; but his authority is not always sufficient. However, this appears plainly to be a mistake; because many of these trees have their roots still remaining, as well as the stumps of their branches. If there is any such thing in reality as fossile wood; it is generally allowed not to swim on the surface of the water; whereas all these before mentioned will: besides, they still retain the qualities of wood, and sometimes they are found swimming in pools, which the country people get out, cleave into splinters, and make use of them instead of candles. The chief difficulty lies in knowing whether firs ever grew in England or not; and some, to solve this, have pretended that they have been brought hither by some flood, particularly that of Noah, where they have lain ever since. It must be acknowledged, that there is no impossibility in this, or at least that they may have been brought hither by some such means; because they are full of a large quantity of bitumen, which no doubt would preserve them from corruption a vast number of years. However, this account is not very probable, because if they had been brought hither by a flood, they would have been found in all the low places alike, and in the south of England as well as in the north; for there are none in the vales of Evesham and Aylesbury, nor indeed in many others, which seem to be most likely. Some of these trees appear as if they were burnt, and others have the marks of the ax still remaining upon them; besides, the stumps, from which they were cut, are in some places also remaining, and appear in the same posture as when the tree was growing; particularly in Shebben Pool, when the summer is dry and the waters low. Others, with more probability, have thought that these trees were not fir, but birch or alder; because they delight to grow in moist places, and having been soaked many years in a bituminous stuff, have been so well impregnated with an oily matter as to imitate fir both in smell and burning: however, this can hardly be the case, because they

split exactly like fir, and because they have evidently a turpentine smell; and besides, at Axholm in Lincolnshire, there have been found trees, thirty-six yards long, exclusive of the tops, which lay very near the roots to which they belonged. But it would detain the reader too long, and be foreign to our present purpose, to endeavour to account for the manner in which these trees have been brought into this island.

Other trees, besides firs, have been found to have been buried under ground; for Dr. Moreton takes notice of a small maple-tree that he met with in a stratum of clay at a considerable depth; and near Bath part of an elm-tree has been discovered of a considerable length: no doubt there have been many others, which have not been thought worth notice. But besides entire trees, or the principal parts, there have been commonly found in the fuel known in many parts of England by the name of Peat; and which is dug out of the earth, several fruits and catkins of other trees, that have been little altered in their texture. The most common of these are hazle-nuts; and near Whitesea the twigs, as well as leaves, of white poplar have been seen, with the branches of hazle, and great numbers of the skeletons of leaves and catkins, besides the stones of plumbs or some such fruit. There have been some pretty large branches of trees found in the strata of stone, and commonly more or less changed into the nature of the strata in which they lay. A great variety of smaller branches have been found in the strata of blue clay, which serves to make tiles in the neighbourhood of London; but though they were in their original shape, yet their internal structure was much altered; for they seemed to be changed into the substance of the common vitriolic pyrites. These, and others of the like kind, are thought to have been branches of oak, and they are generally altered in some sense to the nature of the strata in which they lie, by the insinuation of crystal or stony particles; but in some the veins of the wood are still preserved, and appear very beautiful when polished.

Dr. Plott takes notice of stones which he calls STELECHITES, whereof one in his time was met with near Dudley, called by the country people the Pox Stone, that is, a stone which undergoes little alteration by fire. It was so much like petrified wood, that he took it for the stump of a tree at first sight. There are others of this name that are not so worthy of it, particularly the Stelechites of Aldrovandus, that has the appearance of antimony; whereof many are found in the rocks near Beresford and Stanfop, and among the rubble stones that lie loose above ground in the fields near Heatly and Pagots-Bromley. They are a sort of annular stones, regularly jointed and regularly streaked at the top and bottom; and therefore as unlike the trunk of a tree, though some of them are branched, as any thing can well be; nor indeed do they resemble the trunk or stem of any plant whatever. Mr. Ray takes them to be the petrified back or tail bones of fish, because they generally consist of several plates or pieces sticking together, like the vertebræ of the back-bones of some sorts of fish; though he acknowledges, that they are shorter and thinner than the bones of any fish he had then seen.

Besides trees, and parts of trees, there have been different kinds of plants, which have undergone the same fate; and have either been wrapped in the black slaty stone found over the strata of coals, or in loose stones of a ferruginous substance. Some sorts of stones contain the perfect images of plants, which seem to be nothing more than a painting, because the fluid contained in the plant, has so intimately penetrated the substance of the stone, that it seems to be all of a piece with it, and has preserved no-

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thing more than the figure. The plants that are thus found are of different sorts, but the most common are of the fern kind, yet not such as we have in England, for some pretend they are only to be met with in America. There are also a great number of sea mosses, with which many parts of the bottom of the sea are covered. An ear of barley has been found in one, or at least its image, very exactly painted. Some of the stones, when they have been split, have contained the figure only of the plant, while the other side has appeared more prominent; which seems to have been occasioned by the petrification of the plant itself. Some of the ferns thus found have been different from any species hitherto known; insomuch that it is hard to say, whether or not they were precedent to the formation of the present globe of the earth.

Though these impressions have been most commonly found in the slaty stones above mentioned, yet there have been other stones met with in which they have been seen, though perhaps not so commonly; particularly, there is a whitish stone in Germany, not much harder than chalk, in which they have been frequently seen; as also a grey slate stone of a very fine texture, where they have been often found, besides one of a blackish blue colour. Not only the entire branches of plants appear in these stones, but sometimes the leaves of trees; particularly those of the poplar, willow, white thorn, pear-trees, and many others.

Perhaps it will not be improper to take notice of others that are less singular, and which are common in Germany. These are the leaves of oak and other trees which hang over springs whose waters have a petrifying quality, by whose means they are often covered with a crust like the mosses in many parts of England. The stone that covers them seems chiefly to consist of a sort of spar. Many specimens of all these kinds are frequently to be met with in the cabinets of the curious.

Dr. Plott has met with some sorts of these petrifications in Oxfordshire, particularly at Somerton, where the grass is covered with a soft stone, yet in such a manner that when it is broken off the grass appears as fresh and green as before it was incrufted. Some of the blades of grass grow at least to a foot in length, and yet when pulled up with the root, and held up by that part, it might be pulled out as entire as a sword out of the scabbard. At North Aston, in a field north-west of the church, there is another petrifying water, where the roots of rushes, grass, and moss are in a short time eaten away, insomuch that nothing remains afterwards except the figures of those plants, with some augmentation. In the parish of St. Clement's in the suburbs of Oxford there is a ditch, the water whereof covers with a crust the sticks that fall out of a hedge. At Carfax, in the city itself, there is a pump, that not only covers the boards that fall into it with a crust, but also enters the very pores of the wood, which by degrees rotting away, there is nothing left at length but the linaments of the wood itself.

Petrifications of this kind are always very brittle; though they leave a faint representation of the grain of the wood, yet they never preserve its colour; and in the fire they are as incombustible as stone; for they change nothing but their colour, which becomes more whitish; however, they will entirely dissolve in aqua fortis. There are some indeed that are petrified in a different manner, and will preserve both the colour and texture of the wood: they are sometimes so hard that they will cut glass, and will always strike fire with steel.

The petrifications of marine substances are more common than those of any other sort; and among them are found fish of various kinds, more especially shell-fish, or rather the shell of those fish. However,

it is not very common to find any which represent the figures of river fish; though there is one called the Barbel Stone.

There are other fossils called OSTRACOMORPHOS, which consist of heaps of oyster-shells cemented together. There are many other petrified shells that are not found in clusters, but each of them lie single in a separate state. Of these some are curiously streaked or furrowed, and others plain, with few or no ornaments. Of these again some are of a turbinated form, and others bivalvular, joined together by a hinge, yet the shells of these are commonly found apart. Among these are those called the Stromboites, from their wreathing like a screw, and generally from the right hand to the left, and from the greater to the smaller end. The largest exceed nine inches in length; but those in England, at least that have been hitherto found, are not much above five, with a plain surface; and the least are not above half an inch long, but curiously streaked. They are of an ash colour, somewhat inclined to yellow, and of a harder consistence than the stone in which they lie.

There are some petrifications that resemble cockles, scollops, and oysters; and these are very numerous. The CONCHITES, or cockles, may be divided into the greater and the less; whereof some of the greater are streaked with broad streaks and pretty deep furrows, descending as it were from a centre at the top, and expanding themselves to the rim of the stone. They have also six or seven transverse simple lines, bent circularly to the hinge or joint; these appear to be a stone without, of a dark ash colour; but within they are found to be black flint. There are others again whose streaks descend from the hinge or joint, and yet not in straight lines, but undulated, and much broader than the former.

There are several kinds of the smaller Conchites, which differ in their colour, lines, and valves; for some are yellow, and are found in the fields near Burford in Oxfordshire; their valves rise high, and approach to a roundish shape. These made red hot, and put into beer, are accounted by the country people to be an immediate remedy for a stitch. In another part of this country, there are some of this sort that are flatter, and of an ash colour; but in both the lines run from the joint to the rim. These last are found only at the head of a spring, but never at any distance from it. Some of these have been found only streaked on one side, and rubble-stone on the other; and others have but just begun to be marked with lines.

There are others of this kind found in a bank of yellowish clay, and are of a different form from those just mentioned, for they are streaked transversely. Many of them appear to be hard stones, and yet several that have been met with were nothing but clay; which may justly raise a doubt, whether or not many of these, which have been generally supposed to be petrified shells, are properly so called.

There is another sort of Conchites found in Hornton quarry, nearly approaching to an oval, and scarcely streaked at all; which inclines Dr. Plott, as well as Dr. Lister, to think that these stones, which are so like cockles, never were in reality the shells of that fish.

There is still another sort of Conchites found in Hornton quarry, which is not stony on the inside like the former, but is hollow, and filled up with spar. It is sometimes in irregular figures, but generally forked. The base, or place where the branches of the fork are united, is at the joint or hinge of the valves; which seems somewhat hard to account for.

There are also petrifications or stones, which resemble scollop-shells, and are always found separate.

One of these is very curious, and resembles the Rough Scollop of Aldrovandus. It is of a yellowish colour, and has ears on both sides, with lines that run from the hinge or joint to the rim of the shell. These are very prominent; and there are others that run transversely, not bending towards, but from the hinge or joint; however, these do not pass through the deep furrows so as to join with each other, for they are only upon the ridges. There is another kind of scollop, where the direct and transverse lines are of an equal depth, but very shallow, very numerous and fine. In these the transverse lines bend towards the joint. It is of a light reddish colour, with ears on both sides, and is found in the quarries of Heddington in Oxfordshire.

There is another shell or stone like a small scollop, of a whitish yellow colour: the streaks are large and broad in proportion, but the transverse lines are small and narrow; however, it is eared, like the former, on both sides. These are called *Pectunculi* by Rondeletius, and he makes them a distinct species from the larger sort, which he names *Pectines*; but then those that he speaks of have never more than one ear, which is sometimes on the right, and sometimes on the left side; but this has ears on both sides. There is another of the small kind intirely without ears, nor is there any sign of the ears being broken off; however, there are real shells of this kind taken notice of by different authors. There is still another sort resembling a scollop, or, as some think, a sort of cockle, because it bears too much on one side for the former. It cannot be a *Tellenites*, because if it has any streaks at all, they never run that way. These are in great plenty in several parts of Oxfordshire; some of which are large, and as it were heaped one upon another; and others single, or found by themselves. The real shell-fish that answers to these are called *Streaked Cockles*; but they are always very smooth within, whereas some of these are evidently streaked on the inside; and the streaks not only run from the joint or hinge to the rim, but there are four or five broad transverse streaks, made up of several lines almost close to each other; for which reason some would have it to be a stone of a particular kind.

Besides the shells already mentioned, there are others that seem to be of the oyster kind, which are very common in the gravel-pits in some parts of Oxfordshire; among these, there is one of an oblong shape, which is very thick, and of a bluish colour, and seems to be the same as the thick oblong concha taken notice of by Dr. Merrit, which he found in Worcester-shire, where they are called *Crow-stones*, *Crow-cups*, and *Egg-stones*.

There are other shells or stones that have some resemblance to muscles; but they are of an odd sort of a figure, and there are no real shells that we know of like them. They are not hollow, but are filled on the inside with a stony earth of a yellowish colour, and their covering is white and shining, with oblong lines. It is very long and narrow in proportion, and is marked, but very faintly, like the shell of a common muscle.

There are other petrifications resembling shell-fish, of the softer crustaceous kind, such as the *Sea Urchin*, which for substance and hardness are much like a pebble, and of a yellowish colour. They are divided at first by five pretty straight lines, adorned on each side by a double row of points, ascending from a protuberant centre in the basis of the stone to another shape at the top, but foliated round in the manner of a rose. It is likewise subdivided by five other indented lines, which terminate before they reach the centre; but they make the spaces between them appear like pentagons, or like the shells of some kinds of tortoises. Aldrovandus takes notice of a stone of this kind, which he ima-

gined resembled the *Sea Hedge-hog* deprived of its prickly coat. Dr. Plott calls it the *Porcupine Stone* without bristles. There is another that is curiously embroidered and resembles the *Sea Hedge-hog* of Imperatus. It is of a whitish ash colour without, but within is a hard black flint covered over with thin glittering plates placed edgeways on the ball of the flint, and which compose the uniform eminences and depressures with waved and transverse lines. Some Writers calls these *Serpents Eggs*.

There is another sort of *Hedge-Hog Stone*, which resembles the shell of a kind of sea hedge-hog, and is said to be like the stelled eggs of that hedge-hog. Their outermost coat is full of sharp prickles, upon which account they are sometimes called *Sea Chest-nuts*, because of their likeness to the rough prickles that encompass chestnuts while they are on the tree. When they are dead, all the prickles will fall off, and then the shell is discovered, which is curiously wrought, and resembles the stone of which we are now speaking. They consist of many compartments and eminences, which are so regularly disposed, that the most ingenious embroiderer cannot easily imitate them. It may be doubted, whether there is any animal with a shell like this stone; for no account has been given of any such hitherto. There is also another kind of *Echinites* or *Hedge-hog Stone* found in the quarries near Shotover Hill. The inward shell of this fish is very small though the prickles are long and stiff; and it is always found in the deepest waters sticking to the rocks.

The *Cornu Ammonis*, or *Ammon's Horn*, is so called because it is like the horns of rams, which were consecrated in the temple of Jupiter Ammon, seated in the sandy desarts of Lybia. They were formerly taken to be petrified serpents, and several authors have compared them to the nautilus, or have confounded them with each other. The unpetrified *Ammon's Horns* are divided by several partitions; but they have fewer sinuosities than the nautilus, and they have no small pipes that run through them to preserve a communication one with another. There is also some difference in their covering; for the nautilus is very smooth, or at least the streaks of the surface only answer to the windings on the inside, and are very broad; whereas *Ammon's Horns* have several external turns, are covered often with tubercles, and almost always with streaks. There are plenty of the fossile kind in the county of Oxford, which are of different colours, shapes and sizes, but always so curled up, that the place of the head is in the circumference, and the tail is in the centre of the stone. Some are small, with protuberant parts swelling almost to a round; others are broader and more depressed; but the lines in both are undulated, and extended from near the centre to a single edged ridge on the back of the stone. In this respect they differ from a third sort that has broader lines, but not undulated, and they terminate at the large protuberances on each side the stone, between which and the broad back thereof there run other lines; the whole body of the stone being likewise divided into sutures not much unlike the leaves of an oak.

A sort of these stones have been found in the parish of Cleydon in Oxfordshire, which have many more turns than the former, though they are not much bigger; but they are without a covering, and are of a yellowish colour, with streaks that run from the innermost part of the stone, and are all single, except that some of them are divided into two parts before they reach the rim of the stone, where they terminate with a back much more protuberant than the rest of the stone, though streaked in the same manner. There are also others met with that are not stones like the former, but consist of a fine stony earth, or hardened yellow clay; contrary to

the opinion of some authors, who affirm that they are all of the same consistence.

The OPHIOMORPHITES nearly resemble the former, and are so called from their being like serpents rolled up. Some of these are also found so soft, that it is easy to break them with the fingers; but there are others that consist of a hard bluish stone. They differ from these in their lines or furrows; for in the former the streaks are wider, and more open near the rim; but in some of these they are closer, and also united into pretty large protuberant knobs on each side the back of the stone, which in these is broad and somewhat rising, and is crossed by other crooked or curve lines that run between the eminences. There are other stones of this kind, that have only straight single ribs, which likewise terminate in straight ridges, that run on each side the back of the stone; between which there is a third that is more prominent, and might be taken for the spine of the back; however, it is not wreathed, but plain like those on each side of it. The largest of this kind in Oxfordshire was found at Langford, near Oxford, and is eleven inches over, and weighs seventeen pounds. The ribs are single, and there are no knobs or ridges at the back, which is plain and even.

The BELEMNITES are so called from the Greek word *Belemnion*, which signifies a dart, because they are nearly of that shape. Authors are not agreed in what class to place this stone. The shape is, however, sometimes conical, sometimes cylindrical, and they most commonly consist of a substance that is black and horny; the length is from two inches to eight, and the diameter from the sixth part of an inch to three or four inches in circumference. The inward parts consist of rays, and there is generally a cell at the large end, and a furrow that runs from the top to the bottom.

There are other stones that represent herbs and plants, among which are FUNGITES, or TUBEROIDES, so called from their resemblance to mushrooms: these are of an ash colour without, but a black flint within. Others resemble only the parts of plants, one of which has been met with like a root of briony broken off transversely, which shewed the small fibres that run from the centre to the circumference; as well as the other streaks that run down the sides, and the annular divisions. The colour also is so like that of briony, that it can hardly be distinguished from it, except by the weight. It was found in quarries of rubble-stone near Shotover-Hill in Oxfordshire.

There are other stones like the fruit of trees, some of which are called PYRIFORMES, from their likeness to pears: one of these was found of eleven inches in circumference, and in size and form resembling a king-pear. This was a black flint; but there is another that is whitish without, and yellow within, in the shape of a warden pear. Other stones have been found in the shape of apricots, with the cleft or furrow from the stalk to the top, exactly representing a real apricot; likewise there have been spars found resembling mulberries, and white flints in the shape of Lucca olives.

There are also stones in the shape of those belonging to fruits. Most of these have a kind of pedicle or stalk, from which they seem to have had their growth, and are ridged and furrowed the whole length of the stone. Their texture is very curious, they being made up of little thin plates, not unlike the stone called the Selenite, only they are opaque, and the bulk of the stone much different. The plates seem to be made up of strings, some of which run two ways, and others three, and according to their directions the stone will readily cleave; yet they are all oblique to the axis of the stone.

There are other stones that resemble animals either entirely or in part, among which there are some that seem to have been petrified reptiles, and very likely have been really such, which may easily be accounted for without the help of a flood. There are others that represent the shells of garden snails, and are very numerous. There are others called Worm-stones, which are of two sorts, and one of them is of a whitish yellow colour; but not hollow within; for they seem to be of the same texture with the pebble-stones among which they are found.

There are some stones that represent the parts of four-footed beasts; particularly in the quarries at Heddington there are some that are like the head of a horse, having the ears and crest of the mane, with the places of the eyes, as prominent as in a real horse; and the rest of the face entire, only the mouth and nose are wanting in them all. These are not uncommon, and they are of several sizes; though they are not taken notice of by any ancient authors. There are other stones in the form of hearts, and on account of their size are by authors called Bucardites, or stones like bulls hearts. They are of a whitish yellow colour, with a smooth plain surface; though there are some that are ribbed on each side; these are ten inches in circumference, and weigh about two pounds; and there have been some found that have weighed twice as much.

Dr. Plott met with some sort of stones in the quarries of the rubble-stone near Shotover, which were composed of filaments like hair; and which could not be the Polytrix of Pliny, because they are not greenish, nor the Bestrychites of Zoroaster, nor the Corsoides of Pliny, because they are neither grey nor long. However, it is a sort of Thrichites, because it is most like the short hair of beasts. The colour is yellowish, and each hair when viewed through a microscope appears to be streaked and furrowed throughout its whole length.

Some stones have been found accurately representing the combs of bees, with the cells of each cavity all hexangular, exactly like those of honeycombs. There was one stone found in a marl-pit that was very like a mole both in the head and tail, but more especially in the foot; it was so very exact that it was divided into claws, and represented the foot of that animal in all particulars. Some have been found so nearly resembling the head of an Owl, as almost to imitate life, having the eyes and beak of that animal very perfect. Another was of the shape and size of a partridge's skull, with the eyes and short beak, and was hollowed behind just as if the brains had been taken out: to these may be added still another, which was the accurate representation of a pullet's heart, with the fat near the basis thereof, and the coronary vessels descending from it most exactly delineated. All these are taken notice of by Dr. Plott.

There are some stones that seem to belong to the oviparous quadrupeds, among which is the Bufonites or Toad-stone. Authors acquaint us there are two kinds of these, the first of which are those that are called Brontixæ and Ombria, which are sometimes of a dusky reddish, yellowish or greenish colour, of the size of a hen's egg. From the flat or the concave side there generally runs five lines to the centre of the convex side, at equal distances, and marked with exceeding small tubercles.

There has been another stone found in the rubble-quarry near Shotover Hill, that is a lively representation of olfactory nerves entire and whole: many of these are of a yellowish colour, smooth without, and hollow within. Dr. Plott found another of an oval shape, and chiefly of a reddish colour; but at one end it had a circle of white within, which is a zone of the colour of the stone, and then a round pupil of white, so that it looked like an eye darkened by a cataract.

There

There are other stones, which resemble the ears of a man, though much less, and Dr. Plott calls them *Otites* or *Auriculares*; they are common in the rubble-quarries near Shotover, but more so in a bank near a spring at Somerton town's-end, eastward from the church. There are other stones met with in the shape of human breasts, having not only the nipple, but the areola studded with small protuberances, and therefore may be properly called *Mammillares*.

There are other stones, which exactly resemble the heart of a man, with the trunk of the descending part of the vena cava, as also the ascending part of the vein of the same name. Likewise from the left ventricle there proceeded the trunk of the great artery, and a portion of the same artery tending downwards. Within it appeared to be a whitish sort of flint, and certainly deserves the name of *Anthropocardites*.

Other stones have been found exactly representing the private parts of a man; and others in the shape of kidneys, with the trunk of one of the ureters descending from the hollow part of it. When found it was the colour of a kidney, and was so soft that it might be readily cut with a knife, that is, the part of it resembling an ureter; but in less than an hour's time it grew as hard as the rest of the stone. To this class may be added the *Triorchites*, or *Diorchites*, which resemble the testicles of man or beast.

Some stones have been met with in the shape of human bones; particularly one exactly resembling the lowermost part of the thigh-bone of a man, with the lower head; between which are the anterior and the larger posterior sinus, which is the seat of the strong ligament that rises out of the thigh, and that allows a passage to the vessels descending into the leg. A little above the sinus, where the bone seems to have been broken off, there is a shining spar-like substance, resembling marrow in the hollow of the bone. Its circumference near the head is exactly two feet, and at the top above the sinus about fifteen inches, and the weight is near twenty pounds; which shews that the bulk is too monstrous to have belonged to a man, though it is precisely of the same shape. With this there was found a tooth that weighed two ounces and a quarter; but it was not at all petrified, which perhaps may be owing to the nature of teeth, whose hardness and want of large pores do not so readily subject them to putrefaction: for the same reason in graves they are often found sound and good, when all the other parts have been consumed. Not far from Bath in Somersetshire, there have been hundreds of teeth picked up by those who followed the plough, though no other bones were met with to which they might have been supposed to belong. We are informed by Tazellus in his history of Sicily, that two large skeletons were found, which, when they came to be touched, all fell into dust, except the teeth called the grinders. What animal the thigh-bone above mentioned did belong to is hard to say, though some have taken it to be the bone of an elephant brought over by the Romans when they were masters of this kingdom. However, it does not appear from any authors, that those animals were ever brought over into Britain; and yet it cannot be denied that several have been brought over hither for public shews: but whether any died in Oxfordshire, and were there buried, must be left to the judgment of the reader.

There has been a great number of monstrous teeth found in different parts of England; and in Essex there were two met with in the reign of Richard I which were large enough to make two hundred each of the common size. One dug up near Maidstone in Kent was near seven inches in circumference, and weighed five ounces and one eighth. In the year

1666, after the fire of London, when St. Mary Woolchurch was pulled down, there was a thigh-bone found larger than the above-mentioned, which however was not turned to stone. There was also another found in London three feet and two inches long. After all, we may be certain that these bones did not belong to elephants, because they are of a quite different shape, which has been found by comparing them together; and therefore Dr. Plott was of opinion they belonged to men or women. To support his opinion, he takes notice of the sizes of the several giants that have been mentioned by authors; and he likewise mentions a giant in France, who lived there about two hundred years ago: this man was said to be so tall, that a man of a common stature might go upright between his legs.

Dr. Plott likewise takes notice of a stone found at the foot of Shotover Hill, which represents the leg and foot of a man cut off above the ankle, and which from the toe to the heel is about a yard long. However, he does not take this to be a petrification, but a stone formed in this shape by the plastic power of nature.

Besides these stones resembling the parts of animals, there are others not unlike things made by art. Among these are some of the shape of buttons, and others like the heel of an old shoe, with the lifts plainly distinguished from each other. One of the button stones was found at Teynton in Oxfordshire, pretty near resembling a hair button.

Other stones have been seen like the bags called the Sleeves of Hippocrates, made use of by the chemists; and there have been three one above another, as they usually place them. Others have been found in the shape of a whetstone; and some in that of a cap. There is another stone of an ash colour called *Trochites*, from its likeness to a wheel; for it has rays or spokes which proceed from the center, like those of a cart-wheel from its nave. Some of these are called *Entrochi*, or *Wheels within Wheels*; the rays of one of the *Trochites* being in relief, and always lying in the furrows between the two protuberances of the other, as in the sutures of a skull. The round part is smooth, and the nave is flat; from which, as in common wheels, the prominent rays proceed to the outward circumference, so as to leave furrows between them. They are joined together so curiously, that they seem to be the effect of art; for the spokes of one are inserted in the furrows of the other, so as to represent the sutures of a human skull. Sometimes there are twenty united together in this manner. When the *Entrochos* is smooth in every part, the spokes are prominent. These stones differ in colour from each other; for some are white, others ash-coloured, and others again yellow: they differ also in size, for the largest are near an inch broad, and about a third as much thick. It is found in Saxony, in the clefts of marble, of a whitish ash-colour.

The *Entrochi* of Staffordshire are much larger, longer, and consequently compounded of more *trochites*, than those of Yorkshire or Somersetshire; for some are three inches and a half in circumference, whose center or nave is half an inch over. One found in a rock was near six inches long, but it was so fast inclosed that it could not be got out entire. Some of two inches and a half long consisted of thirty-five *trochites*.

At Beresford, and other places in Staffordshire, there are stones that seem to be made up of thick *trochites*, that have no bore at all, nor any rays at the top proceeding from a solid centre; which is no wonder, because when they are broken they do not seem to consist of plates like the rest. There is another sort that seem to be made up of joints like the *Entrochi*, in which the *trochites* neither appear round nor square on their outermost rims, but sharp like

like the edge of a screw, tapering from the place of their joining, and are streaked on their surfaces; so that the rays of one do not enter into the furrows of the other, nor yet do the rays join to the centre at right angles; and this in these is a large cylinder of black flint. Neither are all these cylindrical as the former; for some of them taper upwards from a broad basis, the lowermost rims being greatest, and decreasing gradually to the top. Some of these are so different from the former, that they have a thin streaked plate passing from each rim to the sides of the cylindrical concavity; so that there appears a distinct concavity between each ring. Some again have others included within them, and appear like rings parallel to each other, and not like a screw, nor do the protuberant edges of the one enter into the furrows of the other, like the male and female screws.

Some sorts of these stones, that have such cavities, are in the form of five columns joined together without any addition; and others are bound by thin rings that stand pretty thick and at equal distances, which are not streaked. Some again are knit together by the same sort of rings, that are only in pairs, there being some distance between each pair; and others have four placed in the same manner. There is still another sort fenced in the same way, some of which are of an equal bigness from the bottom to the top, and are curiously wrought in small rings, first with two at some distance, and then with four close together; and so on alternately the whole length of the stone: but others, though like the former in other respects, are bigger both at the top and at the bottom, and resemble a pillar with a pedestal and capital. Lastly, there are some very small ones, that stand in cavities like straight smooth pillars, only they are marked with a row of knobs on each side; and there are others that look like so many buttons piled upon each other.

ASTERIÆ, or STAR-STONES, are found in several parts of the kingdom, and particularly in the fields about Cleydon in Oxfordshire. They consist of thin plates lying obliquely to the horizontal position, much after the manner of the Jews Stone; and the colour is various, according to the different soils in which they are found: for this reason, in Gloucestershire and Yorkshire, where they are taken out of a blue clay, they are nearly of the same colour, and break like flints with a dark shining surface. In Warwickshire, as well as in some parts of Gloucestershire, they are of an ash colour; and at Cleydon they are yellowish, because they are found in a yellowish earth. They are here about an inch and a half in length, and seldom less than an inch in circumference: and whereas in other countries they are so hard, that it is difficult, if at all possible, to separate one from another without spoiling them; yet if these are steeped in vinegar for a night, they may be divided the next morning with safety and ease. They likewise differ from those of other places in shape; for, besides the sculpture that makes up the angles, there is the representation of a rose in the middle thereof, which is not commonly seen in those found elsewhere.

Many of the longest jointed Star-Stones have some of their joints a little broader and more prominent than others, dividing the whole body as it were into certain conjugations of two, three, or more joints, which, as Dr. Lister observes, are marked with sets of wires, as he calls them.

The Star-Stones found in Staffordshire are exactly of the same shape, in which stars are commonly painted; for they have all five principal rays of an equal length, shape, and make, and proceeding from the centre, which is either solid or hollow, and where they join in angles of seventy-two degrees. They differ somewhat from each other in the dif-

ferent places where they are found, as also from those in Oxfordshire, as well as from those taken notice of by Dr. Lister in the Philosophical Transactions; for though they are placed on each other in columns, and seem to be fragments, some having three, four, or more joints, yet none of them seem to be made up of plates lying obliquely to the horizontal position of the star; and some of them have their angles so very acute, and consequently their sides so deeply furrowed, that they seem to represent the rowel of a spur, without any sculpture or indented future; but when there is any such, they are of a quite different kind from those already mentioned.

The first sort are placed in a case of a flinty kind of stone, consisting of five angles; and the rays proceed from a solid centre, of a coal-black colour, not bigger than a common pin; yet they are evidently of a flat figure, consisting of five angles; though the angles of the inner one do not point against the sharp rays of the outer, but against the deep furrows between them; however, they are both smoothly jointed, without any hatching or engraving.

The second sort consists of a flat and not hollow-sided piece, such as Dr. Lister has described in the Philosophical Transactions; and the hatchings thereof are very different from all his. There is one principal ray which extends itself from the centre to the extremity of each angle, with oblique lines proceeding upwards therefrom, in such a manner that they in some sense represent so many boughs of a tree.

The third kind has also flat sides; but the joints are all unequal, one of them being always more protuberant than the next, and so alternately throughout the whole column. It consists of twelve joints, and the hollow of each angle is neither hatched on the top, nor is the column bent, or the least inclining, as those commonly are which are of a greater length. These have the property of moving in vinegar, like the former; and this property seems to have been known to Roger Bacon near five hundred years ago; for in one of his epistles he affirms they would run in vinegar.

The ASTROITES are a kin to the Asteriæ, and are of different sizes, but are adorned all over with many stars; and there are no less than four different kinds found in Oxfordshire, in two whereof the stars are in mezzo-relievo, they being prominent and standing outwards, with the streaks descending from the center at the top and all sides to the rock on which they grow. Some of these are of a larger and others of a smaller kind, which are both found in the quarries of rubble-stone. There is a third sort, which are more beautiful than the rest, and are deeply engraved like a seal, and streaked from the prominent edges above, to a centre in the bottom. These are generally hexagons, and sometimes pentagons; and yet they agree with the former in this, that the stars are only superficial, and not found in the body of the stone.

The fourth sort has been imperfectly described by Gesner, and after him by several others. The streaks of these are like the third sort, descending in a concave; but from the edges are generally round, or with five angles at the top, and tend to a center, but not of their own kind, for they are smooth and apparently prominent. They are found in quarries of rubble-stone, and are stellated, not only on the surface of the stone, but quite through the depth thereof; yet not so as to have one continued star reach through the whole, but many, according to the thickness of the stone; for about ten of them lie in the depth of an inch, much after the same manner as the star-stones; only they are not separate, but join together, and make as it were so many rows

of the stone. Some of these are so large in France, that they have been there used for the building of walls and houses; but with us they are generally employed in paving causeways, particularly in Oxfordshire.

The property of moving in vinegar is common both to the Asteriæ and the Astroids; though the Asteriæ will move not only in a whole joint, but two or three connected together; whereas the Astroids must be broken into very small pieces before they will move. The Asteriæ has not only a progressive motion, but will turn round in vinegar, and will stir more briskly and longer than any other stone that vinegar has the like effect upon; and though it has been steeped therein for three or four days, yet when fresh is poured upon it, it will still emit a great many little bubbles as at first from underneath it, and at the instant it begins to move.

Linnæus places the LAPIS JUDAICUS, or JEW'S STONE, among petrifications; and Boet informs us that it is in the shape of an olive, and is roundish, tender, and brittle, with streaks that run according to the length, and placed at equal distances, as if they were done by art. The colour is whitish, or a faint ash colour, shining within, and it may be obliquely cloven into foliaceous plates. It is called a Jew's Stone, because it has been found in Judæa, and other parts of Syria; but some of these have been found in England, particularly in Oxfordshire, which are of a more slender and longer shape than any sort of olive. Some are about two inches in length, and an inch and a half in circumference; but others have been met with less than an inch long, and not much above half an inch round. Most of them have a kind of pedicle or stalk, from which they seem to have had their growth, and there are ridges or furrows through the whole length of the stone. The ridges are marked with small knots, in four points placed in a square, and a fifth in the middle. Their texture is very curious, for they consist of thin plates, as above, not unlike the felenites, only they are opaque.

Linnæus likewise places CORAL, Madrepore, and the like, among petrifications: and he calls them Lithophytes, though they have been commonly placed among sea plants. Those of the Coral kind are a little flexible, like wood; when in the water, and to a small degree when out of it; but they may be reduced into powder like chalk. There are a great many of this kind, which resemble small trees without leaves: others are in the form of a net, sometimes with large meshes, and sometimes with small. The inside of the branches seem to be of the nature of horn; for it has the same smell when put into the fire: but the bark is of a stony nature, and contains a great deal of salt. Coral, properly so called, is of a stony nature, and is placed in the animal kingdom, because it produces sea insects. Some of these are red, and others white, and others of various colours. However, the red, of the colour of vermillion, is best, and is by some said to be of the male kind, and that which is palish of the female. The white Coral is the next in value, and then the black; but those of the other colours some will not allow to be Corals, though they are found in the same places. It is always covered with a bark, and is stony, solid, and very hard, even in the water; though the branches are a little flexible, but soon grow hard in the air. The bark of Coral is a mixture of tartar and a fluid of a gluey nature; and though it is a little rough, it takes a very fine polish. Some take the black Coral to be the sea plant of a different nature.

Red Coral is not so much esteemed in Europe as it is in Asia, and particularly in Arabia. It is used for making several sorts of toys, such as spoons, heads of canes, knife-handles, sword-hilts, and

beads; and, when set in silver, it serves as a plaything for children, and is designed to rub their gums therewith, that they may breed their teeth more easily.

On the young branches of Coral there are found small eminences, pierced in the form of stars, and full of a milky fluid when they are just taken out of the water. Many learning men have thought sea plants to be nothing but petrifications, consisting of plates of salt, and layers of tartar, placed one upon another; and as coral always grows with its head downwards, in caverns of rocks in the sea, the situation has caused them to suspect that they were nothing else but petrifications like those found on the roofs of certain caves in the rocks. But since the discovery of the flowers of coral, and some other marine productions, it is not at all doubted but they have a regular organization; and if their seeds have not yet been perceived, it is because their smallness renders them imperceptible.

But some have thought that the generation of these plants is not owing to these seeds; because, as they always hang with their heads downwards, they would fall off to the bottoms of the caverns, and not place themselves on the top; but this difficulty may be removed, by supposing they are lighter than the sea water, and that the milk which surrounds them is of so thick a nature, that it may help to assist them in swimming. Hence indeed it may happen, that many of them may rise to the top of the water, and there perish; but then likewise others may ascend to the top of the caverns, and there fix themselves, and then they will grow like the coral from which they proceed. Hence we may conclude, from the regularity of these productions, the organization of their parts, the great numbers of small pores in their bark to receive the bitumen and other sea juices, the eminences regularly hollowed in the form of stars, which serve for the cases of flowers in the same shape, the vessels full of a milky fluid which is found between the bark and the body of the plant, to make it grow thicker by little and little, and the perpetual uniformity of the same circumstances; we say, from all these particularities we have reason to believe, that the bottom of the sea is covered with plants, with characteristics different from ours. In Spain they have a particular sort of a machine for the getting of Coral, particular at a promontory in Catalonia. This is a wooden cross which is very large, and in the centre there is a wooden ball of a great weight, to which a very long and thick rope is fastened. At each end of the cross they hang a net in the form of a bag, which being let down into the sea, there are proper persons, who know where the Coral is to be found, and have the care of managing the rope. They guide one or more ends of the cross into the caverns, and then the nets lay hold of the Coral, break it off, and let it fall into the hollow part of the net; and when they have got as much as can well be contained in each of them, the machine is drawn up. The Red Coral is only chosen for medicinal uses, and many authors have ascribed great virtues thereto, which are in a great measure imaginary; however, it cannot be denied that it is a good absorbent, and therefore is proper to restrain the orgasm of the blood, and to blunt the acrimony of the bile and other humours in various sorts of fluxes, as well as for the gripes in children. Its dose is from a scruple to a drachm.

The MADREPORE has no bark like the former, but it is branched like it, though the branches are not so numerous. There are several sorts of them, and some are only a thick plate of a hardish stony matter, pierced with a great number of holes or pores, which are disposed in the form of small pipes, waves, stars, and other figures; but it is most commonly in the shape of a small tree, and the branches

are

are always full of holes or pores. It is found in various parts of the world, but no where in such great plenty as near the Caribbee islands.

There are several sorts of them, as the stellular Madreporé akin to Coral; the branched Madreporé akin to Coral; the Madreporé or Milleporé of Tournefort; the common Madreporé or fistulous white Coral; the Madreporé like southernwood; the warty-pointed Madreporé, by some called the water-pointed white Coral; and the white stellular Madreporé.

Though Madreporé is generally found growing in the sea, yet it is sometimes found on the tops of mountains: that met with by Jussieu on Mount Chaumont in Normandy was porous, light, white, and in all respects like the common Madreporé. It is, like most petrifications, alkaline and absorbent, and has much the same virtues as Coral. In fluxes of the belly, the dose is from half a scruple to two scruples.

We cannot conclude this History of Minerals, &c. without paying that just tribute, which is due to the wise Author of Nature, who has not only provided man with every thing that is necessary either for his

use or amusement, but has furnished him with reason to enquire into their various properties. The beasts of the field either assist him in the ease of this labour, or supply him with the most nourishing food; the inhabitants of the air above him, and those of the waters beneath, furnish his table with the most delicate repasts; the earth affords him the most wholesome vegetables, which preserve the temperature of his body, and relieve those disorders which arise from too free a use of grosser food; beneath his feet, and deep in the bowels of the earth, inexhaustible treasures lie hid, such as gold, silver, and the most precious jewels; iron, to secure him in his habitation from assassination and plunder, and to make him every kind of instrument indispensibly necessary in agriculture, navigation, and mechanical arts. Vain indeed is the attempt to enumerate, in a few lines, those wonders of the creation! Let us, however, from what we have read, draw this conclusion, that, in proportion as we increase our knowledge of natural causes, the more elevated idea shall we have of him, who is the author of them all.



A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of

NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature.

B O O K VI.

Containing the THEORY of the EARTH in general.

THE general history of the Earth, is a necessary study for those who desire to make themselves acquainted with nature and her productions, and the detail of singular circumstances of the life and manners of animals, or of the culture and vegetation of plants, belong perhaps, less to natural history than to the general results of observations made on the different matters which compose the terrestrial globe; the eminences, depths, and inequalities of its form, the motion of the sea, the direction of mountains, the position of quarries, the rapidity and effects of currents, &c. This is nature in its ample extent, and these are her principal operations; they influence all the rest, and the theory of these effects is a first science of which the intelligence of particular phenomena, as well as the exact knowledge of terrestrial substances depends.

C H A P. I.

Containing a Sketch of the UNIVERSE.

THE world may be considered as one vast mansion, where man has been admitted to enjoy, to admire, and to be grateful. The first desires of savage nature are merely to gratify the importunities of sensual appetite, and to neglect the contemplation of things, barely satisfied with their enjoyment: the beauties of nature, and all the wonders of creation, have but little charms for a being taken up in obviating the wants of the day, and anxious for precarious subsistence.

Philosophers, therefore, who have testified such surprize at the want of curiosity in the ignorant, seem not to consider that they are usually employed in making provisions of a more important nature; in providing rather for the necessities than the amusements of life. It is not till our more pressing wants are sufficiently supplied, that we can attend to the calls of curiosity; so that in every age scientific refinement has been the latest effort of human industry.

But human curiosity, though at first slowly excited, being at last possessed of leisure for indulging its propensity, becomes one of the greatest amusements of life, and gives higher satisfactions than what even the senses can afford. A man of this disposition turns all nature into a magnificent theatre, replete with objects of wonder and surprize, and fitted up chiefly for his happiness and entertainment: he industriously examines all things, from the minutest insect to the most finished animal; and when his limited organs can no longer make the disquisition, he sends out his imagination upon new enquiries.

Nothing, therefore, can be more august and striking than the idea which his reason, aided by his imagination, furnishes of the universe around him. Astronomers tell us, that this earth which we inhabit forms but a very minute part in that great assemblage of bodies of which the world is composed. It is a million of times less than the sun, by which it is enlightened. The planets also, which like it, are subordinate to the sun's influence, exceed the earth a thousand times in magnitude. These, which were at first supposed to wander in the heavens without any fixed path, and took their name from their apparent deviations, have long been found to perform their circuits with great exactness and strict regularity. They have been discovered as forming with our earth a system of bodies circulating round the sun, all obedient to one law, and impelled by one common influence.

Modern philosophy has taught us to believe that, when the great Author of nature began the work of creation, he chose to operate by second causes; and, that, suspending the constant exertion of his power, he endued matter with a quality by which the universal œconomy of nature might be continued, without his immediate assistance. This quality is called attraction; a sort of approximating influence, which all bodies, whether terrestrial or celestial, are found to possess; and which in all increases as the quantity of matter in each increases. The sun, by far the greatest body in our system, is, of consequence, possessed of much the greatest share

of this attracting power; and all the planets of which our earth is one, are of course, entirely subject to its superior influence. Were this power, therefore, left uncontrouled by any other, the sun must quickly have attracted all the bodies of our celestial system to itself; but it is equably counteracted by another power of equal efficacy; namely a progressive force which each planet received when it was impelled forward, by the divine architect, upon its first formation. The heavenly bodies of our system being thus acted upon by two opposing powers; namely, by that of attraction, which draws them towards the sun; and that of impulsion, which drives them strait forward into the great void of space; they pursue a track between these contrary directions; and each like a stone whirled about in a sling, obeying two opposite forces, circulates round its great centre of heat and motion.

In this manner, therefore, is the harmony of our planetary system preserved. The sun, in the midst, gives heat, and light, and circular motion to the planets which surround it: Mercury, Venus, the Earth, Mars, Jupiter, and Saturn, perform their constant circuits at different distances, each taking up a time to complete its revolutions proportion to the greatness of the circle which it is to describe. The lesser planets also, which are attendants upon some of the greater, are subject to the same laws; they circulate with the same exactness; and are, in the same manner, influenced by their respective centres of motion.

Besides those bodies which make a part of our peculiar system, and which may be said to reside within its great circumference; there are others, that frequently come among us, from the most distant tracts of space, and that seem like dangerous intruders upon the beautiful simplicity of nature. These are comets, whose appearance was once so terrible to mankind, the theory of which is better understood at present: we know that their number is much greater than that of the planets; and that, like these, they roll in orbits, in some measure, obedient to solar influence. Astronomers have endeavoured to calculate the returning periods of many of them; but experience has not, as yet, confirmed the veracity of their investigations; indeed, who can tell when those wanderers have made their excursions into other worlds and distant systems, what obstacles may be found to oppose their progress, to accelerate their motions, or retard their return?

But what we have hitherto attempted to sketch, is but a small part of that great fabric in which the Deity has thought proper to manifest his wisdom and omnipotence. There are multitudes of other bodies dispersed over the face of the heavens, that lie too remote for examination: these have no motion, such as the planets are found to possess, and are therefore, called fixed stars; and from their extreme brilliancy and their immense distance, philosophers have been induced to suppose them to be suns resembling that which enlivens our system; as the imagination also, once excited, is seldom content to stop, it has furnished each with an attendant system of planets belonging to itself, and has even induced some to deplore the fate of those systems, whose imagined suns, which, sometimes happens, have become no longer visible.

But conjectures of this kind, which no reasoning can ascertain, nor experiment reach, are rather amusing than useful. Though we see the greatness and wisdom of the Deity in all the seeming worlds that surround us, it is our chief concern to trace him in that which we inhabit. The examination of the earth, the wonders of its contrivance, the history of its advantages, or of the seeming defects in its formation, are the proper business of the natural historian. A description of this earth, its animals,

vegetables, and minerals, is the most delightful entertainment the mind can be furnished with, as it is the most interesting and useful. We would beg leave, therefore, to conclude these common-place speculations, with an observation, which is not entirely so.

An use, hitherto not much insisted upon, that may result from the contemplation of celestial magnificence, is, that it will teach us to make an allowance for the apparent irregularities we find below. Whenever we can examine the works of the Deity at a proper point of distance, so as to take in the whole of his design, we see nothing but uniformity, beauty, and precision. The heavens present us with a plan, which, though inexpressibly magnificent, is yet regular beyond the power of invention. Whenever, therefore, we find any apparent defects in the earth, which we are about to consider, instead of attempting to reason ourselves into an opinion that they are beautiful, it will be wise to say, that we do not behold them at the proper point of distance, and that our eye is laid too close to the objects to take in the regularity of their connexion. In short, we may conclude that God, who is regular in his great productions, acts with equal uniformity in the little.

CHAP. II.

Containing a short Survey of the GLOBE, from the light of Astronomy and Geography.

ALL the sciences are in some measure linked with each other, and before the one is ended the other begins. In a natural history, therefore of the earth, we must begin with a short account of its situation and form, as given us by astronomers and geographers: it will be sufficient however, upon this occasion, just to hint to the imagination, what they, by the most abstract reasonings, have forced upon the understanding. The earth we inhabit is, as has been said before, one of those bodies which circulate in our solar system; it is placed at an happy middle distance from the centre; and even seems in this respect, privileged beyond all other planets that depend upon our great luminary for their support. Less distant from the sun than Saturn, Jupiter, and Mars, and yet less parched up than Venus and Mercury, that are situated too near the violence of its power, the earth seems in a peculiar manner to share the bounty of the Creator: it is not, therefore, without reason, that mankind consider themselves as the peculiar objects of his providence and regard.

Besides that motion which the earth has round the sun, the circuit of which is performed in a year, it has another upon its own axle, which it performs in twenty-four hours. Thus like a chariot-wheel, it has a compound motion; for while it goes forward on its journey, it is at the same time turning upon itself. From the first of these two arise the grateful vicissitude of the seasons; from the second, that of day and night.

It may be also readily conceived that a body thus wheeling in circles will most probably be itself a sphere. The earth, beyond all possibility of doubt, is found to be so. Whenever its shadow happens to fall upon the moon, in an eclipse, it appears to be always circular, in whatever position it is projected: and it is easy to prove, that a body which in every position makes a circular shadow, must itself be round. The rotundity of the earth may be also proved from the meeting of two ships at sea: the top-mast of each are the first parts that are discovered by both, the under parts being hidden by the convexity of the globe which rises between them. The ships in this instance may be resembled to two

men who approach each other on the opposite sides of an hill: their heads will first be seen, and gradually as they come nearer they will come intirely into view.

However, though the earth's figure is said to be spherical, we ought only to conceive it as being nearly so. It has been found in the last age to be rather flatted at both poles, so that its form is commonly resembled to that of a turnep. The cause of this swelling of the equator is ascribed to the greater rapidity of the motion with which the parts of the earth are there carried round; and which, consequently, endeavouring to fly off, act in opposition to central attraction. The twirling of a mop may serve as an homely illustration; which, as every one has seen, spreads and grows broader in the middle as it continues to be turned round.

As the earth receives light and motion from the sun, so it derives much of its warmth and power of vegetation from the same beneficent source. However, the different parts of the globe participate of these advantages in very different proportions, and accordingly put on very different appearances; a polar prospect, and a landscape at the equator, are as opposite in their appearances as in their situation.

The polar regions, that receive the solar beams in a very oblique direction, and continue for one half of the year in night, receive but few of the genial comforts which other parts of the world enjoy. Nothing can be more mournful or hideous than the picture which travellers present of those wretched regions. The ground, which is rocky and barren, rears itself in every place in lofty mountains and inaccessible cliffs, and meets the mariner's eye at forty leagues from shore. These precipices, frightful in themselves, receive an additional horror from being constantly covered with ice and snow, which daily seem to accumulate and to fill all the vallies with increasing desolation. The few rocks and cliffs, that are bare of snow, look at a distance of a dark brown colour, and quite naked. Upon a nearer approach, however, they are found replete with many different veins of coloured stone, here and there spread over with a little earth, and a scanty portion of grass and heath. The internal parts of the country are still more desolate and deterring. In wandering through these solitudes, some plains appear covered with ice, that, at first glance, seem to promise the traveller an easy journey. But these are even more formidable and more unpassable than the mountains themselves, being cleft with dreadful chasms, and every where abounding with pits that threaten certain destruction. The seas that surround these inhospitable coasts, are still more astonishing, being covered with flakes of floating ice, that spread like extensive fields, or that rise out of the water like enormous mountains. These, which are composed of materials as clear and transparent as glass, assume many strange and fantastic appearances. Some of them look like churches or castles, with pointed turrets; some like ships in full sail; and people have often given themselves the fruitless toil to attempt piloting the imaginary vessels into harbour. There are still others that appear like large islands, with plains, valleys, and hills, which often rear their heads two hundred yards above the level of the sea; and although the height of these be amazing, yet their depth beneath is still more so; some of them being found to sink three hundred fathom under water.

The earth presents a very different appearance at the equator, where the sun-beams, darting directly downwards, burn up the lighter soils into extensive sandy deserts, or quicken all the moister tracts with incredible vegetation. In these regions, almost all the same inconveniencies are felt from the proxi-

mity of the sun, that in the former were endured from its absence. The deserts are intirely barren, except where they are found to produce serpents, and in such quantities, that some extensive plains seem almost entirely covered with them.

It not unfrequently happens also that this dry soil, which is so parched and comminuted by the force of the sun, rises with the smallest breeze of wind; and the sands being composed of parts almost as small as those of water, they assume a similar appearance, rolling onward in waves like those of a troubled sea, and overwhelming all they meet with inevitable destruction. On the other hand, those tracts which are fertile, teem with vegetation even to a noxious degree. The grass rises to such an height as often to require burning; the forests are impassable from underwoods, and so matted above, that even the sun, fierce as it is, can seldom penetrate. These are so thick as scarce to be extirpated; for the tops being so bound together by the climbing plants that grow round them, though an hundred should be cut at the bottom, yet not one would fall, as they mutually support each other. In these dark and tangled forests, beasts of various kinds, insects in astonishing abundance, and serpents of surprising magnitude, find a quiet retreat from man, and are seldom disturbed except by each other.

In this manner the extremes of our globe seem equally unfitted for the comforts and conveniencies of life; and, although the imagination may find an awful pleasure in contemplating the frightful precipices of Greenland, or the luxurious verdure of Africa, yet true happiness can only be found in the more moderate climates, where the gifts of nature may be enjoyed without incurring danger in obtaining them.

It is in the temperate zone, therefore, that all the arts of improving nature, and refining upon happiness, have been invented: and this part of the earth is, more properly speaking, the theatre of natural history. Although there be millions of animals and vegetables in the unexplored forests under the line, yet most of these may for ever continue unknown, as curiosity is there repressed by surrounding danger. But it is otherwise in these delightful regions which we inhabit, and where this art has had its beginning. Among us there is scarce a shrub, a flower, or an insect, without its particular history; scarce a plant that could be useful which has not been propagated; nor a weed that could be noxious which has not been pointed out.

CHAP. III.

Containing a View of the Surface of the EARTH.

IF we take a slight survey of the surface of our globe, a thousand objects offer themselves, which, though long known, yet still demand our curiosity. The most obvious beauty that every where strikes the eye is the verdant covering of the earth, which is formed by an happy mixture of herbs and trees of various magnitudes and uses. It has been often remarked that no colour refreshes the sight so much as green; and it may be added, as a further proof of the assertion, that the inhabitants of those places where the fields are continually white with snow, generally become blind long before the usual course of nature.

This advantage, which arises from the verdure of the fields, is not a little improved by their agreeable inequalities. There is scarce two natural landscapes that offer prospects entirely resembling each other; their risings and depressions, their hills and valleys, are never entirely the same, but always offer

fer something new to entertain and refresh the imagination.

But to increase the beauties of the face of nature; the landscape is enlivened by springs and lakes, and intersected by rivulets. These lend a brightness to the prospect; give motion and coolness to the air; and, what is much more important, furnish health and subsistence to animated nature.

Such are the most obvious and tranquil objects that every where offer: but there are objects of a more awful and magnificent kind; the Mountain rising above the clouds, and topt with snow; the River pouring down its sides, increasing as it runs, and losing itself, at last, in the ocean; the Ocean spreading its immense sheet of waters over one half of the globe, swelling and subsiding at well-known intervals, and forming a communication between the most distant parts of the earth.

If we leave those objects that seem to be natural to our earth, and keep the same constant tenor, we are presented with the great irregularities of nature. The burning mountain; the abrupt precipice; the unfathomable cavern; the headlong cataract; and the rapid whirlpool.

If we carry our curiosity a little further, and descend to the objects immediately below the surface of the globe, we shall there find wonders still as amazing. We first perceive the earth for the most part lying in regular beds or layers, every bed growing thicker in proportion as it lies deeper, and its contents more compact and heavy. We shall find, almost wherever we make our subterranean enquiry, an amazing number of shells that belonged to aquatic animals. Here and there, at a distance from the sea, beds of oyster-shells, several yards thick, and many miles over; sometimes testaceous substances of various kinds on the tops of mountains, and often in the heart of the hardest marble. These, which are dug up by the peasants, in every country, are regarded with little curiosity; for being so very common, they are considered as substances entirely terrene. But it is otherwise with the enquirer after nature, who finds them, not only in shape but in substance, every way resembling those that are found in the sea; and he, therefore, is at a loss to account for their removal.

Yet not one part of nature alone, but all her productions and varieties, become the object of the speculative man's enquiry: he takes different views of nature from the inattentive spectator; and scarce an appearance, how common soever, but affords matter for his contemplation: he enquires how and why the surface of the earth has those risings and depressions which most men call natural; he demands in what manner the mountains were formed, and in what consist their uses; he asks from whence springs arise, and how rivers flow round the convexity of the globe; he enters into an examination of the ebbings and flowings, and the other wonders of the deep; he acquaints himself with the irregularities of nature, and endeavours to investigate their causes; by which, at least, he will become better versed in their history. The internal structure of the globe becomes an object of his curiosity; and, although his enquiries can fathom but a very little way, yet, if possessed with a spirit of theory, his imagination will supply the rest. He will endeavour to account for the situation of the marine fossils that are found in the earth, and for the appearance of the different beds of which it is composed. These have been the enquiries that have splendidly employed many of the philosophers of the last and present age; and, to a certain degree, they must be serviceable. But the worst of it is, that, as speculations amuse the writers more than facts, they may be often carried to an extravagant length; and that time may be spent in reasoning

upon nature, which might be more usefully employed in writing her history.

Too much speculation in natural history is certainly wrong; but there is a defect of an opposite nature that does much more prejudice; namely, that of silencing all enquiry, by alledging the benefits we receive from a thing, instead of investigating the cause of its production. If we enquire how a mountain came to be formed, such a reasoner, enumerating its benefits, answers, because God knew it would be useful. If we demand the cause of an earthquake, he finds some good produced by it, and alledges that as the cause of its explosion. Thus such an enquirer has some ready reason for every appearance in nature, which serves to swell his periods, and give splendor to his declamation: every thing about him is, on some account or other, declared to be good; and he thinks it presumption to scrutinize its defects, or endeavour to imagine how it might be better. Such writers, and there are many such, add very little to the advancement of knowledge. It is finely remarked by Bacon, that the investigation of final causes is a barren study; and, like a virgin dedicated to the Deity, brings forth nothing. In fact, those men who want to compel every appearance and every irregularity in nature into our service, and expatiate on their benefits, combat that very morality which they would seem to promote. God has permitted thousands of natural evils to exist in the world, because it is by their intervention that man is capable of moral evil; and he has permitted that we should be subject to moral evil, that we might do something to deserve eternal happiness by shewing we had recititude to avoid it.

CHAP. IV.

A Review of the different THEORIES of the EARTH.

HUMAN invention has been exercised for several ages to account for the various irregularities of the earth. While those philosophers mentioned in the last chapter see nothing but beauty, symmetry, and order; there are others, who look upon the gloomy side of nature, enlarge on its defects, and seem to consider the earth, on which they tread, as one scene of extensive desolation. Beneath its surface they observe minerals and waters confusedly jumbled together; its different beds of earth irregularly lying upon each other; mountains rising from places that once were level; and hills sinking into vallies; whole regions swallowed by the sea, and others again rising out of its bosom: all these they suppose to be but a few of the changes that have been wrought in our globe; and they send out the imagination to describe its primæval state of beauty.

Of those who have written theories describing the manner of their original formation of the earth, or accounting for its present appearances, the most celebrated are Burnet, Whiston, Woodward, and Buffon. As speculation is endless, so it is not to be wondered that all these differ from each other, and give opposite accounts of the several changes, which they suppose our earth to have undergone. As the systems of each have had their admirers, it is, in some measure, incumbent upon the natural historian to be acquainted, at least, with their outlines; and, indeed, to know what others have even dreamed, in matters of science, is very useful, as it may often prevent us from indulging similar delusions ourselves, which we should never have adopted, but because we take them to be wholly our own. However, as entering into a detail of these theories,

ries, is rather furnishing an history of opinions than things, we will endeavour to be as concise as possible.

The first who formed this amusement of earth-making into system, was the celebrated Thomas Burnet, a man of polite learning and rapid imagination. His Sacred Theory, as he calls it, describing the changes which the earth has undergone, or shall hereafter undergo, is well known for the warmth with which it is imagined, and the weakness with which it is reasoned, for the elegance of its style, and the meanness of its philosophy. "The earth," says he, "before the deluge, was very differently formed for what it is at present: it was at first a fluid mass; a chaos composed of various substances, differing both in density and figure: those which were most heavy sunk to the centre, and formed in the middle of our globe an hard solid body; those of a lighter nature remained next; and the waters, which were lighter still, swam upon its surface, and covered the earth on every side. The air, and all those fluids which were lighter than water, floated upon this also; and in the same manner encompassed the globe; so that between the surrounding body of waters, and the circumambient air, there was formed a coat of oil, and other unctuous substances, lighter than water. However, as the air was still extremely impure, and must have carried up with it many of those earthy particles with which it once was intimately blended, it soon began to defecate, and to depose these particles upon the oily surface already mentioned, which soon uniting, the earth and oil formed that crust, which soon became an habitable surface, giving life to vegetation, and dwelling to animals.

"This imaginary antideluvian abode was very different from what we see it at present. The earth was light and rich; and formed of a substance entirely adapted to the feeble state of incipient vegetation: it was an uniform plain, every where covered with verdure; without mountains, without seas, or the smallest inequalities. It had no difference of seasons, for its equator was in the plain of the ecliptic, or, in other words, it turned directly opposite to the sun, so that it enjoyed one perpetual and luxuriant spring. However, this delightful face of nature did not long continue in the same state; for, after a time, it began to crack and open in fissures: a circumstance which always succeeds when the sun exhales the moisture from rich or marshy situations. The crimes of mankind had been for some time preparing to draw down the wrath of Heaven; and they, at length, induced the Deity to defer repairing these breaches in nature. Thus the chasms of the earth every day became wider, and, at length, they penetrated to the great abyss of waters; and the whole earth, in a manner, fell in. Then ensued a total disorder in the uniform beauty of the first creation, the terrene surface of the globe being broken down: as it sunk the waters gushed out in its place; the deluge became universal; all mankind, except eight persons, were destroyed, and their posterity condemned to toil upon the ruins of desolated nature."

It only remains to mention the manner in which he relieves the earth from this universal wreck, which would seem to be as difficult as even its first formation. "These great masses of earth falling into the abyss, drew down with them vast quantities also of air; and by dashing against each other, and breaking into small parts by the repeated violence of the shock, they, at length, left between them large cavities filled with nothing but air. These cavities naturally offered a bed to receive the influent waters; and in proportion as they filled, the face of the earth became once more visible. The higher parts of its broken surface, now become the tops of mountains, were the first that appeared; the

plains soon after came forward, and, at length, the whole globe was delivered from the waters, except the places in the lowest situations; so that the ocean and the seas are still a part of the ancient abyss that have not had a place to return. Islands and rocks are fragments of the earth's former crust; kingdoms and continents are larger masses of its broken substance; and all the inequalities that are to be found on the surface of the present earth, are owing to the accidental confusion into which both earth and waters were then thrown."

The next theorist was Woodward, who, in his Essay towards a Natural History of the Earth, which was only designed to precede a greater work, has endeavoured to give a more rational account of its appearances; and was, in fact, much better furnished for such an undertaking than any of his predecessors, being one of the most assiduous naturalists of his time. His little book, therefore, contains many important facts, relative to natural history, although his system may be weak and groundless.

He begins by asserting that all terrene substances are disposed in beds of various natures, lying horizontally one over the other, somewhat like the coats of an onion; that they are replete with shells, and other productions of the sea: these shells being found in the deepest cavities, and on the tops of the highest mountains. From these observations, which are warranted by experience, he proceeds to observe, that these shells and extraneous fossils are not productions of the earth, but are all actual remains of those animals which they are known to resemble; that all the beds of the earth lie under each other, in the order of their specific gravity; and that they are disposed as if they had been left there by subsiding waters. All these assertions he affirms with much earnestness, although daily experience contradicts him in some of them; particularly we find layers of stone often over the lightest soils, and the softest earth under the hardest bodies. However, having taken it for granted, that all the layers of the earth are found in the order of their specific gravity, the lightest at the top, and the heaviest next the centre, he consequently asserts, and it will not improbably follow, that all the substances of which the earth is composed, were once in an actual state of dissolution. This universal dissolution he takes to have happened at the time of the flood. He supposes that at that time a body of water, which was then in the centre of the earth, uniting with that which was found on the surface, so far separated the terrene parts as to mix altogether in one fluid mass; the contents of which afterwards sinking according to their respective gravities, produced the present appearances of the earth. Being aware, however, of an objection that fossile substances are not found dissolved, he exempts them from this universal dissolution, and, for that purpose, endeavours to shew that the parts of animals have a stronger cohesion than those of minerals; and that, while even the hardest rocks may be dissolved, bones and shells may still continue entire.

So much for Woodward; but of all the systems which were published respecting the earth's formation, that of Whiston was most applauded, and most opposed. Nor need we wonder; for being supported with all the parade of deep calculation, it awed the ignorant, and produced the approbation of such as would be thought otherwise, as it implied a knowledge of abstruse learning, to be even thought capable of comprehending what the writer aimed at. In fact, it is not easy to divest this theory of its mathematical garb; but those who have had leisure, have found the result of our philosopher's reasoning to be thus. He supposes the earth to have been originally a comet; and he considers the history

tory of the creation, as given us in scripture, to have its commencement just when it was, by the hand of the Creator, more regularly placed as a planet in our solar system. Before that time, he supposes it to have been a globe without beauty or proportion; a world in disorder; subject to all the vicissitudes which comets endure; some of which have been found, at different times, a thousand times hotter than melted iron; at others, a thousand times colder than ice. These alternations of heat and cold, continually melting and freezing the surface of the earth, he supposes to have produced, to a certain depth, a chaos entirely resembling that described by the poets, surrounding the solid contents of the earth, which still continued unchanged in the midst, making a great burning globe of more than two thousand leagues in diameter. This surrounding chaos, however, was far from being solid: he resembles it to a dense though fluid atmosphere, composed of substances mingled, agitated, and shocked against each other; and in this disorder he describes the earth to have been just at the eve of creation.

But upon its orbit's being then changed, when it was more regularly wheeled round the sun, every thing took its proper place; every part of the surrounding fluid then fell into a situation, in proportion as it was light or heavy. The middle, or central part, which always remained unchanged, still continued so, retaining a part of that heat which it received in its primæval approaches towards the sun; which he calculates, may continue for about six thousand years. Next to this fell the heavier parts of the chaotic atmosphere, which serve to sustain the lighter: but as in descending they could not entirely be separated from many watery parts, with which they were intimately mixed, they drew down a part of these also with them; and these could not mount again after the surface of the earth was consolidated: they, therefore, surrounded the heavy first descending parts, in the same manner as these surround the central globe. Thus the entire body of the earth is composed internally of a great burning globe: next which, is placed an heavy terrene substance, that encompasses it; round which also is circumfused a body of water. Upon this body of water, the crust of earth on which we inhabit is placed: so that, according to him, the globe is composed of a number of coats, or shells, one within the other, all of different densities. The body of the earth being thus formed, the air, which is the lightest substance of all, surrounded its surface; and the beams of the sun darting through, produced that light which, we are told, first obeyed the Creator's command.

The whole œconomy of the creation being thus adjusted, it only remained to account for the risings and depressions on the surface of the earth, with the other seeming irregularities of its present appearance. The hills and vallies are considered by him as formed by their pressing upon the internal fluid, which sustains the outward shell of earth, with greater or less weight: those parts of the earth which are heaviest, sink into the subjacent fluid more deeply, and become vallies: those that are lightest rise higher upon the earth's surface, and are called mountains.

Such was the face of nature before the deluge; the earth was then more fertile and populous than it is at present; the life of man and animals was extended to ten times its present duration; and all these advantages arose from the superior heat of the central globe, which ever since has been cooling. As its heat was then in full power, the genial principle was also much greater than at present; vegetation and animal increase were carried on with more vigour; and all nature seemed teeming with the seeds of life. But these physical advantages

were only productive of moral evil; the warmth which invigorated the body increased the passions and appetites of the mind; and, as man became more powerful, he grew less innocent. It was found necessary to punish this depravity; and all living creatures were overwhelmed by the deluge in universal destruction.

This deluge, which simple believers are willing to ascribe to a miracle, philosophers have long been desirous to account for by natural causes: they have proved that the earth could never supply from any reservoir towards its centre, nor the atmosphere by any discharge from above, such a quantity of water as would cover the surface of the globe to a certain depth over the tops of our highest mountains. Where, therefore, was all this water to be found? Whiston has found enough, and more than a sufficiency, in the tail of a comet; for he seems to allot comets a very active part in the great operations of nature.

He calculates, with great seeming precision, the year, the month, and the day of the week on which this comet (which has paid the earth some visits since, though at a kinder distance) involved our globe in its tail. The tail may be supposed to be a vaporous fluid substance, exhaled from the body of the comet, by the extreme heat of the sun, and increasing in proportion as it approached that great luminary. It was in this that our globe was involved at the time of the deluge; and as the earth still acted by its natural attraction, it drew to itself all the watery vapours which were in the comet's tail; and the internal waters being also at the same time let loose, in a very short space the tops of the highest mountains were laid under the deep.

The punishment of the deluge being thus completed, and all the guilty destroyed, the earth, which had been broken by the eruption of the internal waters, was also enlarged by it; so that upon the comet's recess, there was found room sufficient in the internal abyss for the recess of the superfluous waters; whither they all retired, and left the earth uncovered, but in some respects changed; particularly in its figure, which, from being round, was now become oblate. In this universal wreck of nature Noah survived, by a variety of happy causes, to re-people the earth, and to give birth to a race of men slow in believing ill-imagined theories of the earth.

After so many theories of the earth, which had been published, applauded, answered, and forgotten; Mr. Buffon ventured to add one more to the number. This philosopher was, in every respect, better qualified than any of his predecessors for such an attempt, being furnished with more materials, having a brighter imagination to find new proofs, and a better style to cloath them in. However, in our opinion, this seems the weakest part of his admirable work; and we could wish, that he had been content with giving us facts instead of systems; that, instead of being a reasoner, he had contented himself with being merely an-historian.

He begins his system by making a distinction between the first part of it and the last; the one being found only on conjecture, the other depending entirely upon actual observation. The latter part of his theory may, therefore, be true, though the former should be found erroneous.

The planets, says he, and the earth, among the number, might have been formerly (he only offers this as conjecture) a part of the body of the sun, and adherent to its substance. In this situation, a comet falling in upon that great body might have given it such a shock, and so shaken its whole frame, that some of its particles might have been driven off like streaming sparkles from red hot iron; and each

of these streams of fire, small as they were in comparison of the sun, might have been large enough to have made an earth as great, nay many times greater than ours. So that in this manner the planets, together with the globe which we inhabit, might have been driven off from the body of the sun by an impulsive force: in this manner also they would continue to recede from it for ever, were they not drawn back by its superior power of attraction; and thus, by the combination of the two motions, they are wheeled round in circles.

Being in this manner detached at a distance from the body of the sun, the planets, from having been at first globes of liquid fire, gradually became cool. The earth also having been impelled obliquely forward, received a rotatory motion upon its axis at the very instant of its formation; and this motion being greatest at the equator, the parts there acting against the force of gravity, they must have swollen out, and given the earth an oblate or flattened figure.

As to its internal substance, our globe having once belonged to the sun, it continues to be an uniform mass of melted matter, very probably vitrified in its primæval fusion. But its surface is very differently composed. Having been in the beginning heated to a degree equal to, if not greater, than what comets are found to sustain, like them it had an atmosphere of vapours floating round it, and which cooling by degrees, condensed and subsided upon its surface. These vapours formed, according to their different densities, the earth, the water, and the air; the heavier parts falling first, and the lighter remaining still suspended.

Thus far our philosopher is, at least, as much a system-maker as Whiston or Burnet; and, indeed, he fights his way with great perseverance and ingenuity through a thousand objections that naturally arise. Having, at last, got upon the earth, he supposes himself on firmer ground, and goes forward with greater security. Turning his attention to the present appearance of things upon this globe, he pronounces from the view that the whole earth was at first under water. This water he supposes to have been the lighter parts of its former evaporation, which, while the earthy particles sunk downwards by their natural gravity, floated on the surface, and covered it for a considerable space of time.

"The surface of the earth," says he, "must have been in the beginning much less solid than it is at present; and, consequently, the same causes, which at this day produce but very slight changes, must then, upon so complying a substance, have had very considerable effects. We have no reason to doubt but that it was then covered with the waters of the sea; and that those waters were above the tops of our highest mountains, since, even in such elevated situations, we find shells and other marine productions in very great abundance. It appears also that the sea continued for a considerable time upon the face of the earth: for as these layers of shells are found so very frequent at such great depths, and in such prodigious quantities, it seems impossible for such numbers to have been supported all alive at one time; so that they must have been brought there by successive depositions. These shells also are found in the bodies of the hardest rocks, where they could not have been deposited, all at once, at the time of the deluge, or at any such instant revolution; since that would be to suppose, that all the rocks in which they are found, were, at that instant, in a state of dissolution, which would be absurd to assert. The sea, therefore, deposited them where-soever they are now to be found, and that by slow and successive degrees.

"It will appear, also, that the sea covered the whole

earth, from the appearance of its layers, which lying regularly one above the other, seem all to resemble the sediment formed at different times by the ocean. Hence, by the irregular force of its waves, and its currents driving the bottom into sand-banks, mountains must have been gradually formed within this universal covering of waters; and these successively raising their heads above its surface, must, in time, have formed the highest ridges of mountains upon land, together with continents, islands and low grounds, all in their turns. This opinion will receive additional weight by considering, that in those parts of the earth where the power of the ocean is greatest, the inequalities on the surface of the earth are highest: the ocean's power is greatest at the equator, where its winds and tides are most constant; and, in fact, the mountains at the equator are found to be higher than in any other part of the world. The sea, therefore, has produced the principal changes in our earth: rivers, volcanoes, earthquakes, storms, and rain, having made but slight alterations, and only such as have affected the globe to very inconsiderable depths."

This is but a very slight sketch of Mr. Buffon's Theory of the Earth; a theory which he has much more powerfully supported, than happily invented; and it would be needless to take up the reader's time from the pursuit of truth in the discussion of plausibilities. In fact, a thousand questions might be asked this most ingenious philosopher, which he would not find it easy to answer; but such is the lot of humanity, that a single Goth can in one day destroy the fabric which Cæsars were employed an age in erecting. We might ask, how mountains, which are composed of the most compact and ponderous substances, should be the first whose parts the sea began to remove? We might ask, how fossil-wood is found deeper even than shells? which argues, that trees grew upon the places he supposes once to have been covered with the ocean. But we hope this excellent man is better employed than to think of gratifying the petulance of incredulity, by answering endless objections.

CHAP. V.

Containing the NATURAL HISTORY of FOSSIL-SHELLS, and other extraneous FOSSILS.

WE may affirm of Mr. Buffon, that which has been said of the chymists of old: though he may have failed in attaining his principal aim, of establishing a theory, yet he has brought together such a multitude of facts relative to the history of the earth, and the nature of its fossil productions, that curiosity finds ample compensation even while it feels the want of conviction.

Before, therefore, we enter upon the description of those parts of the earth, which seem more naturally to fall within the subject, it will not be improper to give a short history of those animal productions that are found in such quantities, either upon its surface, or at different depths below it. They demand our curiosity, and, indeed, there is nothing in natural history that has afforded more scope for doubt, conjecture, and speculation. Whatever depths of the earth we examine, or at whatever distance within land we seek, we most commonly find a number of fossil-shells, which being compared with others from the sea, of known kinds, are found to be exactly of a similar shape and nature. They are found at the very bottom of quarries and mines, in the retired and inward parts of the most firm and solid rocks, upon the tops of even the highest hills and mountains, as well as in the valleys and plains: and this



F O S S I L S .

Class IX. Fossil Shells.

P E C T E N

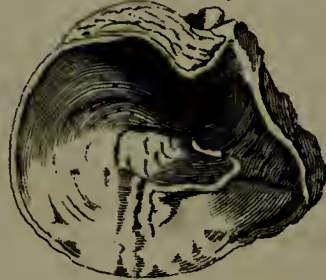
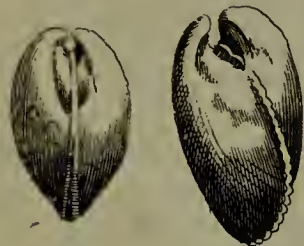


OSTRACITES

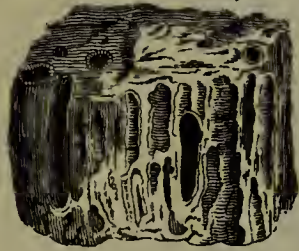
CONCHA Margaritifera.

TIBULLUS Marinus.

BUCARDITÆ



SYRINGOIDES Lapis.



TROCHI



CYLINDRI



DENTALIA



COCHLEÆ



NERITÆ



B U C C I N A



N A U T I L I



CONCHÆ Anomia.



Ammonitæ or SNAKE Stones.



ORTHO CERATITES

GRYPHITES

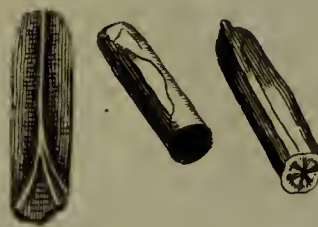


E C H I N I T Æ

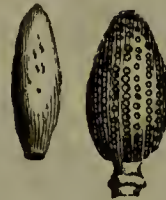


Class X. Fossil Bodies, once parts of Animals.

BELEMNITÆ



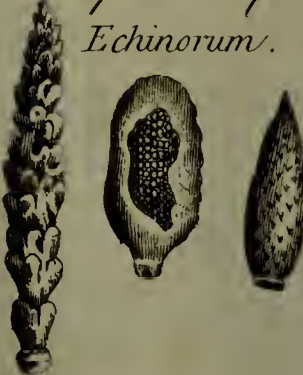
JUDAICUS



ACULEI



Echinorum.



ENTROCHUS



APPENDICULÆ Asteriarum.

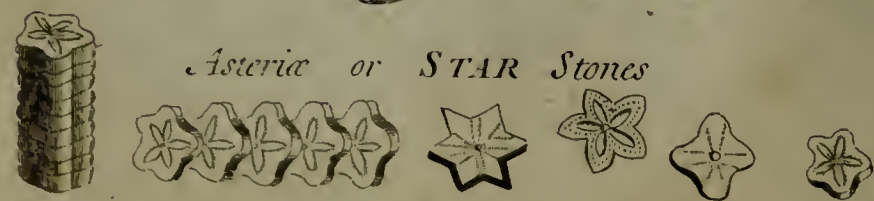
T R O C H I T Æ



ASTEROPodium cum Asteria.



Asteria or STAR Stones



ASTEROPodium



this not in one country alone, but in all places where there is any digging for marble, chalk, or any other terrestrial matters, that are so compact as to fence off the external injuries of the air, and thus preserve these shells from decay.

These marine substances, so commonly diffused, and so generally to be met with, were for a long time considered by philosophers, as productions, not of the sea, but of the earth. "As we find that spars," said they, "always shoot into peculiar shapes, so these seeming snails, cockles, and muscle-shells, are only sportive forms that nature assumes amongst others of its mineral varieties: they have the shape of fish, indeed, but they have always been terrestrial substances."

With this plausible solution mankind were for a long time content; but upon closer enquiry, they were obliged to alter their opinion. It was found that these shells had, in every respect, the properties of animal and not of mineral nature. They were found exactly of the same weight with their fellow shells upon shore. They answered all the chemical trials in the same manner as sea shells do. Their parts, when dissolved, had the same appearance to view, the same smell and taste. They had the same effects in medicine when inwardly administered; and, in a word, were so exactly conformable to marine bodies, that they had all the accidental concretions growing to them, (such as pearls, corals, and smaller shells) which are found in shells just gathered on the shore. They were, therefore, from these considerations, given back to the sea; but the wonder was, how to account for their coming so far from their own natural element upon land.

As this naturally gave rise to many conjectures, it is not to be wondered that some among them have been very extraordinary. An Italian, quoted by Mr. Buffon, supposes them to have been deposited in the earth at the time of the crusades, by the pilgrims who returned from Jerusalem: who gathering them upon the sea shore, in their return carried them to their different places of habitation. But this conjecturer seems to have but a very inadequate idea of their numbers. At Touraine, in France, more than an hundred miles from the sea, there is a plain of about nine leagues long, and as many broad, from whence the peasants of the country supply themselves with marle for manuring their lands. They seldom dig deeper than twenty feet, and the whole plain is composed of the same materials, which are shells of various kinds, without the smallest portion of earth between them. Here then, is a large space, in which are deposited millions of tons of shells, that pilgrims could not have collected, though their whole employment had been nothing else. England is furnished with its beds, which though not quite so extensive, yet are equally wonderful. "Near Reading in Berkshire, for many succeeding generations, a continued body of oyster-shells has been found through the whole circumference of five or six acres of ground. The foundation of these shells is an hard rocky chalk; and above this chalk, the oyster-shells lie in a bed of green sand, upon a level, as nigh as can possibly be judged, and about two feet thickness." These shells are in their natural state, but they were found also petrified, and almost in equal abundance in all the Alpine rocks, in the Pyrenees, on the hills of France, England, and Flanders. Even in all quarries from whence marble is dug, if the rocks be split perpendicularly downwards, petrified shells, and other marine substances, will be plainly discerned.

"About a quarter of a mile from the river Medway, in the county of Kent, after the taking off the coping of a piece of ground there, the workmen

came to a blue marble, which continued for three feet and a half deep, or more, and then beneath appeared an hard floor or pavement, composed of petrified shells crowded closely together. This layer was about an inch deep, and several yards over; and it could be walked upon as upon a beach. These stones, of which it was composed, (the describer supposes them to have always been stones) were either wreathed as snails, or bivalvular like cockles. The wreathed kinds were about the size of an hazelnut, and were filled with a stony substance of the colour of marle; and they themselves, also, till they were washed, were of the same colour; but when cleaned they appear of the colour of bezoar, and of the same polish. After boiling in water they became whitish, and left a chalkiness upon the fingers."

In several parts of Asia and Africa, travellers have observed these shells in great abundance. In the mountains of Castravan, which lie above the city Barut, they quarry out a white stone, every part of which contains petrified fishes in great numbers, and of surprising diversity. They also seem to continue in such preservation, that their fins, scales, and all the minutest distinctions of their make, can be perfectly discerned.

From all these instances we may conclude, that fossils are very numerous; and, indeed, independent of their situation, they afford no small entertainment to observe them as preserved in the cabinets of the curious. The varieties of their kinds is astonishing. Most of the sea shells which are known, and many others to which we are entirely strangers, are to be seen either in their natural state, or in various degrees of petrefaction. In the place of some we have mere spar, or stone, exactly expressing all the lineaments of animals, as having been wholly formed from them. For it has happened that the shells dissolving by very slow degrees, and the matter having nicely and exactly filled all the cavities within, this matter, after the shells have perished, has preserved exactly and regularly the whole print of their internal surface. Of these there are various kinds found in our pits; many of them resembling those of our own shores; and many others that are only to be found on the coasts of other countries. There are some shells resembling those that are never stranded upon our coasts, but always remain in the deep: and many more there are which we can assimilate with no shells known amongst us. But we find not only shells in our pits, but also fishes and corals in great abundance; together with almost every sort of marine production.

It is extraordinary enough, however, that the common red coral, though so very frequent at sea, is scarce seen in the fossil world; nor is there any account of its having ever been met with. But to compensate for this, there are all the kinds of the white coral now known; and many other kinds of that substance with which we are unacquainted. Of animals there are various parts; the vertebræ of whales, and the mouths of lesser fishes; these, with teeth also of various kinds, are found in the cabinets of the curious; where they receive long Greek names, which it is neither the intention nor the province of this work to enumerate. Indeed, few readers would think themselves much improved, should we proceed with enumerating the various classes of the Conicthyodonts, Polyteptoginglimi, or the Orthoceratites. These names, which mean no great matter when they are explained, may serve to guide in the furnishing a cabinet; but they are of very little service in furnishing the page of instructive history.

From all these instances we see in what abundance petrefactions are to be found; and, indeed,
Mr.

Mr. Buffon, has not been sparing in the variety of his quotations, concerning the places where they are mostly to be found. However, we are surpris'd that he should have omitted the mention of one, which, in some measure, more than any of the rest, would have serv'd to strengthen his theory. We are inform'd by almost every traveller, that has described the pyramids of Egypt, that one of them is entirely built of a kind of free-stone, in which these petrified shells are found in great abundance. This being the case, it may be conjectured, as we have accounts of these pyramids among the earliest records of mankind, and of their being built so long before the age of Herodotus, who lived but fifteen hundred years after the flood, that even the Egyptian priests could tell neither the time nor the cause of their erection; therefore it may be conjectured that they were erected but a short time after the flood. It is not very likely, therefore, that the marine substances found in one of them, had time to be formed into a part of the solid stone, either during the deluge, or immediately after it; and, consequently, their petrefaction must have been before that period. And this is the opinion Mr. Buffon has so strenuously endeavour'd to maintain; having given specious reasons to prove, that such shells were laid in the beds where they are now found, not only before the deluge, but even antecedent to the formation of man, at the time when the whole earth, as he supposes, was buried beneath a covering of waters.

But while there are many reasons to persuade us that these extraneous fossils have been deposited by the sea, there is one fact that will abundantly serve to convince us that the earth was habitable, if not inhabited, before these marine substances came to be thus deposited; for we find fossil-trees, which no doubt once grew upon the earth, as deep, and as much in the body of solid rocks, as these shells are found to be. Some of these fallen trees also have lain at last as long, if not longer, in the earth, than the shells, as they have been found sunk deep in a marly substance, compos'd of decayed shells, and other marine productions. Mr. Buffon has prov'd that fossil-shells could not have been deposited in such quantities all at once by the flood; and we think, from the above instance, it is pretty plain, that howsoever they were deposited, the earth was covered with trees before their deposition; and, consequently, that the sea could not have made a very permanent stay. How then shall we account for these extraordinary appearances in nature? A suspension of all assent is certainly the first, although the most mortifying conduct. Were we to offer a conjecture (and all that has been said upon this subject is but conjecture) instead of supposing them to be the remains of animals belonging to the sea, we would consider them rather as bred in the numerous fresh-water lakes that, in primæval times, covered the face of uncultivated nature. Some of these shells we know to belong to fresh waters: some can be assimilated to none of the marine shells now known; why, therefore, may we not as well ascribe the production of all to fresh waters, where we do not find them, as we do that of the latter to the sea only, where we never find them? We know that lakes, and lands also, have produced animals that are now no longer existing; why, therefore, might not these fossil productions be among the number? We allow that this is making a very harsh supposition; but we cannot avoid thinking, that it is not attended with so many embarrassments as some of the former; and that it is much easier to believe that these shells were bred in fresh water, than that the sea had for a long time covered the tops of the highest mountains.

C H A P. VI.

NATURAL HISTORY of the internal Structure of the EARTH.

HAVING, in some measure, got free from the regions of conjecture, let us now proceed to a description of the earth as we find it by examination, and observe its internal composition, as far as it has been the subject of experience, or expos'd to human enquiry. These enquiries, indeed, have been carried but to a very little depth below its surface, and even in that disquisition men have been conducted more by motives of avarice than of curiosity. The deepest mine, which is that at Cotteberg in Hungary, reaches not more than three thousand feet deep; but what proportion does that bear to the depth of the terrestrial globe, down to the centre, which is above four thousand miles? All, therefore, that has been said of the earth, to a deeper degree, is merely fabulous or conjectural: we may suppose with Buffon, that it is a globe of glass; with Whiston, a sphere of heated iron; with Burnet, a great mass of waters; and with Kircher, one dreadful volcano; but let us, at the same time, shew our consciousness, that all these are but suppositions.

Upon examining the earth, where it has been opened to any depth, the first thing that occurs, is the different layers or beds of which it is compos'd; these all lying horizontally one over the other like the leaves of a book, and each of them compos'd of materials that increase in weight in proportion as they lie deeper. This is, in general, the disposition of the different materials where the earth seems to have remained unmolested; but this order is frequently inverted; and we cannot tell whether from its original formation, or from accidental causes. Of different substances, thus dispos'd, the far greatest part of our globe consists, from its surface downwards to the greatest depths we ever dig or mine.

The first layer most commonly found at the surface, is that light coat of blackish mould, which is called, by some, garden earth. With this the earth is every where invest'd, unless it be wash'd off by rains, or removed by some other external violence. This seems to have been formed from animal and vegetable bodies decaying, and thus turning into its substance. It also serves again as a storehouse, from whence animal and vegetable nature are renewed; and thus are all vital blessings continued with unceasing circulation. This earth, however, is not to be supposed entirely pure, but is mixed with much stony and gravelly matter, from the layers lying immediately beneath it. It generally happens, that the soil is fertile in proportion to the quantity that this putrified mould bears to the gravelly mixture; and as the former predominates, so far is the vegetation upon it more luxuriant. It is this external covering that supplies man with all the true riches he enjoys. He may bring up gold and jewels from greater depths; but they are merely the toys of a capricious being, things upon which he has plac'd an imaginary value, and for which fools alone part with the more substantial blessings of life. It is this earth, says Pliny, that, like a kind mother, receives us at our birth, and sustains us when born. It is this alone, of all the elements around us, that is never found an enemy to man. The body of waters deluge him with rains, oppress him with hail, and drown him with inundations. The air rushes in storms, prepares the tempest, or lights up the volcano; but the earth, gentle and indulgent, ever subservient to the wants of man, spreads his walks with flowers, and his table with plenty;

plenty; returns with interest every good committed to her care; and, though she produces the poison, she still supplies the antidote; though constantly teized more to furnish the luxuries of man than his necessities, yet, even to the last, she continues her kind indulgence, and, when life is over, she piously covers his remains in her bosom.

This external and fruitful layer which covers the earth, is, as was said, in a state of continual change. Vegetables, which are naturally fixed and rooted to the same place, receive their adventitious nourishment from the surrounding earth and water: animals, which change from place to place, are supported by these, or by each other. Both, however, having for a time enjoyed a life adapted to their nature, give back to the earth those spoils, which they had borrowed for a very short space, yet still to be quickened again into fresh existence. But the deposits they make are of very dissimilar kinds, and the earth is very differently enriched by their continuance. Those countries that have for a long time supported men and other animals, having been observed to become every day more barren, while, on the contrary, those desolate places, in which vegetables only are abundantly produced, are known to be possessed of amazing fertility. "In regions which are uninhabited," says Mr. Buffon, "where the forests are not cut down, and where animals do not feed upon the plants, the bed of vegetable earth is constantly increasing. In all woods, and even in those often cut, there is a layer of earth of six or eight inches thick, which has been formed by the leaves, branches and bark, which fall and rot upon the ground. It has frequently been observed on a Roman way which crosses Burgundy for a long extent, that there is a bed of black earth, of more than a foot thick, gathered over the stony pavement, on which several trees, of a very considerable size, are supported. This is found to be nothing else than an earth formed by decayed leaves and branches, which have been converted by time into a black soil. Now as vegetables draw much more of their nourishment from the air and water than they do from the earth, it must follow, that in rotting upon the ground, they must give more to the soil than they have taken from it. Hence, therefore, in woods kept a long time without cutting, the soil below increases to a considerable depth; and such we actually find the soil in those American wilds where the forests have been undisturbed for ages. But it is otherwise where men and animals have long subsisted; for as they make a considerable consumption of wood and plants, both for firing and other uses, they take more from the earth than they return to it: it follows, therefore, that the bed of vegetable earth, in an inhabited country, must be always diminishing; and must, at length, resemble the soil of Arabia Petrea, and other provinces of the East, which having been long inhabited, are now become plains of salt and sand; the fixed salt always remaining while the other volatile parts have flown away."

If from this external surface we descend deeper, and view the earth cut perpendicularly downwards, either in the banks of great rivers, or steepy sea shores; or, going still deeper, if we observe it in quarries or mines, we shall find its layers regularly disposed in their proper order. We must not expect, however, to find them of the same kind or thickness in every place, as they differ in different soils and situations. Sometimes marle is seen to be over sand, and sometimes under it. The most common disposition is, that under the first earth is found gravel or sand, then clay or marle, then chalk or coal, marbles, ores, sands, gravels; and thus an alternation of these substances, each growing more

dense as it sinks deeper. The clay, for instance, found at the depth of an hundred feet, is usually more heavy than that found not far from the surface. In a well which was dug at Amsterdam, to the depth of two hundred and thirty feet, the following substances were found in succession: seven feet of vegetable earth, nine of turf, nine of soft clay, eight of sand, four of earth, ten of clay, four of earth, ten of sand, two of clay, four of white sand, one of soft earth, fourteen of sand, eight of clay mixed with sand, four of sea-sand mixed with shells, then an hundred and two feet of soft clay, and then thirty-one feet of sand.

In a well dug at Marly, to the depth of an hundred feet, Mr. Buffon gives us a still more exact enumeration of its layers of earth. Thirteen of a reddish gravel, two of gravel minged with a vitrifiable sand, three of mud or slime, two of marle, four of marly stone, five of marle in dust mixed with vitrifiable sand, six of very fine vitrifiable sand, three of earthy marle, three of hard marle, one of gravel, one of eglantine, a stone of the hardness and grain of marble, one of gravelly marle, one of stony marle, one of a coarser kind of stony marle, two of a coarser kind still, one of vitrifiable sand mixed with fossil shells, two of fine gravel, three of stony marle, one of coarse powdered marle, one of stone, calcifiable like marble, three of grey sand, two of white sand, one of red sand streaked with white, eight of grey sand with shells, three of very fine sand, three of a hard grey stone, four of red sand streaked with white, three of white sand, and fifteen of a reddish vitrifiable sand.

In this manner the earth is every where found in beds over beds; and, what is still remarkable, each of them, as far as it extends, always maintains exactly the same thickness. It is found also, that, as we proceed to considerable depths, every layer grows thicker. Thus in the adduced instances we might have observed, that the last layer was fifteen feet thick, while most of the others were not above eight; and this might have gone much deeper, for ought we can tell, as before they got through it the workmen ceased digging.

These layers are sometimes very extensive, and often are found to cover a space of some leagues in circumference. But it must not be supposed that they are uniformly continued over the whole globe without any interruption: on the contrary, they are ever, at small intervals, cracked through as it were by perpendicular fissures; the earth resembling, in this respect, the muddy bottom of a pond, from whence the water has been dried off by the sun, and thus gaping in several chinks, which descend in a direction perpendicular to its surface. These fissures are many times found empty, but oftener closed up with adventitious substances, that the rain, or some other accidental causes, have conveyed to fill their cavities. Their openings are not less different than their contents, some being not above half an inch wide, some a foot, and some several hundred yards asunder; which last form those dreadful chasms that are to be found in the Alps, at the edge of which the traveller stands, dreading to look down at the immeasurable gulph below. These amazing clefts are well known to such as have past these mountains, where a chasm frequently presents itself several hundred feet deep, and as many over, at the edge of which the way lies. It often happens also, that the road leads along the bottom, and then the spectator observes on each side frightful precipices several hundred yards above him; the sides of which correspond so exactly with each other, that they evidently seem torn asunder.

But these chasms to be found in the Alps, are nothing to what Ovalle tells us are to be seen in the

Andes. These amazing mountains, in comparison of which the former are but little hills, have their fissures in proportion to their greatness. In some places they are a mile wide, and deep in proportion; and there are some others, that running under ground, in extent resemble a province.

Of this kind also is that cavern called Elden-hole, in Derbyshire; which, Dr. Plot tells us, was founded by a line of eight and twenty hundred feet, without finding the bottom, or meeting with water: and yet the mouth at the top is not above forty yards over. This immeasurable cavern runs perpendicularly downward; and the sides of it seem to tally so plainly as to shew that they once were united. Those who come to visit the place, generally procure stones to be thrown into its mouth; and these are heard for several minutes, falling and striking against the sides of the cavern, producing a sound that resembles distant thunder, dying away as the stone goes deeper.

Of this kind also is that dreadful cavern described by Ælian; his account of which the reader may not have met with. "In the country of the Arrian Indians, is to be seen an amazing chasm, which is called, The Gulph of Pluto. The depth, and the recesses of this horrid place, are as extensive as they are unknown. Neither the natives, nor the curious who visit it, are able to tell how it first was made, or to what depths it descends. The Indians continually drive thither great multitudes of animals, more than three thousand at a time, of different kinds, sheep, horses, and goats; and, with an absurd superstition, force them into the cavity, from whence they never return. Their several sounds, however, are heard as they descend; the bleating of sheep, the lowing of oxen, and the neighing of horses, issuing up to the mouth of the cavern. Nor do these sounds cease, as the place is continually furnished with a fresh supply."

There are many more of these dreadful perpendicular fissures in different parts of the earth; with accounts of which Kircher, Gaffarellus, and others, who have given histories of the wonders of the subterranean world, abundantly supply us. The generality of readers, however, will consider them with less astonishment, when they are informed of their being common all over the earth: that in every field, in every quarry, these perpendicular fissures are to be found; either still gaping, or filled with matter that has accidentally closed their interstices. The inattentive spectator neglects the enquiry, but their being common is partly the cause that excites the philosopher's attention to them: the irregularities of nature he is often content to let pass unexamined; but when a constant and a common appearance presents itself, every return of the object is a fresh call to his curiosity; and the chink in the next quarry becomes as great a matter of wonder as the chasm in Elden-hole. Philosophers have long, therefore, endeavoured to find out the cause of these perpendicular fissures, which our own countrymen, Woodward and Ray, were the first that found to be so common and universal. Mr. Buffon supposes them to be cracks made by the sun, in drying up the earth immediately after its emergence from the deep. The heat of the sun is very probably a principal cause; but it is not right to ascribe to one only, what we find may be the result of many. Earthquakes, severe frosts, bursting waters, and storms tearing up the roots of trees, have, in our own times, produced them: and to this variety of causes we must, at present, be content to assign those that have happened before we had opportunities for observation.

C H A P. VII.

Of CAVES and Subterraneous PASSAGES that sink, but not perpendicularly, into the Earth.

WHEN we survey the subterrenean wonders of the globe, besides those fissures that descend perpendicularly, we frequently find others that descend but a little way, and then spread themselves often to a great extent below the surface. Many of these caverns, it must be confessed, may be the production of art and human industry; retreats made to protect the oppressed, or shelter the spoiler. The famous labyrinth of Candia, for instance, is supposed to be entirely the work of art: Mr. Tournefort assures us, that it bears the impression of human industry, and that great pains have been bestowed upon its formation. The stone-quarry of Maestricht is evidently made by labour: carts enter at its mouth, and load within, then return and discharge their freight into boats that lie on the brink of the river Maese. This quarry is so large, that forty thousand people may take shelter in it: and it in general serves for this purpose, when armies march that way; becoming then an impregnable retreat to the people that live thereabout. Nothing can be more beautiful than this cavern, when lighted up with torches; for there are thousands of square pillars, in large level walks, about twenty feet high; and all wrought with much neatness and regularity. In this vast grotto there is very little rubbish; which shews both the goodness of the stone, and the carefulness of the workmen. To add to its beauty, there also are, in various parts of it, little pools of water, for the convenience of the men and cattle. It is remarkable also, that no droppings are seen to fall from the roof, nor are the walks any way wet under foot, except in cases of great rains, where the water gets in by the air shafts. The Salt-mines in Poland are still more spacious than these. Some of the catacombs, both in Egypt and Italy, are said to be very extensive. But no part of the world has a greater number of artificial caverns than Spain, which were made to serve as retreats to the Christians, against the fury of the Moors, when the latter conquered that country. However, an account of the works of art does not properly belong to a natural history. It will be sufficient to observe, that though caverns be found in every country, far the greatest part of them have been fashioned by the hand of Nature only. Their size is found beyond the power of man to have effected; and their forms but ill adapted to the conveniences of an human habitation. In some places, indeed, we find mankind still make use of them as houses; particularly in those countries where the climate is very severe; but in general they are deserted by every race of meaner animals, except the bat: these nocturnal solitary creatures are usually the only inhabitants; and these only in such whose descent is sloping, or, at least, not directly perpendicular.

There is scarce a country in the world without its natural caverns; and many new ones are discovered every day. Of those in England, Oakey-hole, the Devil's-hole, and Penpark-hole, have been often described. The former, which lies on the south side of Mendip-hills, within a mile of the town of Wells, is much resorted to by travellers. To conceive a just idea of this, we must imagine a precipice of more than an hundred yards high, on the side of a mountain which shelves away a mile above it. In this is an opening not very large, into which you enter, going along upon a rocky uneven pavement, sometimes ascending, and sometimes descending. The roof of it, as you advance,

grows higher; and, in some places, is fifty feet from the floor. In some places, however, it is so low that a man must stoop to pass. It extends itself, in length, about two hundred yards; and from every part of the roof, and the floor, there are formed sparry concretions of various figures, that by strong imaginations have been likened to men, lions, and organs. At the farthest part of this cavern rises a stream of water, well stored with fish, large enough to turn a mill, and which discharges itself near the entrance.

Penpark-hole, in Gloucestershire, is almost as remarkable as the former. Captain Sturmeý descended into this by a rope, twenty-five fathoms perpendicular, and at the bottom found a very large vault in the shape of an horse-shoe. The floors consisted of a kind of white stone enamelled with lead ore, and the pendent rocks were glazed with spar. Walking forward on this stony pavement, for some time, he came to a great river, twenty fathoms broad, and eight fathoms deep; and having been informed that it ebbed and flowed with the sea, he remained in his gloomy abode for five hours, to make an exact observation. He did not find, however, any alteration whatsoever in its appearance. But his curiosity was ill requited; for it cost this unfortunate gentleman his life: immediately after his return, he was seized with an unusual and violent head-ach, which threw him into a fever, of which he died soon after.

But of all the subterraneous caverns now known, the grotto of Antiparos is the most remarkable, as well for its extent, as for the beauty of its sparry incrustations. This celebrated cavern was first discovered by one Magni, an Italian traveller, about an hundred years ago, at Antiparos, an inconsiderable island of the Archipelago. The account he gives of it is long and inflated, but upon the whole amusing. "Having been informed," says he, "by the natives of Paros, that in the little island of Antiparos, which lies about two miles from the former, of a gigantic statue that was to be seen at the mouth of a cavern in that place, it was resolved that we (the French consul and himself) should pay it a visit. In pursuance of this resolution, after we had landed on the island, and walked about four miles through the midst of beautiful plains, and sloping woodlands, we at length came to a little hill, on the side of which yawned a most horrid cavern, that with its gloom at first struck us with terror, and almost repressed curiosity. Recovering the first surprize, however, we entered boldly; and had not proceeded above twenty paces, when the supposed statue of the giant presented itself to our view. We quickly perceived, that what the ignorant natives had been terrified at as a giant, was nothing more than a sparry concretion, formed by the water dropping from the roof of the cave, and by degrees hardening into a figure that their fears had formed into a monster. Incited by this extraordinary appearance, we were induced to proceed still farther, in quest of new adventures in this subterranean abode. As we proceeded, new wonders offered themselves; the spars, formed into trees and shrubs, presented a kind of petrified grove; some white, some green; and all receding in due perspective. They struck us with the more amazement, as we knew them to be mere productions of Nature, who, hitherto in solitude, had, in her playful moments, dressed the scene, as if for her own amusement.

"But we had as yet seen but a few of the wonders of the place; and we are introduced only into the portico of this amazing temple. In one corner of this half illuminated recess, there appeared an opening of about three feet wide, which seemed to lead to a place totally dark, and that one of the

natives assured us contained nothing more than a reservoir of water. Upon this we tried, by throwing down some stones, which rumbling along the sides of the descent for some time, the sound seemed at last quashed in a bed of water. In order, however, to be more certain, we sent in a Levantine mariner, who, by the promise of a good reward, with a flambeaux in his hand, ventured into this narrow aperture. After continuing within it for about a quarter of an hour, he returned, carrying some beautiful pieces of white spar in his hand, which art could neither imitate nor equal. Upon being informed by him that the place was full of these beautiful incrustations, I ventured in once more with him, for about fifty paces, anxiously and cautiously descending by a steep and dangerous way. Finding, however, that we came to a precipice which led into a spacious amphitheatre, if I may so call it, still deeper than any other part, we returned, and being provided with a ladder, flambeaux, and other things to expedite our descent, our whole company, man by man, ventured into the same opening, and descending one after another, we at last saw ourselves all together in the most magnificent part of the cavern.

"Our candles being now all lighted up, and the whole place completely illuminated, never could the eye be presented with a more glittering, or a more magnificent scene. The roof all hung with solid isicles, transparent as glass, yet solid as marble. The eye could scarce reach the lofty and noble ceiling; the sides were regularly formed with spars; and the whole presented the idea of a magnificent theatre, illuminated with an immense profusion of lights. The floor consisted of solid marble; and in several places magnificent columns, thrones, altars, and other objects appeared, as if nature had designed to mock the curiosities of art. Our voices, upon speaking or singing, were redoubled to an astonishing loudness; and upon the firing of a gun, the noise and reverberations were almost deafening. In the midst of this grand amphitheatre rose a concretion of about fifteen feet high, that, in some measure, resembled an altar; from which, taking the hint, we caused masks to be celebrated there. The beautiful columns that shot up round the altar, appeared like candlesticks; and many other natural objects represented the customary ornaments of this sacrament.

"Below even this spacious grotto, there seemed another cavern; down which I ventured with my former mariner, and descended about fifty paces by means of a rope. I at last arrived at a small spot of level ground, where the bottom appeared different from that of the amphitheatre, being composed of soft clay, yielding to the pressure, and in which I thrust a stick to about six feet deep. In this, however, as above, numbers of the most beautiful crystals were formed; one of which, particularly, resembled a table. Upon our egress from this amazing cavern, we perceived a Greek inscription upon a rock at the mouth, but so obliterated by time, that we could not read it. It seemed to import that one Antipater, in the time of Alexander, had come thither; but whether he penetrated into the depths of the cavern, he does not think fit to inform us."

Such is the account of this beautiful scene, as communicated in a letter to Kircher. We have another, and a more copious description of it by Tournefort, which is in every body's hands; but we have given the above, both because it was communicated by the first discoverer, and because it is a simple narrative of facts, without any reasoning upon them. According to Tournefort's account, indeed, we might conclude, from the rapid growth of the spars in this grotto, that it must every year

be growing narrower, and that it must, in time, be choaked up with them entirely; but no such thing has happened hitherto, and the grotto at this day continues as spacious as we ever knew it.

This is not a place for an enquiry into the seeming vegetation of those stony substances with which this and almost every cavern are incrusted. It is enough to observe, in general, that they are formed by an accumulation of that little gritty matter which is carried thither by the waters, and which in time acquires the hardness of marble. What in this place more imports us to know is, how these amazing hollows in the earth came to be formed. In the three instances above-mentioned, it is pretty evident, that their excavation has been owing to water. These finding subterraneous passages under the earth, and by long degrees hollowing the beds in which they flowed, the ground above them has slipt down closer to their surface, leaving the upper layers of the earth or stone still suspended. The ground that sinks upon the face of the waters forming the floor of the cavern; the ground, or rock that keeps suspended, forming the roof: and, indeed, there are but few of these caverns found without water, either within them, or near enough to point out their formation.

C H A P. VIII.

Of MINES, DAMPS, and Mineral VAPOURS.

THE caverns, which we have been describing, generally carry us but a very little way below the surface of the earth. Two hundred feet, at the utmost, is as much as the lowest of them is found to sink. The perpendicular fissures run much deeper; but few persons have been bold enough to venture down to their deepest recesses: and some few who have tried, have been able to bring back no tidings of the place, for unfortunately they left their lives below. The excavations of art have conducted us much farther into the bowels of the globe. Some mines in Hungary are known to be a thousand yards perpendicular downwards; and we have been informed, by good authority, of a coal-mine in the north of England, an hundred yards deeper still.

It is beside our present purpose to enquire into the peculiar construction and contrivance of these, which more properly belongs to the history of fossils. It will be sufficient to observe in this place, that as we descend into the mines, the various layers of earth are seen, as we have already described them; and in some of these are always found the metals or minerals, for which the mine has been dug. Thus frequently gold is found dispersed and mixed with clay and gravel; sometimes it is mingled with other metallic bodies, stones, or bitumens; and sometimes united with that most obstinate of all substances, platina, from which scarce any art can separate it. Silver is sometimes found quite pure, sometimes mixed with other substances and minerals. Copper is found in beds mixed with various substances, marbles, sulphurs, and pyrites. Tin, the ore of which is heavier than that of any other metal, is generally found mixed with every kind of matter: lead is also equally common; and iron we well know can be extracted from all the substances upon earth.

The variety of substances which are thus found in the bowels of the earth, in their native state, have a very different appearance from what they are afterwards taught to assume by human industry. The richest metals are very often less glittering and splendid than the most useless marcasites, and the basest ores are in general the most beautiful to the eye.

This variety of substances, which compose the

internal parts of our globe, is productive of equal varieties both above and below its surface. The combination of the different minerals with each other, the heats which arise from their mixture, the vapours they diffuse, the fires which they generate, or the colds which they sometimes produce, are all either noxious or salutary to man; so that in this great laboratory of nature, a thousand benefits and calamities are forging, of which we are wholly unconscious; and it is happy for us that we are so.

Upon our descent into mines of considerable depth, the cold seems to increase from the mouth as we descend; but after passing very low down, we begin, by degrees, to come into a warmer air, which sensibly grows hotter as we go deeper, till, at last, the labourers can scarce bear any covering as they continue working.

This difference in the air was supposed by Boyle to proceed from magazines of fire that lay nearer the centre, and that diffused their heat to the adjacent regions. But we now know that it may be ascribed to more obvious causes. In some mines, the composition of the earth all around is of such a nature, that upon the admission of water or air, it frequently becomes hot, and often bursts out into eruptions. Besides this, as the external air, cannot readily reach the bottom, or be renewed there, and observable heat is perceived below, without the necessity of recurring to the central heat for an explanation.

Hence, therefore, there are two principal causes of the warmth at the bottom of mines: the heat of the substances of which the sides are composed; and the want of renovation in the air below. Any sulphureous substance mixed with iron, produces a very great heat, by the admission of water. If, for instance, a quantity of sulphur be mixed with a proportionable share of iron filings, and both kneaded together into a soft paste, with water, they will soon grow hot, and at last produce a flame. This experiment, produced by art, is very commonly effected within the bowels of the earth by nature. Sulphurs and irons are intimately blended together, and want only the mixture of water or air to excite their heat; and this, when once raised, is communicated to all bodies that lie within the sphere of their operation. Those beautiful minerals called marcasites and pyrites, are often of this composition; and wherever they are found, either by imbibing the moisture of the air, or having been by any means combined with water, they render the mine considerably hot.

The want of fresh air, also, at these depths, is, as we have said, another reason for their being found much hotter. Indeed, without the assistance of art, the bottom of most mines would, from this cause, be insupportable. To remedy this inconvenience, the miners are often obliged to sink, at some convenient distance from the mouth of the pit where they are at work, another pit, which joins the former below, and which, in Derbyshire, is called an air-shaft. Through this the air circulates; and thus the workmen are enabled to breathe freely at the bottom of the place; which becomes, as Mr. Boyle affirms, very commodious for respiration; and also very temperate as to heat and cold. Mr. Locke, however, who has left us an account of the Mendip mines, seems to present a different picture. "The descent into these is exceeding difficult and dangerous; for they are not sunk like wells, perpendicularly, but as the crannies of the rocks happen to run. The constant method is to swing down by a rope, placed under the arms, and clamber along, by applying both feet and hands to the sides of the narrow passage. The air is conveyed into them through a little passage that runs along the sides from the top, where they set up some turfs, on the lee-side of the hole, to catch and force it down. These turfs being removed to the windy side, or laid over the

the mouth of the hole, the miners below presently want breath, and faint; and if sweet-smelling flowers chance to be placed there, they immediately lose their fragrancy, and stink like carrion." An air so very putrifying can never be very commodious for respiration.

Indeed, if we examine the complexion of most miners, we shall be very well able to form a judgment of the unwholesomeness of the place where they are confined. Their pale and fallow looks shew how much the air is damaged by passing through those deep and winding ways, that are rendered humid by damps, or warmed with noxious exhalations. But although every mine is unwholesome, all are not equally so. Coal-mines are generally less noxious than those of tin; tin than those of copper; but none are so dreadfully destructive as those of quicksilver. At the mines near the village of Idra, nothing can adequately describe the deplorable infirmities of such as fill the hospital there: emaciated and crippled, every limb contracted or convulsed, and some in a manner transpiring quicksilver at every pore. There was one man, says Dr. Pope, who was not in the mines above half a year, and yet whose body was so impregnated with this mineral, that putting a piece of brass money in his mouth, or rubbing it between his fingers, it immediately became as white as if it had been washed over with quicksilver. In this manner all the workmen are killed sooner or later; first becoming paralytic, and then dying consumptive: and all this they sustain for the trifling reward of seven-pence a day.

But these metallic mines are not so noxious from their own vapours, as from those of the substances with which the ores are usually united, such as arsenic, cinnabar, bitumen, or vitriol. From the fumes of these, variously combined, and kept enclosed, are produced those various damps that put on so many dreadful forms, and are usually so fatal. Sometimes those noxious vapours are perceived by the delightful fragrance of their smell, somewhat resembling the pea-blossom in bloom, from whence one kind of damp has its name. The miners are not deceived, however, by its flattering appearances; but as they have thus timely notice of its coming, they avoid it while it continues, which is generally during the whole summer season. Another shews its approach by the burning of the candles, which seem to collect their flame into a globe of light, and thus gradually lessen, till they are quite extinguished. From this also the miners frequently escape; however, such as have the misfortune to be caught in it, either swoon away, and are suffocated, or slowly recover in excessive agonies. Here also is a third, called the fulminating damp, much more dangerous than either of the former, as it strikes down all before it, like a flash of gunpowder, without giving any warning of its approach. But there is another, more dangerous than all the rest, which is found in those places where the vapour has been long confined, and has been, by some accident, set free. The air rushing out from thence, always goes upon deadly errands; and scarce any escape to describe the symptoms of its operations.

Some colliers in Scotland, working near an old mine that had been long closed up, happened inadvertently to open an hole into it, from the pit where they were then employed; luckily they at that time perceived their error, and instantly fled for their lives. The next day, however, they were resolved to renew their work in the same pit, and eight of them ventured down, without any great apprehensions; but they had scarce got to the bottom of the stairs that led to the pit, but coming within the vapour, they all instantly dropped down dead, as if they had been shot. Amongst these unfortunate

No. 49.

poor men; there was one whose wife was informed that he was stifled in the mine; and as he happened to be next the entrance, she so far ventured down as to see where he lay. As she approached the place, the sight of her husband inspired her with a desire to rescue him, if possible, from that dreadful situation; though a little reflection might have shewn her it was then too late. But nothing could deter her; she ventured forward, and had scarce touched him with her hand, when the damp prevailed; and the misguided, but faithful creature, fell dead by his side.

Thus, the vapours found beneath the surface of the earth, are very various in their effects upon the constitution: and their are not less in their appearances. There are many kinds that seemingly are no way prejudicial to health, but in which the workmen breathe freely; and yet in these, if a lighted candle be introduced, they immediately take fire; and the whole cavern at once becomes one furnace of flame. In mines, therefore, subject to damps of this kind, they are obliged to have recourse to a very peculiar contrivance to supply sufficient light for their operations. This is by a great wheel; the circumference of which is beset with flints, which striking against steels placed for that purpose at the extremity, a stream of fire is produced, which affords light enough; and yet which does not set fire to the mineral vapour.

Of this kind are the vapours of the mines about Bristol; on the contrary, in other mines a single spark struck out from the collision of flint and steel, would set the whole shaft in a flame. In such, therefore, every precaution is used to avoid a collision; the workmen making use only of wooden instruments in digging; and being cautious before they enter the mine, to take out even the nails from their shoes. Whence this strange difference should arise, that the vapours of some mines catch fire with a spark, and others only with a flame, is a question that we must be content to leave in obscurity, till we know more of the nature both of mineral vapour and of fire. This only we may observe, that gunpowder will readily fire with a spark, but not with the flame of a candle: on the other hand, spirits of wine will flame with a candle, but not with a spark; but even here the cause of this difference, as yet, remains a secret.

As, from this account of mines, it appears that the internal parts of the globe are filled with vapours of various kinds, it is not surprising, that they should at different times reach the surface, and there put on various appearances. In fact, much of the salubrity, and much of the unwholesomeness of climates and soils, is to be ascribed to these vapours, which make their way from the bowels of the earth upwards; and refresh or taint the air with their exhalations. Salt mines being naturally cold, send forth a degree of coldness to the external air, to comfort and refresh it: on the contrary, metallic mines are known, not only to warm it with their exhalations, but often to destroy all kinds of vegetation by their volatile corrosive fumes. In some mines dense vapours are plainly perceived issuing from their mouths, and sensibly warm to the touch. In some places, neither snow nor ice will continue on the ground that covers a mine; and over others the fields are found destitute of verdure. The inhabitants, also, are rendered dreadfully sensible of these subterraneous exhalations, being affected with such a variety of evils proceeding entirely from this cause, that books have been professedly written upon this class of disorders.

Nor are these vapours which thus escape to the surface of the earth, entirely unconfined; for they are frequently, in a manner circumscribed to a spot: the grotto Del Cane, near Naples, is an instance of

this; the noxious effects of which have made that cavern so very famous. This grotto, which has so much employed the attention of travellers, lies within four miles of Naples, and is situated near a large lake of clear and wholesome water. Nothing can exceed the beauty of the landscape which this lake affords; being surrounded with hills covered with forests of the most beautiful verdure, and the whole bearing a kind of amphitheatrical appearance. However, this region, beautiful as it appears, is almost entirely uninhabited; the few peasants that necessity compels to reside there, looking quite consumptive and ghastly, from the poisonous exhalations that rise from the earth. The famous grotto lies on the side of an hill, near which place a peasant resides, who keeps a number of dogs for the purpose of shewing the experiment to the curious. These poor animals always seem perfectly sensible of the approach of a stranger, and endeavour to get out of the way. However, their attempts being perceived, they are taken and brought to the grotto; the noxious effects of which they have so frequently experienced. Upon entering this place, which is a little cave, or rather a hole dug into the hill, about eight feet high and twelve feet long, the observer can see no visible marks of its pestilential vapour; only to about a foot from the bottom, the wall seems to be tinged with a colour resembling that which is given by stagnant waters. When the dog, this poor philosophical martyr, as some have called him, is held above this mark, he does not seem to feel the smallest inconvenience; but when his head is thrust down lower, he struggles to get free for a little; but in the space of four or five minutes he seems to lose all sensation, and to be taken out without life. Being plunged in the neighbouring lake, he quickly recovers, and is permitted to run home seemingly without the smallest injury.

This vapour, which thus for a time suffocates, is of the humid kind, as it extinguishes a torch, and fuddies a looking-glass: but there are other vapours perfectly inflammable, and that only require the approach of a candle to set them blazing. Of this kind was the burning well at Brofely, which is now stopped up; the vapour of which, when a candle was brought within about a foot of the surface of the water, caught flame like spirits of wine, and continued blazing for several hours after. Of this kind, also, are the perpetual fires in the kingdom of Persia. In that province, where the worshippers of fire hold their chief mysteries, the whole surface of the earth, for some extent, seems impregnated with inflammable vapours. A reed struck into the ground continues to burn like a flambeau; an hole made beneath the surface of the earth, instantly becomes a furnace answering all the purposes of a culinary fire. There they make lime by merely burying the stones in the earth, and watch with veneration the appearances of a flame that has not been extinguished for times immemorial. How different are men in various climates! This deluded people worship these vapours as a deity, which in other parts of the world are considered as one of the greatest evils.

C H A P. IX.

OF VOLCANOES and EARTHQUAKES.

MINES and caverns, as we have said, reach but a very little way under the surface of the earth, and we have hitherto had no opportunities of exploring further. Without all doubt the wonders that are still unknown surpass those that have been represented, as there are depths of thousands of miles which are hidden from our enquiry. The

only tidings we have from those unfathomable regions are by means of volcanoes, those burning mountains that seem to discharge their materials from the lowest abysses of the earth. A volcano may be considered as a cannon of immense size, the mouth of which is often near two miles in circumference. From this dreadful aperture are discharged torrents of flame and sulphur, and rivers of melted metal. Whole clouds of smoke and ashes, with rocks of enormous size, are discharged to many miles distance; so that the force of the most powerful artillery is but as a breeze agitating a feather, in comparison. In the deluge of fire and melted matter which runs down the sides of the mountain, whole cities are sometimes swallowed up and consumed. Those rivers of liquid fire are often two hundred feet deep; and, when they harden, frequently form considerable hills. Nor is the danger of these confined to the eruption only: but the force of the internal fire struggling for vent, frequently produces earthquakes through the whole region where the volcano is situated. So dreadful have been these appearances, that men's terrors have added new horrors to the scene, and they have regarded as prodigies, what we know to be the result of natural causes. Some philosophers have considered them as vents communicating with the fires of the centre, and the ignorant as the mouths of hell itself. Astonishment produces fear, and fear superstition: the inhabitants of Iceland believe the bellowings of Hecla are nothing else but the cries of the damned, and that its eruptions are contrived to encrease their tortures.

But if we regard this astonishing scene of terror with a more tranquil and inquisitive eye, we shall find that these conflagrations are produced by very obvious and natural causes. We have already been apprized of the various mineral substances in the bosom of the earth, and their aptness to burst out into flames. Marcasites and pyrites, in particular, by being humidified with water, or air, contract this heat, and often endeavour to expand with irresistible explosion. These, therefore, being lodged in the depths of the earth, or in the bosom of mountains, and being either washed by the accidental influx of waters below, or fanned by air, insinuating itself through perpendicular fissures from above, take fire at first by only heaving in earthquakes, but at length by bursting through every obstacle, and making their dreadful discharge in a volcano.

These volcanoes are found in all parts of the earth: in Europe there are three that are very remarkable; *Ætna* in Sicily, *Vesuvius* in Italy, and *Hecla* in Iceland. *Ætna* has been a volcano for ages immemorial. Its eruptions are very violent, and its discharge has been known to cover the earth sixty-eight feet deep. In the year 1537, an eruption of this mountain produced an earthquake through the whole island, for twelve days, overturned many houses, and at last formed a new aperture which overwhelmed all within five leagues round. The cinders thrown up were driven even into Italy, and its burning were seen at Malta, at the distance of sixty leagues. There is nothing more awful, says Kircher, than the eruptions of this mountain, nor nothing more dangerous than attempting to examine its appearances, even long after the eruption has ceased. As we attempt to clamber up its steepy sides, every step we take upward, the feet sink back half way. Upon arriving near the summit, ashes and snow, with an ill assorted conjunction, present nothing but objects of desolation. Nor is this the worst, for, as all places are covered over, many caverns are intirely hidden from the sight, into which, if the enquirer happens to fall, he sinks to the bottom and meets inevitable destruction. Upon coming to the edge of the great crater, nothing can sufficiently

ficiently represent the tremendous magnificence of the scene. A gulph two miles over, and so deep that no bottom can be seen; on the sides pyramidical rocks starting out between apertures that emit smoke and flame; all this accompanied with a sound that never ceases, louder than thunder, strikes the bold with horror, and the religious with veneration for him that has power to controul its burnings.

In the descriptions of Vesuvius, or Hecla, we shall find scarce any thing but a repetition of the same terrible objects, though rather lessened, as these mountains are not so large as the former. The crater of Vesuvius is but a mile across, according to the same author; whereas that of *Ætna* is two. On this particular, however, we must place no dependence, as these caverns every day alter; being lessened by the mountains sinking in at one eruption, and enlarged by the fury of another. It is not one of the least remarkable particulars respecting Vesuvius, that Pliny the naturalist was suffocated in one of its eruptions; for his curiosity impelled him too near, he found himself involved in smoke and cinders when it was too late to retire; and his companions hardly escaped to give an account of the misfortune. It was in that dreadful eruption that the city of Herculaneum was overwhelmed; the ruins of which have been lately discovered at sixty feet distance below the surface, and what is still more remarkable, forty feet below the bed of the sea. One of the most remarkable eruptions of this mountain was in the year 1707, which is finely described by Valetta, a part of whose description we beg leave to translate.

“Towards the latter end of summer, in the year 1707, the mount Vesuvius, that had for a long time been silent, now began to give some signs of commotion. Little more than internal murmurs at first were heard, that seemed to contend within the lowest depths of the mountain; no flame, nor even any smoke, was as yet seen. Soon after some smoke appeared by day, and a flame by night, which seemed to brighten all the Campania. At intervals also it shot off substances with a sound very like that of artillery, but which, even at so great a distance as we were at, infinitely exceeded them in greatness. Soon after it began to throw up ashes, which becoming the sport of the winds, fell at great distances, and some many miles. To this succeeded showers of stones, which killed many of the inhabitants of the valley, but made a dreadful ravage among the cattle. Soon after a torrent of burning matter began to roll down the sides of the mountain, at first with a slow and gentle motion, but soon with increased celerity. The matter thus poured out, when cool, seemed, upon inspection, to be of a vitrified earth, the whole united into a mass of more than stony hardness. But what was particularly observable was, that upon the whole surface of these melted materials, a light spongy stone seemed to float, while the lower body was of the hardest substance, of which our roads are usually made. Hitherto there were no appearances but what had been often remarked before; but on the third or fourth day, seeming flashes of lightning were shot forth from the mouth of the mountain, with a noise far exceeding the loudest thunder. These flashes, in colour and brightness, resembled what we usually see in tempests, but they assumed a more twisted and serpentine form. After this followed such clouds of smoke and ashes, that the whole city of Naples, in the midst of the day, was involved in nocturnal darkness, and the nearest friends were unable to distinguish each other in this frightful gloom. If any person attempted to stir out without torch-light, he was obliged to return, and every part of the city was filled with supplica-

tions and terror; at length after a continuance of some hours, about one o'clock at midnight, the wind blowing from the north, the stars began to be seen; the heavens, though it was night, began to grow brighter; and the eruptions, after a continuance of fifteen days, to lessen. The torrent of melted matter was seen to extend from the mountain down to the shore; the people began to return to their former dwellings, and the whole face of nature to resume its former appearance.”

Bishop Berkley gives an account of one of these eruptions in a manner something different from the former. “In the year 1717, and the middle of April, with much difficulty I reached the top of mount Vesuvius, in which I saw a vast aperture full of smoke, which hindered me from seeing its depth and figure. I heard within that horrid gulph certain extraordinary sounds, which seemed to proceed from the bowels of the mountain, a sort of murmuring, sighing, dashing sound, and between whiles a noise like that of thunder or cannon, with a clattering like that of tiles falling from the tops of houses into the streets. Sometimes, as the wind changed, the smoke grew thinner, discovering a very ruddy flame, and the circumference of the crater streaked with red and several shades of yellow. After an hour's stay, the smoke being moved by the wind, gave us short and partial prospects of the great hollow; in the flat bottom of which I could discern two furnaces almost contiguous; that on the left seeming about three yards over, glowing with ruddy flame, and throwing up red hot stones, with an hideous noise, which, as they fell back, caused the clattering already taken notice of. May 8, in the morning, I ascended the top of Vesuvius a second time, and found a different face of things. The smoke ascending upright, gave a full prospect of the crater, which, as I could judge, was about a mile in circumference, and an hundred yards deep. A conical mount had been formed since my last visit in the middle of the bottom, which I could see was made by the stones, thrown up and fallen back again into the crater. In this new hill remained the two furnaces already mentioned. The one was seen to throw up every three or four minutes, with a dreadful sound, a vast number of red hot stones, at least three hundred feet higher than my head, as I stood upon the brink; but as there was no wind, they fell perpendicularly back from whence they had been discharged. The other was filled with red hot liquid matter, like that in the furnace of a glass-house; raging and working like the waves of the sea, with a short abrupt noise. This matter would sometimes boil over, and run down the side of the conical hill, appearing at first red hot, but changing colour as it hardened and cooled. Had the wind driven in our faces, we had been in no small danger of stifling by the sulphureous smoke, or being killed by the masses of melted minerals, that were shot from the bottom. But as the wind was favourable, I had an opportunity of surveying this amazing scene for above an hour and an half together. On the fifth of June, after an horrid noise, the mountain was seen at Naples to work over; and about three days after, its thunders were renewed so, that not only the windows in the city, but all the houses shook. From that time it continued to overflow, and sometimes at night were seen columns of fire shooting upward from its summit. On the tenth, when all was thought to be over, the mountain again renewed its terrors, roaring and raging most violently. One cannot form a juster idea of the noise, in the most violent fits of it, than by imagining a mixed sound, made up of the raging of a tempest, the murmur of a troubled sea, and the roaring of thunder and artillery, confused all together. Though we heard this at the distance of

twelve miles, yet it was very terrible. I therefore resolved to approach nearer to the mountain; and, accordingly, three or four of us got into a boat, and were set ashore at a little town, situated at the foot of the mountain. From thence we rode about four or five miles, before we came to the torrent of fire that was descending from the side of the volcano; and here the roaring grew exceeding loud and terrible as we approached. I observed a mixture of colours in the cloud, above the crater, green, yellow, red, blue. There was likewise a ruddy dismal light in the air, over that tract where the burning river flowed. These circumstances, set off and augmented by the horror of the night, made a scene the most uncommon and astonishing I ever saw; which still increased as we approached the burning river. Imagine a vast torrent of liquid fire, rolling from the top, down the side of the mountain, and with irresistible fury bearing down and consuming vines, olives, and houses; and divided into different channels, according to the inequalities of the mountain. The largest stream seemed half a mile broad at least, and five miles long. I walked so far before my companions up the mountain, along the side of the river of fire, that I was obliged to retire in great haste, the sulphureous steam having surpris'd me, and almost taken away by breath. During our return, which was about three o'clock in the morning, the roaring of the mountain was heard all the way, while we observed it throwing up huge spouts of fire and burning stones, which falling, resembled the stars in a rocket. Sometimes I observed two or three distinct columns of flame, and sometimes one only that was large enough to fill the whole crater. These burning columns, and fiery stones, seemed to be shot a thousand feet perpendicular above the summit of the volcano: and in this manner the mountain continued raging for six or eight days after. On the eighteenth of the same month the whole appearance ended, and the mountain remained perfectly quiet, without any visible smoke or flame."

The matter which is found to roll down from the mouth of all volcanoes in general, resembles the dross that is thrown from a smith's forge. But it is different, perhaps, in various parts of the globe; for, as we have already said, there is not a quarter of the world that has not its volcanoes. In Asia, particularly in the islands of the Indian ocean, there are many. One of the most famous is that of Albouras, near Mount Taurus, the summit of which is continually on fire, and covers the whole adjacent country with ashes. In the island of Ternate there is a volcano, which some travellers assert; burns most furiously in the times of the equinoxes, because of the winds which then contribute to increase the flames. In the Molucca islands there are many burning mountains; they are also seen in Japan, and the islands adjacent; and in Java and Sumatra, as well as in other of the Philippine islands. In Africa there is a cavern, near Fez, which continually sends forth either smoke or flames. In the Cape de Verde islands, one of them, called the Island del Fuego, continually burns; and the Portuguese, who frequently attempted a settlement there, have as often been obliged to desist. The Peak of Teneriffe is, as every body knows, a volcano that seldom desists from eruptions. But of all parts of the earth, America is the place where those dreadful irregularities of nature are the most conspicuous. Vesuvius, and *Ætna* itself, are but mere fire-works, in comparison to the burning mountains of the Andes; which as they are the highest mountains of the world, so also are they the most formidable for their eruptions. The mountain of Arequipa in Peru, is one of the most celebrated; Carrassa, and Malahallo, are very considerable; but

that of Cotopaxi, in the province of Quito, exceeds any thing we have hitherto read or heard of. The mountain of Cotopaxi, as described by Ulloa, is more than three miles perpendicular from the sea; and it became a volcano at the time of the Spaniards first arrival in that country. A new eruption of it happened in the year 1743, having been some days preceded by a continual roaring in its bowels. The sound of one of these mountains is not like that of the volcanoes in Europe, confined to a province, but is heard at an hundred and fifty miles distance. An aperture was made in the summit of this immense mountain; and three more about equal heights, near the middle of its declivity, which was at that time buried under prodigious masses of snow. The ignited substances ejected on that occasion, mixed with a prodigious quantity of ice and snow, melting amidst the flames, were carried down with such astonishing rapidity, that in an instant the valley from Callo to Latacunga was overflowed; and besides its ravages in bearing down the houses of the Indians, and other poor inhabitants, great numbers of people lost their lives. The river of Latacunga was the channel of this terrible flood; till being too small for receiving such a prodigious current, it overflowed the adjacent country, like a vast lake, near the town, and carried away all the buildings within its reach. The inhabitants retired into a spot of higher ground behind the town, of which those parts which stood within the limits of the current were totally destroyed. The dread of still greater devastations did not subside for three days; during which, the volcano ejected cinders, while torrents of melted ice and snow poured down its sides. The eruption lasted several days, and was accompanied with terrible roarings of the wind, rushing through the volcano still louder than the former rumblings in its bowels. At last all was quiet, neither fire nor smoke to be seen, nor noise to be heard; till, in the ensuing year, the flames again appeared with recruited violence, forcing their passage through several other parts of the mountain, so that in clear nights the flames being reflected by the transparent ice, formed an awfully magnificent illumination.

Such is the appearance and the effect of those fires which proceed from the more inward recesses of the earth; for that they generally come from deeper regions than man has hitherto explored, we cannot avoid thinking, contrary to the opinion of Mr. Buffon, who supposes them rooted but a very little way below the bed of the mountain. We can never suppose, says this great naturalist, that these substances are ejected from any great distance, below, if we only consider the great force already required to fling them up to such vast heights above the mouth of the mountain; if we consider the substances thrown up, which we shall find upon inspection to be the same with those of the mountain below; if we take into our consideration, that air is always necessary to keep up the flame; but, most of all, if we attend to one circumstance, which is, that if these substances were exploded from a vast depth below, the same force required to shoot them up so high, would act against the sides of the volcano, and tear the whole mountain in pieces. To all this specious reasoning, particular answers might easily be given; as that the length of the funnel increases the force of the explosion; that the sides of the funnel are actually often burst with the great violence of the flame; that air may be supposed at depths at least as far as the perpendicular fissures descend. But the best answer is a well-known fact; namely, that the quantity of matter discharged from *Ætna* alone, is supposed, upon a moderate computation, to exceed twenty times the original bulk of the mountain. The greatest part of Sicily, seems covered

covered with its eruptions. The inhabitants of Catania have found, at the distance of several miles, streets and houses, sixty feet deep, overwhelmed by the lava or matter it has discharged. But what is still more remarkable, the walls of these very houses have been built of materials evidently thrown up by the mountain. The inference from all this is very obvious; that the matter thus exploded cannot belong to the mountain itself, otherwise, it would have been quickly consumed; it cannot be derived from moderate depths, since its amazing quantity evinces, that all the places near the bottom must have long since been exhausted; nor can it have any extensive, and, if we may so call it, a superficial spread, for then the country round would be quickly undermined; it must, therefore, be supplied from the deeper regions of the earth; those undiscovered tracts where the Deity performs his wonders in solitude, satisfied with self-approbation!

C H A P. X. Of EARTHQUAKES.

HAVING given the theory of volcanoes, we have in some measure given also that of earthquakes. They both seem to proceed from the same cause, only with this difference, that the fury of the volcano is spent in the eruption, that of an earthquake spreads wider and acts more fatally by being confined. The volcano only affrights a province, earthquakes have laid whole kingdoms in ruin.

Philosophers have taken some pains to distinguish between the various kinds of earthquakes, such as the tremulous, the pulsative, the perpendicular, and the inclined; but these are rather the distinctions of art than of nature, mere accidental differences arising from the situation of the country or of the cause. If, for instance, the confined fire acts directly under a province or a town, it will heave the earth perpendicularly upward, and produce a perpendicular earthquake. If it acts at a distance, it will raise that tract obliquely, and thus the inhabitants will perceive an inclined one.

Nor does it seem that there is much greater reason for Mr. Buffon's distinction of earthquakes. One kind of which he supposes to be produced by fire in the manner of volcanoes, and confined but to a very narrow circumference. The other kind he ascribes to the struggles of confined air, expanded by heat in the bowels of the earth, and endeavouring to get free. For how do these two causes differ? Fire is an agent of no power whatsoever without air. It is the air, which being at first compressed, and then dilated in a cannon, that drives the ball with such force. It is the air struggling for vent in a volcano, that throws up its contents to such vast heights. In short, it is the air confined in the bowels of the earth, and acquiring elasticity by heat, that produces all those appearances generally ascribed to the operation of fire. When, therefore, we are told that there are two causes of earthquakes, we only learn, that a greater or smaller quantity of heat produces those terrible effects; for air is the only active operator in either.

Some philosophers, however, have been willing to give the air as great a share in producing these terrible efforts as they could; and, magnifying its powers, have called in but a very moderate degree of heat to put it in action. Although experience tells that the earth is full of inflammable materials, and that fires are produced wherever we descend; although it tells us that those countries, where there are volcanoes, are most subject to earthquakes, yet they step out of the way, and so find a new solution.

No. 49.

These only allow but just heat enough to produce the most dreadful phenomena, and backing their assertions with long calculations, give theory an air of demonstration. Mr. Amontons has been particularly sparing of the internal heat in this respect; and has shewn perhaps accurately enough, that a very moderate degree of heat may suffice to give the air amazing powers of expansion.

It is astonishing, however, to trace the progress of a philosophical fancy let loose in imaginary speculations. They run thus: "A very moderate degree of heat may bring the air into a condition capable of producing earthquakes; for the air at the depth of forty-three thousand five hundred and twenty-eight fathom below the surface of the earth, becomes almost as heavy as quicksilver. This, however, is but a very slight depth in comparison of the distance to the centre, and is scarce a seventieth part of the way. The air, therefore, at the centre must be infinitely heavier than mercury, or any body that we know of. This granted, we shall take something more, and say, that it is very probable there is nothing but air at the centre. Now let us suppose this air heated, by some means, even to the degree of boiling water, as we have proved that the density of the air is here very great, its elasticity must be in proportion: an heat, therefore, which at the surface of the earth would have produced but a slight expansive force, must at the centre produce one very extraordinary, and, in short, be perfectly irresistible. Hence this force may with great ease produce earthquakes; and if increased it may convulse the globe; it may (by only adding figures enough to the calculation) destroy the solar system, and even the fixed stars themselves." These revelations generally produce nothing; for as we have often observed, increased calculations, while they seem to tire the memory, give the reasoning faculty perfect repose.

However, as earthquakes are the most formidable ministers of nature, it is not to be wondered that a multitude of writers have been curiously employed in their consideration. Woodward has ascribed the cause to a stoppage of the waters below the earth's surface, by some accident. These being thus accumulated, and yet acted upon by fires, which he supposes still deeper, both contribute to heave up the earth upon their bosom. This he thinks accounts for the lakes of water produced in an earthquake, as well as for the fires that sometimes burst from the earth's surface upon those dreadful occasions. There are others who have supposed that the earth may be itself the cause of its own convulsions. When, say they, the roots or basis of some large tract is worn away by a fluid underneath, the earth sinking therein, its weight occasions a tremour of the adjacent parts, sometimes producing a noise, and sometimes an inundation of water. Not to tire the reader with an history of opinions instead of facts, some have ascribed them to electricity, and some to the same causes that produce thunder.

It would be tedious, therefore, to give all the various opinions that have employed the speculative upon this subject. The activity of the internal heat seems alone sufficient to account for every appearance that attends these tremendous irregularities of nature. To conceive this distinctly, let us suppose at some vast distance under the earth, large quantities of inflammable matter, pyrites, bitumens, and marcasites disposed, and only waiting for the aspersions of water, or the humidity of the air, to put their fires in motion; at last, this dreadful mixture arrives; waters find their way into those depths, through the perpendicular fissures; or air insinuates itself through the same minute apertures; immediately new appearances ensue: those substances, which for ages before lay dormant, now conceive

new apparent qualities; they grow hot, produce new air and only want room for expansion. However, the narrow apertures by which the air or water had at first admission, are now closed up; yet as new air is continually generated, and as the heat every moment gives this air new elasticity, it at length bursts, and dilates all round; and, in its struggles to get free, throws all above it into similar convulsions. Thus an earthquake is produced, more or less extensive, according to the depth or the greatness of the cause.

But before we proceed with the causes, let us take a short view of the appearances which have attended the most remarkable earthquakes. By these we shall see how far the theorist corresponds with the historian. The greatest we find in antiquity, is that mentioned by Pliny, in which twelve cities in Asia Minor were swallowed up in one night: he tells us also of another, near the lake Thrasymene, which was not perceived by the armies of the Carthaginians and Romans, that were then engaged near that lake, although it shook the greatest part of Italy. In another place he gives the following account of an earthquake of an extraordinary kind. "When Lucius Marcus, and Sextus Julius, were consuls, there appeared a very strange prodigy of the earth, (as I have read in the books of Ætruscan discipline) which happened in the province of Mutina. Two mountains shocked against each other, approaching and retiring with the most dreadful noise. They, at the same time, and in the midst of the day, appeared to cast forth fire and smoke, while a vast number of Roman knights and travellers from the Æmilian way, stood and continued amazed spectators. Several towns were destroyed by this shock; and all the animals that were near them were killed." In the times of Trajan, the city of Antioch, and a great part of the adjacent country, was buried by an earthquake. About three hundred years after, in the times of Justinian, it was once more destroyed, together with forty thousand inhabitants: and, after an interval of sixty years, the same ill-fated city was a third time overturned, with the loss of not less than sixty thousand souls. In the year 1182, most of the cities of Syria, and the kingdom of Jerusalem, were destroyed by the same accident. In the year 1594, the Italian historians describe an earthquake at Puteoli, which caused the sea to retire two hundred yards from its former bed.

But one of those most particularly described in history, is that of the year 1693; the damages of which were chiefly felt in Sicily, but its motion perceived in Germany, France, and England. It extended to a circumference of two thousand six hundred leagues; chiefly affecting the sea-coasts, and great rivers; more perceivable also upon the mountains than in the vallies. Its motions were so rapid, that those who lay at their length, were tossed from side to side, as upon a rolling billow. The walls were dashed from their foundations; and no less than fifty-four cities, with an incredible number of villages, were either destroyed or greatly damaged. The city of Catania, in particular, was utterly overthrown. A traveller, who was on his way thither, at the distance of some miles, perceived a black cloud, like night, hanging over the place. The sea, all of a sudden, began to roar; Mount Ætna to send forth great spires of flame; and soon after a shock ensued, with a noise as if all the artillery in the world had been at once discharged. Our traveller, being obliged to alight instantly, felt himself raised a foot from the ground; and turning his eyes to the city, he with amazement saw nothing but a thick cloud of dust in the air. The birds flew about astonished; the sun was darkened; the beasts ran howling from the hills; and, although the

shock did not continue above three minutes, yet near nineteen thousand of the inhabitants of Sicily perished in the ruins. Catania, to which city the describer was travelling, seemed the principal scene of ruin; its place only was to be found; and not a footstep of its former magnificence was to be seen remaining.

The earthquake which happened in Jamaica, in 1692, was very terrible, and its description sufficiently minute. "In two minutes time it destroyed the town of Port-Royal, and sunk the houses in a gulph forty fathoms deep. It was attended with an hollow rumbling noise, like that of thunder; and, in less than a minute, three parts of the houses, and their inhabitants, were all sunk quite under water. While they were thus swallowed up on one side of the street or the other, the houses were thrown into heaps; the sand of the street rising like the waves of the sea, lifting up those that stood upon it, and immediately overwhelming them in pits. All the wells discharged their waters with the most vehement agitation. The sea felt an equal share of turbulence, and, bursting over its mounds, deluged all that came in its way. The fissures of the earth were, in some places, so great, that one of the streets appeared twice as broad as formerly. In many places, however, it opened and closed again, and continued this agitation for some time. Of these openings, two or three hundred might be seen at a time; in some whereof the people were swallowed up: in others, the earth closing, caught them by the middle, and thus crushed them instantly to death. Other openings, still more dreadful than the rest, swallowed up whole streets; and others, more formidable, spouted up whole cataracts of water, drowning such as the earthquake had spared. The whole was attended with the most noisome stench; while the thundering of the distant falling mountains, the whole sky overcast with a dusky gloom, and the crash of falling habitations, gave unspeakable horror to the scene. After this dreadful calamity was over, the whole island seemed converted into a scene of desolation; scarce a planter's house was left standing; almost all were swallowed up; houses, people, trees, shared one universal ruin; and, in their places appeared great pools of water, which, when dried up by the sun, left only a plain of barren sand, without any vestige of former inhabitants. Most of the rivers, during the earthquake, were stopt up by the falling in of the mountains; and it was not till after some time that they made themselves new channels. The mountains seemed particularly attacked by the force of the shock; and it was supposed that the principal seat of the concussion was among them. Those who were saved, got on board ships in the harbour; where many remained above two months, the shocks continuing during that interval with more or less violence every day."

As this description seems to exhibit all the appearances that usually make up the catalogue of terrors belonging to an earthquake, we will suppress the detail of that which happened at Lisbon, in our own times, and which is too recent to require a description. In fact, there are few particulars in the accounts of those who were present at that scene of desolation, that we have not more minutely and accurately transmitted to us by former writers, whose narratives we have for that reason preferred. We will, therefore, close this description of human calamities, with the account of the dreadful earthquake at Calabria, in 1638. It is related by the celebrated Father Kircher, as it happened while he was on his journey to visit Mount Ætna, and the rest of the wonders that lie towards the south of Italy. The reader, need scarce be informed, that Kircher is considered, by scholars, as one of the greatest prodigies of learning.

"Having

“ Having hired a boat, in company with four more, two friars of the order of St. Francis, and two seculars, we launched, on the twenty-four of March, from the harbour of Messina, in Sicily, and arrived, the same day, at the promontory of Pelorus. Our destination was for the city of Euphæmia, in Calabria, where we had some business to transact, and where we designed to tarry for some time. However, Providence seemed willing to cross our design; for we were obliged to continue for three days at Pelorus, upon account of the weather; and though we often put out to sea, yet we were as often driven back. At length, however, wearied with the delay, we resolved to prosecute our voyage; and, although the sea seemed more than usually agitated, yet we ventured forward. The gulph of Charybdis, which we approached, seemed whirled round in such a manner, as to form a vast hollow verging to a point in the centre. Proceeding onward, and turning my eyes to Ætna, I saw it cast forth large volumes of smoke, of mountainous sizes, which entirely covered the whole island, and blotted out the very shores from my view. This, together with the dreadful noise, and the sulphureous stench, which was strongly perceived, filled me with apprehensions that some more dreadful calamity was impending. The sea itself seemed to wear a very unusual appearance; those who have seen a lake in a violent shower of rain covered all over with bubbles, will conceive some idea of its agitations. My surprize was still encreased by the calmness and serenity of the weather; not a breeze, not a cloud which might be supposed to put all Nature thus into motion. I therefore warned my companions that an earthquake was approaching; and, after some time, making for the shore with all possible diligence, we landed at Tropæa, happy and thankful for having escaped the threatening dangers of the sea.

“ But our triumphs at land were of short duration; for we had scarce arrived at the Jesuits College in that city, when our ears were stunned with an horrid sound, resembling that of an infinite number of chariots driven fiercely forward, the wheels rattling, and the thongs cracking. Soon after this, a most dreadful earthquake ensued; so that the whole tract upon which we stood seemed to vibrate, as if we were in the scale of a balance that continued wavering. This motion, however, soon grew more violent; and being no longer able to keep my legs, I was thrown prostrate upon the ground. In the mean time, the universal ruin round me redoubled my amazement. The crash of falling houses, the tottering of towers, and the groans of the dying, all contributed to raise my terror and despair. On every side of me I saw nothing but a scene of ruin; and danger threatening wherever I should fly. I commended myself to God as my last great refuge. At that hour, O how vain was every sublunary happiness! wealth, honour, empire, wisdom, all mere useless sounds, and as empty as the bubbles in the deep. Just standing on the threshold of eternity, nothing but God was my pleasure; and the nearer I approached, I only loved him the more. After some time, however, finding that I remained unhurt, amidst the general concussion, I resolved to venture for safety, and running as fast as I could, reached the shore, but almost terrified out of my reason. I did not search long here till I found the boat in which I had landed, and my companions also, whose terrors were even greater than mine. Our meeting was not of that kind where every one is desirous of telling his own happy escape; it was all silence, and a gloomy dread of impending terrors.

“ Leaving this seat of desolation, we prosecuted our voyage along the coast; and the next day came

to Rochetta, where we landed, although the earth still continued in violent agitations. But we were scarce arrived at our inn, when we were once more obliged to return to the boat; and, in about half an hour, we saw the greatest part of the town, and the inn at which we had set up, dashed to the ground, and burying all its inhabitants beneath its ruins.

“ In this manner, proceeding onward in our little vessel, finding no safety at land, and yet, from the smallness of our boat, having but a very dangerous continuance at sea, we at length landed at Lopi-zium, a castle midway between Tropæa and Euphæmia, the city to which, as I said before, we were bound. Here, wherever I turned my eyes, nothing but scenes of ruin and horror appeared; towns and castles levelled to the ground; Strombalo, though at sixty miles distance, belching forth flames in an unusual manner, and with a noise which I could distinctly hear. But my attention was quickly turned from more remote to contiguous danger. The rumbling sound of an approaching earthquake, which we by this time were grown acquainted with, alarmed us for the consequences; it every moment seemed to grow louder, and to approach more near. The place on which we stood now began to shake most dreadfully; so that being unable to stand, my companions and I caught hold of whatever shrub grew next us, and supported ourselves in that manner.

“ After some time, this violent paroxysm ceasing, we again stood up, in order to prosecute our voyage to Euphæmia, that lay within sight. In the mean time, while we were preparing for this purpose, I turned my eyes towards the city, but could see only a frightful dark cloud, that seemed to rest upon the place. This the more surprized us, as the weather was so very serene. We waited, therefore, till the cloud was past away: then turning to look for the city, it was totally sunk. Wonderful to tell! nothing but a dismal and putrid lake was seen where it stood. We looked about to find some one that could tell us of its sad catastrophe, but could see none. All was become a melancholy solitude; a scene of hideous desolation. Thus proceeding pensively along, in quest of some human being that could give us some little information, we at length saw a boy sitting by the shore, and appearing stupified with terror. Of him, therefore, we enquired concerning the fate of the city; but he could not be prevailed on to give us an answer. We entreated him with every expression of tenderness and pity to tell us; but his senses were quite wrapt up in the contemplation of the danger he had escaped. We offered him some victuals, but he seemed to loath the sight. We still, persisted in our offices of kindness; but he only pointed to the place of the city, like one out of his senses; and then running up into the woods, was never heard of after. Such was the fate of the city of Euphæmia: and as we continued our melancholy course along the shore; the whole coast, for the space of two hundred miles, presented nothing but the remains of cities; and men scattered, without an habitation, over the fields. Proceeding thus along, we at length ended our distressful voyage by arriving at Naples, after having escaped a thousand dangers both at sea and land.”

We hope the reader will excuse this long translation from a favourite writer, and that the sooner, as it contains some particulars relative to earthquakes not to be found elsewhere. From the whole of these accounts we may gather, than the most concomitant circumstances are these:

1. A rumbling sound before the earthquake. This proceeds from the air, or fire, or both, forcing their way through the chasms of the earth, and endeavouring

deavouring to get free, which is also heard in volcanoes.

A violent agitation, or heaving of the sea, sometimes before and sometimes after that at land. This agitation is only a similar effect produced on the waters with that at land, and may be called, for the sake of perspicuity, a sea-quake; and this also is produced by volcanoes.

A spouting up of waters to great heights. It is not easy to describe the manner in which this is performed; but volcanoes also perform the same, Vesuvius being known frequently to eject a vast body of water.

A rocking of the earth to and fro, and sometimes a perpendicular bouncing, if it may be so called, of the same. This difference chiefly arises from the situation of the place with respect to the subterranean fire. Directly under it lifts; at a farther distance, it rocks.

Some earthquakes seem to travel onward, and are felt in different countries at different hours the same day. This arises from the great shock being given to the earth at one place, and that being communicated onward by an undulatory motion, successively affects different regions in its progress; as the blow given by a stone falling in a lake is not perceived at the shores till some time after the first concussion.

The shock is sometimes instantaneous, like the explosion of gunpowder; and sometimes tremulous, and continuing for several minutes. The nearer the place where the shock is first given, the more instantaneous and simple it appears. At a greater distance the earth redoubles the first blow, with a sort of vibratory continuation.

As waters have generally so great a share in producing earthquakes, it is not to be wondered that they should generally follow those breaches made by the force of fire, and appear in the great chasms which the earthquake has opened.

These are some of the most remarkable phenomena of earthquakes, presenting a frightful assemblage of the most terrible effects of air, earth, fire, and water.

The valley of Solfatara, near Naples, seems to exhibit, in a minuter degree, whatever is seen of this horrible kind on the great theatre of Nature. This plain, which is about twelve hundred feet long, and a thousand broad, is embosomed in mountains, and has in the middle of it a lake of noisome blackish water, covered with a bitumen, that floats upon its surface. In every part of this plain, caverns appear smoking with sulphur, and often emitting flames. The earth, wherever we walk over it, trembles beneath the feet. Noises of flames, and the hissing of waters, are heard at the bottom. The water sometimes spouts up eight or ten feet high. The most noisome fumes, foetid water, and sulphureous vapours, offend the smell. A stone thrown into any of the caverns, is ejected again with considerable violence. These appearances generally prevail when the sea is any way disturbed; and the whole seems to exhibit the appearance of an earthquake in miniature. However, in this smaller scene of wonders, as well as in the greater, there are many appearances for which perhaps we shall never account; and many questions may be asked, which no conjectures can thoroughly resolve. It was the fault of the philosophers of the last age, to be more inquisitive after the causes of things, than after the things themselves. They seemed to think that a confession of ignorance cancelled their claims to wisdom: they, therefore, had a solution for every demand. But the present age has grown, if not more inquisitive, at least more modest; and none are now ashamed of that ignorance which labour can neither remedy nor remove.

CHAP. XI.

Of the Appearance of New ISLANDS, and TRACTS; and of the disappearing of others.

HITHERTO we have taken a survey only of the evils which are produced by subterranean fires, but we have mentioned nothing of the benefits they may possibly produce. They may be of use in warming and cherishing the ground, in promoting vegetation, and giving a more exquisite flavour to the productions of the earth. The imagination of a person who has never been out of our own mild region, can scarcely reach to that luxuriant beauty with which all Nature appears clothed in those very countries that we have but just now described as desolated by earthquakes, and undermined by subterranean fires. It must be granted, therefore, that though in those regions they have a greater share in the dangers, they have also a larger proportion in the benefits of Nature.

But there is another advantage arising from subterranean fires, which, though hitherto disregarded by man, yet may one day become serviceable to him; namely, that while they are found to swallow up cities and plains in one place, they are also known to produce promontories and islands in another. We have many instances of islands being thus formed in the midst of the sea, which though for a long time barren, have afterwards become fruitful seats of happiness and industry.

New islands are formed in two ways; either suddenly, by the action of subterraneous fires; or more slowly, by the deposition of mud, carried down by rivers, and stopped by some accident. With respect particularly to the first, ancient historians, and modern travellers, give us such accounts as we can have no room to doubt of. Seneca assures us, that in his time the island of Therasia appeared unexpectedly to some mariners, as they were employed in another pursuit. Pliny assures us, that thirteen islands in the Mediterranean appeared at once emerging from the water; the cause of which he ascribes rather to the retiring of the sea in those parts, than to any subterraneous elevation. However, he mentions the island of Hiera, near that of Therasia, as formed by subterraneous explosions; and adds to his list several others, formed in the same manner. In one of which he relates that fish in great abundance were found, and that all those who eat of them died shortly after.

“On the twenty-fourth of May, in the year 1707, a slight earthquake was perceived at Santorin; and the day following, at sun-rising, an object was seen by the inhabitants of that island, at two or three miles distant at sea, which appeared like a floating rock. Some persons, desirous either of gain or excited by curiosity, went there, and found, even while they stood upon this rock, that it seemed to rise beneath their feet. They perceived also that its surface was covered with pumice stones and oysters, which it had raised from the bottom. Every day after, until the fourteenth of June, this rock seemed considerably to increase; and then was found to be half a mile round, and about thirty feet above the sea. The earth of which it was composed seemed whitish, with a small portion of clay. Soon after this the sea again appeared troubled, and steams arose, which were very offensive to the inhabitants of Santorin. But on the sixteenth of the succeeding month, seventeen or eighteen rocks more were seen to rise out of the sea, and at length to join together. All this was accompanied with the most terrible noise, and fires which proceeded from the island that was newly formed. The whole mass, however, of all this new-formed earth, uniting, increased every day, both in height and breadth, and,

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by the force of its explosions, cast forth rocks to seven miles distance. This continued to bear the same dreadful appearances till the month of November in the same year; and it is at present a volcano which sometimes renews its explosions. It is about three miles in circumference; and more than from thirty-five to forty feet high."

It seems extraordinary, that about this place in particular, islands have appeared at different times, particularly that of Hiera, mention above, which has received considerable additions in succeeding ages. Justin tells us, that at the time the Macedonians were at war with the Romans, a new island appeared between those of Theramenes and Thersia, by means of an earthquake. We are told, that this became half as big again about a thousand years after; another island rising up by its side, and joining to it, so as scarce at present to be distinguished from the former.

A new island was formed, in the year 1720, near that of Tercera, near the continent of Africa, by the same causes. In the beginning of December, at night, there was a terrible earthquake at that place, and the top of a new island appeared, which cast forth smoke in vast quantities. The pilot of a ship, who approached it, founded on one side of this island, and could not find ground at sixty fathom. At the other side the sea was totally tinged of a different colour, exhibiting a mixture of white, blue, and green; and was very shallow. This island, on its first appearance, was larger than it is at present; for it has, since that time, sunk in such a manner, as to be scarce above water.

A traveller, whom these appearances could not avoid affecting, speaks of them in this manner: "What can be more surprising than to see fire not only break out of the bowels of the earth, but also to make itself a passage through the waters of the sea! What can be more extraordinary or foreign to our common notions of things, than to see the bottom of the sea rise up into a mountain above the water, and become so firm an island as to be able to resist the violence of the greatest storms! I know that subterraneous fires, when pent in a narrow passage, are able to raise up a mass of earth as large as an island. But that this should be done in so regular and exact a manner that the water of the sea should not be able to penetrate and extinguish those fires; that, after having made so many passages, they should retain force enough to raise the earth; and, in fine, after having been extinguished, that the mass of earth should not fall down, or sink again with its own weight, but still remain in a manner suspended over the great arch below! This is what to me seems more surprising than any thing that has been related of Mount *Ætna*, *Vesuvius*, or any other volcano."

Such are his sentiments; however, there are few of these appearances any way more extraordinary than those attending volcanoes and earthquakes in general. We are not more to be surprised that inflammable substances should be found beneath the bottom of the sea, than at similar depths at land. These have all the force of fire giving expansion to air, and tending to raise the earth at the bottom of the sea, till it at length heaves above water. These marine volcanoes are not so frequent; for, if we may judge of the usual procedure of Nature, it must very often happen that, before the bottom of the sea is elevated above the surface, a chasm is opened in it, and then the water pressing in, extinguishes the volcano before it has time to produce its effects. This extinction, however, is not effected without very great resistance from the fire beneath. The water, upon dashing into the cavern, is very probably at first ejected back with great violence; and thus some of those amazing water-spouts are seen,

which have so often astonished the mariner, and excited curiosity.—But of these in their place.

Besides the production of those islands by the action of fire, there are others, as was said, produced by rivers or seas carrying mud, earth, and such like substances, along with their currents; and at last depositing them in some particular place. At the mouths of most great rivers, there are to be seen banks, thus formed by the sand and mud carried down with the stream, which have rested at that place, where the force of the current is diminished by its junction with the sea. These banks, by slow degrees, increase at the bottom of the deep; the water in those places, is at first found by mariners to grow more shallow; the bank soon heaves up above the surface; it is considered, for a while, as a tract of useless and barren sand; but the seeds of some of the more hardy vegetables are driven thither by the wind, take root, and thus binding the sandy surface, the whole spot is clothed in time with a beautiful verdure. In this manner there are delightful and inhabited islands at the mouths of many rivers, particularly the Nile, the Po, the Mississippi, the Ganges, and the Senegal. There has been, in the memory of man, a beautiful and large island formed in this manner, at the mouth of the river Nanquin, in China, made from depositions of mud at its opening: it is not less than sixty miles long, and about twenty broad. La Loubere informs us, in his voyage to Siam, that these sand-banks increase every day, at the mouths of all the great rivers in Asia: and hence he asserts, that the navigation up these rivers becomes every day more difficult; and will, at one time or another, be totally obstructed. The same may be remarked with regard to the Wolga, which has at present seventy openings into the Caspian sea; and of the Danube, which has seven into the Euxine. We have had an instance of the formation of a new island, not very long since, at the mouth of the Humber, in England. "It is yet within the memory of man," says the relator, "since it began to raise its head above the ocean. It began its appearance at low water, for the space of a few hours; and was buried again till the next tide's retreat. Thus, successively, it lived and died, until the year 1666, when it began to maintain its ground against the insult of the waves; and then first invited the aid of human industry. A bank was thrown about its rising grounds; and being thus defended from the incursions of the sea, it became firm and solid, and, in a short time, afforded good pasturage for cattle. It is about nine miles in circumference, and is worth to the proprietor about eight hundred pounds a year." It would be endless to mention all the islands that have been thus formed, and the advantages that have been derived from them. However, it is frequently found, that new islands may often be considered as only turning the rivers from their former beds; so that, in proportion as land is gained at one part, it is lost by the overflowing of some other.

Little, therefore, is gained by such accessions; nor is there much more by the new islands which are sometimes formed from the spoils of the continent. Mariners assure us, that there are sometimes whole plains unrooted from the main lands, by floods and tempests. These being carried out to sea, with all their trees and animals upon them, are frequently seen floating in the ocean, and exhibiting a surprising appearance of rural tranquillity in the midst of danger. The greatest part, however, having the earth at their roots at length washed away, are dispersed, and their animals drowned; but now and then some are found to brave the fury of the ocean, till being stuck either among rocks or sands, they again take firm footing, and become permanent islands.

As different causes have thus concurred to produce new islands, so we have accounts of others that the same causes have contributed to destroy. We have already seen the power of earthquakes exerted in sinking whole cities, and leaving lakes in their room. There have been islands, and regions also, that have shared the same fate; and have sunk with their inhabitants, never more to be heard of. Thus Pausanias tells us of an island, called Chryses, that was sunk near Lemnos. Pliny mentions several; among others, the island of Cea, for thirty miles, having been washed away, with several thousands of its inhabitants. But of all the noted devastations of this kind, the total submersion of the island of Atalantis, as mentioned by Plato, has been most the subject of speculation. Mankind, in general, now consider the whole of his account as an ingenious fable; but when fables are grown famous by time and authority, they become an agreeable, if not a necessary part of literary information.

"About nine thousand years are passed," says Plato, "since the island of Atalantis was in being. The priests of Egypt were well acquainted with it; and the first heroes of Athens gained much glory in their wars with the inhabitants. This island was as large as Asia Minor and Syria united; and was situated beyond the pillars of Hercules, in the Atlantic ocean. The beauty of the buildings, and the fertility of the soil, were far beyond any thing a modern imagination can conceive; gold and ivory were every where common; and the fruits of the earth offered themselves without cultivation. The arts, and the courage of the inhabitants, were not inferior to the happiness of their situation; and they were frequently known to make conquests, and over-run the continent of Europe and Asia. The imagination of the poetical philosopher riots in the description of the natural and acquired advantages, which they long enjoyed in this charming region. If, says he, we compare that country to our own, ours will appear a mere wasted skeleton, when opposed to it. Their mountains to the very tops were clothed with fertility, and poured down rivers to enrich the plains below."

However, all these beauties and benefits were destroyed in one day by an earthquake sinking the earth, and the sea overwhelming it. At present, not the smallest vestiges of such an island are to be found; Plato remains as the only authority for its existence; and philosophers dispute about its situation. However, we do not mean to enter into the controversy, as there appears but little probability to support the fact; and, indeed, it would be useless to run back nine thousand years in search of difficulties, as we are surrounded with objects that more closely affect us, and that demand admiration at our very doors. When we consider, as Lactantius suggests, the various vicissitudes of nature; lands swallowed by yawning earthquake, or overwhelmed in the deep; rivers and lakes disappearing, or dried away; mountains levelled into plains; and plains swelling up into mountains; we cannot help regarding this earth as a place of very little stability: as a transient abode of still more transitory beings.

CHAP. XII.

OF MOUNTAINS.

HAVING at last, in some measure, emerged from the deeps of the earth, we come to a scene of greater splendour; the contemplation of its external appearance. In this survey, its mountains are the first objects that strike the imagination, and excite our curiosity. There is not, perhaps, any thing in all nature that impresses an unaccustomed

spectator with such ideas of awful solemnity, as these immense piles of Nature's erecting, that seem to mock the minuteness of human magnificence.

In countries where there are nothing but plains, the smallest elevations are apt to excite wonder. In Holland, which is all a flat, they shew a little ridge of hills, near the sea-side, which Boerhaave generally marked out to his pupils, as being mountains of no small consideration. What would be the sensations of such an auditory, could they at once be presented with a view of the heights and precipices of the Alps, or the Andes! Even among us, in England, we have no adequate ideas of a mountain-prospect; our hills are generally sloping from the plain, and clothed to the very top with verdure; we can scarce, therefore, lift our imaginations to those immense piles whose tops peep up behind intervening clouds, sharp and precipitate, and reach to heights that human avarice or curiosity have never been able to ascend.

We, in this part of the world, are not, for that reason, so immediately interested in the question which has so long been agitated among philosophers, concerning what gave rise to these inequalities on the surface of the globe. In our own happy region, we generally see no inequalities but such as contribute to use and beauty; and we, therefore, are amazed at a question enquiring how such necessary inequalities came to be formed, and seeming to express a wonder how the globe comes to be so beautiful as we find it. But though with us there may be no great cause for such a demand, yet in those places where mountains deform the face of Nature, where they pour down cataracts, or give fury to tempests, there seems to be good reason for enquiry either into their causes or their uses. It has been, therefore, asked by many, in what manner mountains have come to be formed; or for what uses they are designed?

To satisfy curiosity in these respects, much reasoning has been employed, and very little knowledge propagated. With regard to the first part of the demand, the manner in which mountains were formed, we have already seen the conjectures of different philosophers on that head. One supposing that they were formed from the earth's broken shell, at the time of the deluge: another, that they existed from the creation, and only acquired their deformities in process of time: a third, that they owed their original to earthquakes: and still a fourth, with much more plausibility than the rest, ascribing them entirely to the fluctuations of the deep, which he supposes in the beginning to have covered the whole earth. Such as are pleased with disquisitions of this kind, may consult Burnet, Whiston, Woodward, or Buffon. Nor would we be thought to decry any mental amusements, that at worst keep us innocently employed; but we cannot help wondering how the opposite demand has never come to be made; and why philosophers have never asked how we come to have plains? Plains are sometimes more prejudicial to man than mountains. Upon plains, an inundation has greater power; the beams of the sun are often collected there with suffocating fierceness; they are sometimes found desert for several hundred miles together, as in the country east of the Caspian sea, although otherwise fruitful, merely because there are no risings nor depressions to form reservoirs, or collect the smallest rivulet of water. The most rational answer, therefore, why either mountains or plains were formed, seems to be, that they were thus fashioned by the hand of Wisdom, in order that pain and pleasure should be so contiguous, as that morality might be exercised either in bearing the one, or communicating the other.

Indeed, the more we consider this dispute respecting

specting the formation of mountains, the more we are struck with the futility of the question. There is neither a straight line, nor an exact superficies, in all nature. If we consider a circle, even with mathematical precision, we shall find it formed of a number of small right lines, joining at angles together. These angles, therefore, may be considered in a circle as mountains are upon our globe; and to demand the reason for the one being mountainous, or the other angular, is only to ask why a circle is a circle, or a globe is a globe. In short, if there be no surface without inequality in Nature, why should we be surprised that the earth has such? It has often been said, that the inequalities of its surface are scarce distinguishable, if compared to its magnitude; and indeed we have every reason to be content with the answer.

Some, however, have avoided the difficulty by urging the final cause. They alledge that mountains have been formed merely because they are useful to man. This carries the enquirer but a part of the way; for no one can affirm that in all places they are useful. The contrary is known, by horrid experience, in those valleys that are subject to their influence. However, as the utility of any part of our earthly habitation, is a very pleasing and flattering speculation to every philosopher, it is not to be wondered that much has been said to prove the usefulness of these. For this purpose, many conjectures have been made that have received a degree of assent even beyond their evidence; for men were unwilling to become more miserably wise.

It has been alledged, as one principal advantage that we derive from them, that they serve, like hoops or ribs, to strengthen our earth, and to bind it together. In consequence of this theory, Kircher has given us a map of the earth, in this manner hooped with its mountains; which might have a much more solid foundation, did it entirely correspond with truth.

Others have found a different use for them, especially when they run surrounding our globe; which is, that they stop the vapours which are continually travelling from the equator to the poles; for these being urged by the heat of the sun, from the warm regions of the line, must all be accumulated at the poles, if they were not stopped in their way by those high ridges of mountains which cross their direction. But an answer to this may be, that all the great mountains in America lie lengthwise, and therefore do not cross their direction.

But to leave these remote advantages, others assert, that not only the animal but vegetable part of the creation would perish for want of convenient humidity, were it not for their friendly assistance. Their summits are, by these, supposed to arrest, as it were, the vapours which float in the regions of the air. The large inflexions, and channels, are considered as so many basins prepared for the reception of those thick vapours, and impetuous rains, which descend into them. The huge caverns beneath are so many magazines or conservatories of water for the peculiar service of man: and those orifices by which the water is discharged upon the plain, are so situated as to enrich and render them fruitful, instead of returning through subterraneous channels to the sea, after the performance of a tedious and fruitless circulation.

However this be, certain it is that almost all our great rivers find their source among mountains; and, in general, the more extensive the mountain, the greater the river: thus the river Amazons, the greatest in the world, has its source among the Andes, which are the highest mountains on the globe; the river Niger travels a long course of several hundred miles from the mountains of the Moon, the highest in all Africa; and the Danube

and the Rhine proceed from the Alps, which are probably the highest mountains of Europe.

It need scarce be said that, with respect to height, there are many sizes of mountains, from the gently rising upland, to the tall craggy precipice. The appearance is in general different in those of different magnitudes. The first are clothed with verdure to the very tops, and only seem to ascend to improve our prospects, or supply us with a purer air: but the lofty mountains of the other class have a very different aspect. At a distance their tops are seen, in wavy ridges, of the very colour of the clouds, and only to be distinguished from them by their figure, which, as we have said, resemble the billows of the sea. As we approach, the mountain assumes a deeper colour; it gathers upon the sky, and seems to hide half the horizon behind it. Its summits also are become more distinct, and appear with a broken and perpendicular line. What at first seemed a single hill, is now found to be a chain of continued mountains, whose tops running along in ridges, are embosomed in each other: so that the curvatures of one are fitted to the prominences of the opposite side, and form a winding valley between, often of several miles in extent; and all the way continuing nearly of the same breadth.

Nothing can be finer, or more exact, than Mr. Pope's description of a traveller straining up the Alps. Every mountain he comes to, he thinks will be the last; he finds, however, an unexpected hill rise before him; and that being scaled, he finds the highest summit almost at as great a distance as before. Upon quitting the plain, he might have left a green and a fertile soil, and a climate warm and pleasing. As he ascends, the ground assumes a more ruflet colour; the grass becomes more mossy, and the weather more moderate. Still as he ascends, the weather becomes more cold, and the earth more barren. In this dreary passage, he is often entertained with a little valley of surprising verdure, caused by the reflected heat of the sun collected into a narrow spot on the surrounding heights. But it much more frequently happens that he sees only frightful precipices beneath, and lakes of amazing depths; from whence rivers are formed, and fountains derive their original. On those places next the highest summits, vegetation is scarcely carried on; here and there a few plants of the most hardy kind appear. The air is intolerably cold; either continually refrigerated with frosts, or disturbed with tempests. All the ground here wears an eternal covering of ice, and snows that seem constantly accumulating. Upon emerging from this war of the elements, he ascends into a purer and a serener region, where vegetation is entirely ceased; where the precipices, composed entirely of rocks, rise perpendicularly above him; while he views beneath him all the combat of the elements; clouds at his feet; and thunders darting upward from their bosoms below. A thousand meteors, which are never seen on the plain, present themselves. Circular rainbows; mock suns; the shadow of the mountain projected upon the body of the air; and the traveller's own image, reflected as in a looking-glass, upon the opposite cloud.

Such are, in general, the wonders that present themselves to a traveller in his journey either over the Alps or the Andes. But we must not suppose that this picture exhibits either a constant or an invariable likeness of those stupendous heights. Indeed, nothing can be more capricious or irregular than the forms of many of them. The tops of some run in ridges for a considerable length, without interruption; in others, the line seems indented by great valleys to an amazing depth. Sometimes a solitary and a single mountain rises from the bosom of the plain; and sometimes extensive plains, and even provinces,

provinces, as those of Savoy and Quito, are found embosomed near the tops of mountains. In general, however, those countries that are most mountainous, are the most barren and uninhabitable.

If we compare the heights of mountains with each other, we shall find that the greatest and highest are found under the Line. It is thought by some, that the rapidity of the earth's motion in these parts, together with the greatness of the tides there, may have thrown up those stupendous masses of earth. But, be the cause as it may, it is a remarkable fact, that the inequalities of the earth's surface are greatest there. Near the Poles, the earth, indeed, is craggy and uneven enough; but the heights of the mountains there are very inconsiderable. On the contrary, at the Equator, where Nature seems to sport in the amazing size of all her productions, the plains are extensive; and the mountains remarkably lofty. Some of them are known to rise three miles perpendicular above the bed of the ocean.

To enumerate the most remarkable of these, according to their size, we shall begin with the Andes, of which we have an excellent description by Ulloa, who went thither by command of the king of Spain, in company with the French Academicians, to measure a degree of the meridian. His journey up these mountains is too curious not to give an extract from.

After many incommodious days sailing up the river Guayaquil, he arrived at Caracol, a town situated at the foot of the Andes. Nothing could exceed the inconveniences which he experienced in this voyage, from the flies and moschetoes (an animal resembling our gnat).

"We were the whole day," says he, "in continual motion to keep them off; but at night our torments were excessive. Our gloves, indeed, were some defence to our hands; but our faces were entirely exposed; nor were our cloaths a sufficient defence for the rest of our bodies; for their stings penetrating through the cloth, caused a very painful and fiery itching. One night, in coming to an anchor near a large and handsome house that was uninhabited, we had no sooner seated ourselves in it, than we were attacked on all sides by swarms of moschetoes, so that it was impossible to have one moment's quiet. Those who had covered themselves with cloaths made for this purpose, found not the smallest defence; wherefore, hoping to find some relief in the open fields, they ventured out, though in danger of suffering in a more terrible manner from the serpents. But both places were equally obnoxious. On quitting this inhospitable retreat, we the next night took up our quarters in a house that was inhabited; the host of which being informed of the terrible manner we had passed the night before, he gravely told us, that the house we so greatly complained of, had been forsaken on account of its being the purgatory of a soul. But we had more reason to believe that it was quitted on account of its being the purgatory of the body. After having journeyed for upwards of three days, through boggy roads, in which the mules at every step sunk up to their bellies, we began at length to perceive an alteration in the climate; and having been long accustomed to heat, we now began to feel it grow sensibly colder.

"It is remarkable, that at Tariguagua we often see instances of the effects of two opposite temperatures, in two persons happening to meet; one of them leaving the plains below, and the other descending from the mountain. The former thinks the cold so severe, that he wraps himself up in all the garments he can procure; while the latter, finds the heat so great, that he is scarce able to bear any cloaths whatsoever. The one thinks the water so cold, that he avoids being sprinkled by it; the other

is so delighted with its warmth, that he uses it as a bath. Nor is the case very different in the same person, who experiences the same diversity of sensation upon his journey up, and upon his return. This difference only proceeds from the change naturally felt at leaving a climate to which one has been accustomed, and coming into another of an opposite temperature.

"The ruggedness of the road from Tariguagua, leading up the mountain, is not easily described. In some parts, the declivity is so great, that the mules can scarce keep their footing; and in others, the acclivity is equally difficult. The trouble of having people going before to mend the road, the pains arising from the many falls and bruises, and the being constantly wet to the skin, might be supported, were not these inconveniences augmented by the sight of such frightful precipices, and deep abysses, as must fill the mind with ceaseless terror. There are some places where the road is so steep, and yet so narrow, that the mules are obliged to slide down, without making any use of their feet whatsoever. On one side of the rider, in this situation, rises an eminence of several hundred yards; and on the other, an abyss of equal depth; so that if he in the least checks his mule, so as to destroy the equilibrium, they both must unavoidably perish.

"After having travelled about nine days in this manner, slowly winding along the side of the mountain, we began to find the whole country covered with an hoar frost; and an hut in which we lay had ice on it. Having escaped many perils, we at length, after a journey of fifteen days, arrived upon the plain, on the extremity of which stands the city of Quito, the capital of one of the most charming regions upon earth. Here, in the centre of the torrid zone, the heat is not only very tolerable, but in some places the cold also is painful. Here they enjoy all the temperature and advantages of perpetual spring; their fields being always covered with verdure, and enamelled with flowers of the most lively colours. However, although this beautiful region be higher than any other country in the world, and although it took up so many days of painful journey in the ascent, it is still overlooked by tremendous mountains; their sides covered with snow, and yet flaming with volcanoes at the top. These seemed piled one upon the other, and rise to a most astonishing height, with great coldness. However, at a determined point above the surface of the sea, the congelation is found at the same height in all the mountains. Those parts which are not subject to a continual frost, have here and there growing upon them a rush, resembling the genista, but much more soft and flexible. Towards the extremity of the part where the rush grows, and the cold begins to increase, is found a vegetable, with a round bulbous head, which, when dried, becomes of amazing elasticity. Higher up the earth is entirely bare of vegetation, and seems covered with eternal snow. The most remarkable mountains are, that of Cotopaxi, (already described as a volcano) Chimborazo, and Pichincha, Cotopaxi is more than three geographical miles above the surface of the sea: the rest are not much inferior. On the top of the latter was my station for measuring a degree of the meridian; where I suffered particular hardships, from the intenseness of the cold, and the violence of the storms. The sky around was, in general, involved in thick fogs, which, when they cleared away, and the clouds, by their gravity, moved nearer to the surface of the earth, they appeared surrounding the foot of the mountain, at a vast distance below, like a sea, encompassing an island in the midst of it. When this happened, the horrid noises of tempests were heard from beneath, then discharging themselves

elves on Quito, and the neighbouring country. I saw the lightnings issue from the clouds, and heard the thunders roll far beneath me. All this time, while the tempest was raging below, the mountain top, where I was placed, enjoyed a delightful serenity; the wind was abated; the sky clear; and the enlivening rays of the sun moderated the severity of the cold. However, this was of no very long duration, for the wind returned with all its violence, and with such velocity as to dazzle the sight; whilst my fears were increased by the dreadful concussions of the precipice, and the fall of enormous rocks; the only sounds that were heard in this frightful situation."

Such is the animated picture of these mountains, as given us by this ingenious Spaniard. A passage over the Alps, or a journey across the Pyrenees, appear petty trips or excursions, in the comparison; and yet these are the most lofty mountains we know of in Europe.

If we compare the Alps with the mountains already described, we shall find them but little more than one half of the height of the former. The Andes, upon being measured by the barometer, are found above three thousand one hundred and thirty-six toises or fathoms above the surface of the sea. Whereas the highest point of the Alps is not above sixteen hundred. The one, in other words, is above three miles high; the other, about a mile and a half. The highest mountains in Asia are, Mount Taurus, Mount Immaus, Mount Caucasus, and the mountains of Japan.—Of these, none equals the Andes in height; although Mount Caucasus, which is the highest of them, makes very near approaches. Father Verbiest tells of a mountain in China, which he measured, and found a mile and a half high. In Africa, the mountains of the Moon, famous for giving source to the Niger, and the Nile, are rather more noted than known. Of the Pike of Teneriffe, one of the Canary Islands that lie off this coast, we have more certain information. In the year 1727, it was visited by a company of English merchants, who travelled up to the top, where they observed its height, and the volcano on its very summit. They found it an heap of mountains, the highest of which rises over the rest like a sugar-loaf, and gives a name to the whole mass. It is computed to be a mile and a half perpendicular from the surface of the sea. Kircher gives us an estimate of the heights of most of the other great mountains in the world; but as he has taken his calculations, in general, from the ancients, or from modern travellers, who had not the art of measuring them, they are quite incredible. The art of taking the heights of places by the barometer, is a new, and an ingenious invention. As the air grows lighter as we ascend, the fluid in the tube rises in due proportion: thus the instrument being properly marked, gives the height with a tolerable degree of exactness; at least enough to satisfy curiosity.

Few of our great mountains have been estimated in this manner; travellers having, perhaps, been deterred, by a supposed impossibility of breathing at the top. However, it has been invariably found, that the air in the highest that our modern travellers have ascended, is not at all too fine for respiration. At the top of the Pike of Teneriffe, there was found no other inconvenience from the air, except its coldness; at the top of the Andes there was no difficulty of breathing perceived. The accounts, therefore, of those who have asserted that they were unable to breathe, although at much less heights, are greatly to be suspected. In fact, it is very natural for mankind to paint those obstacles as insurmountable, which they themselves have not had the fortitude or perseverance to surmount.

The difficulty and danger of ascending to the tops

of mountains, proceeds from other causes, not the thinness of the air. For instance, some of the summits of the Alps have never yet been visited by man; but the reason is, that they rise with such a rugged and precipitate ascent, that they are utterly inaccessible. In some places they appear like a great wall of six or seven hundred feet high; in others, there stick out enormous rocks, that hang upon the brow of the steep, and every moment threaten destruction to the traveller below.

In this manner almost all the tops of the highest mountains are bare and pointed. And this naturally proceeds from their being so continually assaulted by thunders and tempests. All the earthy substances with which they might have been once covered, have for ages been washed away from their summits; and nothing is left remaining, but immense rocks, which no tempest has hitherto been able to destroy.

Nevertheless, time is every day, and every hour, making depredations; and huge fragments are seen tumbling down the precipice, either loosed from the summit by frost or rains, or struck down by lightning. Nothing can exhibit a more terrible picture than one of these enormous rocks, commonly larger than an house, falling from its height, with a noise louder than thunder, and rolling down the side of the mountain. Doctor Plot tells us of one in particular, which being loosened from its bed, tumbled down the precipice, and was partly shattered into a thousand pieces. Notwithstanding, one of the largest fragments of the same, still preserving its motion, travelled over the plain below, crossed a rivulet in the midst, and at last stopped on the other side of the bank! These fragments, as was said, are often struck off by lightning, and sometimes undermined by rains; but the most usual manner in which they are disunited from the mountain, is by frost: the rains insinuating between the interstices of the mountain, continue there until there comes a frost, and then, when converted into ice, the water swells with an irresistible force, and produces the same effect as gun-powder, splitting the most solid rocks, and thus shattering the summits of the mountain.

But not rocks alone, but whole mountains are, by various causes, disunited from each other. We see, in many parts of the Alps, amazing clefts, the sides of which so exactly correspond with the opposite, that no doubt can be made of their having been once joined together. At Cajeta, in Italy, a mountain was split in this manner by an earthquake; and there is a passage opened through it, that appears as if elaborately done by the industry of man. In the Andes these breaches are frequently seen. That at Thermopyle, in Greece, has been long famous. The mountain of the Troglodytes, in Arabia, has thus a passage through it: and that in Savoy, which Nature began, and which Victor Amadeus completed, is an instance of the same kind.

We have accounts of some of these disruptions, immediately after their happening. In the month of June, in the year 1714, a part of the mountain of Diableret, in the district of Valais, in France, suddenly fell down, between two and three o'clock in the afternoon, the weather being very calm and serene. It was of a conical figure, and destroyed fifty-five cottages in the fall. Fifteen persons, together with about an hundred beasts, were also crushed beneath its ruins, which covered an extent of a good league square. The dust it occasioned, instantly covered all the neighbourhood in darkness. The heaps of rubbish were more than three hundred feet high. They stopped the current of a river that ran along the plain, which is now formed into several new and deep lakes. There appeared, through the whole of this rubbish, none of those

substances that seemed to indicate that this disruption had been made by means of subterraneous fires. Most probably, the base of this rocky mountain was rotted and decayed; and thus fell without any extraneous violence. In the same manner, in the year 1618, the town of Pleurs, in France, was buried beneath a rocky mountain, at the foot of which it was situated.

These accidents, and many more that might be enumerated of the same kind, have been produced by various causes: by earthquakes, as in the mountain at Cajota; or by being decayed at the bottom, as at Diableret. But the most general way is, by the foundation of one part of the mountain being hollowed by waters, and, thus wanting a support, breaking from the other. Thus it generally has been found in the great chasms in the Alps; and thus it almost always is known in those disruptions of hills, which are known by the name of land-slips. These are nothing more than the slidings down of an higher piece of ground, disrooted from its situation by subterraneous inundations, and settling itself upon the plain below.

There is not an appearance in all nature that so much astonished our ancestors, as these land-slips. In fact, to behold a large upland, with its houses, its corn, and cattle, at once loosened from its place, and floating, as it water, upon the subjacent water; to behold it quitting its ancient situation, and travelling forward like a ship, in quest of new adventures; this is certainly one of the most extraordinary appearances that can be imagined; and to a people, ignorant of the powers of Nature, might well be considered as a prodigy. Accordingly, we find all our old historians mentioning it as an omen of approaching calamities. In this more enlightened age, however, its cause is very well known; and, instead of exciting ominous apprehensions in the populace, it only gives rise to some very ridiculous law-suits among them, about whose the property shall be; whether the land which has thus slipped, shall belong to the original possessor, or to him upon whose grounds it has encroached and settled. What has been the determination of the judges, is not so well known; but the circumstances of the slips have been minutely and exactly described.

In the lands of Slatberg, in the kingdom of Iceland, there stood a declivity, gradually ascending for near half a mile. In the year 1713, and on the 10th of March, the inhabitants perceived a crack on its side, somewhat like a furrow made with a plough, which they imputed to the effects of lightning, as there had been thunder the night before. However, on the evening of the same day, they were surpris'd to hear an hideous confused noise issuing all round from the side of the hill; and their curiosity being rais'd, they resorted to the place. There, to their amazement, they found the earth, for near five acres, all in gentle motion, and sliding down the hill upon the subjacent plain. This motion continued the remaining part of the day, and the whole night; nor did the noise cease during the whole time; proceeding, probably, from the attrition of the ground beneath. The day following, however, this strange journey down the hill ceased entirely; and above an acre of the meadow below was found covered with what before compos'd a part of the declivity.

However, these slips, when a whole mountain's side seems to descend, happen but very rarely. There are some of another kind, however, much more common; and, as they are always sudden, much more dangerous. These are snow-slips, well known, and greatly dreaded by travellers. It often happens, that when snow has long been accumulated on the tops and on the sides of mountains, it is born down the precipice, either by means of tem-

pests, or its own melting. At first, when loosened, the volume in motion is but small, but gathers as it continues to roll; and, by the time it has reached the habitable parts of the mountain, is generally grown of enormous bulk. Wherever it rolls it levels all things in its way, or buries them in unavoidable destruction. Instead of rolling, it sometimes is found to slide along from the top; yet even thus it is generally as fatal as before. Nevertheless, we have had an instance, a few years ago, of a small family in Germany, that lived for above a fortnight beneath one of these snow-slips. Although they were buried, during that whole time, in utter darkness, and under a bed of some hundred feet deep, yet they were luckily taken out alive; the weight of the snow being supported by a beam that kept up the roof; and nourishment being supplied them by the milk of an ass, that was buried under the same ruin.

But it is not the parts, alone, that are thus found to subside, whole mountains have been known totally to disappear. Pliny tells us, that in his own time, the lofty mountain of Cybotus, together with the city of Eurites, were swallowed by an earthquake. The same fate, he says, attended Phlegium, one of the highest mountains in Æthiopia; which, after one night's concussion, was never seen more. In more modern times, a very noted mountain in the Molucca islands, known by the name of the Peak, and remarkable for being seen at a very great distance from sea was swallowed by an earthquake; and nothing but a lake was left in the place where it stood. Thus, while storms and tempests are levelled against mountains above, earthquakes and waters are undermining them below. All our histories talk of their destruction; and very few new ones (if we except Mount Cenere, and one or two such heaps of cinders) are produced. If mountains, therefore, were of such great utility as some philosophers make them to mankind, it would be a very melancholy consideration that such benefits were diminished every day. But the truth is, the valleys are fertilized by that earth which is washed from their sides; and the plains become richer, in proportion as the mountains decay.

C H A P. XIII.

Of W A T E R.

IN contemplating nature, we shall often find the same substances possessed of contrary qualities, and producing opposite effects. Air, which liquifies one substance, dries up another. That fire which is seen to burn up the desert, is often found, in other places, to assist the luxuriance of vegetation: and water, which, next to fire, is the most fluid substance upon earth, nevertheless, gives all other bodies their firmness and durability; so that every element seems to be a powerful servant, capable either of good or ill, and only awaiting external direction, to become the friend or the enemy of mankind. These opposite qualities, in this substance in particular, have not failed to excite the admiration and enquiry of the curious.

That water is the most fluid penetrating body, next to fire, and the most difficult to confine, is incontestibly proved by a variety of experiments. A vessel through which water cannot pass, may be said to retain anything. It may be objected, indeed, that syrups, oils, and honey, leak through some vessels that water cannot pass through; but this is far from being the result of the greater tenuity and fineness of their parts; it is owing to the resin wherewith the wood of such vessels abounds, which oils and syrups have a power of dissolving; so that these fluids, instead of finding their way, may more properly

properly be said to eat their way through the vessels that contain them. However, water will at last find its way even through these; for it is known to escape through vessels of every substance, glass only excepted. Other bodies may be found to make their way out more readily indeed; as air, when it finds a vent, will escape at once; and quicksilver, because of its weight, quickly penetrates through whatever chinky vessel confines it: but water, though it operates more slowly, yet always finds a more certain issue. As, for instance, it is well known that air will not pass through leather; which water will very readily penetrate. Air also may be retained in a bladder; but water will quickly ooze through. And those who drive this to the greatest degree of precision, pretend to say, that it will pass through pores ten times smaller than air can do. Be this as it may, we are very certain that its parts are so small that they have been actually driven through the pores of gold. This has been proved by the famous Florentine experiment, in which a quantity of water was shut up in an hollow ball of gold, and then pressed with an huge force by screws, during which the fluid was seen to ooze through the pores of the metal, and to stand, like a dew, upon its surface.

As water is thus penetrating, and its parts thus minute, it may easily be supposed that they enter into the composition of all bodies, vegetable, animal, and fossil. This every chemist's experience convinces him of; and the mixture is the more obvious, as it can always be separated, by a gentle heat, from those substances with which it had been united. Fire, as was said, will penetrate where water cannot pass; but then it is not so easily to be separated. But there is scarce any substance from which its water cannot be divorced. The parings or filings of lead, tin, and antimony, by distillation, yield water plentifully: the hardest stones, sea-salt, nitre, vitriol, and sulphur, are found to consist chiefly of water; into which they resolve by force of fire. "All birds, beasts, and fishes," says Newton, "insects, trees, and vegetables, with their parts grow from water; and, by putrefaction, return to water again." In short, almost every substance that we see, owes its texture and firmness to the parts of water that mix with its earth; and, deprived of this fluid, becomes a mass of shapeless dust and ashes.

From hence we see, as was above hinted, that this most fluid body, when mixed with others, gives them consistence and form. Water, by being mixed with earth or ashes, and formed into a vessel, when baked before the fire, becomes a copel, remarkable for this, that it will bear the utmost force of the hottest furnace that art can contrive. So the Chinese earth, of which porcelane is made, is nothing more than an artificial composition of earth and water united by heat; and which a greater degree of heat could easily separate. Thus we see a body, extremely fluid of itself, in some measure assuming a new nature, by being united with others; we see a body, whose fluid and dissolving qualities are so obvious, giving consistence and hardness to all the substances of the earth.

From considerations of this kind, Thales, and many of the ancient philosophers, held that all things were made of water. In order to confirm this opinion, Helmont made an experiment, by divesting a quantity of earth of all its oils and salts, and then putting this earth, so prepared, into an earthen pot, which nothing but rain-water could enter, and planting a willow therein; this vegetable, so planted, grew up to a considerable height and bulk, merely from the accidental aspersion of rain-water; while the earth in which it was planted received no sensible diminution. From this experiment, he concluded, that water was the only nourishment of the

vegetable tribe; and that vegetables, being the nourishment of animals, all organized substances, therefore, owed their support and being only to water. But this has been said by Woodward to be a mistake: for he shews, that water being impregnated with earthy particles, is only the conveyer of such substances into the pores of vegetables, rather than an increaser of them, by its own bulk: and likewise, that water is ever found to afford so much less nourishment, in proportion as it is purified by distillation. A plant in distilled water will not grow so fast as in water not distilled: and if the same be distilled three or four times over, the plant will scarce grow at all, or receive any nourishment from it. So that water, as such, does not seem the proper nourishment of vegetables, but only the vehicle thereof, which contains the nutritious particles, and carries them through all parts of the plants. Water, in its pure state, may suffice to extend or swell the parts of a plant, but affords vegetable matter in a moderate proportion.

However this be, it is agreed on all sides, that water, such as we find it, is far from being a pure simple substance. The most genuine, we know, is mixed with exhalations and dissolutions of various kinds; and no expedient that has been hitherto discovered, is capable of purifying it entirely. If we filter and distil it a thousand times, according to Boerhaave, it will still depose a sediment: and by repeating the process, we may evaporate it entirely away, but can never totally remove its impurities. Some, however, assert, that water, properly distilled will have no sediment; and that the little white speck which is found at the bottom of the still, is a substance that enters from without. Kircher used to shew, in his *Musæum*, a phial of water, that had been kept for fifty years, hermetically sealed; during which time it deposited no sediment, but continued as transparent as when first it was put in. How far, therefore, it may be brought to a state of purity by distillation, is unknown; but we very well know, that all such water as we every where see, is a bed in which plants, minerals, and animals, are all found confusedly floating together.

Rain-water, which is a fluid of Nature's own distilling, and which has been raised so high by evaporation, is, nevertheless, a very mixed and impure substance. Exhalations of all kinds, whether salts, sulphurs, or metals, make a part of its substance, and tend to increase its weight. If we gather the water that falls, after a thunder clap, in a sultry summer's day, and let it settle, we shall find a real salt sticking at the bottom. In winter, however, its impure mixtures are fewer, but still may be separated by distillation. As to that which is generally caught pouring from the tops of houses, it is particularly foul, being impregnated with the smoke of the chimnies, the vapour of the slates or tiles, and with other impurities that birds and animals may have deposited there. Besides, though it should be supposed free from all these, it is mixed with a quantity of air, which, after being kept for some time, will be seen to separate.

Spring-water is next in point of purity. This, according to Dr. Halley, is collected from the air itself; which being saturated with water, and coming to be condensed by the evening's cold, is driven against the tops of the mountains, where being condensed, and collected, it trickles down by the sides, into the cavities of the earth; and running for a while under-ground, bubbles up in fountains upon the plain. This having made but a short circulation, has generally had no long time to dissolve or imbibe any foreign substances by the way.

River-water is generally more foul than the former. Wherever the stream flows, it receives a tincture from its channel. Plants, minerals, and animals,

mals, all contribute to add to its impurities: so that such as live at the mouths of great rivers, are generally subject to all those disorders which contaminated and unwholesome waters are known to produce. Of all the river-water in the world, that of the Indus and the Thames, are said to be most light and wholesome.

The most impure fresh water that we know, is that of stagnating pools and lakes, which, in summer, may be more properly considered as a jelly of floating insects, than a collection of water. In this, millions of little reptiles, undisturbed by any current, which might crush their frames to pieces, breed and engender. The whole teems with shapeless life, and only grows more fruitful by increasing putrefaction.

Of the purity of all these waters, the lightness, and not the transparency, ought to be the test. Water may be extremely clear and beautiful to the eye, and yet very much impregnated with mineral particles. In fact, sea-water is the most transparent of any, and yet is well known to contain a large mixture of salt and bitumen. On the contrary, those waters which are lightest, have the fewest dissolutions floating in them; and may, therefore, be the most useful for all the purposes of life. But, after all, though much has been said upon this subject; and although waters have been weighed with great assiduity, to determine their degree of salubrity; yet neither this, nor their curdling with soap, nor any other philosophical standard whatsoever, will answer the purposes of true information. Experience alone ought to determine the useful, or noxious qualities, of every spring; and experience assures us, that different kinds of water are adapted to different constitutions. An incontestible proof of this, are the many medicinal springs throughout the world, whose peculiar benefits are known to the natives of their respective countries. These are of various kinds, according to the different minerals with which they are impregnated; hot, saline, sulphureous, bituminous, and oily. But the account of these have been already given under that of the several minerals by which they are produced.

After all therefore, we must be contented with an impure mixture for our daily beverage: and yet, perhaps, this very mixture may often be more serviceable to our health than that of a purer kind. We know that it is so with regard to vegetables: and why not, also, in general, to man? Be this as it will, if we are desirous of having water in its greatest purity, we are ordered, by the curious in this particular, to distil it from snow, gathered upon the tops of the highest mountains, and to take none but the outer and superficial part thereof. This we must be satisfied to call pure water; but even this is far short of the pure unmixed philosophical element; which, in reality, is no where to be found.

As water is thus mixed with foreign matter, and often the repository of minute animals, or vegetable feeds, we need not be surpris'd that, when carried to sea, it is always found to putrefy. But we must not suppose that it is the element itself, which thus grows putrid, and offensive, but the substances with which it is impregnated. It is true, the utmost precautions are taken to destroy all vegetable and animal substances that may have previously been lodged in it, by boiling: but, notwithstanding this, there are some that will still survive the operation; and others, that find their way during the time of its stowage. Seamen, therefore, assure us, that their water is generally found to putrefy twice, at least, and sometimes three times, in a long voyage. In about a month after it has been at sea, when the bung is taken out of the cask, it sends up a noisome

and dangerous vapour, which would take fire upon the application of a candle. The whole body of the water then is found replete with little worm-like insects, that float, with great briskness, through all its parts. These generally live for about a couple of days, and then dying, by depositing their spoils, for a while increase the putrefaction. After a time, the heavier parts of these sinking to the bottom, the lighter float, in a scum, at the top; and this is what the mariners call, the water's purging itself. There are still, however, another race of insects, which are bred, very probably, from the spoils of the former; and produce, after some time, similar appearances: these dying, the water is then thought to change no more. However, it very often happens, especially in hot climates, that nothing can drive these nauseous insects from the ship's store of water. They often increase to a very disagreeable and frightful size, so as to deter the mariner, though parching with thirst, from tasting that cup which they have contaminated.

This water, as thus described, therefore, is a very different fluid from that simple elementary substance upon which philosophical theories have been founded; and concerning the nature of which there have been so many disputes. Elementary water is no way compounded; but is without taste, smell, or colour; and incapable of being discerned by any of the senses, except the touch. This is the famous dissolvent of the chemists, into which, as they have boasted, they can reduce all bodies; and which makes up all other substances, only by putting on a different disguise. In some forms, it is fluid, transparent, and evasive of the touch; in others, hard, firm, and elastic. In some, it is stiffened by cold; in others, dissolved by fire. According to them, it only assumes external shapes from accidental causes; but the mountain is as much a body of water as the cake of ice that melts on its brow; and even the philosopher himself is composed of the same materials with the cloud or meteor which he contemplates.

Speculation seldom rests when it begins. Others, disallowing the universality of this substance, will not allow that in a state of nature there is any such thing as water at all. What assumes the appearance, say they, is nothing more than melted ice. Ice is the real element of Nature's making; and when found in a state of fluidity, it is then in a state of violence. All substances are naturally hard; but some more readily melt with heat than others. It requires a great heat to melt iron; a smaller heat will melt copper: silver, gold, tin, and lead, melt with smaller still: ice, which is a body like the rest, melts with a very moderate warmth; and quicksilver melts with the smallest warmth of all. Water, therefore, is but ice kept in continual fusion; and still returning to its former state, when the heat is taken away. Between these opposite opinions, the controversy has been carried on with great ardour; much has been written on both sides; and yet, when we come to examine the debate, it will probably terminate in this question, whether cold or heat first began their operations upon water? This is a fact of very little importance, if known; and what is more, it is a fact we can never know.

Indeed, if we examine into the operations of cold and heat on water, we shall find that they produce somewhat similar effects. Water dilates in its bulk, by heat, to a very considerable degree; and, what is more extraordinary, it is likewise dilated by cold in the same manner.

If water be placed over a fire, it grows gradually larger in bulk, as it becomes hot, until it begins to boil; after which, no art can either increase its bulk, or its heat. By increasing the fire, indeed, it may be more quickly evaporated away; but its heat

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and its bulk, still continue the same. By the expanding of this fluid by heat, philosophers have found a way to determine the warmth or the coldness of other bodies: for if put into a glass tube, by its swelling and rising, it shews the quantity of heat in the body to which it is applied; and by its contracting, and sinking, it shews the absence of the same. Instead of using water in this instrument, which is called a thermometer, they now make use of spirit of wine, which is not apt to freeze, and which is endued even with a greater expansion, by heat, than water. The instrument consists of nothing more than a hollow ball of glass, with a long tube growing out of it. This being partly filled with spirits of wine, tinged red, so as to be seen when it rises, the ball is plunged into boiling water, which making the spirit within expand and rise in the tube, the water marks the greatest height to which it ascends; at this point the tube is to be broken off, and then hermetically sealed, by melting the glass with a blow-pipe: a scale being placed by the side, completes the thermometer. Now as the fluid expands or condenses with heat or cold, it will rise and fall in the tube in proportion; and the degree or quantity of ascent or descent will be seen in the scale.

No fire, as was said, can make water hotter, after it begins to boil. We can, therefore, at any time be sure of an equable certain heat; which is that of boiling water, which is invariably the same. The certainty of such an heat is not less useful than the instrument that measures it. It affords a standard, fixed, degree of heat over the whole world; boiling water being as hot in Greenland, as upon the coasts of Guinea: One fire is more intense than another: of heat there are various degrees; but boiling water is an heat every where the same, and easily procurable.

As heat thus expands water; so cold, when it is violent enough to freeze the same, produces exactly the same effect, and expands it likewise. Thus water is acted upon in the same manner by two opposite qualities; being dilated by both. As a proof that it is dilated by cold, we have only to observe the ice floating on the surface of a pond, which it would not do were it not dilated, and grown more bulky, by freezing, than the water, which remains unfrozen. Mr. Boyle, however, put the matter past a doubt, by a variety of experiments. Having poured a proper quantity of water into a strong earthen vessel, he exposed it, uncovered, to the open air, in frosty nights; and observed, that continually the ice reached higher than the water, before it was frozen. He filled also a tube with water, and stopped both ends with wax: the water, when froze, was found to push out the stopples from both ends; and a rod of ice appeared at each end of the tube, which shewed how much it was swollen by the cold within.

From hence, therefore, we may be very certain of the cold's dilating of the water; and experience also shews, that the force of this expansion has been found as great as any which heat has been found to produce. The touch-hole of a strong gun barrel being stopped, and a plug of iron forcibly driven into the muzzle, after the barrel had been filled with water, it was placed in a mixture of ice and salt: the plug, though soldered to the barrel, at first gave way, but being fixed in more firmly, within a quarter of an hour the gun-barrel burst with a loud noise, and blew up the cover of the box wherein it lay. Such is its force in an ordinary experiment. But it has been known to burst cannons, filled with water, and then left to freeze; for the cold congealing the water, and the ice swelling, it became irresistible: The bursting of rocks, by frost, which is frequent in the Northern climates, and is sometimes seen in our own, is an equal proof of the expansion of con-

gealed water; for having, by some means, insinuated itself into the body of the rock, it has remained there till the cold was sufficient to affect it by congelation. But when once frozen, no obstacle is able to confine it from dilating; and, if it cannot otherwise find room, the rock must burst asunder.

This alteration in the bulk of water, might have served as a proof that it was capable of being compressed into a narrower space than it occupied before; but, till of late, water was held to be incompressible. The general opinion was, that no art whatsoever could squeeze it into a narrower compass; that no power on earth, for instance, could force a pint of water into a vessel that held an hair's breadth less than a pint. And this, said they, appears from the famous Florentine experiment; where the water, rather than suffer compression, was seen to ooze through the pores of the solid metal; and, at length, making a cleft in the side, spun out with great vehemence. But later trials have proved that water is very compressible, and partakes of that elasticity which every other body possesses in some degree. Indeed, had not mankind been dazzled by the brilliancy of one inconclusive experiment, there were numerous reasons to convince them of its having the same properties with other substances. Ice, which is water in another state, is very elastic. A stone flung slantingly along the surface of a pond, bounds from the water several times; which shews it to be elastic also. But the trials of Mr. Canton have put this past all doubt; which being somewhat similar to those of the great Boyle, who pressed it with weights properly applied, carry sufficient conviction.

What has been hitherto related, is chiefly applicable to the element of water alone; but its fluidity is a property that it possesses in common with several other substances, in other respects greatly differing from it. That quality which gives rise to the definition of a fluid, namely, that its parts are in a continual intestine motion, seems extremely applicable to water. What the shapes of those parts are, it would be vain to attempt to discover. Every trial only shews the futility of the attempt; all we find is, that they are extremely minute; and that they roll over each other with the greatest ease. Some, indeed, from this property alone, have not hesitated to pronounce them globular; and we have, in all our hydrostatical books, pictures of these little globes in a state of sliding and rolling over each other. But all this is merely the work of imagination; we know that substances of any kind, reduced very small, assume a fluid appearance, somewhat resembling that of water. Mr. Boyle, after finely powdering and sifting a little dry powder of plaister of Paris, put it in a vessel over the fire, where it soon began to boil like water, exhibiting all the motions and appearances of a boiling liquor. Although but a powder, the parts of which we know are very different from each other, and just as accident has formed them, yet it heaved in great waves, like water. Upon agitation, an heavy body will sink to the bottom, and a light one emerge to the top. There is no reason to suppose the figure of the parts of water round, since we see their fluidity very well imitated by a composition, the parts of which are of various forms and sizes. The shape of the parts of water, therefore, we must be content to continue ignorant of. All we know is, that earth, air, and fire, conduce to separate the parts from each other.

Earthy substances divide the parts from each other, and keep them asunder. This division may be so great, that the water will entirely lose its fluidity thereby. Mud, potter's clay, and dried bricks, are so many different combinations of earth and water; each substance in which the parts of water are most separated from each other, appearing to be

the most dry. In some substances, indeed, where the parts of water are greatly divided, as in porcelain, for instance, it is no easy matter to recover and bring them together again; but they continue in a manner fixed and united to the manufactured clay. This circumstance led Doctor Cheney into a very peculiar strain of thinking. He suspected that the quantity of water, on the surface of the earth, was daily decreasing. For, says he, some parts of it are continually joined to vegetable, animal, and mineral substances, which no art can again recover. United with these, the water loses its fluidity; for if, continues he, we separate a few particles of any fluid, and fasten them to a solid body, or keep them asunder, they will be fluid no longer. To produce fluidity, a considerable number of such particles are required; but here they are close, and destitute of their natural properties. Thus, according to him, the world is growing every day harder and harder, and the earth firmer and firmer; and there may come a time when every object around us may be stiffened in universal frigidity! However, we have causes enough of anxiety in this world already, not to add this preposterous concern to the number.

That air also contributes to divide the parts of water, we can have no manner of doubt; some have even disputed whether water be not capable of being turned into air. Though this cannot be allowed, it must be granted, that it may be turned into a substance which greatly resembles air (as we have seen in the experiment of the æolipile) with all its properties; except that, by cold, this new-made air may be condensed again into water.

But of all the substances which tend to divide the parts of water, fire is the most powerful. Water, when heated into steam, acquires such force, and the parts of it tend to fly off from each other with such violence, that no earthly substance we know of, is strong enough to confine them. A single drop of water, converted into steam, has been found capable of raising a weight of twenty tons; and would have raised twenty thousand, were the vessel confining it sufficiently strong, and the fire below increased in proportion.

From this easy yielding of its parts to external pressure, arises the art of determining the specific gravity of bodies by plunging them in water; with many other useful discoveries in that part of natural philosophy, called hydrostatics. The laws of this science, which Archimedes began, and Pascal, with some other of the moderns, have improved, rather belongs to experimental than to natural history. However, we shall mention some of the most striking paradoxes in this branch of science, which are as well confirmed by experiment, as rendered universal by theory. It would, indeed, be unpardonable, while discoursing on the properties of water, to omit giving some account of the manner in which it sustains such immense bulks as we see floating upon its soft and yielding surface: how some bodies, that are known to sink at one time, swim with ease, if their surface be enlarged: how the heaviest body, even gold itself, may be made to swim upon water; and how the lightest, such as cork, shall remain sunk at the bottom: how the pouring in of a single quart of water, will burst an hoghead hooped with iron: and how it ascends, in pipes, from the valley, to travel over the mountain: these are circumstances that are at first surprising; but, upon a slight consideration, lose their wonder.

In order to conceive the manner in which all these wonders are effected, we must begin by observing that water is possessed of an invariable property, which has not hitherto been mentioned; that of always keeping its surface level and even. Winds, indeed, may raise it into waves; or art spurt it up in fountains; but ever, when left to itself, it sinks

into a smooth even surface, of which no one part is higher than another. If any one should pour water, for instance, into the arm of a pipe of the shape of the letter U, the fluid would rise in the other arm just to the same height; because, otherwise, it would not find its level, which it invariably maintains. A pipe bending from one hill down into the valley, and rising by another, may be considered as a tube of this kind, in which the water, sinking in one arm, rises to maintain its level in the other. Upon this principle all water-pipes depend; which can never raise the water higher than the fountain from which they proceed.

Again, let us suppose for a moment, that the arms of the pipe already mentioned, may be made long or short at pleasure; and let us still further suppose, that there is some obstacle at the bottom of it, which prevents the water poured into one arm, from rising in the other. Now it is evident, that this obstacle at the bottom will sustain a pressure from the water in one arm, equal to what would make it rise in the other; and this pressure will be great, in proportion as the arm filled with water is tall. We may, therefore, generally conclude, that the bottom of every vessel is pressed by a force, in proportion to the height of the water in that vessel. For instance, if the vessel filled with water be forty feet high, the bottom of that vessel will sustain such a pressure as would raise the same water forty feet high, which is very great. From hence we see how extremely apt our pipes that convey water to the city are to burst; for descending from an hill of more than forty feet high, they are pressed by the water contained in them, with a force equal to what would raise it more than forty feet high; and that this is sometimes able to burst a wooden pipe, we can have no room to doubt of.

Still recurring to our pipe, let us suppose one of its arms ten times as thick as the other; this will produce no effect whatsoever upon the obstacle below, which we supposed hindering its rise in the other arm; because, how thick soever the pipe may be, its contents would only rise to its own level; and it will, therefore, press the obstacle with an equal force. We may, therefore, universally conclude, that the bottom of any vessel is pressed by its water, not as it is broad or narrow, but in proportion as it is high. Thus the water contained in a vessel not thicker than one's finger, presses its bottom as forcibly as the water contained in an hoghead of an equal height; and, if we made holes in the bottoms of both, the water would burst out as forceful from the one as the other. Hence we may, with great ease, burst an hoghead with a single quart of water, and it has been often done. We have only, for this, to place an hoghead on one end, filled with water; we then bore an hole in its top, into which we plant a narrow tin pipe, of about thirty feet high: by pouring a quart of water into this, at the top, as it continues to rise higher in the pipe, it will press more forcibly on the bottom and sides of the hoghead below, and at last burst it.

Still returning to our simple instrument of demonstration. If we suppose the obstacle at the bottom of the pipe to be moveable, so as that the force of the water can push it up into the other arm; such a body is quicksilver, for instance. Now, it is evident, that the weight of water weighing down upon this quicksilver in one arm, will at last press it up in the other arm; and will continue to press it upwards, until the fluid in both arms be upon a par. So that here we actually see quicksilver, the heaviest substance in the world, except gold, floating upon water, which is but a very light substance.

When we see water thus capable of sustaining quicksilver, we need not be surprised that it is capable of floating much lighter substances, ships, animals,

animals, or timber. When any thing floats upon water, we always see that a part of it sinks in the same. A cork, a ship, a buoy, each buries itself a bed on the surface of the water; this bed may be considered as so much water displaced; the water will, therefore, lose so much of its own weight as is equal to the weight of that bed of water which it displaces. If the body be heavier than a similar bulk of water, it will sink; if lighter, it will swim. Universally, therefore, a body plunged in water, loses as much of its weight as is equal to the weight of a body of water of its own bulk. Some light bodies, therefore, such as cork, lose much of their weight, and therefore swim; other more ponderous bodies sink, because they are heavier than their bulk of water.

Upon this simple theorem entirely depends the art of weighing metals hydrostatically. A person has a guinea, for instance, and desires to know whether it be pure gold: it has been weighed in the usual way with another guinea, and been found exactly of the same weight, but still there is some suspicion, from its greater bulk, that it is not pure. In order to determine this, there is nothing more to be done than to weigh it in water with that same guinea that is known to be good, and of the same weight; and this will instantly shew the difference; for the true ponderous metal will sink, and the false bulky one will be sustained in proportion to the greatness of its surface. Those whose business it is to examine the purity of metals, have a balance made for this purpose, by which they can precisely determine which is most ponderous, or, as it is expressed, which has the greatest specific gravity. Seventy-one pound and an half of quicksilver is found to be equal in bulk to an hundred pound weight of gold. In the same proportion, sixty of lead, fifty-four of silver, forty-seven of copper, forty-five of brass, forty-two of iron, and thirty-nine of tin, are each equal to an hundred pound of the most ponderous of all metals.

This method of precisely determining the purity of gold, by weighing in water, was first discovered by Archimedes, to whom mankind have been indebted for many useful discoveries. Hiero, king of Sicily, having sent a certain quantity of gold to be made into a crown, the workman, it seems, kept a part for his own use, and supplied the deficiency with a baser metal. His fraud was suspected by the king, but could not be detected, till he applied to Archimedes; who weighed the crown in water; and, by this method, informed the king of the quantity of gold which was taken away.

It has been said, that all fluids endeavour to preserve their level; and, likewise, that a body pressing on the surface, tended to destroy that level. From hence it will easily be inferred, that the deeper any body sinks, the greater will be the resistance of the depressed fluid beneath. It will be asked, therefore, as the resistance increases in proportion as the body descends, how comes the body, after it is got a certain way, to sink at all? The answer is obvious. From the fluid above pressing it down with almost as great a force as the fluid beneath presses it up. Take away, by any art, the pressure of the fluid from above, and let only the resistance of the fluid from below be suffered to act, and after the body is got down very deep, the resistance will be insuperable. To give an instance: a small hole opens in the bottom of a ship at sea, forty feet we will suppose below the surface of the water; through this the water bursts up with great violence; a person attempts to stop it with his hand, but it pushes the hand violently away. Here the hand is, in fact, a body attempting to sink upon water, at a depth of forty feet, with the pressure from above taken away. The water, therefore, will overcome his strength; and will continue to burst in till it has got to its level:

if he should then dive into the hold, and clap his hand upon the opening; as before, he shall perceive no force acting against his hand at all, for the water above presses the hand as much down against the hole, as the water without presses it upward. For this reason also, when we dive to the bottom of the water, we sustain a very great pressure from above, it is true, but it is counteracted by the pressure from below; and the whole acting uniformly on the surface of the body, wraps us close round without injury.

As we have deviated thus far, we will just mention one or two properties more, which water, and all such like fluids, is found to possess. And first, their ascending in vessels which are emptied of air, as in our common pumps for instance. The air, however, being the agent in this case, we must previously examine its properties, before we undertake the explanation. The other property to be mentioned is, that of their ascending in small capillary tubes. This is one of the most extraordinary and inscrutable appearances in nature. Glass tubes may be drawn, by means of a lamp, as fine as an hair; still preserving their hollow within. If one of these be planted in a vessel of water, or spirit of wine, the liquor will immediately be seen to ascend; and it will rise higher, in proportion as the tube is smaller; a foot, two feet, and more. How does this come to pass? Is the air the cause? No: the liquor rises, although the air be taken away. Is attraction the cause? No: for quicksilver does not ascend, which it otherwise would. Many have been the theories of experimental philosophers to explain this property. Such as are fond of travelling in the regions of conjecture, may consult Hawksbee, Morgan, Jurin, or Watson, who have examined the subject with great minuteness. Hitherto, however, nothing but doubts instead of knowledge have been the result of their enquiries. It will not, therefore, become us to enter into the minuteness of the enquiry, when we have so many greater wonders to call our attention away.

C H A P. XIV.

Of the Origin of RIVERS.

THE sun riseth, and the sun goeth down, and pants for the place from whence he arose. All things are filled with labour, and man cannot utter it. All rivers run into the sea, yet the sea is not full. Unto the place whence the rivers come, thither they return again. The eye is not satisfied with seeing, nor the ear with hearing." Thus speaks the wisest of the Jews. And, at so early a period was the curiosity of man employed in observing these great circulations of nature. Every eye attempted to explain those appearances; and every philosopher who has long thought upon the subject, seems to give a peculiar solution. The enquiry whence rivers are produced; whence they derive those unceasing stores of water, which continually enrich the world with fertility and verdure; has been variously considered; and divided the opinions of mankind, more than any other topic in natural history.

In this contest, the various champions may be classed under two leaders, Mr. De La Hire, who contends that rivers must be supplied from the sea, strained through the pores of the earth; and Doctor Halley, who has endeavoured to demonstrate, that the clouds alone are sufficient for the supply. Both sides have brought in mathematics to their aid; and have shewn, that long and laborious calculations can at any time be made, to obscure both sides of a question.

De La Hire begins his proofs, that rain-water, evaporated

evaporated from the sea, is insufficient for the production of rivers; by shewing, that rain never penetrates the surface of the earth above sixteen inches. From thence he infers, that it is impossible for it, in many cases, to sink so as to be found at such considerable depths below. Rain-water, he grants, is often seen to mix with rivers, and to swell their currents; but a much greater part of it evaporates. In fact, continues he, if we suppose the earth every where covered with water, evaporation alone would be sufficient to carry off two feet nine inches of it in a year; and yet, we very well know, that scarce nineteen inches of rain-water falls in that time; so that evaporation would carry off a much greater quantity than is ever known to descend. The small quantity of rain-water that falls is therefore but barely sufficient for the purposes of vegetation. Two leaves of a fig-tree have been found, by experiment, to imbibe from the earth, in five hours and an half, two ounces of water. This implies the great quantity of fluid that must be exhausted in the maintenance of one single plant. Add to this, that the waters of the river Rungis will, by calculation, rise to fifty inches; and the whole country from whence they are supplied, never receives fifty inches, in the year, by rain. Besides this, there are many salt springs, which are known to proceed immediately from the sea, and are subject to its flux and reflux. In short, wherever we dig beneath the surface of the earth, except in a very few instances, water is to be found; and it is by this subterraneous water, that springs and rivers, nay, a great part of vegetation itself, is supported. It is this subterraneous water, which is raised into steam, by the internal heat of the earth, that feeds plants. It is this subterraneous water that distils through its interstices; and there cooling, forms fountains. It is this that, by the addition of rains, is increased into rivers; and pours plenty over the whole earth.

On the other side of the question, it is asserted, that the vapours which are exhaled from the sea, and driven by the winds upon land, are more than sufficient to supply not only plants with moisture, but also to furnish a sufficiency of water to the greatest rivers. For this purpose, an estimate has been made of the quantity of water emptied at the mouth of the greatest rivers; and of the quantity also raised from the sea by evaporation; and it has been found, that the latter by far exceeds the former. This calculation was made by Mr. Mariotte. By him it was found, upon receiving such rain as fell in a year, in a proper vessel, fitted for that purpose, that one year with another, there might fall about twenty inches of water upon the surface of the earth, throughout Europe. It was also computed, that the river Seine, from its source to the city of Paris, might cover an extent of ground, that would supply it annually with above seven millions of cubic feet of this water, formed by evaporation. But, upon computing the quantity which passed through the arches of one of its bridges in a year, it was found to amount only to two hundred and eighty millions of cubic feet, which is not above the sixth part of the former number. Hence it appears, that this river may receive a supply brought to it by the evaporated waters of the sea, six times greater than what it gives back to the sea by its current; and, therefore, evaporation is more than sufficient for maintaining the greatest rivers; and supplying the purposes also of vegetation.

In this manner the sea furnishes sufficient humidity to the air for furnishing the earth with all necessary moisture. One part of its vapours fall upon its own bosom, before they arrive upon land. Another part is arrested by the sides of mountains, and is compelled, by the rising stream of air, to mount upward towards the summits. Here it is presently

precipitated, dripping down by the crannies of the stone. In some places, entering into the caverns of the mountain, it gathers in those receptacles, which being once filled, all the rest overflows; and breaking out by the sides of the hills, forms single springs. Many of these run down by the valleys, or guts between the ridges of the mountain, and form little rivulets or brooks; many of these meeting in one common valley, and gaining the plain ground, being grown less rapid, become a river: and many of these uniting, make such vast bodies of water as the Rhine, the Rhone, and the Danube.

There is still a third part, which falls upon the lower grounds, and furnishes plants with their wonted supply. But the circulation does not rest even here; for it is again exhaled into vapour by the action of the sun; and afterwards returned to that great mass of waters whence it first arose. This, adds Doctor Halley, seems the most reasonable hypothesis; and much more likely to be true, than that of those who derive all springs from the filtering of the sea waters through certain imaginary tubes or passages within the earth; since it is well known, that the greatest rivers have their most copious fountains the most remote from the sea.

This seems the most general opinion; and yet, after all, it is still pressed with great difficulties; and there is still room to look out for a better theory. The perpetuity of many springs, which always yield the same quantity when the least rain or vapour is afforded, as well as when the greatest, is a strong objection. Derham mentions a spring at Upminster, which he could never perceive by his eye to be diminished, in the greatest droughts, even when all the ponds in the country, as well as an adjoining brook, have been dry for several months together. In the rainy seasons also, it was never overflowed; except sometimes, perhaps, for an hour or so, upon the immision of the external rains. He, therefore, justly enough concludes, that had this spring its origin from rain or vapour, there would be found an increase or decrease of its water, corresponding to the causes of its production.

Thus the reader, after having been tossed from one hypothesis to another, must at last be contented to settle in conscious ignorance. All that has been written upon this subject, affords him rather something to say, than something to think; something rather for others than for himself. Varenus, indeed, although he is at a loss for the origin of rivers, is by no means so as to their formation. He is pretty positive that all rivers are artificial. He boldly asserts, that their channels have been originally formed by the industry of man. His reasons are, that when a new spring breaks forth, the water does not make itself a new channel, but spreads over the adjacent land. Thus, says he, men are obliged to direct its course; or, otherwise, Nature would never have found one. He enumerates many rivers, that are certainly known, from history, to have been dug by men. He alledges, that no salt-water rivers are found, because men did not want salt-water; and as for salt, that was procurable at a less expence than digging a river for it. However, it costs a speculative man but a small expence of thinking to form such an hypothesis. It may, perhaps, engross the reader's patience to detain him longer upon it.

Nevertheless, though philosophy be thus ignorant, as to the production of rivers, yet the laws of their motion, and the nature of their currents, have been very well explained. The Italians have particularly distinguished themselves in this respect; and it is chiefly to them that we are indebted for the improvement.

All rivers have their source either in mountains, or elevated lakes; and it is in their descent from these,

these, that they acquire that velocity which maintains their future current. At first their course is generally rapid and headlong; but it is retarded in its journey by the continual friction against its banks, by the many obstacles it meets to divert its stream, and by the plains generally becoming more level as it approaches towards the sea.

If this acquired velocity be quite spent, and the plain through which the river passes is entirely level, it will, notwithstanding, still continue to run from the perpendicular pressure of the water, which is always in exact proportion to the depth. This perpendicular pressure is nothing more than the weight of the upper waters pressing the lower out of their places, and, consequently, driving them forward, as they cannot recede against the stream. As this pressure is greatest in the deepest parts of the river, so we generally find the middle of the stream most rapid; both because it has the greatest motion thus communicated by the pressure, and the fewest obstructions from the banks on either side.

Rivers thus set into motion are almost always found to make their own beds. When they find the bed elevated, they wear its substance away, and deposit the sediment in the next hollow, so as in time to make the bottom of their channels even. On the other hand, the water is continually gnawing and eating away the banks on each side; and this with more force as the current happens to strike more directly against them. By these means, it always has a tendency to render them more strait and parallel to its own course. Thus it continues to rectify its banks, and enlarge its bed; and, consequently, to diminish the force of its stream, till there becomes an equilibrium between the force of the water, and the resistance of its banks, upon which both will remain without any further mutation. And it is happy for man that bounds are thus put to the erosion of the earth by water; and that we find all rivers only dig and widen themselves but to a certain degree.

In those plains and large valleys where great rivers flow, the bed of the river is usually lower than any part of the valley: but it often happens, that the surface of the water is higher than many of the grounds that are adjacent to the banks of the stream. If, after inundations, we take a view of some rivers, we shall find their banks appear above water, at a time that all the adjacent valley is overflowed. This proceeds from the frequent deposition of mud, and such like substances, upon the banks, by the rivers frequently overflowing; and thus, by degrees, they become elevated above the plain; and the water is often seen higher also.

Rivers, as every body has seen, are always broadest at the mouth; and grow narrower towards their source. But what is less known, and probably more deserving curiosity, is, that they run in a more direct channel as they immediately leave their sources; and that their sinuosities and turnings become more numerous as they proceed. It is a certain sign among the savages of North America, that they are near the sea, when they find the rivers winding, and every now and then changing their direction. And this is even now become an indication to the Europeans themselves, in their journeys through those trackless forests. As those sinuosities, therefore, increase as the river approaches the sea, it is not to be wondered at, that they sometimes divide, and thus disembogue by different channels. The Danube disembogues into the Euxine by seven mouths; the Nile, by the same number; and the Wolga, by seventy.

The currents of rivers, are to be estimated very differently from the manner in which those writers, who have given us mathematical theories on this subject, represent them. They found their cal-

culations upon the surface being a perfect plain, from one bank to the other; but this is not the actual state of nature; for rivers, in general, rise in the middle; and this convexity is greatest in proportion as the rapidity is greater. Any person, to be convinced of this, need only lay his eye as nearly as he can on a level with the stream, and looking across to the opposite bank, he will perceive the river in the midst to be elevated considerably above what it is at the edges. This rising, in some rivers, is often found to be three feet high; and is ever increased, in proportion to the rapidity of the stream. In this case, the water in the midst of the current loses a part of its weight, from the velocity of its motion; while that at the sides, for the contrary reason, sinks lower. It sometimes, however, happens, that this appearance is reversed; for when tides are found to flow up with violence against the natural current of the water, the greatest rapidity is then found at the sides of the river, as the water there resists the influx from the sea. On those occasions, therefore, the river presents a concave rather than a convex surface; and, as in the former case, the middle waters rose in a ridge; in this case, they sink in a furrow.

The stream of all rivers is more rapid in proportion as its channel is diminished. For instance, it will be much swifter where it is ten yards broad, than where it is twenty; for the force behind still pushing the water forward, when it comes to the narrow part, it must make up by velocity what it wants in room.

It often happens that the stream of a river is opposed by one of its jutting banks, by an island in the midst, the arches of a bridge, or some such obstacle. This produces, not unfrequently, a back current; and the water having past the arch with great velocity, pushes the water on each side of its direct current.

This produces a side current, tending to the banks, and not unfrequently a whirlpool; in which a large body of waters are circulated in a kind of cavity, sinking down in the middle. The central point of the whirlpool is always lowest, because it has the least motion: the other parts are supported, in some measure, by the violence of theirs; and, consequently, rise higher as their motion is greater; so that towards the extremity of the whirlpool must be higher than towards the center.

If the stream of a river be stopped at the surface, and yet be free below; for instance, if it be laid over by a bridge of boats, there will then be a double current; the water at the surface will flow back, while that at the bottom will proceed with increased velocity. It often happens that the current at the bottom is swifter than at the top, when, upon violent land-floods, the weight of waters towards the source presses the waters at the bottom, before it has had time to communicate its motion to the surface. However, in all other cases, the surface of the stream is swifter than the bottom, as it is not retarded by rubbing over the bed of the river.

It might be supposed that bridges, dams, and other obstacles in the current of a river, would retard its velocity: but the difference they make is very inconsiderable. The water, by these stoppages, gets an elevation above the object; which, when it has surmounted, it gives a velocity that recompences the former delay. Islands and turnings also retard the course of the stream but very inconsiderably; any cause which diminishes the quantity of the water, most sensibly diminishes the force and the velocity of the stream.

An increase of water in the bed of the river always increases its rapidity, except in cases of inundation. The instant the river has overflowed its

banks, the velocity of its current is always turned that way, and the inundation is perceived to continue for some days; which it would not otherwise do, if, as soon as the cause was discontinued, it acquired its former rapidity.

A violent storm, that sets directly up against the course of the stream, will always retard, and sometimes entirely stop its course. We have seen an instance of this, when the bed of a large river was left entirely dry for some hours, and fish were caught among the stones at the bottom.

Inundations are generally greater towards the source of rivers, than farther down; because the current is generally swifter below than above; and that for the reason already assigned.

A little river may be received into a large one, without augmenting either its width or depth. This, which at first view seems a paradox, is yet very easily accounted for. The little river, in this case, only goes towards increasing the swiftness of the larger, and putting its dormant waters into motion. In this manner, the Venetian branch of the Po was pushed on by the Ferarrese branch and that of Panaro, without any enlargement of its breadth or depth from these accessions.

A river tending to enter another, either perpendicularly, or in an opposite direction, will be diverted, by degrees, from that direction; and be obliged to make itself a more favourable entrance downward, and more conspiring with the stream of the former.

The union of two rivers into one, makes it flow the swifter; since the same quantity of water, instead of rubbing against four shores, now only rubs against two. And, besides, the current being deeper, becomes of consequence more fitted for motion.

With respect to the places from whence rivers proceed, it may be taken for a general rule, that the largest and highest mountains supply the greatest and most extensive rivers. It may also be remarked, in whatever direction the ridge of the mountain runs, the river takes an opposite course. If the mountain, for instance, stretches from north to south, the river runs from east to west; and so contrariwise. These are some of the most generally received opinions with regard to the course of rivers; however, they are liable to many exceptions; and nothing but an actual knowledge of each particular river can furnish us with an exact theory of its current.

The largest rivers of Europe are, first, the Wolga, which is about six hundred and fifty leagues in length, extending from Reschow to Astrachan. It is remarkable of this river, that it abounds with water during the summer months of May and June; but all the rest of the year is so shallow as scarce to cover its bottom, or allow a passage for loaded vessels that trade up its stream. It was up this river that the English attempted to trade into Persia, in which they were so unhappily disappointed, in the year 1741. The next in order is the Danube. The course of this is about four hundred and fifty leagues, from the mountains of Switzerland to the Black Sea. It is so deep between Buda and Belgrade, that the Turks and Christians have fleets of men of war upon it, which frequently engaged, during the last war between the Ottomans and the Austrians: however, it is unnavigable further down, by reason of its cataracts, which prevent its commerce into the Black Sea. The Don, or Tanaïs, which is four hundred leagues from the source of that branch of it called the Sofna, to its mouth in the Euxine sea. In one part of its course it approaches near the Wolga; and Peter the Great had actually begun a canal, by which he intended joining those two rivers; but this he did not live to finish. The Nieper, or Boristhenes, which rises in the middle of Muscovy, and runs a course of

three hundred and fifty leagues, to empty itself into the Black Sea. The Old Cossacks inhabit the banks and islands of this river; and frequently cross the Black Sea, to plunder the maritime places on the coasts of Turkey. The Dwina, which takes its rise in a province of the same name in Russia, that runs a course of three hundred leagues, and disembogues into the White Sea, a little below Archangel.

The largest rivers of Asia are, the Hoanho, in China, which is eight hundred and fifty leagues in length, computing from its source at Raja Ribron, to its mouth in the Gulph of Changi. The Jenisca of Tartary, about eight hundred leagues in length, from the Lake Selinga to the Icy Sea. This river is, by some, supposed to supply most of that great quantity of drift wood which is seen floating in the seas, near the Arctic circle. The Oby, of five hundred leagues, running from the lake of Kila into the Northern sea. The Amour, in Eastern Tartary, whose course is about five hundred and seventy-five leagues, from its source to its entrance into the sea of Kamtschatka. The Kiam, in China, five hundred and fifty leagues in length. The Ganges, one of the most noted rivers in the world, and about as long as the former. It rises in the mountains which separate India from Tartary; and running through the dominions of the Great Mogul, discharges itself by several mouths into the bay of Bengal. It is not only esteemed by the Indians for the depth, and pureness of its stream, but for a supposed sanctity which they believe to be in its waters. It is visited annually by several hundred thousand pilgrims, who pay their devotions to the river as to a god; for savage simplicity is always known to mistake the blessings of the Deity for the Deity himself. They carry their dying friends from distant countries, to expire on its banks; and to be buried in its stream. The water is lowest in April or May; but the rains beginning to fall soon after, the flat country is overflowed for several miles, till about the end of September; the waters then begin to retire, leaving a prolific sediment behind, that enriches the soil, and, in a few days time, gives a luxuriance to vegetation, beyond what can be conceived by an European. Next to this may be reckoned the still more celebrated river Euphrates. This rises from two sources, northward of the city Erzerum, in Turcomania; and unites about three days journey below the same; from whence, after performing a course of five hundred leagues, it falls into the Gulph of Persia, fifty miles below the city of Bassora in Arabia. The river Indus is extended from its source to its discharge into the Arabian sea, four hundred leagues.

The largest rivers of Africa are, the Senegal, which runs a course of not less than eleven hundred leagues, comprehending the Niger, which some have supposed to fall into it. However, later accounts seem to affirm that the Niger is lost in the sands, about three hundred miles up from the western coasts of Africa. Be this as it may, the Senegal is well known to be navigable for more than three hundred leagues up the country; and how much higher it may reach is not yet discovered, as the dreadful fatality of the inland parts of Africa, not only deter curiosity, but even avarice, which is a much stronger passion. At the end of last war, of fifty Englishmen that were sent to the factory at Galam, a place taken from the French, and nine hundred miles up the river, only one returned to tell the fate of his companions, who were destroyed by the climate. The celebrated river Nile is said to be nine hundred and seventy leagues, from its source among the mountains of the Moon, in Upper Æthiopia, to its opening into the Mediterranean

terranean sea. The sources of this river were considered as inscrutable by the ancients; and the causes of its periodical inundation were equally known. They have both been ascertained by the missionaries who have travelled into the interior parts of Æthiopia. The Nile takes its rise in the kingdom of Gojam, from a small aperture on the top of a mountain, which, though not above a foot and an half over, yet was unfathomable. This fountain, when arrived at the foot of the mountain, expands into a river; and being joined by others, forms a lake thirty leagues long, and as many broad; from this, its channel, in some measure, winds back to the country where it first began; from thence, precipitating by frightful cataracts, it travels through a variety of desert regions, equally formidable, such as Amhara, Olaca, Damot, and Xaoa. Upon its arrival in the kingdom of Upper Egypt, it runs through a rocky channel, which some late travellers have mistaken for its cataracts. In the beginning of its course, it receives many lesser rivers into it; and Pliny was mistaken, in saying that it received none. In the beginning also of its course, it has many windings; but, for above three hundred leagues from the sea, runs in a direct line. Its annual overflowings arise from a very obvious cause, which is almost universal with the great rivers that take their source near the Line. The rainy season, which is periodical in those climates, flood the rivers; and as this always happens in our summer, so the Nile is at that time overflowed. From these inundations, the inhabitants of Egypt derive happiness and plenty; and, when the river does not arise to its accustomed heights, they prepare for an indifferent harvest. It begins to overflow about the seventeenth of June; it generally continues to augment for forty days, and decreases in about as many more. The time of increase and decrease, however, is much more inconsiderable now than it was among the ancients. Herodotus informs us, that it was an hundred days rising, and as many falling; which shews that the inundation was much greater at that time than at present. Mr. Buffon has ascribed the present diminution, as well to the lessening of the mountains of the Moon, by their substance having so long been washed down with the stream, as to the rising of the earth in Egypt, that has for so many ages received this extraneous supply. But we do not find, by the buildings that have remained since the times of the ancients, that the earth is much raised since then. Besides the Nile in Africa, we may reckon the Zara, and the Coanza, from the greatness of whose openings into the sea, and the rapidity of whose streams, we form an estimate of the great distance from whence they come. Their courses, however, are spent in watering deserts and savage countries, whose poverty or fierceness have kept strangers away.

But of all parts of the world, America, as it exhibits the most lofty mountains, so also it supplies the largest rivers. The foremost of these is the great river Amazons, which, from its source in the lake of Lauricocha, to its discharge into the Western Ocean, performs a course of more than twelve hundred leagues. The breadth and depth of this river is answerable to its vast length; and, where its width is most contracted, its depth is augmented in proportion. So great is the body of its waters, that other rivers, though before the objects of admiration, are lost in its bosom. It proceeds, after their junction, with its usual appearance, without any visible change in its breadth or rapidity; and, if we may so express it, remains great without ostentation. In some places it displays its whole magnificence, dividing into several large branches, and encompassing a multitude of

islands; and, at length, discharging itself into the ocean, by a channel of an hundred and fifty miles broad. Another river, that may almost rival the former, is the St. Lawrence, in Canada, which rising in the lake Assiniboils, passes from one lake to another, from Cristinaux to Alempigo; from thence to lake Superior; thence to the lake Hurons; to lake Erie; to lake Ontario; and, at last, after a course of nine hundred leagues, pours their collected waters into the Atlantic ocean. The river Mississippi is of more than seven hundred leagues in length, beginning at its source near the lake Assiniboils, and ending at its opening into the Gulf of Mexico. The river Plate runs a length of more than eight hundred leagues from its source in the river Parana, to its mouth. The river Oroonoko is seven hundred and fifty-five leagues in length, from its source near Palto, to its discharge into the Atlantic ocean.

Such is the amazing length of the greatest rivers; and even in some of these, the most remote sources very probably yet continue unknown. In fact, if we consider the number of rivers which they receive, and the little acquaintance we have with the regions through which they run, it is not to be wondered at that geographers are divided concerning the sources of most of them. As among a number of roots by which nourishment is conveyed to a stately tree, it is difficult to determine precisely that by which the tree is chiefly supplied; so among the many branches of a great river, it is equally difficult to tell which is the original. Hence it may easily happen, that a similar branch is taken for the capital stream; and its runnings are pursued, and delineated, in prejudice of some other branch that better deserved the name and the description. In this manner, in Europe, the Danube is known to receive thirty lesser rivers: the Wolga, thirty-two or thirty-three. In Asia, the Hohanno receives thirty-five; the Jenisca above sixty; the Oby as many; the Amour about forty; the Nanquin receives thirty rivers; the Ganges twenty; and the Euphrates about eleven. In Africa, the Senegal receives more than twenty rivers; the Nile receives not one for five hundred leagues upwards, and then only twelve or thirteen. In America, the river Amazons receives above sixty, and those very considerable; the river St. Lawrence about forty, counting those which fall into its lakes; the Mississippi receives forty; and the river Plate above fifty.

We mentioned the inundations of the Ganges and the Nile, but almost every other great river whose source lies within the tropics, have their stated inundations also. The river Pegu has been called, by travellers, the Indian Nile, because of the similar overflowings of its stream: this it does to an extent of thirty leagues on each side; and so fertilizes the soil, that the inhabitants send great quantities of rice into other countries, and have still abundance for their own consumption. The river Senegal has likewise its inundations, which cover the whole flat country of Negroland, beginning and ending much about the same time with those of the Nile; as, in fact, both rivers rise from the same mountains. But the difference between the effects of the inundations in each river is remarkable: in the one, it distributes health and plenty; in the other, diseases, famine, and death. The inhabitants along the torrid coasts of the Senegal can receive no benefit from any additional manure the river may carry down to their soil, which is, by nature, more than sufficiently luxuriant; or, even if they could, they have not industry to turn it to any advantage. The banks, therefore, of the rivers, lie uncultivated, overgrown with rank and noxious herbage, and infested with thousands

sands of animals of various malignity. Every new flood only tends to increase the rankness of the soil, and to provide fresh shelter for the creatures that infest it. If the flood continues but a few days longer than usual, the improvident inhabitants, who are driven up in the higher grounds, want provisions, and a famine ensues. When the river begins to return into its channel, the humidity and heat of the air are equally fatal; and the carcases of infinite numbers of animals, swept away by the inundation, putrifying in the sun, produce a stench that is almost insupportable. But even the luxuriance of the vegetation becomes a nuisance. We have been assured by persons of veracity who have been up the river Senegal, that there are some plants growing along the coast, the smell of which is so powerful, that it is hardly to be endured. It is certain, that all the sailors and soldiers who have been at any of our factories there, ascribe the unwholesomeness of the voyage up the stream, to the vegetable vapour. However this be, the inundations of the rivers in this wretched part of the globe, contribute scarce any advantage, if we except to the beauty of the prospects which they afford. These, indeed, are finished beyond the utmost reach of art: a spacious glassy river, with its banks here and there fringed to the very surface by the mangrove-tree, that grows down into the water, presents itself to view. Lofty forests of various colours, with openings between, carpeted with green plants, and the most gaudy flowers; beasts and animals, of various kinds, that stand upon the banks of the river, and, with a sort of wild curiosity, survey the mariners as they pass, contribute to heighten the scene. This is the sketch of an African prospect; which delights the eye, even while it destroys the constitution.

Beside these annually periodical inundations, there are many rivers that overflow at much shorter intervals. Thus most of those in Peru and Chili have scarce any motion by night; but upon the appearance of the morning sun, they resume their former rapidity: this proceeds from the mountain snows, which melting with the heat, increase the stream, and continue to drive on the current while the sun continues to dissolve them. Some rivers also flow with an even steady current, from their source to the sea; others flow with greater rapidity, their stream being poured down in a cataract, or swallowed by the sands, before they reach the sea.

The rivers of those countries that have been least inhabited, are usually more rocky, uneven, and broken into water-falls or cataracts, than those where the industry of man has been more prevalent. Wherever man comes, nature puts on a milder appearance: the terrible and the sublime are exchanged for the gentle and the useful; the cataract is sloped away into a placid stream; and the banks become more smooth and even. It must have required ages to render the Rhone or the Loir navigable; their beds must have been cleaned and directed; their inequalities removed; and, by a long course of industry, nature must have been taught to conspire with the desires of her controller. Every one's experience must have supplied instances of rivers thus being made to flow more evenly, and more beneficially to mankind; but there are some whose currents are so rapid, and falls so precipitate, that no art can obviate; and that must for ever remain as amazing instances of incorrigible nature.

Of this kind are the cataracts of the Rhine; one of which has been seen to exhibit a very strange appearance: it was that at Schathausen, which was frozen quite across, and the water stood in columns where the cataract had formerly fallen. The Nile, as was said, has its cataracts. The river Vologda, in Russia, has two. The river

Zara, in Africa, has one near its source. The river Velino, in Italy, has a cataract of above an hundred and fifty feet perpendicular. Near the city of Gottenburgh, in Sweden, the river rushes down from a prodigious high precipice into a deep pit, with a terrible noise, and such dreadful force, that those trees designed for the masts of ships, which are floated down the river, are usually turned upside down in their fall, and often are shattered to pieces, by being dashed against the surface of the water in the pit; this occurs if the masts fall sideways upon the water; but if they fall endways, they dive so far under water, that they disappear for a quarter of an hour, or more: the pit into which they are thus plunged, has been often sounded with a line of some hundred fathoms long, but no ground has been found hitherto. There is also a cataract at Powerscourt, in Ireland; in which the water is said to fall three hundred feet perpendicular; which is a greater descent than that of any other cataract in any part of the world. There is a cataract at Albany, in the province of New York, which pours its stream fifty feet perpendicular. But of all the cataracts in the world, that of Niagara, in Canada, if we consider the great body of water that falls, must be allowed to be the greatest, and the most astonishing.

This amazing fall of water is made by the river St. Lawrence, in its passage from the lake Erie into the lake Ontario. We have already said that St. Lawrence was one of the largest rivers in the world; and yet the whole of its waters are here poured down, by a fall of an hundred and fifty feet perpendicular. It is not easy to bring the imagination to correspond with the greatness of the scene; a river extremely deep and rapid, and that serves to drain the waters of almost all North America into the Atlantic ocean, is here poured precipitately down a ledge of rocks, that rise, like a wall, across the whole bed of its stream. The width of the river, a little above, is near three quarters of a mile broad, and the rocks, where it grows narrower, are four hundred yards over. Their direction is not straight across, but hollowing inwards like an horse-shoe; so that the cataract, which bends to the shape of the obstacle, rounding inwards, presents a kind of theatre the most tremendous in nature. Just in the middle of this circular wall of waters, a little island, that has braved the fury of the current, presents one of its points, and divides the stream at top into two; but it unites again long before it has got to the bottom. The noise of the fall is heard at several leagues distance; and the fury of the waters at the bottom of their fall is inconceivable. The dashing produces a mist that rises to the very clouds; and that produces a most beautiful rainbow, when the sun shines. It may easily be conceived, that such a cataract quite destroys the navigation of the stream: and yet some Indian canoes, as it is said, have been known to venture down it with safety.

Of those rivers that lose themselves in the sands, or are swallowed up by chasms in the earth, we have various information. What we are told by the ancients, of the river Alpheus, in Arcadia, that sinks into the ground, and rises again near Syracuse, in Sicily, where it takes the name of Arethusa, is rather more known than credited. But we have better information with respect to the river Tigris being lost in this manner under Mount Taurus; of the Guadalquivir, in Spain, being buried in the sands; of the river Greatah, in Yorkshire, running underground, and rising again, and even of the great Rhine itself, a part of which is no doubt lost in the sands, a little above Leyden. But it ought to be observed of this river, that by much the greatest part arrives at the ocean; for,

although

although the ancient channel which fell into the sea, a little to the west of that city, be now entirely choaked up, yet there are still a number of small canals, that carry a great body of waters to the sea: and, besides, it has also two very large openings, the Lech, and the Wal, below Rotterdam, by which it empties itself abundantly.

Be this as it will, nothing is more common in sultry and sandy deserts, than rivers being thus either lost in the sands, or entirely dried up by the sun. And hence we see, that under the Line, the small rivers are but few; for such little streams as are common in Europe, and which with us receive the name of rivers, would quickly evaporate, in those parching and extensive deserts. It is even confidently asserted, that the great river Niger is thus lost before it reaches the ocean; and that its supposed mouths, the Gambia, and the Senegal, are distinct rivers, that come a vast way from the interior parts of the country. It appears, that the rivers under the Line are large; but it is otherwise at the Poles, where they must necessarily be small. In that desolate region, as the mountains are covered with perpetual ice, which melts but little, or not at all, the springs and rivulets are furnished with a very small supply. Here, therefore, men and beasts would perish, and die for thirst, if Providence had not ordered that in the hardest winter, thaws should intervene, which deposit a small quantity of snow-water in pools under the ice; and from this source the wretched inhabitants drain a scanty beverage.

Thus, whatever quarter of the globe we turn to, we shall find new reasons to be satisfied with that part of it in which we reside. Our rivers furnish all the plenty of the African stream, without its inundation; they have all the coolness of the Polar rivulet, with a more constant supply; they may want the terrible magnificence of huge cataracts, or extensive lakes, but they are more navigable, and more transparent; though less deep and rapid than the rivers of the torrid zone, they are more manageable, and only wait the will of man to take their direction. The rivers of the torrid zone, like the monarchs of the country, rule with despotic tyranny, profuse in their bounties, and ungovernable in their rage. The rivers of Europe, like their kings, are the friends, and not the oppressors of the people; bounded by known limits, abridged in the power of doing ill, directed by human sagacity, and only at freedom to distribute happiness and plenty.

CHAP. XV.

Of the OCEAN in general; and its Saltness.

IN looking upon a map of the world, we find that the ocean occupies considerably more of the globe, than the land is found to do. This immense body of waters is diffused round both the Old and New Continent, to the south; and may surround them also to the north, for what we know, but the ice in those regions has stopped our enquiries. Although the ocean, properly speaking, is but one extensive sheet of waters, continued over every part of the globe, without interruption, and although no part of it is divided from the rest, yet geographers have distinguished it by different names; as the Atlantic or Western Ocean, the Northern Ocean, the Southern Ocean, the Pacific Ocean, and the Indian Ocean. Others have divided it differently, and given other names; as the Frozen Ocean, the Inferior Ocean, or the American Ocean. But all these being arbitrary distinctions, and not of Nature's making, the naturalist may consider them with indifference.

In this vast receptacle, almost all the rivers of the

No. 51.

earth ultimately terminate; nor do such great supplies seem to increase its stores; for it is neither apparently swollen by their tribute, nor diminished by their failure; it still continues the same. Indeed, what is the quantity of water of all the rivers and lakes in the world, compared to that contained in this great receptacle? If we should offer to make a rude estimate, we shall find that all the rivers in the world, flowing into the bed of the sea, with a continuance of their present stores, would take up at least eight hundred years to fill it to its present height. For, supposing the sea to be eighty-five millions of square miles in extent, and a quarter of a mile, upon an average, in depth, this, upon calculation, will give above twenty-one millions of cubic miles of water, as the contents of the whole ocean. Now, to estimate the quantity of water which all the rivers supply, take any one of them; the Po, for instance, the quantity of whose discharge into the sea, is known to be one cubic mile of water in twenty-six days. Now it will be found, upon a rude computation, from the quantity of ground the Po, with its influent streams, covers, that all the rivers of the world furnish about two thousand times that quantity of water. In the space of a year, therefore, they will have discharged into the sea about twenty-six thousand cubic miles of water; and not till eight hundred years will they have discharged as much water as is contained in the sea at present. We have not troubled our readers with the odd numbers, lest they should imagine we were giving precision to a subject that is incapable of it.

Thus great is the assemblage of waters diffused round our habitable globe; and yet, immeasurable as they seem, they are mostly rendered subservient to the necessities and the conveniencies of so little a being as man. Nevertheless, if it should be asked whether they be made for him alone, the question is not easily resolved. Some philosophers have perceived so much analogy to man in the formation of the ocean, that they have not hesitated to assert its being made for him alone. The distribution of land and water, say they, is admirable; the one being laid against the other so skilfully, that there is a just equipoise of the whole globe. Thus the Northern Ocean balances against the Southern; and the New Continent is an exact counter-weight to the Old. As to any objection from the ocean's occupying too large a share of the globe, they contend, that there could not have been a smaller surface employed to supply the earth with a due share of evaporation. On the other hand, some take the gloomy side of the question; they either magnify its apparent defects; or assert, that what seems defects to us, may be real beauties to some wiser order of beings. They observe, that multitudes of animals are concealed in the ocean, and but a small part of them are known; the rest, therefore, they sail not to say, were certainly made for their own benefit, and not for ours. How far either of these opinions be just, we will not presume to determine; but of this we are certain, that God has endowed us with abilities to turn this great extent of waters to our own advantage. He has made these things, perhaps, for other uses; but he has given us faculties to convert them to our own. This much agitated question, therefore, seems to terminate here. We shall never know whether the things of this world have been made for our use; but we very well know that we have been made to enjoy them. Let us then boldly affirm, that the earth, and all its wonders are ours; since we are furnished with powers to force them into our service. Man is the lord of all the sublunary creation; the howling savage, the winding serpent, with all the untameable and rebellious offspring of Nature, are destroyed in the contest, or driven at a distance from his habitations. The extensive and tempestuous ocean, instead of limiting or dividing his

power, only serves to assist his industry, and enlarge the sphere of his enjoyments. Its billows, and its monsters, instead of presenting a scene of terror, only call up the courage of this little intrepid being; and the greatest danger that man now fears on the deep, is from his fellow-creatures. Indeed, when we consider the human race as Nature has formed them, there is but very little of the habitable globe that seems made for them. But when we consider them as accumulating the experience of ages, in commanding the earth, there is nothing so great, or so terrible. What a poor contemptible being is the naked savage, standing on the beach of the ocean, and trembling at its tumults! How little capable is he of converting its terrors into benefits; or of saying, behold an element made wholly for my enjoyment! He considers it as an angry deity, and pays it the homage of submission. But it is very different when he has exercised his mental powers; when he has learned to find his own superiority, and to make it subservient to his commands. It is then that his dignity begins to appear, and that the true Deity is justly praised for having been mindful of man; for having given him the earth for his habitation, and the sea for an inheritance.

This power which man has obtained over the ocean, was at first enjoyed in common; and none pretended to a right in that element where all seemed intruders. The sea, therefore, was open to all till the time of the emperor Justinian. His successor Leo granted such as were in possession of the shore, the sole right of fishing before their respective territories. The Thracian Bosphorus was the first that was thus appropriated; and from that time it has been the struggle of most of the powers of Europe to obtain an exclusive right in this element. The Republic of Venice claims the Adriatic. The Danes are in possession of the Baltic. But the English have a more extensive claim to the empire of all the seas, encompassing the kingdoms of England, Scotland, and Ireland; and although these have been long contested, yet they are now considered as their indisputable property. Every one knows that the great power of the nation is exerted on this element; and that the instant England ceases to be superior upon the ocean, its safety begins to be precarious.

It is in some measure owing to our dependence upon the sea, and to our commerce there, that we are so well acquainted with its extent and figure. The bays, gulphs, currents, and shallows of the ocean, are much better known and examined than the provinces and kingdoms of the earth itself. The hopes of acquiring wealth by commerce, has carried man to much greater length than the desire of gaining information could have done. In consequence of this, there is scarce a strait or an harbour, scarce a rock or a quicksand, scarce an inflexion of the shore, or the jutting of a promontory, that has not been minutely described. But as these present very little entertainment to the imagination, or delight to any but those whose pursuits are lucrative, they need not be dwelt upon here. While the merchant and the mariner are solicitous in describing current and soundings, the naturalist is employed in observing wonders, though not so beneficial, yet to him of a much more important nature. The saltness of the sea seems to be foremost.

Whence the sea has derived that peculiar bitterish saltness which we find in it, appears, by Aristotle, to have exercised the curiosity of naturalists in all ages. He supposed (and mankind were for ages content with the solution) that the sun continually raised dry saline exhalations from the earth, and deposited them upon the sea; and hence, say his followers, the waters of the sea are more salt at top than at bottom. But, unfortunately for this opinion, neither of the facts is true. Sea salt is not

to be raised by the vapours of the sun; and sea water is not saltier at the top than at the bottom. Father Bohours is of opinion that the Creator gave the waters of the ocean their saltness at the beginning; not only to prevent their corruption, but to enable them to bear greater burthens. But their saltness does not prevent their corruption; for stagnant seawater, like fresh, soon grows putrid: and, as for their bearing greater burthens, fresh water answers all the purposes of navigation quite as well. The established opinion, therefore, is that of Boyle, who supposes, "that the sea's saltness is supplied not only from rocks or masses of salt at the bottom of the sea, but also from the salt which the rains and rivers, and other waters, dissolve in their passage through many parts of the earth, and at length carry with them to the sea." But as there is a difference in the taste of rock-salt found at land, and that dissolved in the waters of the ocean, this may be produced by the plenty of nitrous and bituminous bodies that, with the salts, are likewise washed into that great receptacle. These substances being thus once carried to the sea, must for ever remain there; for they do not rise by evaporation, so as to be returned back from whence they came. Nothing but the fresh waters of the sea rise in vapours; and all the saltness remains behind. From hence it follows, that every year the sea must become more and more salt; and this speculation Doctor Halley carries so far as to lay down a method of finding out the age of the world by the saltness of its waters. "For if it be observed," says he, "what quantity of salt is at present contained in a certain weight of water, taken up from the Caspian Sea, for example, and, after some centuries, what greater quantity of salt is contained in the same weight of water, taken from the same place; we may conclude, that in proportion as the saltness has increased in a certain time, so much must it have increased before that time; and we may thus, by the rule of proportion, make an estimate of the whole time wherein the water would acquire the degree of saltness it should be then possessed of." All this may be fine; however, an experiment, begun in this century, which is not to be completed till some centuries hence, is rather a little mortifying to modern curiosity: and, we are induced to think, the inhabitants round the Caspian Sea, will not be apt to undertake the enquiry.

This saltness is found to prevail in every part of the ocean; and as much at the surface as at the bottom. It is also found in all those seas that communicate with the ocean; but rather in a less degree.

The great lakes, likewise, that have no outlets nor communication with the ocean, are found to be salt: but some of them in less proportion. On the contrary, all those lakes through which rivers run into the sea, however extensive they be, are, notwithstanding, very fresh: for the rivers do not deposit their salts in the bed of the lake, but carry them, with their currents, into the ocean. Thus the lakes Ontario and Erie, in North America, although for magnitude they may be considered as inland seas, are, nevertheless, fresh water lakes; and kept so by the river St. Lawrence, which passes through them. But those lakes that have no communication with the sea, nor any rivers, going out, although they be less than the former, are, however, always salt. Thus, that which goes by the name of the Dead Sea, though very small, when compared to those already mentioned, is so exceedingly salt, that its waters seem scarce capable of dissolving any more. The lakes of Mexico, and of Titicaca, in Peru, though of no great extent, are, nevertheless, salt; and both for the same reason.

Those who are willing to turn all things to the best, have not failed to consider this saltness of the sea, as a peculiar blessing from Providence, in order

der to keep so great an element sweet and wholesome. What foundation there may be in the remark, we will not pretend to determine; but we shall shortly find a much better cause for its being kept sweet, namely, its motion.

On the other hand, there have been many who have considered the subject in a different light, and have tried every endeavour to make salt-water fresh, so as to supply the wants of mariners in long voyages, or when exhausted of their ordinary stores. At first it was supposed simple distillation would do; but it was soon found that the bitter part of the water still kept mixed. It was then tried by uniting salt of Tartar with sea-water, and distilling both: but here the expence was greater than the advantage. Calcined bones were next thought of; but an hoghead of calcined bones, carried to sea, would take up as much room as an hoghead of water, and was more hard to be obtained. In this state, therefore, have the attempts to sweeten sea-water rested; the chymist satisfied with the reality of his invention; and the mariner convinced of its being useless. We cannot, therefore, avoid mentioning, a kind of succedaneum which has been lately conceived to answer the purposes of fresh-water, when mariners are quite exhausted. It is well known, the persons who go into a warm bath, come out several ounces heavier than they went in; their bodies having imbibed a correspondent quantity of water. This more particularly happens, if they have been previously debarred from drinking, or go in with a violent thirst; which they quickly find quenched, and their spirits restored. It was supposed, that in case of a total failure of fresh-water at sea, a warm bath might be made of sea-water, for the use of mariners; and that their pores would thus imbibe the fluid, without any of its salts, which would be seen to crystallize on the surface of their bodies. In this manner, it is supposed, a sufficient quantity of moisture may be procured to sustain life, till time or accident furnish a more copious supply.

But, however this be, the saltness of the sea can by no means be considered as a principal cause in preserving its waters from putrefaction. The ocean has its currents, like rivers, which circulate its contents round the globe; and these may be said to be the great agents that keep it sweet and wholesome. Its saltness alone would by no means answer this purpose: and some have even imagined, that the various substances with which it is mixed, rather tend to promote putrescence than impede it. Sir Robert Hawkins, one of our most enlightened navigators, gives the following account of a calm, in which the sea continuing for some time without motion, began to assume a very formidable appearance. "Were it not," says he, "for the moving of the sea, by the force of winds, tides, and currents, it would corrupt all the world. The experiment of this I saw in the year 1590, lying with a fleet about the islands of Azores, almost six months; the greatest part of which time we were becalmed. Upon which all the sea became so replenished with several sorts of jellies, and forms of serpents, adders, and snakes, as seemed wonderful: some green, some black, some yellow, some white, some of divers colours, and many of them had life; and some there were an yard and an half and two yards long; which had I not seen, I could hardly have believed. And hereof are witnesses all the company of the ships which were then present: so that hardly a man could draw a bucket of water clear of some corruption. In which voyage, towards the end thereof, many of every ship fell sick, and began to die apace. But the speedy passage into our country, was a remedy to the crazed, and a preservative for those that were not touched."

This shews, abundantly, how little the sea's saltness was capable of preserving it from putrefaction: but, to put the matter beyond all doubt, Mr. Boyle kept a quantity of sea-water, taken up in the English channel, for some time barrelled up; and, in the space of a few weeks, it began to acquire a foetid smell: he was also assured by one of his acquaintance who was becalmed for twelve or fourteen days in the Indian sea, that the water, for want of motion, began to stink; and that had it continued much longer, the stench would probably have poisoned him. It is the motion, therefore, and not the saltness of the sea, that preserves it in its present state of salubrity; and this, very probably, by dashing and breaking in pieces the rudiments, if we may so call them, of the various animals that would otherwise breed there and putrefy.

There are some advantages, however, which are derived from the saltness of the sea. Its waters being evaporated, furnish that salt which is used for domestic purposes; and, although in some places it is made from springs, and, in others, dug out of mines, yet the greatest quantity is made only from the sea. That which is called bay-salt, (from its coming to us by the Bay of Biscay) is a stronger kind, made by evaporation in the sun: that called common salt, is evaporated in pans over the fire, and is of a much inferior quality to the former.

Another benefit arising from the quantity of salt dissolved in the sea, is, that it thus becomes heavier, and, consequently, more buoyant. Mr. Boyle, who examined the difference between sea-water and fresh, found that the former appeared to be about a forty-fifth part heavier than the latter. Those, also, who have had opportunities of bathing in the sea, pretend to have experienced a much greater ease in swimming there, than in fresh water. However, as we see they have only a forty-fifth part more of their weight sustained by it, we are apt to doubt whether so minute a difference can be practically perceivable. Be this as it may, as sea-water alters in its weight from fresh, so it is found also to differ from itself in different parts of the ocean. In general, it is perceived to be heavier, and, consequently, saltier, the nearer we approach the Line.

But there is an advantage arising from the saltness of the waters of the sea, much greater than what has been yet mentioned; which is, that their congelation is thus retarded. Some, indeed, have gone so far as to say, that sea-water never freezes: but this is an assertion contradicted by experience. However, it is certain that it requires a much greater degree of cold to freeze it than fresh water; so that, while rivers and springs are seen converted into one solid body of ice, the sea is always fit for navigation, and no way affected by the coldness of the severest winter. It is, therefore, one of the greatest blessings we derive from this element, that when at land all the stores of Nature are locked up from us, we find the sea ever open to our necessities, and patient of the hand of industry.

But it must not be supposed, because in our temperate climate we never see the sea frozen, that it is in the same manner open in every part of it. A very little acquaintance with the accounts of mariners, must have informed us, that at the polar regions it is embarrassed with mountains, and moving sheets of ice, that often render it impassable. These tremendous floats are of different magnitudes; sometimes rising more than a thousand feet above the surface of the water; sometimes diffused into plains of above two hundred leagues in length; and, in many parts, sixty or eighty broad. They are usually divided by fissures; one piece following another so close, that a person may step from one to the other. Sometimes mountains are seen rising amidst these plains, and presenting the appearance

of a variegated landscape, with hills and valleys, houses, churches, and towers. These are appearances in which all naturalists are agreed: but the great contest is respecting their formation. Mr. Buffon asserts, that they are formed from fresh water alone; which congealing at the mouths of great rivers, accumulate those huge masses that disturb navigation. However, this great naturalist seems not to have been aware that there are two sorts of ice floating in these seas; the flat ice, and the mountain ice: the one formed of sea-water only; the other, of fresh.

The flat, or driving ice, is entirely composed of sea-water; which, upon dissolution, is found to be salt; and is readily distinguished from the mountain or fresh-water ice, by its whiteness, and want of transparency. This ice is much more terrible to mariners than that which rises up in lumps: a ship can avoid the one, as it is seen at a distance; but it often gets in among the other, which sometimes closing, crushes it to pieces. This, which manifestly has a different origin from the fresh-water ice, may perhaps have been produced in the Icy Sea, beneath the Pole; or along the coasts of Spitzberg, or Nova Zembla.

The mountain-ice, as was said, is different in every respect, being formed of fresh water, and appearing hard and transparent; it is generally of a pale green colour, though some pieces are of a beautiful sky blue; many large masses, also, appear grey; and some black. If examined more nearly, they are found to be incorporated with earth, stones, and brush-wood washed from the shore. On these also are sometimes found, not only earth, but nests with bird eggs, at several hundred miles from land. The generality of these, though almost totally fresh, have, nevertheless, a thick crust of salt-water frozen upon them, probably from the power that ice has sometimes to produce ice. Such mountains as are here described, are most usually seen at spring-time, and after a violent storm, driving out to sea, where they at first terrify the mariner, and are soon after dashed to pieces by the continual washing of the waves; or driven into the warmer regions of the south, there to be melted away. They sometimes, however, strike back upon their native shores, where they seem to take root at the feet of mountains; and, as Martius tells us, are sometimes higher than the mountains themselves. Those seen by him were blue, full of clefts and cavities made by the rain, and crowned with snow, which alternately thawing and freezing every year, augmented their size. These, composed of materials more solid than that driving at sea, presented a variety of agreeable figures to the eye, that, with a little help from fancy, assumed the appearance of trees in blossom; the inside of churches, with arches, pillars, and windows; and the blue coloured rays, darting from within, presented the resemblance of a glory.

If we enquire into the origin and formation of these, which, as we see, are very different from the former, we have a very satisfactory account of them in Krantz's History of Greenland; and we will give the passage, with a very few alterations. "These mountains of ice," says he, "are not salt, like the sea-water, but sweet; and, therefore, can be formed no where except on the mountains, in rivers, in caverns, and against the hills near the sea-shore. The mountains of Greenland are so high, that the snow which falls upon them, particularly on the north-side, is, in one night's time, wholly converted into ice: they also contain clefts and cavities, where the sun seldom or never injects his rays: besides these, are projections, or landing-places, on the declivities of the steepest hills, where the rain and snow-water lodge, and quickly con-

geal. When now the accumulated flakes of snow slide down, or fall with the rain from the eminences above, on these prominences; or, when here and there a mountain-spring comes rolling down to such a lodging place, where the ice has already seated itself, they all freeze, and add their tribute to it. This, by degrees, waxes to a body of ice, that can no more be overpowered by the sun; and which, though it may indeed, at certain seasons, diminish by a thaw, yet, upon the whole, through annual acquisitions, it assumes an annual growth. Such a body of ice is often prominent far over the rocks. It does not melt on the upper surface, but underneath; and often cracks into many larger or smaller clefts, from whence the thawed water trickles out. By this it becomes, at last, so weak, that being overloaded with its own ponderous bulk, it breaks loose, and tumbles down the rocks with a terrible crash. Where it happens to overhang a precipice on the shore, it plunges into the deep with a shock like thunder; and with such an agitation of the water, as will overturn a boat at some distance, as many a poor Greenland has fatally experienced." Thus are these amazing ice mountains launched forth to sea, and found floating in the waters round both the Poles. It is these that have hindered mariners from discovering the extensive countries that lie round the South Pole; and that probably block up the passage to China by the North.

We will conclude this chapter with one effect more, produced by the saltness of the sea; which is, the luminous appearance of its waves in the night. All who have been spectators of a sea by night, a little ruffled with winds, seldom fail of observing its fiery brightness. In some places it shines as far as the eye can reach; at other times, only when the waves boom against the side of the vessel, or the oar dashes into the water. Some seas shine often; others more seldom; some, ever when particular winds blow; and others, within a narrow compass; a long tract of light being seen along the surface, whilst all the rest is hid in total darkness. It is not easy to account for these extraordinary appearances: some have supposed that a number of luminous insects produced the effect, and this is in reality sometimes the case; in general, however, they have every resemblance to that light produced by electricity; and, probably, arise from the agitation and dashing of the saline particles of the fluid against each other. But the manner in which this is done, for we can produce nothing similar by any experiments hitherto made, remains for some happier accident to discover. Our progress in the knowledge of nature is slow; and it is a mortifying consideration, that we are hitherto more indebted for success to chance than industry.

CHAP. XVI.

Of the Tides, Motion, and Currents of the Sea; with their Effects.

IT was said, in the former chapter, that the waters of the sea were kept sweet by their motion; without which they would soon putrefy, and spread universal infection. If we look for final causes, here, indeed, we have a great and an obvious one that presents itself before us. Had the sea been made without motion, and resembling a pool of stagnant water, the nobler races of animated nature would shortly be at an end. Nothing would then be left alive but swarms of ill-formed creatures, with scarce more than vegetable life; and subsisting by putrefaction. Were this extensive bed of waters entirely quiescent, millions of the

smaller reptile kinds would there find a proper retreat to breed and multiply in; they would find there no agitation, no concussion in the parts of the fluid to crush their feeble frames, or to force them from the places where they were bred: there they would multiply in security and ease, enjoy a short life; and putrifying, thus again give nourishment to numberless others, as little worthy of existence as themselves. But the motion of this great element effectually destroys the number of these viler creatures; its currents and its tides produce continual agitations, the shock of which they are not able to endure; the parts of the fluid rub against each other, destroy all viscidities; and the ocean, if we may so express it, acquires health by exercise.

The most obvious motion of the sea, and the most generally acknowledged, is that of its tides. This element is observed to flow for certain hours, from south towards the north; in which motion or flux, which lasts about six hours, the sea gradually swells; so that entering the mouths of rivers, it drives back the river waters to their heads. After a continual flux of six hours, the sea seems to rest for a quarter of an hour; and then begins to ebb, or retire back again, from north to south, for six hours more; in which time the waters sinking, the rivers resume their natural course. After a seeming pause of a quarter of an hour, the sea again begins to flow as before: and thus it has alternately risen and fallen, twice a day, since the creation.

This amazing appearance did not fail to excite the curiosity, as it did the wonder of the ancients. After some wild conjectures of the earliest philosophers, it became well known, in the times of Pliny, that the tides were entirely under the influence, in a small degree, of the sun; but in a much greater of the moon. It was found that there was a flux and reflux of the sea, in the space of twelve hours fifty minutes, which is exactly the time of a lunar day. It was observed, that whenever the moon was in the meridian, or, in other words, as nearly as possible over any part of the sea, that the sea flowed to that part, and made a tide there; on the contrary, it was found, that when the moon left the meridian, the sea began to flow back again from whence it came; and there might be said to ebb. Thus far the waters of the sea seemed very regularly to attend the motions of the moon. But as it appeared, likewise, that when the moon was in the opposite meridian, as far off on the other side of the globe, that there was a tide on this side also; so that the moon produced two tides, one by her greatest approach to us, and another by her greatest distance from us: in other words, the moon, in once going round the earth, produced two tides, always at the same time; one on the part of the globe directly under her; and the other on the part of the globe directly opposite.

Mankind continued for several ages content with knowing the general cause of these wonders, hopeless of discovering the particular manner of the moon's operation. Kepler was the first who conjectured that attraction was the principal cause; asserting that the sphere of the moon's operation extended to the earth, and drew up its waters. The precise manner in which this is done, was discovered by Newton.

The moon has been found, like all the rest of the planets, to attract, and to be attracted by the earth. This attraction prevails throughout our whole planetary system. The more matter there is contained in any body, the more it attracts: and its influence decreases in proportion as the distance, when squared, increases. This being premised, let us see what must ensue upon supposing the moon in the meridian of any tract of the sea. The surface of the water immediately under the moon, is nearer

the moon than any other part of the globe is; and, therefore, must be more subject to its attraction than the waters any where else. The waters will, therefore, be attracted by the moon, and rise in an heap; whose eminence will be the highest, where the attraction is greatest. In order to form this eminence, it is obvious that the surface, as well as the depths, will be agitated; and that wherever the water runs from one part, succeeding waters must run to fill up the space it has left. Thus the waters of the sea, running from all parts, to attend the motions of the moon, produce the flowing of the tide; and it is high tide at that part wherever the moon comes over it, or to its meridian.

But when the moon travels onward, and ceases to point over the place where the waters were just risen, the cause here of their rising ceasing to operate, they will flow back by their natural gravity, into the lower parts from whence they had travelled; and this retiring of the waters will form the ebbing of the sea.

Thus the first part of the demonstration is obvious; since, in general, it requires no great sagacity to conceive that the waters nearest the moon are most attracted, or raised highest by the moon. But the other part of the demonstration, namely, how there come to be high tides at the same time, on the opposite side of the globe, and where the waters are farthest from the moon, is not so easy to conceive. To comprehend this, it must be observed, that the part of the earth, and its waters, that are farthest from the moon, are the parts of all others that are least attracted by the moon: it must also be observed, that all the waters, when the moon is on the opposite side of the earth, must be attracted by it in the same direction that the earth itself attracts them; that is, quite through the body of the earth, towards the moon itself. This, therefore, being conceived, it is plain that those waters which are farthest from the moon, will have less weight than those of any other part, on the same side of the globe; because the moon's attraction, which conspires with the earth's attraction, is there least. Now, therefore, the waters farthest from the moon, having less weight, and being lightest, will be pressed on all sides, by those that, having more attraction, are heavier; and the heavier waters flowing in, will make them swell and rise in an eminence directly opposite to that on the other side of the globe, caused by the more immediate influence of the moon.

In this manner the moon, in one diurnal revolution, produces two tides; one raised immediately under the sphere of its influence, and the other directly opposite to it. As the moon travels, this vast body of waters rears upward, as if to watch its motions; and pursues the same constant rotation. However, in this great work of raising the tides, the sun has no small share; it produces its own tides constantly every day, just as the moon does, but in a much less degree, because the sun is at an immensely greater distance. Thus there are solar tides, and lunar tides. When the forces of these two great luminaries concur, which they always do when they are either in the same, or in opposite parts of the heavens, they jointly produce a much greater tide, than when they are so situated in the heavens, as each to make peculiar tides of their own. To express the very same thing technically; in the conjunctions and oppositions of the sun and moon, the attraction of the sun conspires with the attraction of the moon; by which means the high spring-tides are formed. But in the quadratures of the sun and moon, the water raised by the one is depressed by the other; and hence the lower neap-tides have their production. In a word, the tides are greatest in the syzgies, and least in the quadratures.

This theory well understood, and the astronomical terms previously known, it may readily be brought to explain the various appearances of the tides, if the earth were covered with a deep sea, and the waters uninfluenced by shoals, currents, straits, or tempests. But in every part of the sea, near the shores, the geographer must come in to correct the calculations of the astronomer. For, by reason of the shallowness of some places, and the narrowness of the straits in others, there arises a great diversity in the effect, not to be accounted for without an exact knowledge of all the circumstances of the place. In the great depths of the ocean, for instance, a very slow and imperceptible motion of the whole body of water will suffice to raise its surface several feet high; but if the same increase of water is to be conveyed through a narrow channel, it must rush through it with the most impetuous rapidity. Thus, in the English channel, and the German ocean, the tide is found to flow strongest in those places that are narrowest; the same quantity of water being, in this case, driven through a smaller passage. It is often seen, therefore, pouring through a strait with great force; and, by its rapidity, considerably raised above the surface of that part of the ocean into which it runs.

This shallowness and narrowness in many parts of the sea, give also rise to a peculiarity in the tides of some parts of the world. For in many places, and in our own seas in particular, the greatest swell of the tide is not while the moon is in its meridian height, and directly over the place, but some time after it has declined from thence. The sea, in this case, being obstructed, pursues the moon with what dispatch it can, but does not arrive with all its waters till long after the moon has ceased to operate. Lastly, from this shallowness of the sea, and from its being obstructed by shoals and straits, we may account for the Mediterranean, the Baltic, and the Black Sea, having no sensible tides. These, though to us they seem very extensive, are not however large enough to be affected by the influence of the moon; and as to their communication with the ocean, through such narrow inlets, it is impossible in a few hours they should receive and return water enough to raise or depress them in any considerable degree.

In general we may observe, that all tides are much higher, and more considerable in the torrid zone, than in the rest of the ocean; the sea in those parts being generally deeper, and less affected by changeable winds, or winding shores. The greatest tide we know of, is that at the mouth of the river Indus, where the water rises thirty feet in height. How great, therefore, must have been the amazement of Alexander's soldiers at so strange an appearance! They who always before had been accustomed only to the scarcely perceptible risings of the Mediterranean, or the minute intumescence of the Black Sea, when made at once spectators of a river rising and falling thirty feet in a few hours, must no doubt have felt the most extreme awe, and (as Quintus Curtius tells us) a mixture of curiosity and apprehension. The tides are also remarkably high on the coasts of Malay, in the straits of Sunda, in the Red Sea, at the mouth of the river St. Lawrence, along the coasts of China and Japan, at Panama, and in the gulph of Bengal. The tides at Tonquin, however, are the most remarkable in the world. In this part there is but one tide, and one ebb, in twenty-four hours; whereas, as we have said before, in other places there are two. Besides, there, twice in each month there is no tide at all, when the moon is near the equinoctial, the water being for some time quite stagnant. These, with some other odd appearances attending the same phæno-

mena, were considered by many as inscrutable; but Sir Isaac Newton, with peculiar sagacity, adjudged them to arise from the concurrence of two tides, one from the South Sea, and the other from the Indian Ocean. Of each of these tides there come successively two every day; two at one time greater, and two at another that are less. The time between the arrival of the two greater, is considered by him as high tide; the time between the two lesser, as ebb. In short, with this clue, that great mathematician solved every appearance, and so established his theory as to silence every opposer.

This fluctuation of the sea from the tides, produces another, and more constant rotation of its waters, from the east to the west, in this respect following the course of the moon. This may be considered as one great and general current of the waters of the sea; and although it be not every where distinguishable, it is nevertheless every where existent, except when opposed by some particular current or eddy, produced by partial and local causes. This tendency of the sea towards the west, is plainly perceivable in all the great straits of the ocean; as, for instance, in those of Magellan, where the tide running in from the east, rises twenty feet high, and continues flowing six hours; whereas the ebb continues but two hours, and the current is directed to the west. This proves that the flux is not equal to the reflux; and that from both results a motion of the sea westward, which is more powerful during the time of the flux than the reflux.

But this motion westward has been sensibly observed by navigators, in their passage back from India to Madagascar, and so on to Africa. In the great Pacific Ocean also it is very perceivable: but the places where it is most obvious are, as was said, in those straits which join one ocean to another. In the straits between the Maldivia islands, in the gulph of Mexico, between Cuba and Jucatan. In the straits of the gulph of Paria, the motion is so violent, that it hath received the appellation of the Dragon's Mouth. Northward, in the sea of Canada, in Waigat's straits, in the straits of Java, and, in short, in every strait where the ocean on one part pours into the ocean on the other. In this manner, therefore, is the sea carried with an unceasing circulation round the globe; and, at the same time that its waters are pushed back and forward with the tide, they have thus a progressive current to the west, which, though less observable, is not the less real.

Besides these two general motions of the sea, there are others which are particular to many parts of it, and are called currents. These are found to run in all directions, east, west, north, and south; being formed, as was said above, by various causes; the prominence of the shores; the narrowness of the straits, the variations of the wind, and the inequalities at the bottom. These, though no great object to the philosopher, as their causes are generally local and obvious, are nevertheless of the most material consequence to the mariner; and, without a knowledge of which, he could never succeed. It often has happened, that when a ship has unknowingly got into one of these, every thing seems to go forward with success, the mariners suppose themselves every hour approaching their wish'd-for port, the wind fills their sails, and the ship's prow seems to divide the water; but, at last, by miserable experience they find, that instead of going forward, they have been all the time receding. The business of currents, therefore, makes a considerable article in navigation; and the direction of their stream, and their rapidity, has been carefully set down. This some do by the observation of the surface of the current; or by the driving of the froth along the shore; or by throwing out what is called the log-

log-line, with a buoy made for that purpose: and by the direction and motion of this, they judge of the setting, and the rapidity of the current.

These currents are generally found to be most violent under the equator, where indeed all the motions of the ocean are most perceivable. Along the coasts of Guinea, if a ship happens to overshoot the mouth of any river it is bound to, the current prevents its return; so that it is obliged to steer out to sea, and take a very large compass, in order to correct the former mistake. These set in a contrary direction to the general motion of the sea westward; and that so strongly, that a passage which with the current is made in two days, is with difficulty performed in six weeks against it. However, they do not extend above twenty leagues from the coast; and ships going to the East-Indies, take care not to come within the sphere of their action. At Sumatra, the currents, which are extremely rapid, run from south to north: there are also strong currents between Madagascar and the Cape of Good Hope. On the western coasts of America, the current always runs from the south to the north, where a south wind, continually blowing, most probably occasions this phenomenon. But the currents that are most remarkable, are those continually flowing into the Mediterranean sea, both from the ocean by the streights of Gibraltar, and at its other extremity, from the Euxine sea by the Archipelago. This is one of the most extraordinary appearances in nature, this large sea receiving not only the numerous rivers that fall into it, such as the Nile, the Rhone, and the Po, but also a very great influx from the Euxine sea on one part, and the ocean on the other. At the same time, it is seen to return none of those waters it is thus known to receive: outlets running from it there are none; no rivers but such as bring it fresh supplies; no streights but what are constantly pouring their waters into it. It has therefore been the wonder of mankind in every age, how and by what means this vast concourse of waters are disposed of; or how this sea, which is always receiving, and never returning, is no way fuller than before. In order to account for this, some have said, that the water was re-conveyed by subterraneous passages into the Red Sea. There is a story told of an Arabian cailiff, who caught a dolphin in this sea, admiring the beauty of which, he let it go again, having previously marked it by a ring of iron. Some time after a dolphin was caught in the Red Sea, and quickly known by the ring to be the same that had been taken in the Mediterranean before. Such, however, as have not been willing to found their opinions upon a story, have attempted to account for the disposal of the waters of the Mediterranean by evaporation. For this purpose they have entered into long calculations upon the extent of its surface, and the quantity of water that would be raised from such a surface in a year. They then compute how much water runs in by its rivers and streights in that time; and find, that the quantity exhausted by evaporation greatly exceeds the quantity supplied by rivers and seas. This solution, no doubt, would be satisfactory, did not the ocean, and the Euxine, evaporate as well as the Mediterranean: and as these are subject to the same drain, it must follow, that all the seas will in this respect be upon a par; and, therefore, there must be some other cause for this unperceived drain, and continual supply. This seems to be satisfactorily enough accounted for by Doctor Smith, who supposes an under current running through the streights of Gibraltar to carry out as much water into the ocean, as the upper current continually carries in from it. To confirm this, he observes, that nearer home, between the north and south Foreland, the tide is

known to run one way at top, and the ebb another way at bottom. This double current he also confirms by an experiment communicated to him by an able seaman, who being with one of the king's frigates in the Baltic, found he went with his boat into the mid-stream, and was carried violently by the current; upon which a basket was sunk, with a large cannon-ball, to a certain depth of water, which gave a check to the boat's motion; as the basket sunk still lower, the boat was driven, by the force of the water below, against the upper current; and the lower the basket was let down, the stronger the under current was found, and the quicker was the boat's motion against the upper stream, which seemed not to be above four fathom deep. From hence we may readily infer, that the same cause may operate at the streights of Gibraltar; and that while the Mediterranean seems replenishing at top, it may be emptying at bottom.

The number of the currents at sea are impossible to be recounted, nor indeed are they always known; new ones are daily produced by a variety of causes, and as quickly disappear. When a regular current is opposed by another in a narrow streight, or where the bottom of the sea is very uneven, a whirlpool is often formed. These were formerly considered as the most formidable obstructions to navigation, and the ancient poets and historians speak of them with terror; they are described as swallowing up ships, and dashing them against the rocks at the bottom: apprehension did not fail to add imaginary terrors to the description, and placed at the center of the whirlpool a dreadful den, fraught with monsters whose howlings served to add new horrors to the dashings of the deep. Mankind at present, however, view these eddies of the sea with very little apprehension; and some have wondered how the ancients could have so much overcharged their descriptions. But all this is very naturally accounted for. In those times when navigation was in its infancy, and the slightest concussion of the waves generally sent the poor adventurer to the bottom, it is not to be wondered at that he was terrified at the violent agitations in one of these. When his little ship, but ill fitted for opposing the fury of the sea, was got within the vortex, there was then no possibility of ever returning. To add to the fatality, they were always near the shore; and along the shore was the only place where this ill provided mariner durst venture to fail. These were, therefore, dreadful impediments to his navigation; for if he attempted to pass between them and the shore, he was sometimes sucked in by the eddy; and if he attempted to avoid them, out at sea, he was often sunk by the storm. But in our time, and in our present improved state of navigation, Charybdis, and the Euripus, with all the other irregular currents of the Mediterranean, are no longer formidable. Mr. Addison, not attending to this train of thinking, upon passing through the streights of Sicily, was surpris'd at the little there was of terror in the present appearance of Sylla and Charybdis; and seems to be of opinion, that their agitations are much diminished since the times of antiquity. In fact, from the reasons above, all the wonders of the Mediterranean sea are described in much higher colours than they merit, to us who are acquainted with the more magnificent terrors of the ocean. The Mediterranean is one of the smoothest and most gentle seas in the world; its tides are scarce perceivable, except in the gulph of Venice, and shipwrecks are less known there than in any other part of the world.

It is in the ocean, therefore, that these whirlpools are particularly dangerous, where the tides are violent, and the tempests fierce. To mention only

only one, that called the Maelstrom upon the coasts of Norway, which is considered as the most dreadful and voracious in the world. The name it has received from the natives, signifies the navel of the sea, since they suppose that a great share of the water of the sea is sucked up and discharged by its vortex. A minute description of the internal parts is not to be expected, since none who were there ever returned to bring back information. The body of the waters that form this whirlpool, are extended in a circle above thirteen miles in circumference. In the midst of this stands a rock, against which the tide in its ebb is dashed with inconceivable fury. At this time it instantly swallows up all things that come within the sphere of its violence, trees, timber, and shipping. No skill in the mariner, nor strength of rowing, can work an escape: the sailor at the helm finds the ship at first go in a current opposite to his intentions: his vessel's motion, though slow in the beginning, becomes every moment more rapid; it grows round in circles still narrower and narrower, till at last it is dashed against the rocks, and instantly disappears: nor is it seen again for six hours: till the tide flowing, it is vomited forth with the same violence with which it was drawn in. The noise of this dreadful vortex still farther contributes to increase its terror, which with the dashing of the waters, and the dreadful valley, if it may be so called, caused by their circulation, makes one of the most tremendous objects in nature.

C H A P. XVII.

Of the Changes produced by the Sea upon the Earth.

FROM what has been said, as well of the earth as of the sea, they both appear to be in continual fluctuation. The earth, the common promptuary that supplies subsistence to men, animals, and vegetables, is continually furnishing its stores to their support. But the matter which is thus derived from it, is soon restored and laid down again to be prepared for fresh mutations. The transmigration of souls is no doubt false and whimsical; but nothing can be more certain than the transmigration of bodies: the spoils of the meanest reptile may go to the formation of a prince; and, on the contrary, as the poet has it, the body of Cæsar may be employed in stopping a beer-barrel. From this, and other causes, therefore, the earth is in continual change. Its internal fires, the deviation of its rivers, and the falling of its mountains, are daily altering its surface; and geography can scarce recollect the lakes and the valleys that history once described.

But these changes are nothing to the instability of the ocean. It would seem that inquietude was as natural to it as its fluidity. It is first seen with a constant and equable motion going towards the west; the tides then interrupt this progression, and for a time drive the waters in a contrary direction; beside these agitations, the currents act their part in a smaller sphere, being generally greatest where the other motions of the sea are least; namely, nearest the shore: the winds also contribute their share in this universal fluctuation; so that scarce any part of the sea is wholly seen to stagnate.

As this great element is thus changed, and continually labouring internally, it may be readily supposed that it produces correspondent changes upon its shores, and those parts of the earth subject to

its influence. In fact, it is every day making considerable alterations, either by overflowing its shores in one place, or deserting them in others; by covering over whole tracts of country, that were cultivated and peopled, at one time; or by leaving its bed to be appropriated to the purposes of vegetation, and to supply a new theatre for human industry at another.

In this struggle between the earth and the sea for dominion, the greatest number of our shores seem to defy the whole rage of the waves, both by their height, and the rocky materials of which they are composed. The coasts of Italy, for instance, are bordered with rocks of marble of different kinds, the quarries of which may easily be distinguished at a distance from sea, and appear like perpendicular columns, of the most beautiful kinds of marble, ranged along the shore. In general, the coasts of France, from Brest to Bourdeaux, are composed of rocks; as are also those of Spain and England, which defend the land, and only are interrupted, here and there, to give an egress to rivers, and to grant the conveniencies of bays and harbours to our shipping. It may be in general remarked, that wherever the sea is most violent and furious, there the boldest shores, and of the most compact materials, are found to oppose it. There are many shores several hundred feet perpendicular, against which the sea, when swollen with tides or storms, rises and beats with inconceivable fury. In the Orkneys, where the shores are thus formed, it sometimes, when agitated by a storm, rises two hundred feet perpendicular, and dashes up its spray, together with sand, and other substances that compose its bottom, upon land, like showers of rain.

From hence, therefore, we may conceive how the violence of the sea, and the boldness of the shore, may be said to have made each other. Where the sea meets no obstacles, it spreads its waters with a gentle intumescence, till all its power is destroyed, by wanting depth to aid the motion. But when its progress is checked in the midst, by the prominence of rocks, or the abrupt elevation of the land, it dashes with all the force of its depth against the obstacle, and forms, by its repeated violence, that abruptness of the shore which confines its impetuosity. Where the sea is extremely deep, or very much vexed by tempests, it is no small obstacle that can confine its rage; and for this reason we see the boldest shores projected against the deepest waters; all less impediments having long before been surmounted and washed away. Perhaps of all the shores in the world, there is not one so high as that on the west of St. Kilda, which, upon a late admeasurement, was found to be six hundred fathom perpendicular above the surface of the sea. Here also, the sea is deep, turbulent, and stormy; so that it requires great force in the shore to oppose its violence. In many parts of the world, and particularly upon the coasts of the East-Indies, the shores, though not high above water, are generally very deep, and consequently the waves roll against the land with great weight and irregularity. This rising of the waves against the shore, is called by mariners the surf of the sea; and in shipwrecks is generally fatal to such as attempt to swim on shore. In this case, no dexterity in the swimmer, no float he can use, neither swimming girdle nor cork jacket will save him; the weight of the superincumbent waves break upon him at once, and crushes him with certain ruin. Some few of the natives, however, have the art of swimming and of navigating their little boats near those shores, where an European is sure of instant destruction.

In places where the force of the sea is less violent, or its tides less rapid, the shores are generally seen to descend with a more gradual declivity. Over these, the waters of the tide steal by almost imperceptible degrees, covering them for a large extent, and leaving them bare on its recess. Upon these shores, as was said, the sea seldom beats with any great violence, as a large wave has not depth sufficient to float it onwards; so that here only are to be seen gentle surges making calmly towards land, and lessening as they approach. As the sea, in the former description, is generally seen to present prospects of tumult and uproar, here it more usually exhibits a scene of repose and tranquil beauty. Its waters, which when surveyed from the precipice, afforded a muddy greenish hue, arising from their depth and position to the eye, when regarded from a shelving shore, wear the colour of the sky, and seem rising to meet it. The deafening noise of the deep sea, is here converted into gentle murmurs; instead of the water's dashing against the face of the rock, it advances and recedes, still going forward, but with just force enough to push its weeds and shells, by insensible approaches, to the shore.

There are other shores, beside those already described, which either have been raised by art to oppose the sea's approaches, or from the sea's gaining ground, are threatened with imminent destruction. The sea's being thus seen to give and take away lands at pleasure, is, without question, one of the most extraordinary considerations in all natural history. In some places it is seen to obtain the superiority by slow and certain approaches; or to burst in at once, and overwhelm all things in undistinguished destruction; in other places it departs from its shores, and where its waters have been known to rage, it leaves fields covered with the most beautiful verdure.

The formation of new lands, by the sea's continually bringing its sediment to one place, and by the accumulation of its sands in another, is easily conceived. We have had many instances of this in England. The island of Oxney, which is adjacent to Romney-marsh, was produced in this manner. This had for a long time been a low level, continually in danger of being overflowed by the river Rother; but the sea, by its depositions, has gradually raised the bottom of the river, while it has hollowed the mouth; so that the one is sufficiently secured from inundations, and the other is deep enough to admit ships of considerable burthen. The like also may be seen at that bank called the Dogger-sands, where two tides meet, and which thus receive new increase every day, so that in time the place seems to promise fair for being habitable earth. On many parts of the coasts of France, England, Holland, Germany, and Prussia, the sea has been sensibly known to retire. Hubert Thomas asserts, in his Description of the Country of Liege, that the sea formerly encompassed the city of Tongres, which, however, is at present thirty-five leagues distant from it: this assertion he supports by many strong reasons; and among others, by the iron rings fixed in the walls of the town, for fastening the ships that came into the port. In Italy there is a considerable piece of ground gained at the mouth of the river Arno; and Ravenna, that once stood by the sea-side, is now considerably removed from it. But we need scarce mention these, when we find that the whole republic of Holland seems to be a conquest upon the sea, and in a manner rescued from its bosom. The surface of the earth, in this country, is below the level of the bed of the sea; and we remember, upon approaching the coast, to have looked down

upon it from the sea, as into a valley; however, it is every day rising higher by the depositions made upon it by the sea, the Rhine, and the Meuse; and those parts which formerly admitted large men of war, are now known to be too shallow to receive ships of very moderate burthen. The province of Jucatan, a peninsula in the gulph of Mexico, was formerly a part of the sea: this tract, which stretches out into the ocean an hundred leagues, and which is above thirty broad, is every where, at a moderate depth below the surface, composed of shells, which evince that its land once formed the bed of the sea. In France, the town of Aigues Mortes was a port in the times of St. Louis, which is now removed more than four miles from the sea. Psalmodi, in the same kingdom, was an island in the year 815, but is now more than six miles from the shore. All along the coast of Norfolk, we are well assured, that in the memory of man, the sea has gained fifty yards in some places, and has lost as much in others.

Thus numerous, therefore, are the instances of new lands having been produced from the sea, which, as we see, is brought about two different ways: first, by the waters raising banks of sand and mud where their sediment is deposited; and secondly, by their relinquishing the shore entirely, and leaving it unoccupied to the industry of man.

But as the sea has been thus known to recede from some lands, so has it, by fatal experience, been found to encroach upon others: and, probably, these depredations on one part of the shore, may account for their dereliction from another; for the current which rested upon some certain bank, having got an egress in some other place, it no longer presses upon its former bed, but pours all its stream into the new entrance, so that every inundation of the sea may be attended with some correspondent dereliction of another shore.

However this be, we have numerous histories of the sea's inundations, and its burying whole provinces in its bosom. Many countries that have been thus destroyed, bear melancholy witness to the truth of history; and shew the tops of their houses, and the spires of their steeples, still standing at the bottom of the water. One of the most considerable inundations we have in history, is that which happened in the reign of Henry I. which overflowed the estates of the Earl Godwin, and forms now that bank called the Goodwin sands. In the year 1546, a similar irruption of the sea destroyed an hundred thousand persons in the territory of Dort; and yet a greater number round Dullart. In Friezland, and Zealand, there were more than three hundred villages overwhelmed; and their remains continue still visible at the bottom of the water in a clear day. The Baltic sea has, by slow degrees, covered a large part of Pomerania; and, among others, destroyed and overwhelmed the famous port of Vineta. In the same manner, the Norwegian sea has formed several little islands from the main land, and still daily advances upon the continent. The German sea has advanced upon the shores of Holland, near Catt; so that the ruins of an ancient citadel of the Romans, which was formerly built upon this coast, are now actually under water. To these accidents several more might be added; our own historians, and those of other countries, abound with them; almost every flat shore of any extent, being able to shew something that it has lost, or something that it has gained from the sea.

There are some shores on which the sea has made temporary depredations; where it has overflowed, and after remaining perhaps some ages it has again retired of its own accord, or been driven

back by the industry of man. There are many lands in Norway, Scotland, and the Maldivia islands, that are at one time covered with water, and at another free. The country round the Isle of Ely, in the times of Bede, about a thousand years ago, was one of the most delightful spots in the whole kingdom. It was not only richly cultivated, and produced all the necessaries of life, but grapes also that afforded excellent wine. The accounts of that time are copious in the description of its verdure and fertility; its rich pastures, covered with flowers and herbage; its beautiful shades, and wholesome air. But the sea breaking in, upon the land, overwhelmed the whole country, took possession of the soil, and totally destroyed one of the most fertile vallies in the world. Its air, from being dry and healthful, from that time became most unwholesome, and clogged with vapours; and the small part of the country that, by being higher than the rest, escaped the deluge, was soon rendered uninhabitable, from its noxious vapours. Thus this country continued under water for some centuries; till, at last, the sea, by the same caprice which had prompted its invasions, began to abandon the earth in like manner. It has continued for some ages to relinquish its former conquests; and although the inhabitants can neither boast the longevity, nor the luxuries of their former pre-occupants; yet they find ample means of subsistence; and if they happen to survive the first year of their residence there, they are often known to arrive at a good old age.

But although history be silent as to many other inundations of the like kind, where the sea has overflowed the country, and afterwards retired, yet we have numberless testimonies of another nature, that prove it beyond the possibility of doubt: we mean those numerous trees that are found buried at considerable depths in places where either rivers, or the sea, has accidentally overflowed. At the mouth of the river Nefs, near Bruges, in Flanders, at the depth of fifty feet, are found great quantities of trees lying as close to each other as they do in a wood: the trunks, the branches, and the leaves, are in such perfect preservation, that the particular kind of each tree may instantly be known. About five hundred years ago, this very ground was known to have been covered with the sea; nor is there any history or tradition of its having been dry ground, which we can have no doubt must have been the case. Thus we see a country flourishing in verdure, producing large forests, and trees of various kinds, overwhelmed by the sea. We see this element depositing its sediment to an height of fifty feet; and its waters must, therefore, have risen much higher. We see the same, after it has thus overwhelmed, and sunk the land so deep beneath its slime, capriciously retiring from the same coasts, and leaving that habitable once more, which it had formerly destroyed. All this is wonderful; and perhaps, instead of attempting to enquire after the cause, which has hitherto been inscrutable, it will best become us to rest satisfied with admiration.

At the city of Modena in Italy, and about four miles round it, wherever it is dug, when the workmen arrive at the depth of sixty-three feet, they come to a bed of chalk, which they bore with an augre five feet deep: they then withdraw from the pit, before the augre is removed, and upon its extraction, the water bursts up through the aperture with great violence, and quickly fills this new-made well, which continues full, and is affected neither by rains or droughts. But that which is most remarkable in this operation, is the layers of earth as we descend. At the depth of fourteen feet, are found the ruins of an ancient city, paved streets, houses, floors, and different pieces of Mo-

saic. Under this is found a solid earth, that would induce one to think had never been removed; however, under it is found a soft oozy earth, made up of vegetables; and at twenty-six feet depth, large trees entire, such as walnut-trees, with the walnuts still sticking on the stem, and their leaves and branches in exact preservation. At twenty-eight feet deep, a soft chalk is found, mixed with a vast quantity of shells; and this bed is eleven feet thick. Under this, vegetables are found again, with leaves, and branches of trees as before; and thus alternately chalk and vegetable earth to the depth of sixty-three feet. These are the layers wherever the workmen attempt to bore; while in many of them, they also find pieces of charcoal, bones, and bits of iron. From this description, therefore, it appears, that this country has been alternately overflowed and deserted by the sea, one age after another: nor were these overflowings and retirings of trifling depth, or of short continuance. When the sea burst in, it must have been a long time in overwhelming the branches of the fallen forest with its sediments; and still longer in forming a regular bed of shells eleven feet over them. It must have, therefore, taken an age, at least, to make any one of these layers; and we may conclude, that it must have been many ages employed in the production of them all. The land, also, upon being deserted, must have had time to grow compact, to gather fresh fertility, and to be drained of its waters before it could be disposed to vegetation; or before its trees could have shot forth again to maturity.

We have instances nearer home of the same kind, given us in the Philosophical Transactions; one of them by Mr. Derham. An inundation of the sea, at Dagenham, in Essex, laying bare a part of the adjacent pasture, for above two hundred feet wide, and, in some places, twenty deep, it discovered a number of trees that had lain there for many ages before; these trees, by lying long under ground, were become black and hard, and their fibres so tough, that one might as easily break a wire, as any of them: they lay so thick in the place where they were found, that in many parts he could step from one to another: he conceived also, that not only all the adjacent marshes, for several hundred acres, were covered underneath with such timber, but also the marshes along the mouth of the Thames, for several miles. The meeting with these trees at such depths, he ascribes to the sediment of the river, and the tides, which constantly washing over them, have always left some part of their substance behind, so as, by repeated alluvions, to work a bed of vegetable earth over them, to the height at which he found it.

The levels of Hatfield-Chace, in Yorkshire, a tract of above eighteen thousand acres, which was yearly overflowed, was reduced to arable and pasture land, by one Sir Cornelius Vermuden, a Dutchman. At the bottom of this wide extent, are found millions of the roots and bodies of trees, of such as this island either formerly did, or does at present produce. The roots of all stand in their proper postures; and by them, as thick as ever they could grow, the respective trunks of each, some above thirty yards long. The oaks, some of which have been sold for fifteen pounds a piece, are as black as ebony, very lasting, and close grained. The ash-trees are as soft as earth, and are commonly cut in pieces by the workmen's spades, and as soon as flung up into the open air, turn to dust: But all the rest, even the willows themselves, which are softer than the ash, preserve their substance and texture to this very day. Some of the firs appear to have vegetated, even after they were fallen, and to have, from their branches, struck up large trees, as great as the parent trunk. It is observable, that many

many of these trees have been burnt, some quite through, some on one side, some have been found chopped and squared, others riven with great wooden wedges, all sufficiently manifesting, that the country which was deluged, had formerly been inhabited. Near a great root of one tree, were found eight coins of the Roman emperors; and, in some places, the marks of the ridge and furrow were plainly perceivable, which testified that the ground had formerly been patient of cultivation.

The learned naturalist who has given this description, has pretty plainly evinced, that this forest, in particular, must have been thus levelled by the Romans; and that the falling of the trees, must have contributed to the accumulation of the waters. "The Romans," says he, "when the Britons fled, always pursued them into the fortresses of low woods, and miry forests: in these the wild natives found shelter; and, when opportunity offered, issued out, and fell upon their invaders without mercy. In this manner, the Romans were at length so harrassed, that orders were issued out for cutting down all the woods and forests in Britain. In order to effect this, and destroy the enemy the easier, they set fire to the woods, composed of pines, and other inflammable timber, which spreading, the conflagration destroyed not only the forest, but infinite numbers of the wretched inhabitants who had taken shelter therein. When the pine-trees had thus done what mischief they could, the Romans then brought their army nearer, and, with whole legions of the captive Britons, cut down most of the trees that were yet left standing; leaving only here and there some great trees untouched, as monuments of their fury. These, unneedful of their labour, being destitute of the support of the underwood, and of their neighbouring trees, were easily overthrown by the winds, and, without interruption, remained on the places where they happened to fall. The forest, thus fallen, must necessarily have stopped up the currents, both from land and sea; and turned into great lakes, what were before but temporary streams. The working of the waters here, the consumption and decay of rotten boughs and branches, and the vast increase of water-moss which flourishes upon marshy grounds, soon formed a covering over the trunks of the fallen trees, and raised the earth several feet above its former level. The earth thus every day swelling, by a continual increase from the sediment of the waters, and by the lightness of the vegetable substances of which it was composed, soon overtopped the waters by which this intumescence was at first effected; so that it entirely got rid of its inundations, or only demanded a slight assistance from man for that purpose." This may be the origin of all bogs, which are formed by the putrefaction of vegetable substances, mixed with the mud and slime deposited by waters, and at length acquiring a sufficient consistency.

From this we see what powerful effects the sea is capable of producing upon its shores, either by overflowing some, or deserting others; by altering the direction of these, and rendering those craggy and precipitate, which before were shelving. But the influence it has upon these, is nothing to that which it has upon that great body of earth which forms its bottom. It is at the bottom of the sea that the greatest wonders are performed, and the most rapid changes are produced; it is there that the motion of the tides and the currents have their whole force, and agitate the substances of which their bed is composed. But all these are almost wholly hid from human curiosity: the miracles of the deep are performed in secret; and we have but little information from its abyfles, except what we receive by inspection at very shallow depths, or by the

plummet, or from divers, who are known to descend from twenty to thirty fathom.

The eye can reach but a very short way into the depths of the sea; and that only when its surface is glassy and serene. In many seas it perceives nothing but a bright sandy plain at bottom, extending for several hundred miles, without an intervening object. But in others, particularly in the Red Sea, it is very different: the whole bottom of this extensive bed of waters is, literally speaking, a forest of submarine plants, and corals formed by insects for their habitation, sometimes branching out to a great extent. Here are seen the madrepores, the sponges, mosses, sea-mushrooms, and other marine productions, covering every part of the bottom; so that some have even supposed the sea to have taken its name from the colour of its plants below. However, these plants are by no means peculiar to this sea, as they are found in great quantities in the Persian gulph, along the coasts of Africa, and those of Provence and Catalonia.

The bottom of many parts of the sea near America presents a very different, though a very beautiful appearance. This is covered with vegetables, which make it look as green as a meadow, and beneath are seen thousands of turtles; and other sea-animals, feeding thereon.

In order to extend our knowledge of the sea to greater depths, recourse has been had to the plummet; which is generally made of a lump of lead of about forty pounds weight, fastened to a cord. This, however, only answers in moderate depths; for when a deep sea is to be sounded, the matter of which the cord is composed being lighter than the water, floats upon it, and when let down to a considerable depth, its length so increases its surface, that it is often sufficient to prevent the lead from sinking; so that this may be the reason that some parts of the sea are said to have no bottom.

In general, we learn from the plummet, that the bottom of the sea is tolerably even where it has been examined; and that the farther from the shore, the sea is in general the deeper. Notwithstanding in the midst of a great and unfathomable ocean, we often find an island raising its head, and singly braving its fury. Such islands may be considered as the mountains of the deep; and, could we for a moment imagine the waters of the ocean removed, or dried away, we should probably find the inequalities of its bed resembling those that are found at land. Here extensive plains; there valleys; and, in many places, mountains of amazing height. M. Buache has actually given us a map of that part of its bottom, which lies between Africa and America, taken from the several soundings of mariners: in it we find the same uneven surface that we do upon land, the same eminences, and the same depressions. In such an imaginary prospect, however, there would be this difference, that, at the tops of land-mountains appear the most barren and rocky, the tops of sea-mountains would be found the most verdant and fruitful.

The plummet, which thus gives us some idea of the inequalities of the bottom, leaves us totally in the dark as to every other particular; recourse, therefore, has been had to divers: these, either being bred up in this dangerous way of life, and accustomed to remain some time under water without breathing, or assisted by means of a diving-bell, have been able to return some confused and uncertain accounts of the places below. In the great diving-bell improved by Doctor Halley, which was large enough to contain five men, and was supplied by fresh air by buckets, that alternately rose and fell, they descended fifty fathom. In this huge machine, which was let down from the mast of the ship, the doctor himself went down to
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the bottom, where, when the sea was clear, and especially when the sun shone, he could see perfectly well to write or read, and much more to take up any thing that was underneath: at other times, when the water was troubled and thick, it was as dark as night below, so that he was obliged to keep a candle lighted at the bottom. But there is one thing very remarkable: that the water which from above was usually seen of a green colour, when looked at from below, appeared to him of a very different one, casting a redness upon one of his hands, like that of damask roses: a proof of the sea's taking its colour not from any thing floating in it, but from the different reflections of the rays of light. Upon the whole, the accounts we have received from the bottom, by this contrivance, are but few. We learn from it, and from divers in general, that while the surface of the sea may be deformed by tempests, it is usually calm and temperate below; that some divers who have gone down when the weather was calm, and came up when it was tempestuous, were surpris'd at their not perceiving the change at the bottom. This, however, must not be supposed to obtain with regard to the tides, and the currents, as they are seen constantly shifting their bottom; taking their bed with great violence from one place, and depositing it upon another. We are inform'd, also, by divers, that the sea grows colder in proportion as they descend to the bottom; that as far as the sun's rays pierce, it is influenced by their warmth; but lower, the cold becomes almost intolerable. A person of quality, who had been himself a diver, as Mr. Boyle informs us, declared, that though he seldom descended above three or four fathoms, yet he found it so much colder than near the top, that he could not well endure it; and that being let down in a great diving-bell, although the water could not immediately touch him, he found the air extremely cold upon his first arrival at the bottom.

From divers also we learn, that the sea in many places is filled with rocks at bottom: and that among their cliffs, and upon their sides, various substances sprout forward, which are either really vegetables, or the nests of insects, increased to some magnitude. Some of these assume the shape of beautiful flowers; and, though soft, when taken up, soon harden, and are kept in the cabinets of the curious.

But, of all those divers who have brought us information from the bottom of the deep, the famous Nicola Pesce, whose performances are told us by Kircher, is the most celebrated. We will not pretend to vouch for the veracity of Kircher's account, which he assures us he had from the archives of the kings of Sicily; but it may serve to enliven an heavy chapter. "In the times of Frederic, king of Sicily, there lived a celebrated diver, whose name was Nicolas, and who from his amazing skill in swimming, and his perseverance under water, was surnamed the fish. This man had, from his infancy, been us'd to the sea; and earned his scanty subsistence by diving for corals and oysters, which he sold to the villagers on shore. His long acquaintance with the sea, at last, brought it to be almost his natural element. He frequently was known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there, and ate raw. He often swam over from Sicily to Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulphs of the Lipari islands, no way apprehensive of danger.

"Some mariners out at sea one day observed something at some distance from them, which they regarded as a sea-monster; but upon its approach,

it was known to be Nicolas, whom they took into their ship. When they asked him whither he was going in so stormy and rough a sea, and at such a distance from land, he shew'd them a packet of letters, which he was carrying to one of the towns of Italy, exactly done up in a leather bag, in such a manner as that they could not be wetted by the sea. He kept them thus company for some time on their voyage, conversing and asking questions; and after eating an hearty meal with them, he took his leave, and jumping into the sea, pursued his voyage alone.

"In order to aid these powers of enduring in the deep, nature seem'd to have assist'd him in a very extraordinary manner; for the spaces between his fingers and toes were webbed, as in a goose; and his chest became so very capacious, that he could take in at one inspiration, as much breath as would serve him for a whole day.

"The account of so extraordinary a person did not fail to reach the king himself; who actuated by the general curiosity, order'd that Nicolas should be brought before him. It was no easy matter to find Nicolas, who generally spent his time in the solitudes of the deep; but at last, however, after much searching, he was found, and brought before his majesty. The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the gulph of Charybdis; he therefore conceiv'd that it would be a proper opportunity to have more certain information; and command'd our poor diver to examine the bottom of this dreadful whirlpool: as an incitement to his obedience, he order'd a golden cup to be flung into it. Nicolas was not insensible of the danger to which he was expos'd; dangers best known only to himself; and he therefore presum'd to remonstrate; but the hopes of the reward, the desire of pleasing the king, and the pleasure of shewing his skill, at last prevail'd. He instantly jumped into the gulph, and was swallow'd as instantly up in its bosom. He continued for three quarters of an hour below; during which time the king and his attendants remained upon shore anxious for his fate; but he at last appear'd, buffeting upon the surface, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be supposed he was received with applause, upon his arrival on shore; the cup was made the reward of his adventure; the king order'd him to be taken proper care of; and, as he was somewhat fatigued and debilitated by his labour, after an hearty meal, he was put to bed, and permitted to refresh himself by sleeping.

"When his spirits were thus restored, he was again brought to satisfy the king's curiosity with a narrative of the wonders he had seen; and his account was to the following effect. He would never, he said, have obeyed the king's commands, had he been appriz'd of half the dangers that were before him. There were four things, he said, that render'd the gulph dreadful, not only to men, but even to the fishes themselves: first, the force of the water bursting up from the bottom, which requires great strength to resist; secondly, the abruptness of the rocks, that on every side threaten destruction; thirdly, the force of the whirlpool, dashing against those rocks; and fourthly, the number and magnitude of the polypus fish, some of which appear'd as large as a man, and which every where sticking against the rocks, project'd their fibrous arms to entangle him. Being ask'd how he was able so readily to find the cup that had been thrown in, he repli'd, that it happen'd to be flung by the waves into the cavity of a rock, against which he himself was urg'd in his descent. This account, however, did not satisfy the king's curiosity: being request'd

to venture once more into the gulph for further discoveries, he at first refused; but the king, desirous of having the most exact information possible of all things to be found in the gulph, repeated his solicitations; and, to give them still greater weight, produced a larger cup than the former, and added also a purse of gold. Upon these considerations, the unfortunate Pessacola once again plunged into the whirlpool, and was never heard of more."

CHAP. XVIII.

A particular Account of the Mechanical Properties of AIR.

HAVING described the earth and the sea, we now ascend into that fluid which surrounds them both; and which, in some measure, supports and supplies all animated nature. As upon viewing the bottom of the ocean from its surface, we see an infinity of animals moving therein, and seeking food; so were some superior being to regard the earth at a proper distance, he might consider us in the same light: he might, from his superior station, behold a number of busy little beings, immersed in the ærial fluid, that every where surrounds them, and sedulously employed in procuring the means of subsistence. This fluid, though too fine for the gross perception of its inhabitants, might, to his nicer organs of sight, be very visible; and, while he at once saw into its operations, he might smile at the varieties of human conjecture concerning it: he might readily discern, perhaps, the height above the surface of the earth to which this fluid atmosphere reaches: he might exactly determine that peculiar form of its parts which gives it the spring or elasticity with which it is endued: he might distinguish which of its parts were pure incorruptible air, and which only made for a little time to assume the appearance, so as to be quickly returned back to the element from whence it came. But as for us, who are immersed at the bottom of this gulph, we must be contented with a more confined knowledge; and, wanting a proper point of prospect, remain satisfied with a combination of the effects.

One of the first things that our senses inform us of is, that although the air is too fine for our sight, it is very obvious to our touch. Although we cannot see the wind contained in a bladder, we can very readily feel its resistance; and though the hurricane may want colour, we often fatally experience that it does not want force. We have equal experience of the air's spring or elasticity; the bladder, when pressed, returns again, upon the pressure being taken away; a bottle, when filled, often bursts, from the spring of air which is included.

So far the slightest experience reaches; but, by carrying experiment a little farther, we learn, that air also is heavy: a round glass vessel being emptied of its air, and accurately weighed, has been found lighter than when it was weighed with the air in it. Upon computing the superior weight of the full vessel, a cubic foot of air is found to weigh something more than an ounce.

From this experiment, therefore, we learn, that the earth, and all things upon its surface, are every where covered with a ponderous fluid, which rising very high over our heads, must be proportionably heavy. For instance, as in the sea, a man at the depth of twenty feet, sustains a greater weight of water than a man at the depth of but ten feet; so will a man at the bottom of a valley

have a greater weight of air over him, than a man on the top of a mountain.

From hence we may conclude, that we sustain a very great weight of air; and although, like men walking at the bottom of the sea, we cannot feel the weight which presses equally round us, yet the pressure is not the less real. As in morals, we seldom know the blessings that surround us till we are deprived of them, so here we do not perceive the weight of the ambient fluid till a part of it is taken away. If, by any means, we contrive to take away the pressure of the air from any one part of our bodies, we are soon made sensible of the weight upon the other parts. If we clap our hand upon the mouth of a vessel from whence the air has been taken away, there will thus be air on one side, and none on the other; upon which, we shall instantly find the hand violently sucked inwards, which is nothing more than the weight of the air upon the back of the hand that forces it into the space which is empty below.

As by this experiment we perceive that the air presses with great weight upon every thing on the surface of the earth, so by other experiments we learn the exact weight with which it presses. First, if the air be exhausted out of any vessel, a drinking-vessel for instance, and this vessel be set with the mouth downwards in water, the water will rise up into the empty space, and fill the inverted glass; for the external air will, in this case, press up the water, where there is no weight to resist; as, one part of a bed being pressed, makes the other parts, that have no weight upon them, rise. In this case, as was said, the water being pressed without, will rise in the glass; and would continue to rise (if the empty glass were tall enough) thirty-two feet high. In fact, there have been pipes made purposely for this experiment of above thirty-two feet high; in which, upon being exhausted, the water has always risen to the height of thirty-two feet: there it has always rested, and never ascended higher. From this, therefore, we learn, that the weight of the air which presses up the water, is equal to a pillar or column of water, which is thirty-two feet high; as it is just able to raise such a column, and no more. In other words, the surface of the earth is every where covered with a weight of air, which is equivalent to a covering of thirty-two feet deep of water; or to a weight of twenty-nine inches and an half of quicksilver, which is known to be just as heavy as the former.

Thus we see that the air at the surface of the earth is just as heavy as thirty-two feet of water, or twenty-nine inches and an half of quicksilver; and it is easily found, by computation, that to raise water thirty-two feet, will require a weight of fifteen pounds upon every square inch. Now, if we are fond of computations, we have only to calculate how many square inches are in the surface of an ordinary human body, and allowing every inch to sustain fifteen pounds, we may amaze ourselves at the weight of air we sustain. It has been computed, and found, that our ordinary load of air amounts to within a little of forty thousand pounds: this is wonderful! but wondering is not the way to grow wise.

Notwithstanding this be our ordinary load, and our usual supply, there are at different times very great variations. The air is not, like water, equally heavy at all seasons; but sometimes is lighter, and sometimes more heavy. It is sometimes more compressed, and sometimes more elastic or springy, which produces the same effects as an increase of its weight. The air which at one time raises water thirty-two feet in the tube, and quick-

silver twenty-nine inches, will not at another raise the one to thirty feet, or the other to twenty-six inches. This makes, therefore, a very great difference in the weight we sustain; and we are actually known, by computation, to carry at one time four thousand pounds of air more than at another.

The reason of this surprising difference in the weight of air, is either owing to its pressure from above, or to an increase of vapour floating in it. Its increased pressure is the consequence of its spring or elasticity, which cold and heat sensibly affect, and are continually changing.

This elasticity of the air is one of its most amazing properties; and to which it should seem nothing can set bounds. A body of air that may be contained in a nut-shell, may easily, with heat, be dilated into a sphere of unknown dimensions. On the contrary, the air contained in an house, may be compressed into a cavity not larger than the eye of a needle. In short, no bounds can be set to its confinement or expansion; at least, experiment has hitherto found its attempts indefinite. In every situation, it retains its elasticity; and the more closely we compress it, the more strongly does it resist the pressure. If to the increasing the elasticity on one side by compression, we increase it on the other side by heat, the force of both soon becomes irresistible; and a certain French philosopher supposed, that air thus confined, and expanding, was sufficient for the explosion of a world.

Many instruments have been formed to measure and determine these different properties of the air; and which serve several useful purposes. The barometer serves to measure its weight; to tell us when it is heavier, and when lighter. It is composed of a glass tube or pipe, of about thirty inches in length, closed up at one end; this tube is then filled with quicksilver; this done, the maker clapping his finger upon the open end, inverts the tube, and plunges the open end, finger and all, into a basin of quicksilver, and then takes his finger away: now the quicksilver in the tube will, by its own weight, endeavour to descend into that in the basin; but the external air, pressing on the surface of the quicksilver in the basin without, and no air being in the tube at top, the quicksilver will continue in the tube, being pressed up, as was said, by the air, on the surface of the basin below. The height at which it is known to stand in the tube, is usually about twenty-nine inches, when the air is heavy; but not above twenty-six, when the air is very light. Thus, by this instrument we can, with some exactness, determine the weight of the air; and, of consequence, tell before-hand the changes of the weather. Before the fine dry weather, the air is charged with a variety of vapours, which float in it unseen, and render it extremely heavy, so that it presses up the quicksilver; or, in other words, the barometer rises. In moist, rainy weather, the vapours are washed down, or there is not heat sufficient for them to rise, so that the air is then sensibly lighter, and presses up the quicksilver with less force; or, in other words, the barometer is seen to fall. Our constitutions seem also to correspond with the changes of the weather-glass; they are braced, strong, and vigorous, with a large body of air upon them; they are languid, relaxed, and feeble, when the air is light, and refuses to give our fibres their proper tone.

But although the barometer thus measures the weight of the air with exactness enough for the general purposes of life, yet it is often affected with a thousand irregularities, that no exactness in the instrument can remedy, nor no theory account for. When high winds blow, the quicksilver generally is low; it rises higher in cold weather than in warm; and is usually higher at morning and even-

ing than at mid-day: it generally descends lower after rain than it was before it. There are also frequent changes in the air, without any sensible alteration in the barometer.

As the barometer is thus used in predicting the changes of the weather, so it is also serviceable in measuring the heights of mountains, which mathematicians cannot so readily do: for, as the higher we ascend from the surface of the earth, the air becomes lighter, so the quicksilver in the barometer will descend in proportion. It is found to sink at the rate of the tenth part of an inch for every ninety feet we ascend; so that in going up a mountain, if we find the quicksilver fallen an inch, we conclude, that we are got upon an ascent of near nine hundred feet high. In this there has been found some variation; into a detail of which, it is not the business of a natural historian to enter.

In order to determine the elasticity of air, the wind-gun has been invented, which is an instrument variously made; but in all upon the principle of compressing a large quantity of air into a tube, in which there is an ivory ball, and then giving the compressed elastic air free power to act, and drive the ball as directed. The ball thus driven will pierce a thick board: and will be as fatal, at small distances, as if driven with gunpowder. Perhaps the force of this instrument has never been assisted by means of heat; this, which could be very easily contrived by means of phosphorus, or any other hot substance applied to the barrel, would produce a greater force than gunpowder itself.

The air pump is an instrument contrived to exhaust the air from round a vessel adapted to that purpose, called a receiver. This method of exhausting, is contrived in the simple instrument, by a piston, like that of a syringe, going down into the vessel, and thus pushing out its air; which, by means of a valve, is prevented from returning into the vessel again.

But this, like all other complicated instruments, will be better understood by a minute inspection, than an hour's description: it may suffice here to observe, that by depriving animals, and other substances, of all air, it shews us what the benefits and effects of air are in sustaining life, or promoting vegetation.

The digester is an instrument of still more extraordinary effects than any of the former; and sufficiently discovers the amazing force of air, when its elasticity is augmented by fire. A common tea-kettle, if the spout were closed up, and the lid put firmly down, would serve to become a digester, if strong enough. But the instrument used for this purpose, is a strong metal pot, with a lid to screw close on, so that, when down, no air can get in or return: into this pot meat and bones are put, with a small quantity of water, and then the lid screwed close: a lighted lamp is put underneath, and, what is very extraordinary (yet equally true), in six or eight minutes the whole mass, bones and all, are dissolved into a jelly; so great is the force and elasticity of the air contained within, struggling to escape, and breaking in pieces all the substances with which it is mixed. Care, however, must be taken not to heat this instrument too violently; for then, the inclosed air would become irresistible, and burst the whole, with perhaps a fatal explosion.

There are numberless other useful instruments made to depend on the weight, the elasticity, or the fluidity of the air, which do not come within the plan of the present work; the design of which is not to give an account of the inventions that have been made for determining the nature and properties of air, but a mere narrative of its effects. The description of the pump, the forcing-pump, the fire-engine, the steam-engine, the syphon, and

many others, belong not to the naturalist, but the experimental philosopher: the one gives an history of Nature, as he finds she presents herself to him; and he draws the obvious picture: the other pursues her with close investigation, tortures her by experiment to give up her secrets, and measures her latent qualities with laborious precision. Much more, therefore, might be said of the mechanical effects of air, and of the conjectures that have been made respecting the form of its parts; how some have supposed them to resemble little hoops, coiled up in a spring; others, like fleeces of wool; others, that the parts are endued with a repulsive quality, by which, when squeezed together, they endeavour to fly off, and recede from each other. We might have given the disputes relative to the height to which this body of air extends above us, and concerning which there is no agreement. We might have enquired how much of the air we breathe is elementary, and not reducible to any other substance; and of what density it would become, if it were supposed to be continued down to the center of the earth. At that place we might, with the help of figures, and a bold imagination, have shewn it twenty thousand times heavier than its bulk of gold. We might also prove it millions of times purer than upon earth, when raised to the surface of the atmosphere. But these speculations do not belong to natural history; and they have hitherto produced no great advantages in that branch of science to which they more properly appertain.

C H A P. XIX.

NATURAL HISTORY of the AIR.

OUR atmosphere has been considered by a late eminent philosopher, as one large chemical vessel, in which a great number of various operations are constantly performing. In it all the bodies of the earth are continually sending up a part of their substance by evaporation, to mix in this great alembic, and to float a-while in common. Here minerals, from their lowest depths, ascend in noxious, or in warm vapours, to make a part of the general mass; seas, rivers, and subterraneous springs, furnish their copious supplies; plants receive and return their share; and animals, that by living upon, consume this general store, are found to give it back in greater quantities, when they die. The air, therefore, that we breathe, and upon which we subsist, bears very little resemblance to that pure elementary body which was described in the last chapter; and which is rather a substance that may be conceived, than experienced to exist. Air, such as we find it, is one of the most compounded bodies in all nature. Water may be reduced to a fluid every way resembling air, by heat; which, by cold, becomes water again. Every thing we see gives off its parts to the air, and has a little floating atmosphere of its own round it. The rose is encompassed with a sphere of its own odorous particles; while the night-shade infects the air with scents of a more ungrateful nature. The perfume of musk flies off in such abundance, that the quantity remaining becomes sensibly lighter by the loss. A thousand substances that escape all our senses, we know to be there; the powerful emanations of the load-stone, the effluvia of electricity, the rays of light, and the insinuations of fire. Such are the various substances through which we move, and which we are constantly taking in at every pore, and returning again with imperceptible discharge!

This great solution, or mixture of all earthly bodies, is continually operating upon itself; which, perhaps, may be the cause of its unceasing motion:

but it operates still more visibly upon such grosser substances as are exposed to its influence; for scarce any substance is found capable of resisting the corroding qualities of the air. The air, say the chemists, is a chaos, furnished with all kinds of salts and menstrooms; and, therefore, it is capable of dissolving all kinds of bodies. It is well known, that copper and iron are quickly covered, and eaten with rust; and that in the climates near the equator, no art can keep them clean. In those dreary countries, the instruments, knives and keys, that are kept in the pocket, are nevertheless quickly encrusted; and the great guns, with every precaution, after some years, become useless. Stones, as being less hard, may be readily supposed to be more easily soluble. The marble of which the noble monuments of Italian antiquity are composed, although in one of the finest climates in the world, shew the impressions which have been made upon them by the air. In many places they seem worm eaten by time; and, in others, they appear crumbling into dust. Gold alone seems to be exempted from this general state of dissolution; it is never found to contract rust, though exposed never so long: the reason of this seems to be, that sea-salt, which is the only menstruum capable of acting upon, and dissolving gold, is but very little mixed with the air; for salt being a very fixed body, and not apt to volatilize, and rise with heat, there is but a small proportion of it in the atmosphere. In the laboratories, and shops, however, where salt is much used, and the air is impregnated with it, gold is found to rust as well as other metals.

Bodies of a softer nature are obviously destroyed by the air. Mr. Boyle says, that silks brought to Jamaica, will, if there exposed to the air, rot even while they preserve their colour; but if kept therefrom, they both retain their strength and gloss. The same happens in Brasil, where their cloaths, which are black, soon turn of an iron colour; though, in the shops, they preserve their proper hue. In these tropical climates also, such are the putrescent qualities of the air, that white sugar will sometimes be full of maggots. Drugs and plasters lose their virtue, and become verminous. In some places they are obliged to expose their sweetmeats by day in the sun, otherwise the night air would quickly cause them to putrify. On the contrary, in the cold arctic regions, animal substances, during their winter, are never known to putrify; and meat may be kept for months, without any salt whatsoever. This experiment happily succeeded with the eight Englishmen that were accidentally left upon the inhospitable coasts of Greenland, at a place where seven Dutchmen had perished but a few years before; for killing some rein-deer for their subsistence, and having no salt to preserve the flesh, to their great surprize, they soon found it did not want any, as it remained sweet during their eight months continuance upon that shore.

These powers with which air is endued over unorganized substances, are exerted in a still stronger manner over plants, animals of an inferior nature, and, lastly, over man himself. Most of the beauty, and the luxuriance of vegetation, is well known to be derived from the benign influence of the air: and every plant seems to have its favourite climate, not less than its proper soil. The lower ranks of animals also, seem formed for their respective climates, in which only they can live. Man alone seems the child of every climate, and capable of existing in all. However, this peculiar privilege does not exempt him from the influences of the air; he is as much subject to its malignity, as the meanest insect or vegetable.

With regard to plants, air is so absolutely necessary for their life and preservation, that they will not
vegetate

vegetate in an exhausted receiver. All plants have within them a quantity of air, which supports and agitates their juices. They are continually imbibing fresh nutriment from the air, to increase this store, and to supply the wants which they sustain from evaporation. When, therefore, the external air is drawn from them, they are no longer able to subsist. Even that quantity of air which they before were possessed of, escapes through their pores, into the exhausted receiver; and as this continues to be pumped away, they become languid, grow flaccid, and die. However, the plant or flower thus ceasing to vegetate, is kept, by being secured from the external air, a much longer time sweet than it would have continued, had it been openly exposed.

That air which is so necessary to the life of vegetables, is still more so to that of animals; there are none found, how seemingly torpid soever, that do not require their needful supply. Fishes themselves will not live in water from whence the air is exhausted; and it is generally supposed that they die in frozen ponds, from the want of this necessary to animal existence. Many have been the animals that idle curiosity has tortured in the prison of a receiver, merely to observe the manner of their dying. We shall, from a thousand instances, produce that of the viper, as it is known to be one of the most vivacious reptiles in the world; and as we shall feel but little compassion for its tortures. Mr. Boyle took a new-caught viper, and shutting it up into a small receiver, began to pump away the air. At first, upon the air's being drawn away, it began to swell; some time after he had done pumping, it began to gape, and open its jaws; being thus compelled to open its jaws, it once more resumed its former lankness; it then began to move up and down within, as if to seek for air, and after a while foamed a little, leaving the foam sticking to the inside of the glass; soon after the body and neck grew prodigiously tumid, and a blister appeared upon its back; an hour and an half after the receiver was exhausted, the distended viper moved, and gave manifest signs of life; the jaws remained quite distended; as it were from beneath the epiglottis, came the black tongue, and reached beyond it; but the animal seemed, by its posture, not to have any life: the mouth also was grown blackish within; and in this situation it continued for twenty-three hours. But upon the air's being re-admitted, the viper's mouth was presently closed, and soon after opened again; and for some time those motions continued, which argued the remains of life. Such is the fate of the most insignificant or minute reptile that can be thus included. Mites, fleas, and even the little eels that are found swimming in vinegar, die for want of air. Not only these, but the eggs of these animals, will not produce in vacuo, but require air to bring them to perfection.

As in this manner air is necessary to their subsistence, so also it must be of a proper kind, and not impregnated with foreign mixtures. That factitious air which is pumped from plants or fluids, is generally, in a short time, fatal to them. Mr. Boyle has given us many experiments to this purpose. After having shewn that all vegetable, and most mineral substances, properly prepared, may afford air, by being placed in an exhausted receiver, and this in such quantities, that some have thought it a new substance, made by the alteration which the mineral or plant has undergone by the texture of its parts being loosened in the operation—having shewn, that this air may be drawn in great quantities from vegetable, animal, or mineral substances, such as apples, cherries, amber burnt, or hartshorn—he included a frog in artificial air, produced from paste; in seven minutes space it suf-

fered convulsions, and at last lay still, and being taken out, recovered no motion at all, but was dead. A bird enclosed in artificial air, from raisins, died in a quarter of a minute, and never stirred more. A snail was put into the receiver, with air of paste; in four minutes it ceased to move, and was dead, although it had survived in vacuo for several hours: so that factitious air proved a greater enemy to animals than even a vacuum itself.

Air also may be impregnated with fumes that are instantly fatal to animals. The fumes of hot iron, copper, or any other heated metal, blown into the place where an animal is confined, instantly destroy it. We have already mentioned the vapours in the grotto Del Cane suffocating a dog. The ancients even supposed, that these animals, as they always ran with their noses to the ground, were the first that felt any infection. In short, it should seem that the predominance of any one vapour, from any body, how wholesome soever in itself, becomes infectious; and that we owe the salubrity of the air to the variety of its mixture.

But there is no animal whose frame is more sensibly affected by the changes of the air than man. It is true, he can endure a greater variety of climates than the lower orders generally are able to do; but it is rather by the means which he has discovered of obviating their effects, than by the apparent strength of his constitution. Most other animals can bear cold or hunger better, endure greater fatigues in proportion, and are satisfied with shorter repose. The variations of the climate, therefore, would probably affect them less, if they had the same means or skill in providing against the severities of the change. However this be, the body of man is an instrument much more nicely sensible of the variations of the air, than any of those which his own art has produced; for his frame alone seems to unite all their properties, being invigorated by the weight of the air, relaxed by its moisture, enfeebled by its heat, and stiffened by its frigidty.

But it is chiefly by the predominance of some peculiar vapour, that the air becomes unfit for human support. It is often found by dreadful experience, to enter into the constitution, to mix with its juices, and to putrify the whole mass of blood. The nervous system is not less affected by its operations; palsies and vertigoes are caused by its damps; and a still more fatal train of distempers by its exhalations. In order that the air should be wholesome, it is necessary, as we have seen, that it should not be of one kind, but the compound of several substances; and the more various the composition, to all appearance the more salubrious. A man, therefore, who continues in one place, is not so likely to enjoy this wholesome variety, as he who changes his situation; and, if we may so express it, instead of waiting for a renovation of air, walks forward to meet his arrival. This mere motion, independent even of the benefits of exercise, becomes wholesome, by thus supplying a great variety of that healthful fluid by which we are sustained.

A thousand accidents are found to increase these bodies of vapour, that make one place more or less wholesome than another. Heat may raise them in too great quantities; and cold may stagnate them. Minerals may give off their effluvia in such proportion as to keep away all other kind of air; vegetables may render the air unwholesome by their supply; and animal putrefaction seems to furnish a quantity of vapour, at least as noxious as any of the former. All these united, generally make up the mass of respiration, and are, when mixed together, harmless; but any one of them, for a long

long time singly predominant, becomes at length fatal.

The effects of heat in producing a noxious quality in the air, are well known. Those torrid regions under the Line, are always unwholesome. At Senegal the natives consider forty as a very advanced time of life, and generally die of old age at fifty. At Carthageña, in America, where the heat of the hottest day ever known in Europe is continual; where, during their winter season, these dreadful heats are united with a continual succession of thunder, rain, and tempests; arising from their intenseness, the wan and livid complexions of the inhabitants might make strangers suspect that they were just recovered from some dreadful distemper; the actions of the natives are conformable to their colour; in all their motions there is somewhat relaxed and languid; the heat of the climate even affects their speech, which is soft and slow, and their words generally broken. Travellers from Europe retain their strength and ruddy colour in that climate, possibly for three or four months; but afterwards suffer such decays in both, that they are no longer to be distinguished from the inhabitants by their complexion. However, this languid and spiritless existence is frequently drawled on sometimes even to eighty. Young persons are generally most affected by the heat of climate, which spares the more aged; but all, upon their arrival on the coasts, are subject to the same train of fatal disorders. Few nations have experienced the mortality of these coasts, so much as our own: in our unsuccessful attack upon Carthageña, more than three parts of our army were destroyed by the climate alone; and those that returned from that fatal expedition, found their former vigour irretrievably gone. In our more fortunate expedition, which gave us the Havana, we had little reason to boast of our success; instead of a third, not a fifth part of the army were left survivors of their victory, the climate being an enemy that even heroes cannot conquer.

The distempers that thus proceed from the cruel malignity of those climates are many; that, for instance, called the Chapotonadas, carries off a multitude of people; and extremely thins the crews of European ships, whom gain tempts into those inhospitable regions. The nature of this distemper is but little known, being caused in some persons by cold, in others by indigestion. But its effects are far from being obscure; it is generally fatal in three or four days: upon its seizing the patient, it brings on what is there called the black vomit, which is the sad symptom after which none are ever found to recover. Some, when the vomit attacks them, are seized with a delirium, that, were they not tied down, they would tear themselves to pieces, and thus expire in the midst of this furious paroxysm. This disorder, in milder climates, takes the name of the bilious fever, and is attended with milder symptoms, but very dangerous in all.

There are many other disorders incident to the human body, that seem the offspring of heat; but to mention no other, that very lassitude which prevails in all the tropical climates, may be considered as a disease. The inhabitants of India, says a modern philosopher, sustain an unceasing languor, from the heats of their climate; and are torpid in the midst of profusion. For this reason, the great Disposer of Nature has clothed their country with trees of an amazing height, whose shade might defend them from the beams of the sun; and whose continual freshness might, in some measure, temperate their fierceness. From these shades, therefore, the air receives refreshing moisture, and animals a cooling protection. The whole race of

savage animals retire, in the midst of the day, to the very center of the forests; not so much to avoid their enemy man, as to find a defence against the raging heats of the season. This advantage which arises from shade in torrid climates, may probably afford a solution for that extraordinary circumstance related by Boyle, which he imputes to a different cause. In the island of Ternate, belonging to the Dutch, a place that had been long celebrated for its beauty and healthfulness, the clove-trees grew in such plenty, that they in some measure lessened their own value: for this reason, the Dutch resolved to cut down the forests, and thus to raise the price of the commodity: but they had soon reason to repent of their avarice; for such a change ensued, by cutting down the trees, that the whole island, from being healthy and delightful, having lost its charming shades, became extremely sickly, and has actually continued so to this day. Boerhaave considered heat so prejudicial to health, that he was never seen to go near a fire.

An opposite set of calamities are the consequence, in climates where the air is condensed by cold. In such places, all that train of distempers which are known to arise from obstructed perspiration, are very common; eruptions, boils, scurvy, and a loathsome leprosy, that covers the whole body with a scurf, and white putrid ulcers. These disorders also are infectious; and, while they thus banish the patient from society, they generally accompany him to the grave. The men of those climates seldom attain to the age of fifty; but the women, who do not lead such laborious lives, are found to live longer.

The autumnal complaints which attend a wet summer, indicate the dangers of a moist air. The long continuance of an east wind also, shews the prejudice of a dry one. Mineral exhalations, when copious, are every where known to be fatal; and although we probably owe the increase and luxuriance of vegetation to a moderate degree of their warmth, yet the natives of those countries where there are mines in plenty, but too often experience the noxious effects of their vicinity. Those trades also that deal in the preparations of metals of all kinds, are always unwholesome; and the workmen, after some time, are generally seen to labour under palsies, and other nervous complaints. The vapours from some vegetable substances, are well known to be attended with dangerous effects. The shade of the machinet-tree, in America, is said to be fatal; as was that of the juniper, if we may credit the ancients. Those who walk through fields of poppies, or in any manner prepare those flowers, for making opium, are very sensibly affected with the drowsiness they occasion. A physician of Mr. Boyle's acquaintance, causing a large quantity of black hellebore to be pounded in a mortar, most of the persons who were in the room, and especially the person who pounded it, were purged by it; and some of them strongly. He also gathered a certain plant in Ireland, which the person who beat in a mortar, and the physician who was standing near, were so strongly affected by, that their hands and faces swelled to an enormous size, and continued tumid for a long time after.

But neither mineral nor vegetable steams are so dangerous to the constitution, as those proceeding from animal substances, putrifying either by disease or death. The effluvia that comes from diseased bodies, propagate that frightful catalogue of disorders which are called infectious. The parts which compose vegetable vapours; and mineral exhalations, seem gross and heavy, in comparison of these volatile vapours, that go to great distances, and have been described as spreading desolation

defolation over the whole earth. They fly every where; penetrate every where; and the vapours that fly from a single disease, soon render it epidemic.

The plague is the first upon the list in this class of human calamities. From whence this scourge of man's presumption may have its beginning, is not well known; but we well know that it is propagated by infection. Whatever be the general state of the atmosphere, we learn from experience, that the noxious vapours, though but singly introduced at first, taints the air by degrees: every person infected, tends to add to the growing malignity; and, as the disorder becomes more general, the putrescence of the air becomes more noxious, so that the symptoms are aggravated by continuance. When it is said that the origin of this disorder is unknown, it implies, that the air seems to be but little employed in first producing it. There are some countries, even in the midst of Africa, that we learn have never been infected with it; but continue, for centuries, unmolested. On the contrary, there are others, that are generally visited once a year, as in Egypt, which, nevertheless, seems peculiarly blessed with the serenity and temperature of its climate. In the former countries, which are of vast extent, and many of them very populous, every thing should seem to dispose the air to make the plague continual among them. The great heats of the climate, the unwholesomeness of the food, the sloth and dirt of the inhabitants, but, above all, the bloody battles which are continually fought among them, after which heaps of dead bodies are left unburied, and exposed to putrefaction. All these one might think would be apt to bring the plague among them; and yet, nevertheless, we are assured by Leo Africanus, that in Numidia the plague is not known once in an hundred years; and that in Negroland, it is not known at all. This dreadful disorder, therefore, must have its rise, not from any previous disposition of the air, but from some particular cause, beginning with one individual, and extending the malignity, by communication; till at last the air becomes actually tainted by the generality of the infection.

The plague which spread itself over the whole world, in the year 1346, as we are told by Mezeray, was so contagious, that scarce a village, or even an house, escaped being infected by it. Before it had reached Europe, it had been for two years travelling from the great kingdom of Cathay, where it began by a vapour most horridly foetid; this broke out of the earth like a subterranean fire, and upon the first instant of its eruption, consumed and desolated above two hundred leagues of that country, even to the trees and stones.

In that great plague which desolated the city of London, in the year 1665, a pious and learned schoolmaster of Mr. Boyle's acquaintance, who ventured to stay in the city, and took upon him the humane office of visiting the sick and the dying, who had been deserted by better physicians, averred, that being once called to a poor woman who had buried her children of the plague, he found the room where she lay so little that it scarce could hold any more than the bed whereon she was stretched. However, in this wretched abode, beside her, in an open coffin, her husband lay, who had some time before died of the same disease; and whom she, poor creature, soon followed. But what shewed the peculiar malignity of the air, thus suffering from animal putrefaction, was, that the contagious steams had produced spots on the very wall of their wretched apartment: and Mr. Boyle's own study, which was contiguous to a pest-house, was also spotted in the same frightful manner. Happily for mankind, this disorder, for more than a century,

has not been known in our island; and, for this last age, has abated much of its violence, even in those countries where it is most common. Diseases, like empires, have their revolutions; and those which for a while were the scourge of mankind, sink unheard of, to give place to new ones, more dreadful, as being less understood.

For this revolution in disorders, which has employed the speculation of many, Mr. Boyle accounts in the following manner: "Since," says he, "there want not causes in the bowels of the earth, to make considerable changes amongst the materials that nature has plentifully treasured up in those magazines, and as those noxious steams are abundantly supplied to the surface, it may not seem improbable, that in this great variety, some may be found capable of particularly affecting the human frame in a particular manner, and thus of producing new diseases. The duration of these may be greater or less, according to the lastingness of those subterraneous causes that produced them. On which account, it need be no wonder that some diseases have but a short duration, and vanish not long after they appear; whilst others may continue longer, as having under ground more settled and durable causes to maintain them."

From the recital of this train of mischiefs produced by the air, upon minerals, plants, animals, and man himself, a gloomy mind may be apt to dread this indulgent nurse of nature as a cruel and an inexorable step-mother: but it is far otherwise; and, although we are sometimes injured, yet almost all the comforts and blessings of life spring from its propitious influence. It would be needless to observe, that it is absolutely necessary for the support of our lives; for of this, every moment's experience assures us. But how it contributes to this support, is not so readily comprehended. All allow it to be a friend; to whose benefits we are constantly obliged: and yet, to this hour, philosophers are divided as to the nature of the obligation. The dispute is, whether the air is only useful by its weight to force our juices into circulation; or, whether, by containing a peculiar spirit, it mixes with the blood in our vessels, and acts like a spur to their industry. Perhaps it may exert both these useful offices at the same time. Its weight may give the blood its progressive motion, through the larger vessels of the body; and its admixture with it, cause those contractions of all the vessels, which serve to force it still more strongly forward, through the minutest channels of the circulation. Be this as it may, it is well known, that that part of our blood which has just received the influx of the air in our bodies, is of a very different colour from that which has almost performed its circuit. It has been found, that the arterial blood which has been immediately mixed with the air in the lungs, and, if we may so express it, is just beginning its journey through the body, is of a fine florid scarlet colour; while, on the contrary, the blood of the veins that is returning from having performed its duty, is of a blackish crimson hue. Whence this difference of colour should proceed, is not well understood; we only know the fact, that this florid colour is communicated by the air; and we are well convinced, that this air has been admitted into the blood for very useful purposes.

Besides this vital principle in animals, the air also gives life and body to flame. A candle quickly goes out in an exhausted receiver; for having soon consumed the quantity of air, it then expires, for want of a fresh supply. There has been a flame contrived that will burn under water; but none yet has been found, that will continue to burn without air. Gunpowder, which is the most catching and powerful fire we know, will not go off in an exhausted

hausted receiver; nay, if a train of gunpowder be laid, so as that one part may be fired in the open air, yet the other part in vacuo will remain untouched, and unconsumed. Wood also set on fire, immediately goes out; and its flame ceases upon removing the air; for something is then wanting to press the body of the fire against that of the fuel, and to prevent the too speedy diffusion of the flame. We frequently see cooks, and others, whose business it is to keep up strong fires, take proper precautions to exclude the beams of the sun from shining upon them, which effectually puts them out. This they are apt to ascribe to a wrong cause; namely, the operation of the light: but the real fact is, that the warmth of the sun-beams lessen and dissipate the body of the air that goes to feed the flame; and the fire, of consequence, languishes for want of a necessary supply.

The air, while it thus kindles fire into flame, is notwithstanding found to moderate the rays of light, to dissipate their violence, and to spread an uniform lustre over every object. Were the beams of the sun to dart directly upon us, without passing through this protecting medium, they would either burn us up at once, or blind us with their effulgence. But by going through the air, they are reflected, refracted, and turned from their direct course, a thousand different ways; and thus are more evenly diffused over the face of nature.

Among the other necessary benefits the air is of to us, one of the principal is its conveyance of sound. Even the vibrations of a bell, which have the loudest effect that we know of, ceases to be heard, when under the receiver of an air-pump. Thus all the pleasures we receive from conversation with each other, or from music, depend entirely upon the air.

Odours likewise are diffused only by the means of air; without this fluid to swim in, they would for ever remain torpid in their respective substances; and the rose would affect us with as little sensations of pleasure, as the thorn on which it grew.

Those who are willing to augment the catalogue of the benefits we receive from this element, assert also, that tastes themselves would be insipid, were it not that the air presses their parts upon the nerves of the tongue and palate, so as to produce their grateful effects. Thus, continue they, upon the tops of high mountains, as on the Pike of Teneriff, the most poignant bodies, as pepper, ginger, salt, and spice, have no sensible taste, for want of their particles being thus sent home to the sensory. But we owe the air sufficient obligations, not to be studious of admitting this among the number: in fact, all substances have their taste, as well on the tops of mountains, as in the bottom of the valley; and several have been known to eat a good dinner on the Alps.

It is sufficient, therefore, that we regard the air as the parent of health and vegetation; as a kind dispenser of light and warmth; and as the conveyer of sounds and odours. This is an element of which avarice will not deprive us; and which power cannot monopolize. The treasures of the earth, the verdure of the fields, and even the refreshments of the stream, are too often seen going only to assist the luxuries of the great; while the less fortunate part of mankind stand humble spectators of their encroachments. But the air no limitations can bound, nor any land-marks restrain. In this benign element, all mankind can boast an equal possession; and for this we all have equal obligations to Heaven. We consume a part of it, for our own sustenance, while we live; and, when we die, our putrifying bodies give back the supply, which, during life, we had accumulated from the general mass.

CHAP. XX.

Of Regular and Irregular WINDS.

WIND is a current of air. Experimental philosophers produce an artificial wind, by an instrument called an æolipyle. This is nothing more than an hollow copper ball, with a long pipe; a tea-kettle might be readily made into one, if it were entirely closed at the lid, and the spout left open; through this spout it is to be filled with water, and then set upon the fire, by which means it produces a violent blast, like wind, which continues while there is any water remaining in the instrument. In this manner water is converted into a rushing air; which, if caught as it goes out, and left to cool, is again quickly converted into its former element. Besides this, as was mentioned in the former chapter, almost every substance contains some portions of air. Vegetables, or the bodies of animals left to putrify, produce it in a very copious manner. But it is not only seen thus escaping from bodies, but it may be very easily made to enter into them. A quantity of air may be compressed into water, so as to be intimately blended with it. It finds a much easier admission into wine, or any fermented liquor; and an easier still, into spirits of wine. Some salts suck up the air in such quantities, that they are made sensibly heavier thereby, and often are melted by its moisture. In this manner, most bodies, being found either capable of receiving or affording it, we are not to be surprized at those streams of air that are continually fleeting round the globe. Minerals, vegetables, and animals, contribute to increase the current; and are sending off their constant supplies. These, as they are differently affected by cold or heat, by mixture or putrefaction, all yield different quantities of air at different times; and the loudest tempests, and most rapid whirlwinds, are formed for their united contributions.

The sun is the principal instrument in rarefying the juices of plants, so as to give an escape to their imprisoned air; it is also equally operative in promoting the putrefaction of animals. Mineral exhalations are more frequently raised by subterranean heat. The moon, the other planets, the seasons, are all combined in producing these effects in a smaller degree. Mountains give a direction to the courses of the air. Fires carry a current of air along their body. Night and day alternately chill and warm the earth, and produce an alternate current of its vapours. These, and many other causes, may be assigned for the variety, and the activity of the winds, their continual change, and uncertain duration.

With us on land, as the wind proceeds from so many causes, and meets such a variety of obstacles, there can be but little hopes of ever bringing its motions to conform to theory; or of foretelling how it may blow a minute to come. The great Bacon, indeed, was of opinion, that by a close and regular history of the winds, continued for a number of ages together, and the particulars of each observation reduced to general maxims, we might at last come to understand the variations of this capricious element; and that we could foretell the certainty of a wind, with as much ease as we now foretell the return of an eclipse. Indeed, his own beginnings in this arduous undertaking, seem to speak the possibility of success; but, unhappily for mankind, this investigation is the work of ages, and we want a Bacon to direct the process.

To be able, therefore, with any plausibility, to account for the variations of the wind upon land, is not to be at present expected; and to understand any thing of their nature, we must have recourse to those

those places where they are more permanent and steady. This uniformity and steadiness we are chiefly to expect upon the ocean. There, where there is no variety of substances to furnish the air with various and inconstant supplies; where there are no mountains to direct the course of its current, but where all is extensively uniform and even; in such a place, the wind arising from a simple cause, must have but one simple motion. In fact, we find it so. There are many parts of the world where the winds, that with us are so uncertain, pay their stated visits. In some places, they are found to blow one way by day, and another by night; in others, for one half of the year, they go in a direction contrary to their former course: but what is more extraordinary still, there are some places where the winds never change, but for ever blow the same way. This is particularly found to obtain between the tropics in the Atlantic and Æthiopic oceans; as well as in the great Pacific sea.

Few things can appear more extraordinary to a person who has never been out of our variable latitudes, than this steady wind, that for ever sits in the sail, sending the vessel forward; and as effectually preventing its return. He who has been taught to consider that nothing in the world is so variable as the winds, must certainly be surpris'd to find a place where there is nothing more uniform. With us their inconstancy has become a proverb; with the natives of those distant climates, they may talk of a friend or a mistress as fixed and unchangeable as the winds, and mean a compliment by the comparison. When our ships are once arriv'd into the proper latitudes of the great Pacific ocean, the mariner forgets the helm, and his skill becomes almost useless: neither storms nor tempests are known to deform the glassy bosom of that immense sheet of waters; a gentle breeze, that for ever blows in the same direction, rests upon the canvas, and speeds the navigator. In the space of six weeks, ships are thus known to cross an immense ocean, that takes more than so many months to return. Upon returning, the trade-wind, which has been propitious, is then avoided; the mariner is generally oblig'd to steer into the northern latitudes, and to take the advantage of every casual wind that offers, to assist him into port. This wind, which blows with such constancy one way, is known to prevail not only in the Pacific ocean, but also in the Atlantic, between the coasts of Guinea and Brazil; and, likewise, in the Æthiopic ocean. This seems to be the great universal wind, blowing from the east to the west, that prevails in all the extensive oceans, where the land does not frequently break the general current. Were the whole surface of the globe an ocean, there would probably be but this one wind, for ever blowing from the east, and pursuing the motions of the sun westward. All the other winds seem subordinate to this; and many of them are made from the deviations of its current. To form, therefore, any conception relative to the variations of the wind in general, it is proper to begin with that which never varies.

There have been many theories to explain this invariable motion of the winds; among the rest, we cannot omit that of Doctor Lyster, for its strangeness: "The sea," says he, "in those latitudes, is generally covered over with green weeds, for a great extent; and the air produced from the vegetable perspiration of these, produces the trade-wind." The theory of Cartesius was not quite so absurd. He alledged, that the earth went round faster than its atmosphere at the equator; so that its motion, from west to east, gave the atmosphere an imaginary one from east to west; and thus an east wind was eternally seen to prevail. Rejecting those arbitrary opinions, conceived without force,

and asserted without proof, Doctor Halley has given one more plausible; which seems to be the reigning system of the day.

To conceive his opinion clearly, let us for a moment suppose the whole surface of the earth to be an ocean, and the air encompassing it on every side, without motion. Now it is evident, that that part of the air which lies directly under the beams of the sun, will be rarefied; and if the sun remained for ever in the same place, there would be a great vacuity in the air (if it may be so expressed) beneath the place where the sun stood. The sun, moving forward, from east to west, this vacuity will follow too, and still be made under it. But while it goes on to make new vacuities, the air will rush in to fill up those the sun has already made; in other words, as it is still travelling forward, the air will continually be rushing in behind, and pursue its motions from east to west. In this manner, the air is put into motion by day; and by night, the parts continue to impel each other, till the next return of the sun, that gives a new force to the circulation.

In this manner is explained the constant east wind that is found blowing round the globe, near the equator. But it is also known, that as we recede from the equator on either side, we come into a trade-wind, that continually blows from the poles, from the north on one side, or the south on the other, both directing towards the equator. This also proceeds from a similar cause with the former; for the air being more rarefied in those places over which the sun more directly daats its rays, the currents will come both from the north and the south to fill up the intermediate vacuity.

These two motions, namely, the general one from east to west, and the more particular one from both the poles, will account for all the phenomena of trade-winds; which, if the whole surface of the globe were sea, would undoubtedly be constant, and for ever continue to blow in one direction. But there are a thousand circumstances to break these air-currents into smaller ones; to drive them back against their general course; to raise or depress them; to condense them into storms; or to whirl them in eddies. In consequence of this, regard must be often had to the nature of the soil, the position of the high mountains, the course of the rivers, and even to the luxuriance of vegetation.

If a country lying directly under the sun, be very flat and sandy, and if the land be low and extensive, the heats occasioned by the reflection of the sun-beams, produces a very great rarefaction of the air. The deserts of Africa, which are conformable to this description, are scarce ever fanned by a breath of wind by day; but the burning sun is continually seen blazing in intolerable splendor above them. For this reason, all along the coasts of Guinea, the wind is always perceived blowing in upon land, in order to fill up the vacuity caused by the sun's operation. In those shores, therefore, the wind blows in a contrary direction to that of its general current; and is constantly found setting in from the west.

From the same cause it happens, that those constant calms, attended with deluges of rain, are found in the same part of the ocean. For this tract being placed in the middle, between the westerly winds blowing on the coast of Guinea, and the easterly trade-winds that move at some distance from shore, in a contrary direction, the tendency of that part of the air that lies between these two opposite currents, is indifferent to either, and so rests between both in torpid serenity; and the weight of the incumbent atmosphere, being diminished by the continual contrary winds blowing from hence,

it is unable to keep the vapours suspended that are copiously borne thither; so that they fall in continual rains.

But it is not to be supposed, that any theory can account for all the phaenomena of even those winds that are known to be most regular. Instead of a complete system of the trade-winds, we must rather be content with an imperfect history. These, as was said, being the result of a combination of effects, assume as great a variety, as the causes producing them are various.

Besides the great general wind above mentioned; in those parts of the Atlantic that lie under the temperate zone, a north wind prevails constantly during the months of October, November, December, and January. These, therefore, are the most favourable months for embarking for the East-Indies, in order to take the benefit of these winds, for crossing the line: and it has been often found, by experience, that those who had set sail five months before, were not in the least farther advanced in their voyage, than those who waited for the favourable wind. During the winter of Nova Zembla, and the other arctic countries, a north wind reigns almost continually. In the Cape de Verde islands, a south wind prevails during the month of July. At the Cape of Good Hope, a north-west wind blows during the month of September. There are also regular winds, produced by various causes, upon land. The ancient Greeks were the first who observed a constant breeze, produced by the melting of the snows, in some high neighbouring countries. This was perceived in Greece, Thrace, Macedonia, and the Aegean sea. The same kind of winds are now remarked in the kingdom of Congo, and the most southern parts of Africa. The flux and reflux of the sea also produces some regular winds, that serve the purposes of trade; and, in general, it may be observed, that wherever there is a strong current of water, there is a current of air that seems to attend it.

Besides these winds that are found to blow in one direction, there are, as was said before, others that blow for certain months of the year one way, and the rest of the year the contrary way: these are called the Monsoons, from a famous pilot of that name, who first used them in navigation with success. In all that part of the ocean that lies between Africa and India, the east winds begin at the month of January, and continue till about the commencement of June. In the month of August, or September, the contrary direction takes place; and the west winds prevail for three or four months. The interval between these winds, that is to say, from the end of June to the beginning of August, there is no fixed wind; but the sea is usually tossed by violent tempests, proceeding from the north. These winds are always subject to their greatest variations, as they approach the land; so that on one side of the great peninsula of India, the coasts are, for near half the year, harrassed by violent hurricanes, and northern tempests; while, on the opposite side, and all along the coasts of Coromandel, these dreadful tempests are wholly unknown. At Java, and Ceylon, a west wind begins to reign in the month of September; but at fifteen degrees of south latitude, this wind is found to be lost, and the great general trade wind from the east, is perceived to prevail. On the contrary, at Cochin, in China, the west wind begins at March; so that these Monsoons prevail, at different seasons, throughout the Indies. So that the mariner takes one part of the year to go from Java to the Moluccas; another from Cochin to Molucca; another from Molucca to China; and still another to direct him from China to Japan.

There are winds also that may be considered as peculiar to certain coasts; for example, the south-

wind is almost constant upon the coasts of Chili and Peru; western winds almost constantly prevail on the coast of Terra Magellanica; and in the environs of the Streights le Maire. On the coasts of Malabar, north and north-west winds prevail continually; along the coast of Guinea, the north-west wind is also very frequent; and, at a distance from the coasts, the north-east is always found prevailing. From the beginning of November to the end of December, a west wind prevails on the coasts of Japan; and, during the whole winter, no ships can leave the port of Cochin, on account of the impetuosity of the winds that set upon the coast. These blow with such vehemence, that the ports are entirely choaked up with sand, and even boats are not able to enter. However, the east winds that prevail for the other half of the year, clear the mouths of the harbours from the accumulations of the preceding winter, and set the confined ships at liberty. At the Streights of Babelmandel there is a south wind that periodically returns, and which is always followed by a north-east.

Besides winds thus peculiar to certain coasts, there are others found to prevail on all the coasts, in warm climates; which, during one part of the day, blow from the shore, and, during another part of it, blow from the sea. The sea-breeze, in those countries, as Dampier observes, commonly rises in the morning, about nine, proceeding slowly, in a fine small black curl, upon the surface of the water, and making its way to refresh the shore. It is gentle at first, but increases gradually till twelve, then insensibly sinks away, and is totally hushed at five. Upon its ceasing, the land breeze begins to take its turn, which increases till twelve at night, and is succeeded, in the morning, by the sea breeze again. Without all doubt nothing could have been more fortunate, for the inhabitants of the warm countries, where those breezes blow, than this alternate refreshment, which they feel at those seasons when it is most wanted. The heat, on some coasts, would be insupportable, were it not for such a supply of air, when the sun has rarefied all that which lay more immediately under the coast. The sea-breeze temperates the heat of the sun by day; and the land-breeze corrects the malignity of the dews, and vapours, by night. Where these breezes, therefore, prevail, and they are very common, the inhabitants enjoy a share of health and happiness, unknown to those that live much farther up the country, or such as live in similar latitudes without this advantage. The cause of these obviously seems to arise from the rarefaction of the air by the sun, as their duration continues with its appearance, and alters when it goes down. The sun, it is observed, equally diffusing his beams upon land and sea, the land, being a more solid body than the water, receives a greater quantity of heat, and reflects it more strongly. Being thus, therefore, heated to a greater degree than the waters, it, of consequence, drives the air from land out to sea; but, its influence being removed, the air returns to fill up the former vacuity. Such is the usual method of accounting for this phaenomenon; but, unfortunately, these sea and land breezes are visitants that come at all hours. On the coasts of Malabar, the land-breezes begin at midnight, and continue till noon; then the sea-breezes take their turn, and continue till midnight. While, again, at Congo, the land-breezes begin at five, and continue till nine the next day.

But, if the cause of these be so inscrutable, that are, as we see, tolerably regular in their visitations, what shall we say to the winds of our own climate, that are continually shifting, and incapable of rest? Some general causes may be assigned, which nothing but particular experience can apply. And, in the first place, it may be observed, that clouds,

and heat, and, in short, whatever either increases the density or the elasticity of the air, in any one place, will produce a wind there: for the increased activity of the air thus pressing more powerfully on the parts of it that are adjacent, will drive them forward; and thus go on, in a current, till the whole comes to an equality.

In this manner, as a denser air produces a wind, on the one hand; so will any accident, that contributes to lighten the air, produce it on the other: for a lighter air may be considered as a vacuity, into which the neighbouring air will rush: and hence it happens, that when the barometer marks a peculiar lightness in the air, it is no wonder that it foretells a storm.

The winds upon large waters are generally more regular than those upon land. The wind at sea generally blows with an even steady gale; the wind at land puffs by intervals, increasing its strength, and remitting it, without any apparent cause. This, in a great measure, may be owing to the many mountains, towers, or trees, that it meets in its way, all contributing either to turn it from its course, or interrupt its passage.

The east wind blows more constantly than any other, and for an obvious reason: all other winds are, in some measure, deviations from it, and partly may owe their origin thereto. It is generally, likewise, the most powerful, and for the same reason.

There are often double currents of the air. While the wind blows one way, we frequently see the clouds move another. This is generally the case before thunder; for it is well known that the thunder cloud always moves against the wind: the cause of this surprising appearance has hitherto remained a secret. From hence we may conclude, that weathercocks only inform us of that current of the air, which is near the surface of the earth; but are often erroneous with regard to the upper regions; and, in fact, Derham has often found them erroneous.

Winds are generally more powerful on elevated situations than on the plain, because their progress is interrupted by fewer obstacles. In proportion as we ascend the heights of a mountain, the violence of the weather seems to increase, until we have got above the region of storms, where all is usually calm and serene. Sometimes, however, the storms rise even to the tops of the highest mountains; as we learn from those who have been on the Andes, and as we are convinced by the deep snows that crown even the highest.

Winds blowing from the sea are generally moister, and more attended with rains, than those which blow over extensive tracts of land: for the sea gives off more vapours to the air, and these are rolled forward upon land, by the winds blowing from thence. For this reason our easterly winds, that blow from the continent, are dry, compared with those that blow from the surface of the ocean, with which we are surrounded on every other quarter.

In general the winds are more boisterous in spring and autumn, than at other seasons: for, that being the time of high tides, the sea may communicate a part of its motions to the winds. The sun and moon, also, which then have a greater effect upon the waters, may also have some influence upon the winds; for, there being a great body of air surrounding the globe, which, if condensed into water, would cover it to the depth of thirty-two feet, it is evident that the sun and moon will, to a proportionable degree, affect the atmosphere, and make a tide of air. This tide will be scarce perceivable, indeed; but, without doubt, it actually exists; and may contribute to increase the vernal

and autumnal storms, which are then known to prevail.

Upon narrowing the passage through which the air is driven; both the density and the swiftness of the wind is increased. For as currents of water flow with greater force and rapidity by narrowing their channels, so also will a current of air, driven through a contracted space, grow more violent and irresistible. Hence we find those dreadful storms that prevail in the defiles of mountains, where the wind, pushing from behind through a narrow channel, at once increases in speed and density, levelling, or tearing up, every obstacle that rises to obstruct its passage.

Winds reflected from the sides of mountains and towers, are often found to be more forceful than those in direct progression. This we frequently perceive near lofty buildings, such as churches or steeples, where winds are generally known to prevail, and that much more powerful than at some distance. The air, in this case, by striking against the side of the building, acquires additional density, and therefore blows with more force.

These differing degrees of density, which the air is found to possess, sufficiently shew that the force of the winds do not depend upon their velocity alone; so that those instruments called anemometers, which are made to measure the velocity of the wind, will by no means give us certain information of the force of the storm. In order to estimate this with exactness, we ought to know its density; which also these are not calculated to discover. For this reason we often see storms, with very powerful effects, that do not seem to shew any great speed; and on the contrary, we see these wind measurers go round, with great swiftness, when scarce any damage has followed from the storm.

Such is the nature, and the inconstancy of the irregular winds with which we are best acquainted. But their effects are much more formidable in those climates, near the tropics, where they are often found to break in upon the steady course of the trade winds, and to mark their passage with destruction. With us the tempest is but rarely known, and its ravages are registered as an uncommon calamity; but, in the countries that lie between the tropics, and for a good space beyond them, its visits are frequent, and its effects anticipated. In these regions the winds vary their terrors, sometimes involving all things in a suffocating heat; sometimes mixing all the elements of fire, air, earth, and water together; sometimes, with a momentary swiftness, passing over the face of the country, and destroying all things in their passage; and sometimes raising whole sandy deserts in one country, to deposit them upon some other. We have little reason, therefore, to envy these climates the luxuriance of their soil, or the brightness of their skies. Our own muddy atmosphere, that wraps us round in obscurity, though it fails to gild our prospects with sun-shine, or our groves with fruitage, nevertheless answers the calls of industry. They may boast of a plentiful, but precarious harvest; while, with us, the labourer toils in a certain expectation of a moderate, but an happy return.

In Egypt, a kingdom so noted for its fertility, and the brightness of its atmosphere, during summer, the south winds are so hot, that they almost stop respiration; besides which, they are charged with such quantities of sand, that they sometimes darken the air, as with a thick cloud. These sands are so fine, and driven with such violence, that they penetrate every where; even into chests, be they shut never so closely. If these winds happen to continue for any length of time, they produce epidemic diseases; and are often followed by a great mortality.

mortality. It is also found to rain but very seldom in that country; however, the want of showers is richly compensated by the copiousness of their dews, which greatly tend to promote vegetation.

In Persia, the winter begins in November, and continues till March. The cold at that time is intense enough to congeal the water; and snow falls in abundance upon their mountains. During the months of March and April, winds arise, that blow with great force, and seem to usher in the heats of summer. These return again, in autumn, with some violence; without, however, producing any dreadful effects. But, during their summer, all along the coasts of the Persian Gulph, a very dangerous wind prevails, which the natives call the Sameyel, still more dreadful and burning than that of Egypt, and attended with instant and fatal effects. This terrible blast, which was, perhaps, the pestilence of the ancients, instantly kills all those that it involves in its passage. What its malignity consists in, none can tell, as none have ever survived its effects, to give information. It frequently assumes a visible form; and darts, in a kind of bluish vapour, along the surface of the country. The natives not only of Persia, but Arabia, talk of its effects with terror; and their poets have not failed to heighten them, with the assistance of imagination. They have described it as under the conduct of a minister of vengeance, who governs its terrors, and raises, or depresses it, as he thinks proper. These deadly winds are also known along the coasts of India, at Necapatan, Masulipatan, and Petaoli. But, luckily for mankind, the shortness of their duration diminishes the injuries that might ensue from their malignity.

The Cape of Good Hope, as well as many islands in the West-Indies, are famous for their hurricanes, and that extraordinary kind of cloud, which is said to produce them. This cloud, which is the forerunner of an approaching hurricane, appears, when first seen, like a small black spot on the verge of the horizon; and is called, by sailors, the bull's eye, from being seen so minute at a vast distance. All this time, a perfect calm reigns over the sea and land, while the cloud grows gradually broader as it approaches. At length, coming to the place where its fury is to fall, it invests the whole horizon with darkness. During all the time of its approach, an hollow murmur is heard in the cavities of the mountains: and beasts and animals, sensible of its approach, are seen running over the fields, to seek for shelter. Nothing can be more terrible than its violence when it begins. The houses in those countries, which are made of timber, the better to resist its fury, bend to the blast like osiers, and again recover their rectitude. The sun, which, but a moment before, blazed with meridian splendor, is totally shut out; and a midnight darkness prevails, except that the air is incessantly illuminated with gleams of lightning, by which one can easily see to read. The rain falls, at the same time, in torrents; and its descent has been resembled to what pours from the spouts of our houses after a violent shower. These hurricanes are not less offensive to the sense of smelling also; and never come without leaving the most noisome stench behind them. If the seamen also lay by their wet cloaths, for twenty-four hours, they are all found swarming with little white maggots, that were brought with the hurricane. Our first mariners, when they visited those regions, were ignorant of its effects, and the signs of its approach; their ships, therefore, were dashed to the bottom at the first onset; and numberless were the wrecks which the hurricane occasioned. But, at present, being fore-warned of its approach, they strip their masts of all their sails, and thus patiently abide its fury. These hurricanes are com-

mon in all the tropical climates. On the coasts of Guinea they have frequently three or four in a day, that thus shut out the heavens for a little space; and when past leave all again in former splendor. They chiefly prevail, on that coast, in the intervals of the trade-winds; the approach of which clears the air of its meteors, and gives these mortal showers that little degree of wholesomeness, which they possess. They chiefly obtain there during the months of April and May; they are known at Loango, from January to April; on the opposite coast of Africa, the hurricane season begins at May; and, in general, whenever a trade-wind begins to cease, these irregular tempests are found to exert their fury.

All this is terrible; but there is a tempest, known in those climates, more formidable than any we have hitherto been describing, which is called, by the Spaniards, a Tornado. As the former was seen arriving from one part of the heavens, and making a line of destruction; so the winds in this seem to blow from every quarter, and settle upon one destined place, with such fury, that nothing can resist their vehemence. When they have all met, in their central spot, then the whirlwind begins with circular rapidity. The sphere every moment widens as it continues to turn, and catches every object that lies within its attraction. This, also, like the former, is preceded by a flattering calm; the air is every where hushed; and the sea is as smooth as polished glass: however, as its effects are more dreadful than those of the ordinary hurricane, the mariner tries all the power of his skill to avoid it; which, if he fails of doing, there is the greatest danger of his going to the bottom. All along the coasts of Guinea, beginning about two degrees north of the line, and so downward, lengthwise, for about a thousand miles, and as many broad, the ocean is unnavigable, upon account of these tornados. In this torpid region there reigns unceasing tornados, or continual calms; among which, whatever ship is so unhappy as to fall, is totally deprived of all power of escaping. In this dreadful repose of all the elements, the solitary vessel is obliged to continue, without a single breeze to assist the mariner's wishes, except those whirlwinds, which only serve to increase his calamity. At present, therefore, this part of the ocean is totally avoided; and, although there may be much gold along the coasts of that part of Africa, to tempt avarice, yet there is something, much more dreadful than the fabled dragon of antiquity, to guard the treasure. As the internal parts of that country are totally unknown to travellers, from their burning sand and extensive deserts, so here we find a vast tract of ocean, lying off its shores, equally unvisited by the mariner.

But of all these terrible tempests that deform the face of Nature, and repress human presumption, the sandy tempests of Arabia and Africa, are the most terrible, and strike the imagination most strongly. To conceive a proper idea of these, we are by no means to suppose them resembling those whirlwinds of dust that we sometimes see scattering in our air, and sprinkling their contents upon our roads or meadows. The sand-storm of Africa exhibits a very different appearance. As the sand of which the whirlwind is composed is excessively fine, and almost resembles the parts of water, its motion entirely resembles that of a fluid; and the whole plain seems to float onward, like a slow inundation. The body of sand thus rolling, is deep enough to bury houses and palaces in its bosom: travellers who are crossing those extensive deserts, perceive its approach at a distance; and, in general, have time to avoid it, or turn out of its way, as it generally extends but to a moderate breadth. However,

ever, when it is extremely rapid, or very extensive, as sometimes is the case, no swiftness, no art, can avail; nothing then remains, but to meet death with fortitude, and submit to be buried alive with resignation.

It is happy for us of Britain, that we have no such calamity to fear; for, from this, even some parts of Europe are not entirely free. We have an account given us, in the History of the French Academy, of a miserable town in France, that is constantly in danger of being buried under a similar inundation. "In the neighbourhood of St. Paul de Leon, in Lower Brittany, there lies a tract of country along the sea-side, which before the year 1666 was inhabited, but now lies deserted, by reason of the sands which cover it, to the height of twenty feet; and which every year advance more and more inland, and gain ground continually. From the time mentioned above, the sand has buried more than six leagues of the country inward; and it is now but half a league from the town of St. Paul; so that, in all appearance, the inhabitants must be obliged to abandon it entirely. In the country that has been overwhelmed, there are still to be seen the tops of some steeples peeping through the sand, and many chimnies that still remain above this sandy ocean. The inhabitants, however, had sufficient time to escape; but being deprived of their little all, they had no other resource but begging for their subsistence. This calamity chiefly owes its advancement to a north, or an east wind, raising the sand, which is extremely fine, in such great quantities, and with such velocity, that M. Deslands, who gave the account, says, that while he was walking near the place, during a moderate breeze of wind, he was obliged, from time to time, to shake the sand from his cloaths and hat, on which it was lodged in great quantities, and made them too heavy to be easily borne. Still further, when the wind was violent, it drove the sand across a little arm of the sea, into the town of Roscoff, and covered the streets of that place two feet deep; so that they have been obliged to carry it off in carts. It may also be observed, that there are several particles of iron mixed with the sand, which are readily affected by the loadstone. The part of the coast that furnishes these sands, is a tract of about four leagues in length; and is upon a level with the sea at high-water. The shore lies in such a manner as to leave its sands subject only to the north and east winds, that bear them farther up the shore. It is easy to conceive how the same sand that has at one time been borne a short way in land, may, by some succeeding and stronger blast, be carried up much higher; and thus the whole may continue advancing forward, deluging the plain, and totally destroying its fertility. At the same time, the sea, from whence this deluge of sand proceeds, may furnish it in inexhaustible quantities. This unhappy country, thus overwhelmed in so singular a manner, may well justify what the antients and the moderns have reported concerning those tempests of sand in Africa, that are said to destroy villages, and even armies in their bosom."

C H A P. XXI.

Of METEORS, and such Appearances as result from a Combination of the Elements.

IN proportion as the substances of nature are more compounded and combined, their appearances become more inexplicable and amazing. The properties of water have been very nearly ascertained. Many of the qualities of air, earth, and fire, have been discovered, and estimated; but when these come to be united by Nature, they often

produce a result which no artificial combinations can imitate: and we stand surpris'd, that although we are possess'd of all those substances which Nature makes use of, she shews herself a much more various operator than the most skilful chemist ever appeared to be. Every cloud that moves, and every shower that falls, serves to mortify the philosopher's pride; and to shew him hidden qualities in air and water; that he finds it difficult to explain. Dews, hail, snow, and thunder, are not less difficult for being more common. Indeed, when we reflect on the manner in which Nature performs any one of these operations, our wonder increases. To see water, which is heavier than air, rising in air, and then falling in a form so very different from that in which it rose; to see the same fluid at one time descending in the form of hail, at another in that of snow; to see two clouds, by dashing against each other, producing an electrical fire, which no watery composition that we know of, can effect—these serve sufficiently to excite our wonder; and still the more, in proportion as the objects are ever pressing on our curiosity. Much, however, has been written concerning the manner in which nature operates in these productions; as nothing is so ungrateful to mankind as hopeless ignorance.

And first, with regard to the manner in which water evaporates, and rises to form clouds, much has been advanced, and many theories devised. All water, say some, has a quantity of air mixed with it; and the heat of the sun darting down, disengages the particles of this air from the grosser fluid: the sun's rays being reflected back from the water, carry back with them those bubbles of air and water which, being lighter than the condensed air, will ascend till they meet with a more rarefied air; and they will then stand suspended. Experience, however, proves nothing of all this. Particles of air or fire, are not thus known to ascend with a thin coat of water; and, in fact, we know that the little particles of steam are solid drops of water. But besides this, water is known to evaporate more powerfully in the severest frost, than when the air is moderately warm. Doctor Hamilton, therefore, of the university of Dublin, rejecting this theory, has endeavoured to establish another. According to him, as aqua fortis is a menstruum that dissolves iron, and keeps it mixed in the fluid; as aqua regia is a menstruum that dissolves gold; or as water dissolves salts to a certain quantity; so air is a menstruum that corrodes and dissolves a certain quantity of water, and keeps it suspended above. But however ingenious this may be, it can hardly be admitted; as we know, by Mariotte's experiment, that if water and air be enclosed together, instead of the air's acting as a menstruum upon the water, the water will act as a menstruum upon the air, and take it all up. We know also, that of two bodies, that which is most fluid and penetrating, is most likely to be the menstruum of the other; but water is more fluid and penetrating than air, and therefore, the most likely of the two to be the menstruum. We know that all bodies are more speedily acted upon, the more their parts are brought into contact with the menstruum that dissolves them; but water, enclosed with compressed air, is not the more diminished thereby. In short, we know, that cold, which diminishes the force of other menstrua, is often found to promote evaporation. In this variety of opinion, and uncertainty of conjecture, we cannot avoid thinking that a theory of evaporation may be formed upon very simple and obvious principles, and embarrassed with very few objections.

We know that a repelling power prevails in nature, not less than an attractive one. This repulsion prevails strongly between the body of fire and that

that of water. If the end of a red hot bar of iron be plunged into a vessel of water, the fluid rises, and large drops of it fly up in all manner of directions, every part bubbling and steaming until the iron be cold. Why may we not, for a moment, compare the rays of the sun, darted directly upon the surface of the water, to so many bars of red hot iron; each bar, indeed, infinitely small; but not the less powerful? In this case, wherever a ray of fire darts, the water, from its repulsive quality, will be driven on all sides; and, of consequence, as in the case of the bar of iron, a part of it will rise. The parts thus rising, however, will be extremely small; as the ray that darts is extremely so. The assemblage of the rays darting upon the water in this manner, will cause it to rise in a light thin steam above the surface; and as the parts of this steam are extremely minute, they will be lighter than air, and, consequently, float upon it. There is no need for supposing them bubbles of water, filled with fire; for any substance, even gold itself, will float on air, if its parts be made small enough; or, in other words, if its surface be sufficiently increased. This water, thus disengaged from the general mass, will be still farther attenuated and broken by the reflected rays, and consequently more adapted for ascending.

From this plain account, every appearance in evaporation may be easily deduced. The quantity of heat increases evaporation, because it raises a greater quantity of steam. The quantity of wind increases evaporation; for, by waving the surface of the water, it thus exposes a greater surface to the evaporating rays. A dry frost, in some measure, assists the quantity of evaporation; as the quantity of rays are found to be no way diminished thereby. Moist weather alone prevents evaporation; for the rays being absorbed, refracted, and broken, by the intervening moisture, before they arrive at the surface, cannot produce the effect; and the vapour will rise in a small proportion.

Thus far we have accounted for the ascent of vapours; but to account for their falling again, is attended with rather more difficulty. We have already observed, that the particles of vapour, disengaged from the surface of the water, will be broken and attenuated in their ascent, by the reflected, and even the direct rays, that happen to strike upon their minute surfaces. They will, therefore, continue to ascend, till they rise above the operation of the reflected rays, which reaches but to a certain height above the surface of the earth. Being arrived at this region, which is cold for want of reflected heat, they will be condensed, and suspended in the form of clouds. Some vapours that ascend to great heights, will be frozen into snow; others, that are condensed lower down, will put on the appearance of a mist, which we find the clouds to be, when we ascend among them, as they hang along the sides of a mountain. These clouds of snow and rain, being blown about by winds, are either entirely scattered and dispersed above, or they are still more condensed by motion, like a snow-ball, that grows more large and solid as it continues to roll. At last, therefore, they will become too weighty for the air which first raised them, to sustain; and they will descend, with their excess of weight, either in snow or rain. But as they will fall precipitately, when they begin to descend, the air, in some measure, will resist the falling; for, as the descending fluid gathers velocity in its precipitation, the air will increase its resistance to it, and the water will, therefore, be thus broken into rain; as we see, that water which falls from the tops of houses, though it begins in a spout, separates into drops before it has got to the bottom. Were it not for this happy interposition of the air, between us

and the water falling from a considerable height above us, a drop of rain might fall with dangerous force, and an hail-stone might strike us with fatal rapidity.

In this manner, evaporation is produced by day; but when the sun goes down, a part of that vapour which his rays had excited, being no longer broken, and attenuated by the reflecting rays, it will become heavier than the air, even before it has reached the clouds; and it will, therefore, fall back in dews, which differ only from rain in descending before they have had time to condense into a visible form.

Hail, the Cartesians say, is a frozen cloud, half melted, and frozen again in its descent. An hoar-frost is but a frozen dew. Lightning we know to be an electrical flash, produced by the opposition of two clouds: and thunder to be the sound proceeding from the same, continued by an echo reverberated among them. It would be to very little purpose, to attempt explaining exactly how these wonders are effected: we have as yet but little insight into the manner in which these meteors are found to operate upon each other; and, therefore, we must be contented with a detail rather of their effects than their causes.

In our own gentle climate, where Nature wears the mildest and kindest aspect, every meteor seems to befriend us. With us, rains fall in refreshing showers, to enliven our fields; and to paint the landscape with a more vivid beauty. Snows cover the earth, to preserve its tender vegetables from the inclemency of the departing winter. The dews descend with such an imperceptible fall as no way injures the constitution. Even thunder is seldom injurious; and it is often wished by the husbandman, to clear the air, and to kill numberless insects that are noxious to vegetation. Hail is the most injurious meteor that is known in our climate; but it seldom visits us with violence, and then its fury is but transient.

One of the most dreadful storms we hear of, was that of Hertfordshire, in the year 1697. It began by thunder and lightning, which continued for some hours, when suddenly a black cloud came forward, against the wind, and marked its passage with devastation. The hail-stones which it poured down, being measured, were found to be many of them fourteen inches round, consequently, as large as a bowling-green ball. Wherever it came, every plantation fell before it; it tore up the ground, split great oaks, and other trees, without number; the fields of ye were cut down, as if levelled with a scythe; wheat, oats, and barley, suffered the same damage. The inhabitants found but a precarious shelter, even in their houses, their tiles and windows being broke by the violence of the hail-stones, which, by the force with which they came, seemed to have descended from a great height. The birds, in this universal wreck, vainly tried to escape by flight; pigeons, crows, rooks, and many more of the smaller and feebler kinds, were brought down. An unhappy young man, who had not time to take shelter, was killed; one of his eyes was struck out of his head, and his body was all over black with the bruises: another had just time to escape, but not without the most imminent danger, his body being bruised all over. But what is most extraordinary, all this fell within the compass of a mile.

Mezeray, in his History of France, tells us of a shower of hail much more terrible, which happened in the year 1510, when the French monarch invaded Italy. There was, for a time, an horrid darkness, thicker than that of midnight, which continued till the terrors of mankind were changed to still more terrible objects, by thunder and lightning breaking the gloom, and bringing on such a shower of hail, as no history of human calamities

could equal. These hail-stones were of a bluish colour; and some of them weighed not less than an hundred pounds. A noisome vapour of sulphur attended the storm. All the birds and beasts of the country were entirely destroyed. Numbers of the human race suffered the same fate. But what is still more extraordinary, the fishes found no protection from their native element; but were equal sufferers in the general calamity.

These, however, are terrors that are seldom exerted in our mild climates. They only serve to mark the page of history with wonder; and stand as admonitions to mankind, of the various stores of punishment in the hands of the Deity, which his power can treasure up, and his mercy can suspend.

In the temperate zones, therefore, meteors are rarely found thus terrible; but between the tropic, and near the poles, they assume very dreadful and various appearances. In those inclement regions, where cold and heat exert their chief power, meteors seem peculiarly to have fixed their residence. They are seen there in a thousand terrifying forms, astonishing to Europeans, yet disregarded by the natives, from their frequency. The wonders of air, fire, and water, are there combined, to produce the most tremendous effects; and to sport with the labours and apprehensions of mankind. Lightnings, that flash without noise; hurricanes, that tear up the earth; clouds, that all at once pour down their contents, and produce an instant deluge; mock suns, northern lights, that illuminate half the hemisphere; circular rainbows; halos; fleeting balls of fire; clouds, reflecting back the images of things on earth, like mirrors; and water-spouts, that burst from the sea, to join with the mists, that hang immediately above them. These are but a part of the phænomena that are common in those countries; and from many of which, our own climate is, in a great measure, exempted.

The meteors of the torrid zone are different from those that are found near the polar circles: and it may readily be supposed, that in those countries where the sun exerts the greatest force in raising vapours of all kinds, there should be the greatest quantity of meteors. Upon the approach of the winter months, as they are called, under the line, which usually begin about May, the sky, from a fiery brightness, begins to be overcast, and the whole horizon seems wrapt in a muddy cloud. Mists and vapours still continue to rise; and the air, which so lately before was clear and elastic, now becomes humid, obscure, and stifling: the fogs become so thick, that the light of the sun seems in a manner excluded; nor would its presence be known, but for the intense and suffocating heat of its beams, which dart through the gloom, and, instead of dissipating, only serve to increase the mist. After this preparation, there follows an almost continual succession of thunder, rain, and tempests. During this dreadful season, the streets of cities flow like rivers; and the whole country wears the appearance of an ocean. The inhabitants often make use of this opportunity to lay in a stock of fresh water, for the rest of the year; as the same cause which pours down the deluge at one season, denies the kindly shower at another. The thunder which attends the fall of these rains, is much more terrible than that we are generally acquainted with. With us, the flash is seen at some distance, and the noise shortly after ensues; our thunder generally rolls on one quarter of the sky, and one stroke pursues another. But here it is otherwise; the whole sky seems illuminated with unremitted flashes of lightning; every part of the air seems productive of its own thunders; and every cloud produces its own shock. The strokes come so thick, that the inhabitants can scarce mark the intervals; but all is one unremitted roar of elementary

confusion. It should seem, however, that the lightning of those countries is not so fatal, or so dangerous, as with us; since, in this case, the torrid zone would be uninhabitable.

When these terrors have ceased, with which, however, the natives are familiar, meteors of another kind begin to make their appearance. The intense beams of the sun, darting upon stagnant waters, that generally cover the surface of the country, raise vapours of various kinds. Floating bodies of fire, which assume different names, rather from their accidental forms, than from any real difference between them, are seen without surprize. The draco volans, or flying dragon, as it is called; the ignis fatuus, or wandering fire; the fires of St. Helmo, or the mariner's light, are every where frequent; and of these we have numberless descriptions. "As I was riding in Jamaica," says Mr. Barham, "one morning from my habitation, situated about three miles north-west from Jago-de-la-Vega, I saw a ball of fire, appearing to me of the bigness of a bomb, swiftly falling down with a great blaze. At first I thought it fell into the town; but when I came nearer, I saw many people gathered together, a little to the southward, in the Savannah, to whom I rode up, to enquire the cause of their meeting: they were admiring, as I found, the ground's being strangely broke up and ploughed by a ball of fire; which, as they said, fell down there. I observed there were many holes in the ground; one in the middle of the bigness of a man's head, and five or six smaller round about it, of the bigness of one's fist, and so deep as not to be fathomed by such implements as were at hand. It was observed, also, that all the green herbage was burnt up, near the holes; and there continued a strong smell of sulphur near the place, for some time after."

Ulloa gives an account of one of a similar kind, at Quito. "About nine at night," says he, "a globe of fire appeared to rise from the side of the mountain Pichinca, and so large, that it spread a light over all the part of the city facing that mountain. The house where I lodged looking that way, I was surprized with an extraordinary light, darting through the crevices of the window-shutters. On this appearance, and the bustle of the people in the street, I hastened to the window, and came time enough to see it, in the middle of its career; which continued from west to south, till I lost sight of it, being intercepted by a mountain, that lay between me and it. It was round; and its apparent diameter about a foot. I observed it to rise from the sides of Pichinca; although, to judge from its course, it was behind that mountain where this congeries of inflammable matter was kindled. In the first half of its visible course it emitted a prodigious effulgence; then it began gradually to grow dim; so that, upon its disappearing behind the intervening mountain, its light was very faint."

Meteors, of this kind, are very frequently seen between the tropics; but they sometimes, also, visit the more temperate regions of Europe. We have the description of a very extraordinary one, given us by Montanari, that serves to shew to what great heights, in our atmosphere, these vapours are found to ascend. In the year 1676, a great globe of fire was seen at Bononia, in Italy, about three quarters of an hour after sun-set. It passed westward, with a most rapid course, and at the rate of not less than a hundred and sixty miles in a minute, which is much swifter than the force of a cannon-ball, and, at last, stood over the Adriatic sea. In its course it crossed over all Italy; and, by computation, it could not have been less than thirty-eight miles above the surface of the earth. In the whole line of its course, wherever it approached, the inhabitants below could distinctly hear it, with a hissing noise, resembling

resembling that of a fire-work. Having passed away to sea, towards Corfica, it was heard, at last, to go off with a most violent explosion, much louder than that of a cannon; and, immediately after, another noise was heard, like the rattling of a great cart upon a stony pavement; which was, probably, nothing more than the echo of the former sound. Its magnitude, when at Bononia, appeared twice as long as the moon, one way; and as broad the other; so that, considering its height, it could not have been less than a mile long, and half a mile broad. From the height at which this was seen, and there being no volcano, on that quarter of the world, from whence it came, it is more than probable that this terrible globe was kindled on some part of the contrary side of the globe, in those regions of vapours, which we have been just describing; and thus rising above the air, and passing, in a course opposite to that of the earth's motion, in this manner it acquired its amazing rapidity.

To these meteors, common enough southward, we will add one more of a very uncommon kind, which was seen by Ulloa, at Quito, in Peru; the beauty of which will, in some measure, serve to relieve us, after the description of those hideous ones preceding. "At day-break," says he, "the whole mountain of Pambamarca, where we then resided, was encompassed with very thick clouds; which the rising of the sun dispersed so far, as to leave only some vapours, too fine to be seen. On the side opposite to the rising sun, and about ten fathoms distant from the place where we were standing, we saw, as in a looking-glass, each his own image; the head being, as it were, the center of three circular rainbows, one without the other, and just near enough to each other as that the colours of the internal verged upon those more external; while round all was a circle of white, but with a greater space between. In this manner these circles were erected, like a mirror, before us; and as we moved, they moved, in disposition and order. But, what is most remarkable, though we were six in number, every one saw the phænomenon, with regard to himself, and not that relating to others. The diameter of the arches gradually altered, as the sun rose above the horizon; and the whole, after continuing a long time insensibly faded away. In the beginning, the diameter of the inward iris, taken from its last colour, was about five degrees and a half; and that of the white arch, which surrounded the rest, was not less than sixty-seven degrees. At the beginning of the phænomenon, the arches seemed of an oval or elliptical figure, like the disk of the sun; and afterwards became perfectly circular. Each of these was of a red colour, bordered with an orange; and the last bordered by a bright yellow, which altered into a straw colour, and this turned to a green; but, in all, the external colour remained red." Such is the description of one of the most beautiful illusions that has been ever seen in nature. This alone seems to have combined all the splendours of optics in one view. To understand the manner, therefore, how this phænomenon was produced, would require a perfect knowledge of optics; which it is not our present province to enter upon. It will be sufficient, therefore, only to observe, that all these appearances arise from the density of the cloud, together with its uncommon and peculiar situation, with respect to the spectator and the sun. It may be observed, that but one of these three rainbows was real, the rest being only reflections thereof. It may also be observed, that whenever the spectator stands between the sun and a cloud of falling rain, a rainbow is seen, which is nothing more than the reflection of the different coloured rays of light from the bosom of the cloud. If, for instance, we

take a glass globe, filled with water, and hang it up before us, opposite the sun, in many situations, it will appear transparent; but if it is raised higher, or sideways, to an angle of forty-five degrees, it will at first appear red; altered a very little higher, yellow; then green; then blue, then violet colour; in short, it will assume successively all the colours of the rainbow; but, if raised higher, still it will become transparent again. A falling shower may be considered as an infinite number of these little transparent globes, assuming different colours, by being placed at the proper heights. The rest of the shower will appear transparent, and no part of it will seem coloured; but such as are at angles of forty-five degrees from the eye, forty-five degrees upward, forty-five degrees on each side, and forty-five degrees downward, did not the plain of the earth prevent us. We, therefore, see only an arch of the rainbow, the lower part being cut off from our sight by the earth's interposition. However, upon the tops of very high mountains, circular rainbows are seen, because we can see to an angle of forty-five degrees downward, as well as upward, or sideways, and therefore we take in the rainbow's complete circle.

In those forlorn regions, round the poles, the meteors though of another kind, are not less numerous and alarming. When the winter begins, and the cold prepares to set in, the same misty appearance which is produced in the southern climates by the heat, is there produced by the contrary extreme. The sea smokes like an oven, and a fog arises, which mariners call the frost smoke. This cutting mist, commonly raises blisters on several parts of the body; and, as soon as it is wafted to some colder part of the atmosphere, it freezes to little icy particles, which are driven by the wind, and create such an intense cold on land, that the limbs of the inhabitants are sometimes frozen, and drop off.

There also, halos, or luminous circles round the moon, are oftener seen than in any other part of the earth, being formed by the frost smoke; although the air otherwise seems to be clear. A lunar rainbow also is often seen there, though somewhat different from that which is common with us; as it appears of a pale white, striped with grey. In these countries also the aurora borealis streams, with peculiar lustre, and variety of colours. In Greenland it generally arises in the east, and darts its sportive fires, with variegated beauty, over the whole horizon. Its appearance is almost constant in winter; and, at those seasons when the sun departs, to return no more for half a year, this meteor kindly rises to supply its beams, and affords sufficient light for all the purposes of existence. However, in the very midst of their tedious night, the inhabitants are not entirely forsaken. The tops of the mountains are often seen painted with the red rays of the sun; and the poor Greenlander from thence begins to date his chronology. It would appear whimsical to read a Greenland calendar, in which we might be told, that one of their chiefs, having lived forty days, died, at last, of a good old age; and that his widow continued for half a day to deplore his loss, with great fidelity, before she admitted a second husband.

The meteors of the day, in these countries, are not less extraordinary than those of the night; mock suns are often reflected upon an opposite cloud; and the ignorant spectator fancies that there are often three or four real suns in the firmament at the same time. In this splendid appearance the real sun is always readily known by its superior brightness, every reflection being seen with diminished splendour. The solar rainbow there is often seen different from ours. Instead of a pleasing variety of colours,

lours, it appears of a pale white, edged with a stripe of dusky yellow; the whole being reflected from the bosom of a frozen cloud.

But, of all the meteors which mock the imagination with an appearance of reality, those strange illusions that are seen there, in fine serene weather, are the most extraordinary and entertaining. "Nothing," says Krantz, "ever surprised me more, than, on a fine warm summer's day, to perceive the islands that lie four leagues west of our shore, putting on a form quite different from what they are known to have. As I stood gazing upon them, they appeared, at first, infinitely greater than what they naturally are; and seemed as if I viewed them through a large magnifying glass. They were not thus only made larger, but brought nearer to me. I plainly descried every stone upon the land, and all the furrows filled with ice, as if I stood close by. When this illusion had lasted for a while, the prospect seemed to break up, and a new scene of wonder to present itself. The islands seemed to travel to the shore, and represented a wood, or a tall cut hedge. The scene then shifted, and shewed the appearance of all sorts of curious figures; as ships with sails, streamers and flags; antique elevated castles, with decayed turrets; and a thousand forms, for which fancy found a resemblance in nature. When the eye had been satisfied with gazing, the whole groupe of riches seemed to rise in air, and at length vanish into nothing. At such times the weather is quite serene and clear; but compressed with such subtle vapours, as it is in very hot weather; and these appearing between the eye and the object, give it all that variety of appearances which glasses of different refrangibilities would have done." Mr. Krantz observes, that commonly a couple of hours afterwards, a gentle west wind and a visible mist follows, which puts an end to this *lusus naturæ*.

It were easy to swell this catalogue of meteors with the names of many others, both in our own climate and in other parts of the world. Such as falling stars, which are thought to be no more than unctuous vapours, raised from the earth to small heights, and continuing to shine till that matter which first raised and supported them, being burnt out, they fall back again to the earth, with extinguished flame. Burning spears, which are a peculiar kind of aurora borealis; bloody rains, which are said to be the excrements of an insect, that at that time has been raised into the air. Showers of stones, fishes, and ivy-berries, at first, no doubt, raised into the air by tempests in one country, and falling at some considerable distance, in the manner of rain, to astonish another. But omitting these, of which we know little more than what is thus briefly mentioned, we will give a description of a water-spout; a most surprising phenomenon; not less dreadful to mariners, than astonishing to the observers of nature.

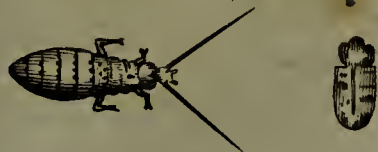
These spouts are seen very commonly in the tropical seas, and sometimes in our own. Those seen by Tournefort, in the Mediterranean, he has described as follows. "The first of these," says this great botanist, "that we saw, was about a musket-shot from our ship. There we perceived the water began to boil, and to rise about a foot above its level. The water was agitated and whitish; and above its surface there seemed to stand a smoke, such as might be imagined to come from wet straw before it begins to blaze. It made a sort of a murmuring sound, like that of a torrent, heard at a distance, mixed, at the same time, with an hissing noise, like that of a serpent: shortly after we perceived a column of this smoke rise up to the clouds, at the same time whirling about with great rapidity. It appeared to be as thick as one's finger; and the

former found still continued. When this disappeared, after lasting for about eight minutes, upon turning to the opposite quarter of the sky, we perceived another, which began in the manner of the former; presently after a third appeared in the west; and instantly beside it still another arose. The most distant of these three could not be above a musket-shot from the ship. They all continued like so many heaps of wet straw set on fire, that continued to smoke, and to make the same noise as before. We soon after perceived each, with its respective canal, mounting up in the clouds, and spreading where it touched; the cloud, like the mouth of a trumpet, making a figure, to express it intelligibly, as if the tail of an animal were pulled at one end by a weight. These canals were of a whitish colour, and so tinged, as I suppose, by the water which was contained in them; for, previous to this, they were apparently empty, and of the colour of transparent glass. These canals were not straight, but bent in some parts, and far from being perpendicular, but rising in their clouds with a very inclined ascent. But what is very particular, the cloud to which one of them was pointed happening to be driven by the wind, the spout still continued to follow its motion, without being broken; and passing behind one of the others, the spouts crossed each other, in the form of a St. Andrew's cross. In the beginning they were all about as thick as one's finger, except at the top, where they were broader, and two of them disappeared; but shortly after, the last of the three increased considerably; and its canal, which was at first so small, soon became as thick as a man's arm, then as his leg, and at last thicker than his whole body. We saw distinctly, through this transparent body, the water, which rose up with a kind of spiral motion; and it sometimes diminished a little of its thickness, and again resumed the same; sometimes widening at top, and sometimes at bottom; exactly resembling a gut filled with water, pressed with the fingers, to make the fluid rise or fall; and I am well convinced, that this alteration in the spout was caused by the wind, which pressed the cloud, and impelled it to give up its contents. After some time its bulk was so diminished as to be no thicker than a man's arm again; and thus, swelling and diminishing, it at last became very small. In the end, I observed the sea which was raised about it to resume its level by degrees, and the end of the canal that touched it to become as small as if it had been tied round with a cord; and this continued till the light, striking through the cloud, took away the view. I still, however, continued to look, expecting that its parts would join again, as I had before seen in one of the others, in which the spout was more than once broken, and yet again came together; but I was disappointed, for the spout appeared no more."

Many have been the solutions offered for this surprising appearance. Mr. Buffon supposes the spout, here described, to proceed from the operation of fire, beneath the bed of the sea; as the waters at the surface are thus seen agitated. However, the solution of Dr. Stuart is not divested of probability; who thinks it may be accounted for by suction, as in the application of a cupping-glass to the skin.

Wherever spouts of this kind are seen they are extremely dreaded by mariners; for if they happen to fall upon a ship they most commonly dash it to the bottom. But, if the ship be large enough to sustain the deluge, they are at least sure to destroy its sails and rigging, and render it unfit for sailing. It is said that vessels of any force usually fire their guns at them, loaden with a bar of iron; and, if so happy as to strike them, the water is instantly seen

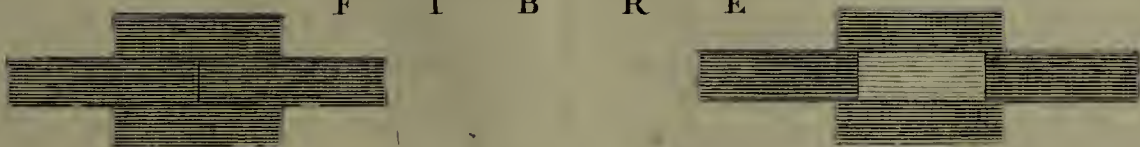
DEATH WATCH



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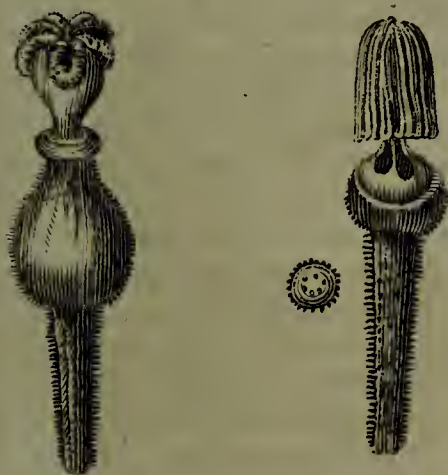
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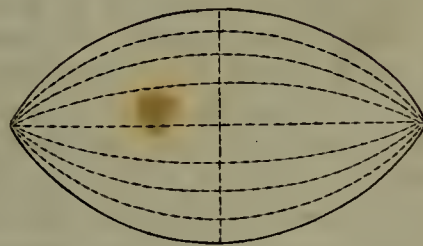
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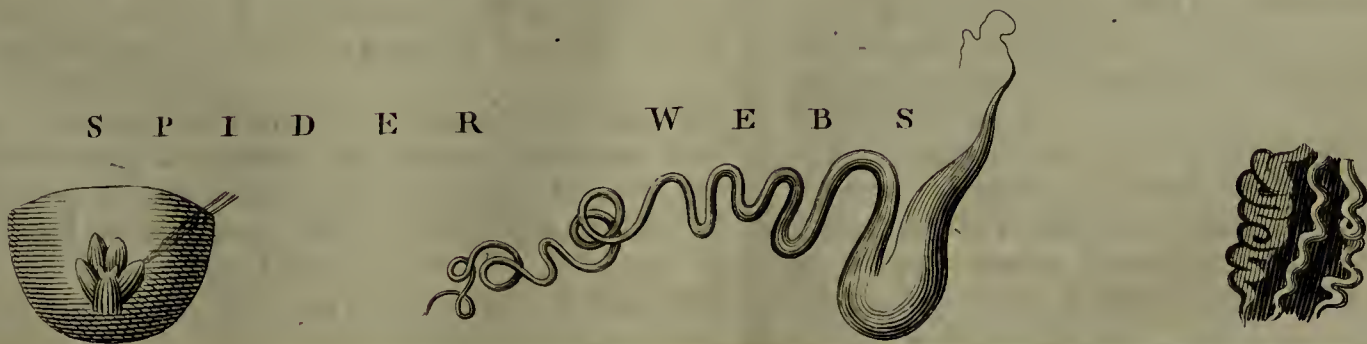
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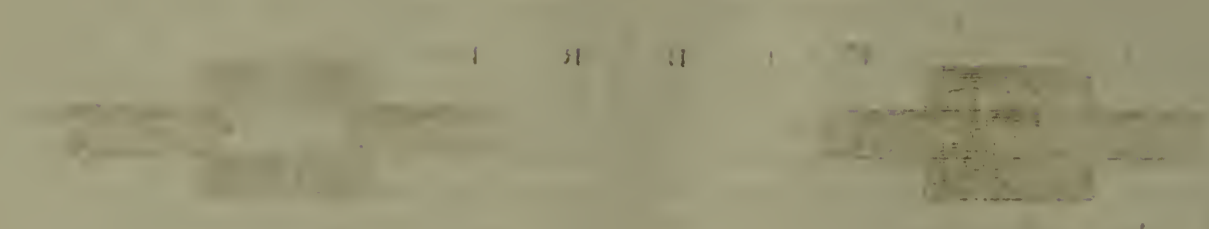


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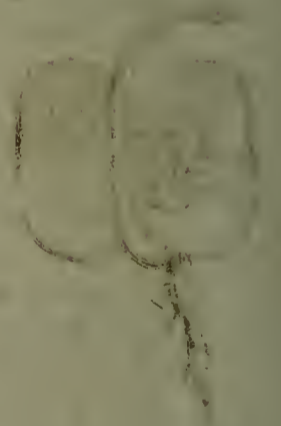
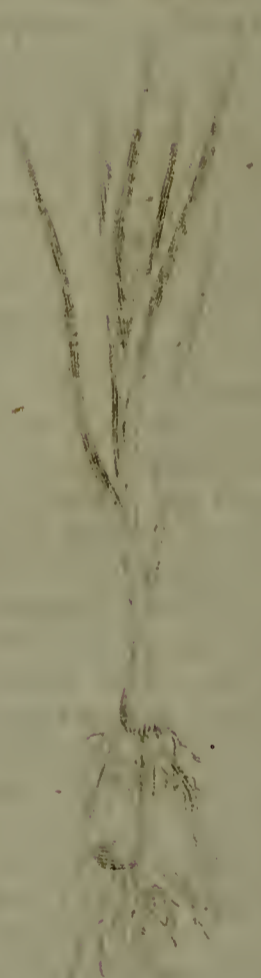
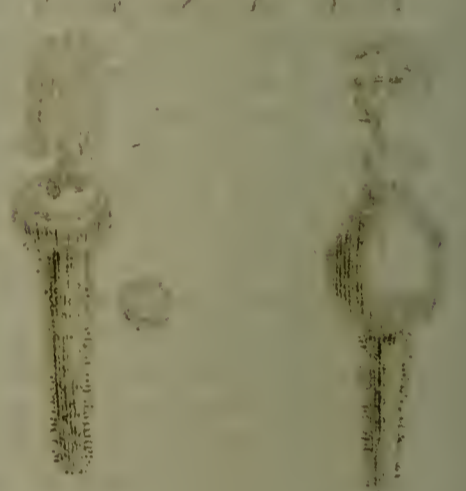
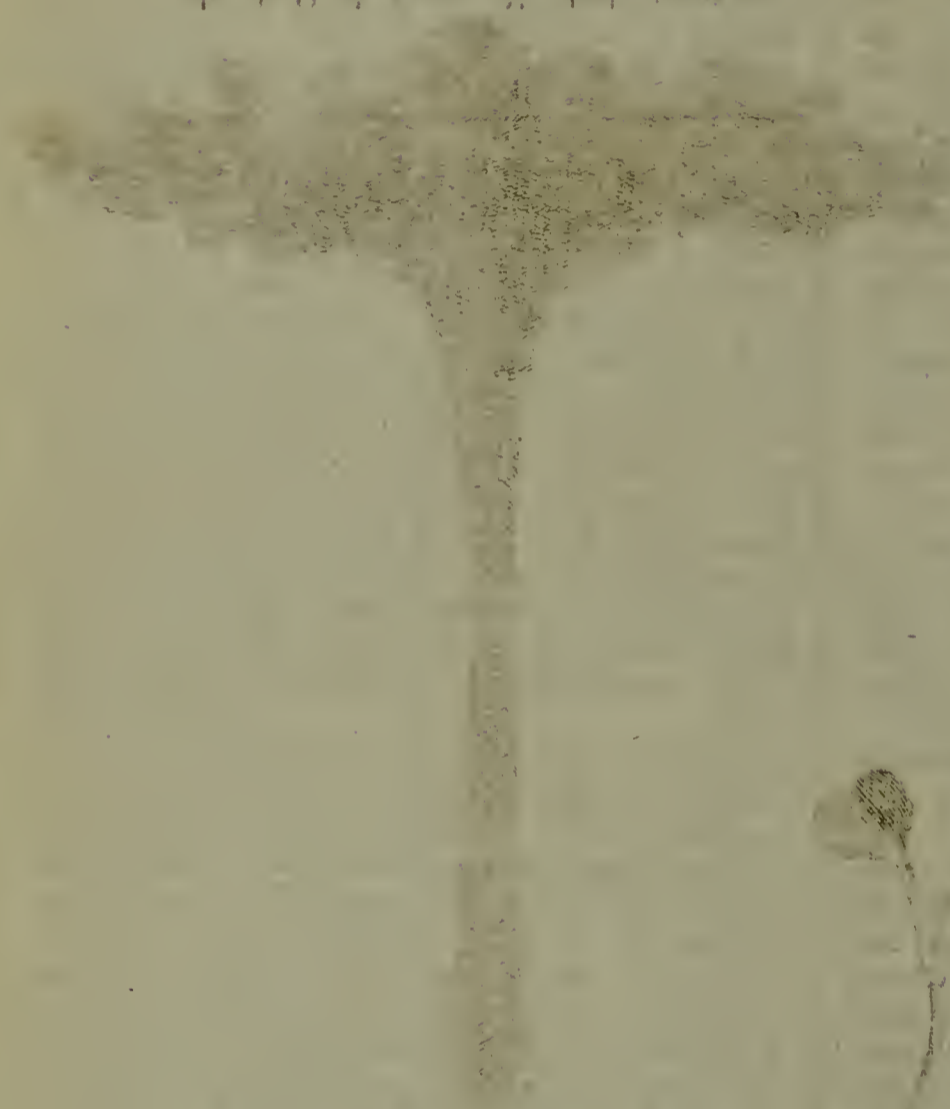
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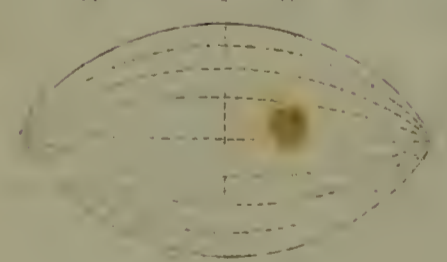


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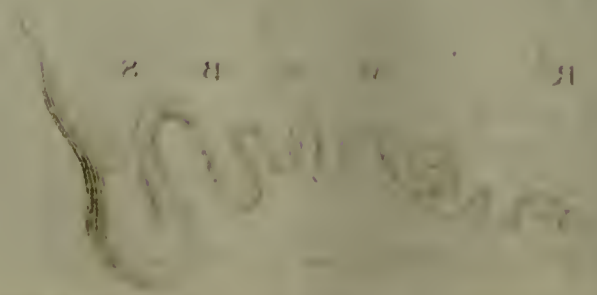
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to fall from them, with a dreadful noise, though without any further mischief.

The more the sky is obscured with clouds, water-spouts, and the phænomena which accompany them, are the more easily observed.

M. de la Nux thinks, and perhaps with reason, that water-spouts are nothing but viscous portions of a cloud driven off by different whirlwinds, i. e. by the whirlings of the superior air sinking into the mass of vapours of which the whole cloud is composed.

What seems to prove that these water-spouts are composed of viscous parts, is the tenaciousness of their cohesion; for they make inflexions and curvatures in every direction, without breaking: If the matter of water-spouts was not viscous, how can we conceive that they should, without breaking, bend and obey the motion of the winds? If all the parts did not firmly adhere, the wind would dissipate them, or, at least, make them change their form. But, as the form, both of the large and small water-spouts, is uniformly the same, this is almost a certain indication of the viscous tenacity of the matter of which they are composed.

Thus the basis of the matter of water-spouts is a viscous substance contained in the clouds, and every water-spout is formed by a whirlwind of air pressing through the mass of vapours, and, by blowing up the inferior part of the cloud, pierces it, and descends with its covering of viscous matter. And, as complete water-spouts descend from the cloud to the surface of the sea, the water must boil and whirl at the place to which the end of the water-spout is directed; because the air blows from the extremity of the water-spout like the tube of a pair of bellows. The effects of this blowing upon the sea will augment, in proportion as the cylinder approaches the surface of the water; and, when the orifice of the tube enlarges, a greater quantity of air is permitted to escape, and the agitation of the water is, of course, increased.

M. de la Nux has seen water-spouts around the isle of Bourbon in the months of January, May, June, and October, i. e. in all seasons of the year. He has seen them in calm weather, and during the highest winds. These phænomena, however, may be said to be rare, and seldom appear but upon the sea; because the viscosity of the clouds can only proceed from the bituminous and greasy particles raised, by the heat of the sun and the winds, from the waters of the sea; and collected in the clouds near its surface. It is for this reason that water-spouts seldom appear on land, where there is not, as on the surface of the sea, a sufficient quantity of bituminous and oily particles to be exhaled by the action of the sun. They are sometimes, however, observed on land, and even at great distances from the sea; this effect may be produced, when viscous clouds have been rapidly driven by a violent wind from the sea toward the land. M. Grignon, in the month of June 1768, saw a well formed water-spout in Lorraine near Vauvillier, among the hills which are a continuation of the Vosges. It was about fifty fathoms high. Its form was that of a column, and it communicated with a large thick cloud. It was impelled by one or several winds, which made the water-spout turn rapidly; and it produced lightning and thunder. This water-spout continued seven or eight minutes only, and broke upon the base of the hill, which is from five to six hundred feet high.

We are at a loss whether we ought to reckon these spouts called typhons, which are sometimes seen at land, of the same kind with those so often described by mariners, at sea, as they seem to differ in several respects. That, for instance, observed at Hatfield, in Yorkshire, in 1687, as it is described

No. 54.

by a person who saw it, seems rather to have been a whirlwind than a water-spout. The season in which it appeared was very dry; the weather extremely hot, and the air very cloudy. After the wind had blown for some time, with considerable force; and condensed the black clouds one upon another, a great whirling of the air ensued; upon which the center of the clouds, every now and then, darted down, in the shape of a thick long black pipe; in which the relator could distinctly view a motion, like that of a screw, continually screwing up to itself, as it were, whatever it happened to touch. In its progress it moved slowly over a grove of young trees, which it violently bent, in a circular motion: Going forward to a barn, it in a minute stripped it of all the thatch, and filled the whole air with the same. As it came near the relator, he perceived that its blackness proceeded from a gyration of the clouds, by contrary winds, meeting in a point, or a center; and where the greatest force was exerted, there darting down, like an Archimedes's screw, to suck up all that came in its way. Another which he saw, some time after, was attended with still more terrible effects; levelling, or tearing up great oak trees, catching up the birds in its vortex, and dashing them against the ground. In this manner it proceeded, with an audible whirling noise, like that of a mill; and, at length, dissolved, after having done much mischief.

But we must still continue to suspend our assent as to the nature even of these land spouts; since they have been sometimes found to drop, in a great column of water, at once upon the earth, and produce an instant inundation, which could not readily have happened had they been caused by the gyration of a whirlwind only. Indeed, every conjecture regarding these meteors, seems to be entirely unsatisfactory. They sometimes appear in the calmest weather at sea; and, therefore, these are not caused by a whirlwind. They are always capped by a cloud: and, therefore, are not likely to proceed from fires at the bottom. They change place; and, therefore, suction seems impracticable. In short, we still want facts, upon which to build a rational theory; and, instead of knowledge, we must be contented with admiration. To be well acquainted with the appearances of Nature, even though we are ignorant of their causes, often constitutes the most useful wisdom.

Having thus gone through a particular description of the earth, let us now pause for a moment, to contemplate the great picture before us. The universe may be considered as the palace in which the Deity resides; and this earth as one of its apartments. In this, all the meaner races of animated nature mechanically obey him; and stand ready to execute his commands, without hesitation. Man alone is found refractory; he is the only being endowed with a power of contradicting these mandates: The Deity was pleased to exert superior power in creating him a superior being; a being endowed with a choice of good and evil; and capable, in some measure, of co-operating with his own intentions. Man, therefore, may be considered as a limited creature, endowed with powers imitative of those residing in the Deity. He is thrown into a world that stands in need of his help; and has been granted a power of producing harmony from partial confusion.

If, therefore, we consider the earth as allotted for our habitation, we shall find, that much has been given us to enjoy, and much to amend; that we have ample reasons for our gratitude, and still more for our industry. In those great outlines of nature,

to which art cannot reach, and where our greatest efforts must have been ineffectual, God himself has finished these with amazing grandeur and beauty. Our beneficent Father has considered these parts of nature as peculiarly his own; as parts which no creature could have skill or strength to amend: and therefore, made them incapable of alteration, or of more perfect regularity. The heavens, and the firmament, shew the wisdom, and the glory of the Workman. Astronomers, who are best skilled in the symmetry of systems, can find nothing there that they can alter for the better. God made these perfect, because no subordinate being could correct their defects.

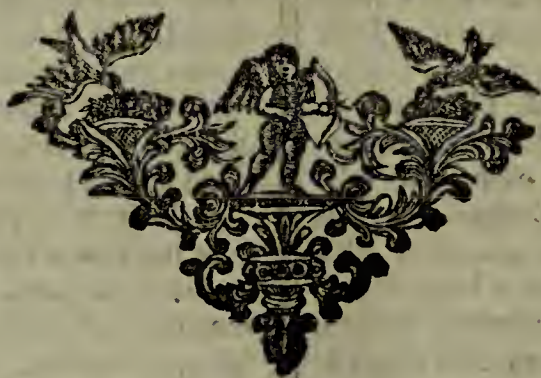
When, therefore, we survey nature on this side, nothing can be more splendid, more correct, or amazing. We there behold a Deity residing in the midst of an universe, infinitely extended every way, animating all, and cheering the vacuity with his presence! We behold an immense and shapeless mass of matter, formed into worlds by his power, and dispersed at intervals, to which even the imagination cannot travel! In this great theatre of his glory, a thousand suns, like our own, animate their respective systems, appearing and vanishing at divine command. We behold our own bright luminary, fixed in the center of its system, wheeling its planets in times proportioned to their distances, and at once dispensing light, heat, and action. The earth also is seen with its twofold motion; producing, by the one, the change of seasons; and, by the other, the grateful vicissitudes of day and night. With what silent magnificence is all this performed! with what seeming ease! The works of art are exerted with interrupted force; and their noisy progress discovers the obstructions they receive: but the earth, with a silent steady rotation, successively presents every part of its bosom to the sun; at once imbibing nourishment and light from that parent of vegetation and fertility.

But not only provisions of heat and light are thus supplied, but its whole surface is covered with a transparent atmosphere, that turns with its motion, and guards it from external injury. The rays of the sun are thus broken into a genial warmth; and, while the surface is assisted, a gentle heat is produced in the bowels of the earth, which contributes to cover it with verdure. Waters also are supplied in healthful abundance, to support life,

and assist vegetation. Mountains arise, to diversify the prospect, and give a current to the stream. Seas extend from one continent to the other, replenished with animals, that may be turned to human support; and also serving to enrich the earth with a sufficiency of vapour. Breezes fly along the surface of the fields, to promote health and vegetation. The coolness of the evening invites to rest; and the freshness of the morning renews for labour.

Such are the delights of the habitation that has been assigned to man; without any one of these he must have been wretched; and none of these could his own industry have supplied. But while many of his wants are thus kindly furnished, on the one hand, there are numberless inconveniencies to excite his industry on the other. This habitation, though provided with all the conveniencies of air, pasturage, and water, is but a desert place, without human cultivation. The lowest animal finds more conveniencies in the wilds of nature, than he who boasts himself their lord. The whirlwind, the inundation, and all the asperities of the air, are peculiarly terrible to man, who knows their consequences, and, at a distance, dreads their approach. The earth itself, where human art has not pervaded, puts on a frightful gloomy appearance. The forests are dark and tangled; the meadows over-grown with rank weeds; and the brooks stray without a determined channel. Nature, that has been kind to every lower order of beings, has been quite neglectful with regard to him; to the savage uncontriving man the earth is an abode of desolation, where his shelter is insufficient, and his food precarious.

A world thus furnished with advantages on one side, and inconveniencies on the other, is the proper abode of reason, is the fittest to exercise the industry of a free and a thinking creature. These evils, which art can remedy, and prescience guard against, are a proper call for the exertion of his faculties; and they tend still more to assimilate him to his Creator. God beholds with pleasure, that being which he has made, converting the wretchedness of his natural situation into a theatre of triumph; bringing all the headlong tribes of nature into subjection to his will; and producing that order and uniformity upon earth, of which his own heavenly fabric is so bright an example.



A

NEW, COMPLETE, and UNIVERSAL BODY, or SYSTEM of
NATURAL HISTORY;

Being a Grand, Accurate and Extensive

Display of Animated Nature.

B O O K VII.

Containing the NATURAL HISTORY *of* MAN.

C H A P. I.

Of the Nature of M A N.

HAVING given an account of the Earth in general, and the advantages and inconveniencies with which it abounds, we shall now proceed to give the Natural History of Man. Though it is so much our interest to acquire an exact and thorough knowledge of ourselves, yet we are often less acquainted with the human, than with any other existence. Provided by nature with organs, calculated solely for our preservation, we never employ those organs but to receive foreign impressions; our only study is, to acquire a familiarity with external objects, and to exist out of ourselves. Too intent on multiplying the functions of our senses, and on enlarging the external bounds of our being, rarely do we make any use of that internal sense which reduces us to our true dimensions, and which abstracts from us whatever does not constitute a part of ourselves. It is by an exertion of this sense alone, however, that we can form a proper judgment of ourselves. But how shall it receive its full activity and extent? How shall the soul, in which it resides, be disengaged from all the illusions of the mind? Having lost the habit of employing it, it has remained inactive amidst the tumult of our corporeal sensations; it has been, as it were, dried up by the fire of our passions; the heart, the mind, the senses, have all co-operated against it.

Unalterable in its substance, and impassible by its essence, it still, however, continues the same. The splendor of its light has been overcast, but its power has not been diminished. It is less luminous; but its guidance is not the less certain. Let us then collect those rays, of which we are not yet deprived. The obscurity with which we are surrounded will decrease; and though the road may not be every where equally filled with light, we yet

shall have a torch that will prevent us from going astray.

The first, and indeed the most difficult step, which leads to the knowledge of ourselves, is, a distinct conception of the nature of the two substances that constitute our being. To say simply, that the one is unextended, immaterial and immortal; and that the other is extended, material and mortal, is only to deny of one thing, what we affirm of another. What knowledge is to be acquired from this mode of negation? Such private expressions can exhibit no real and positive idea; but to say, that we are certain of the existence of the former, and that the existence of the latter is less evident; that the substance of the one is simple, indivisible, and of one form, since it only manifests itself by a single modification, which is thought; that the other is less a substance than a subject, capable of receiving different forms, which bear a relation to those of our senses, but all as uncertain, all as variable, as the nature of the organs themselves: That is to say something; it is to ascribe to each such distinct and positive properties, as may lead us to an elemental knowledge of both, and to a comparison between them.

From the smallest reflection on the origin of our knowledge, it is easy, indeed, to perceive, that by comparison alone, we can acquire it. What is absolutely incomparable, is utterly incomprehensible; of this, God is the only instance we can adduce; he exceeds all comprehension, because he is above all comparison. But whatever is capable of being compared, whatever we can contemplate in different lights, whatever we can consider relatively, may always conclude to come within the sphere of our understanding. The more subjects of comparison, the more different views, or particular appearances, we have for examining any object, the more methods there are for obtaining a knowledge of it, and the greater facility there is to combine those ideas which ought to direct our judgment.

The existence of the soul is demonstrated to us; or rather that existence and ourselves form but one and the same thing. To be and to think, are with us identical. This truth is within us, and it is more than intuitive; it is independent of our senses, of our imagination, of our memory, and of all our other relative faculties. The existence of our body, and of other external objects, is held in uncertainty by every unprejudiced reasoner; for what is that extension of length, breadth and depth, which we call our body, and which seems to be so much our own, but as it relates to our senses? What are even the material organs of those senses, but so many conformities with what affects them? And, with regard to our internal sense, our soul, has it any thing similar, any thing in common, with the nature of these external organs? Does the sensation excited in our soul by light or sound, resemble that tenuous matter, which seems to diffuse light, or even that tremulous undulation, which sound produces in the air? Our eyes and our ears have every necessary conformity with these matters, because those organs and matter itself, are, in effect, of the same nature. The sensation, however, which the soul experiences, has nothing similar, nothing analogous to it; and is not this a sufficient proof, that the nature of the soul is in reality different from that of matter?

It is a certain truth, then, that the internal sensation is altogether different from its cause; as also, that, if there are things which exist without us, they are in themselves totally different from what we conceive them to be. As the sensation therefore, bears no kind of resemblance to the thing which is the cause of it; does it not follow, that what excites our sensations is necessarily, and of its own nature, quite another thing than we imagine it? The extension which we perceive by our eyes, the impenetrability, of which we receive an idea by the touch, all those qualities, whose various combinations constitute matter, are of a doubtful existence; since our inward sensation, and what it represents to us as extension, impenetrability, &c. are no wise extended or impenetrable, and have not even the smallest affinity with those qualities.

If it is observed, that the soul is often affected with sensations, during sleep, and the absence of every object; and that these sensations are sometimes very different from those, which it has experienced by the presence of the same objects, through the channel of the senses; does it not lead to a belief, that this presence of objects is not necessary to the existence of our sensations; and that, of consequence, our soul and we may exist singly, and independently of those objects? During sleep, and after death, for example, our body exists; it has even all that kind of existence of which it is susceptible, and is the same as it was before; yet the soul no longer perceives this existence of the body; it has ceased to be with regard to us. The question is therefore, whether a thing which can exist, and afterwards not exist; whether a thing, which affects us in a manner altogether different from what it is, or what it has been, may yet be a reality of indubitable existence.

That something exists without us, we may believe, though not with a positive assurance; whereas of the real existence of every thing within us, we have a certainty. That of our soul therefore, is incontestible, and that of our body seems doubtful; because matter may be only a mode of the soul, one of its methods of perception. Our soul perceives by this method, when we are awake; it perceives by another method, when we are asleep; after death, it will perceive by a method far more different still: and whatever is, in the present state, the cause of its sensations, matter in general may well cease to exist,

with respect to it, when all communication with its own body is cut off.

But let us admit this existence of matter; let us, though it is impossible to demonstrate it, adopt the common opinion, and say, that it even exists as it appears to our senses, by comparing the soul with any material object, we shall then find differences so great, and contrarieties so strongly marked, that every doubt will instantly vanish of its being of a nature totally different, and of an order infinitely superior.

Our soul has but one form, which is very simple, very general, and very permanent. Thought is this form; otherwise than by thought, it is impossible for us to perceive the soul. This form has nothing in it of division and extension, nothing of impenetrability, or matter; of consequence, therefore, our soul, the subject of this form, is indivisible, and immaterial. Our body on the contrary, and all other bodies, have many forms. Every one of these is compounded, divisible, variable, perishable, and has a relation to the different organs, through which we perceive them. Our body, therefore, any things material, having nothing permanent, nothing real, nothing general, by which we may fix our researches, and attain a certain knowledge of them. A blind man has no idea of that part of a material object, which represents to us the form of bodies; a leper, whose skin has lost the sense of feeling, is denied all the ideas which arise from the touch; and a deaf man has no knowledge of sounds. Let these three modes of sensation be successively destroyed, in a man whom nature has provided with them, and the soul will exist in its wonted vigour; its internal functions will subsist, and thought will still manifest itself within him. On the other hand, divest matter of all its qualities; strip it of colour, of strength, of solidity, and of every other property which has any relation to our senses, and the consequence will be its annihilation. Our soul therefore, is unperishable, but matter may, and will perish.

Thus it is with all the other faculties of our soul, compared with those of our body, and with the most essential properties of any kind of matter. As the soul wills and commands, so the body obeys in every thing within its power. The soul forms, at pleasure, an intimate union with any object: neither distance, nor magnitude, nor figure, can obstruct this union, when the soul inclines to it; it is effected, and effected in an instant. The body can form no union: whatever touches it too closely injures it; it requires a long time in order to approach another body; it every where meets with some resistance, with some obstacle; from the smallest shock, its motion ceases. Is will then nothing more than a corporeal movement; and is contemplation but a simple contact? How could this contact take place upon a remote object, upon an abstracted subject? How could this movement be accomplished in an indivisible instant? Is it possible to have a conception of motion, without having a conception of space, and of time? Will, therefore, if it be a motion, is not a material one; and if the union of the soul to a particular object be a touch, a contact, is not this touch effected at a distance; is not this contact a penetration; qualities which are absolutely opposite to those of matter, and which of consequence cannot belong to an immaterial being?

But we have already dwelt too long on a subject, which by many will perhaps be considered as foreign to our purpose. Ought Considerations on the Soul to find a place in a system of Natural History? Why, after all, retrench from the Natural History of Man, the history of the noblest part of his being? Why thus preposterously debase him, and, as it were, force us to consider him merely as an animal; while
in

in reality, he is of a nature so different and distinguished, so superior to that of the brutes, that he who confounds them must be immersed in ignorance as themselves?

In comparing man with an animal, we find in both a body, an organized substance, senses, flesh, blood, motion, and a multitude of other resemblances. But these resemblances, are all external, and not sufficient to justify a decision, that the human and the animal natures are similar. In order to form a proper judgment of the nature of each, we ought to have as distinct a knowledge of the internal qualities of an animal, as we have of our own. As the knowledge, however, of what passes within an animal is impossible to be attained; as we know not of what order and kind its sensations may be, in relation to those of man; we may judge solely from a comparison of the effects of the natural operations of both.

Let us, then, take a view of these effects; and, while we admit of all the particular resemblances, limit our investigation to the most general differences. It will be allowed, that the most stupid man is able to manage the most acute animal: he governs it, and renders it subservient to his purposes; and this, not so much on account of his strength or skill, as of the superiority of his nature, and of his having a rational scheme, system of action, and method by which he compels the animals to obey him. We do not find, that the strongest and most expert animals give law to the others, and hold them in servitude. The stronger, it is true, devour the weaker; but this action implies no more than an urgent necessity, or a rage of appetite; a quality very different from that which is capable of producing a series of actions, all tending to the same end. Did animals enjoy this faculty, should we not see some of them assume dominion over others, and oblige them to furnish them with food, to watch over them and to attend them when sick or wounded? Now, throughout the creation of animals, there is no vestige of such subordination; no appearance that one of them knows, or is sensible of, the superiority of his own nature over that of others. It follows, then, that they must all be considered as of one nature; as also, that the nature of man is not only highly superior to that of any animal, but also entirely different from it.

Man, by an outward sign, indicates what passes within him; he communicates his sentiments by speech, which is a sign common to the whole human species. The savage and the civilized man have the same power of utterance; they both speak naturally, and speak so as to be understood. No animal is endowed with this expression of thought; nor is it a defect owing, as is commonly imagined, to the want of proper organs. Anatomists have found the tongue of an ape to be as perfect as that of a man. The ape, therefore, if he had thought, it would have speech; and if its thought had aught analogous to ours, this speech would have an analogy to ours also. Supposing its thoughts were only the thoughts of an ape, it still would hold some kind of discourse with other apes; a circumstance, of which we should certainly have heard, had it been endowed with the powers of speech. So far, then, is the ape from having any thought like ours, that it has not even any order or series of thoughts of its own. Nothing regular, nothing connected, passes within it; for as it expresses nothing by combined and settled signs, so it is, of consequence, void of thought, even in the lowest degree.

So true it is, that it is from no organical defect, animals are denied the gift of speech, that we know several species of them which may be taught to pronounce words, and even repeat sentences of some length. Perhaps, were we to take the trouble to

teach them, many others might be found capable of articulating particular sounds; but to make them conceive the idea which such sounds denote, is an impracticable task. They seem to repeat and even to articulate them, merely as an echo, or an artificial machine, would repeat or articulate. It is not in the mechanical powers, or the material organs, but in the intellectual faculty, in thought, that they are deficient.

As all language supposes a chain of thought, it is on this account that animals have none; for, even allowing something in them which resembles our first apprehensions, our most gross and mechanical sensations, they still will be found incapable of forming that association of ideas, which can alone produce reflection; and in this, be it remarked, consists the essence of thought. To this inability of connecting ideas, it is owing, that they are destitute of thought and speech; as also, that they neither can invent nor improve any thing. Were they endowed with the power of reflection, even in the most subordinate degree, they would be capable of making some kind of proficiency, and would acquire more industry: the modern beaver would build with more art and solidity than the ancient; and the bee would daily be adding new improvements to its cell. If we suppose this cell as perfect already as it can be, we ascribe to the insect an intelligence superior to our own; an intelligence whereby it could discern at once the last degree of perfection to which its work might be carried; while we ourselves are for ever in the dark as to this degree, and stand in need of much reflection, time and practice, in order to perfect even one of our most trivial arts.

Whence can arise that uniformity we observe in all the works of animals? Why does each species invariably perform the same actions in the same manner? And why does not one individual perform them better or worse than another? Can there be a stronger proof that their operations are merely the effects of mechanism and materiality; evidently as it follows, that if they possessed the smallest spark of that light which is inherent in us, their works would display variety at least, if they did not display perfection; and that one individual of the same species would, in some of its performances, do something a little different from what another had done? But this is far from being the case. One plan of action is common to the whole species, and whoever would attribute a soul to animals, must of necessity, allow but one to each species. Of this soul each individual would be an equal partaker; and as thereby it would be divisible, it would consequently be material, and of a nature widely different from ours.

Why, on the other hand, are our productions and performances so various and so diversified? Why is a servile imitation more troublesome to us than an original design? It is because our soul is our own; because it is independent on that of another; because we have nothing in common with our species, but the substance of our body; and because, in effect, our resemblance to animals is confined to the lowest of our faculties.

Were internal sensations annexed to matter, and dependent on the corporeal organs, should we not see as remarkable differences in the works of animals of the same species, as in those of men? Would not those which were the most happily organized, build their nests, contrive their cells, or lay their eggs, in a manner more solid, more elegant and more commodious? And would not some individual, possessed of a superior genius, take an opportunity to manifest that superiority in this very mode? Now nothing of this very kind has ever happened; and therefore the corporeal organs, however perfect or imperfect, have no influence on the nature of

the internal sensations. Hence may we conclude, that animals have no sensations of this kind; that such sensations have no connection with matter, no dependence, in their nature, on the corporeal organs; and that, of consequence, there must be a substance within us, different from matter, which is at once the subject and the cause that produces and receives those sensations.

But these proofs of the immateriality of the soul may be carried farther still. In all the works of nature, there are imperceptible gradations maintained. This truth, which in no other instance admits of exception, is here expressly contradicted; between the faculties of man, and those of the most perfect animal, the distance is infinite; an evident proof, that man is of a different nature, and that of himself he forms a distinct class, between which and that of animals, there is an immense chasm. If man belonged to the class of animals, there would be a certain number of beings in nature less perfect than the former, and more perfect than the latter, in order to complete the gradation of man to the monkey. But this is not the case; the transition is immediate from the thinking being to the material being; from intellectual power to mechanical force; from order and design to blind motion; from reflection to appetite.

To the ingenuous enquirer after truth more than enough has been here advanced, as demonstrative of the excellency of our nature, and of the immense distance which the Creator has placed between man and the brute. The former is a rational being, the latter a being devoid of reason. And as there is no medium between the positive and the negative; as there are no intermediate beings between the rational being, and the being devoid of reason; it is evident, that man is of a nature entirely different from that of the animal; that all the resemblance he bears to it is merely external; and that to judge of him by this resemblance, is to allow ourselves to be deceived by appearance, and wilfully to shut our eyes against that light, by which we ought to distinguish it from reality.

Having thus considered man as to his internal properties, we shall now proceed to examine his external ones, and to give the history of his body. After taking a view of the different stages of his life, we shall conduct him to the period when he must be separated from that body, and then resign him to the common mass of matter to which he belongs.

CHAP. II.

The Infancy of MAN.

IN surveying the various classes of animals, and examining their strength, their beauty, or their structure, we find man possesses most of those advantages united, which the rest enjoy partially. Infinitely superior to all others in the powers of the understanding, he is also superior to them in the fitness and proportions of his form. He would, indeed, have been one of the most miserable beings upon earth, if with a sentient mind he was so formed as to be incapable of obeying its impulse; but Nature has otherwise provided; as with the most extensive intellects to command, she has furnished him with a body the best fitted for obedience.

In infancy, however, that mind, and this body, form the most helpless union in all animated nature; and, if any thing can give us a picture of complete imbecillity, it is a man when just come into the world. The infant just born stands in need of all things, without the power of procuring any.

The lower races of animals, upon being produced, are active, vigorous, and capable of self-support; but the infant is obliged to wait in helpless expectation; and its cries are its only aid to procure subsistence.

An infant just born may be said to come from one element into another; for from the watery fluid in which it was surrounded, it now immerses into air; and its first cries seem to imply how greatly it regrets the change. How much longer it could have continued in a state of almost total insensibility, in the womb, is impossible to tell; but it is very probable that it could remain there some hours more. In order to throw some light upon this subject, Mr. Buffon so placed a pregnant bitch as that her puppies were brought forth in warm water, in which he kept them above half an hour at a time. However, he saw no change in the animals, thus newly brought forth; they continued the whole time vigorous; and, during the whole time, it is very probable that the blood circulated through the same channels through which it passed while they continued in the womb.

Almost all animals have their eyes closed, for some days after being brought into the world. The infant opens them the instant of its birth. However, it seems to keep them fixed and idle; they want that lustre which they acquire by degrees; and if they happen to move, it is rather an accidental gaze than an exertion of the act of seeing. The light alone seems to make the greatest impression upon them. The eyes of infants are sometimes found turned to the place where it is strongest; and the pupil is seen to dilate and diminish, as in grown persons, in proportion to the quantity it receives. But still, the infant is incapable of distinguishing objects; the sense of seeing, like the rest of the senses, requires an habit before it becomes any way serviceable. All the senses must be compared with each other, and must be made to correct the defects of one another, before they can give just information. It is probable, therefore, that if the infant could express its own sensations, it would give a very extraordinary description of the illusions which it suffers from them. The sight might, perhaps, be represented as inverting objects, or multiplying them; the hearing, instead of conveying one uniform tone, might be said to bring up an interrupted succession of noises; and the touch apparently would divide one body into as many as there are fingers that grasped it. But all these errors are lost in one common confused idea of existence; and it is happy for the infant, that it then can make but very little use of its senses, when they could serve only to bring it false information.

If there be any distinct sensations, those of pain seem to be much more frequent and stronger than those of pleasure. The infant's cries are sufficient indications of the uneasinesses it must at every interval endure; while, in the beginning, it has got no external marks to testify its satisfactions. It is not till after forty days that it is seen to smile; and not till that time also, the tears begin to appear, its former expressions of uneasiness being always without them. As to any other marks of the passions, the infant being as yet almost without them, it can express none of them in its visage; which, except in the act of crying and laughing, is fixed in a settled serenity. All the other parts of the body seem equally relaxed and feeble: its motions are uncertain, and its postures without choice; it is unable to stand upright; its hams are yet bent, from the habit which it received from its position in the womb; it has not strength enough in its arms to stretch them forward, much less to grasp any thing with its hands; it rests just in the posture it is laid; and, if abandoned, must continue in the same position.

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Nevertheless, though this be the description of infancy among mankind in general, there are countries, and races, among whom infancy does not seem marked with such utter imbecillity, but where the children, not long after they are born, appear possessed of a greater share of self-support. The children of Negroes have a surprising degree of this premature industry: they are able to walk at two months; or, at least, to move from one place to another: they also hang to the mother's back without any assistance, and seize the breast over her shoulder, continuing in this posture till she thinks proper to lay them down. This is very different in the children of our countries, that seldom are able to walk under a twelvemonth.

The skin of children newly brought forth, is always red, proceeding from its transparency, by which the blood beneath appears more conspicuous. Some say that this redness is greatest in those children that are afterwards about to have the finest complexions; and it appears reasonable that it should be so, since the thinnest skins are always the fairest. The size of a new-born infant is generally about twenty inches, and its weight about twelve pounds. The head is large, and all the members delicate, soft, and puffy. These appearances alter with its age; as it grows older, the head becomes less in proportion to the rest of the body; the flesh hardens: the bones that before birth grew very thick in proportion, now lengthen by degrees, and the human figure more and more acquires its due dimensions. In such children, however, as are but feeble or sickly, the head always continues too big for the body; the heads of dwarfs being extremely large in proportion.

Infants, when newly born, pass most of their time in sleeping, and awake with crying, excited either by sensations of pain, or of hunger. Man, when come to maturity, but rarely feels the want of food, as eating twice or thrice in the four and twenty hours is known to suffice the most voracious: but the infant may be considered as a little glutton, whose only pleasure consists in its appetite; and this, except when it sleeps, it is never easy without satisfying. Thus Nature has adapted different desires to the different periods of life; each as it seems most necessary for human support or succession. While the animal is yet forming, hunger excites it to that supply which is necessary for its growth; when it is completely formed, a different appetite takes place, that incites it to communicate existence. These two desires take up the whole attention at different periods, but are very seldom found to prevail strongly together in the same age; one pleasure ever serving to repress the other: and, if we find a person of full age, placing a principal part of his happiness in the nature and quantity of his food, we have strong reasons to suspect, that with respect to his other appetites, he still retains a part of the imbecillity of his childhood.

It is extraordinary, however, that infants, who are thus more voracious than grown persons, are nevertheless more capable of sustaining hunger. We have several instances, in accidental cases of famine, in which the child has been known to survive the parent; and seen clinging to the breast of their dead mother. Their little bodies also, are more patient of cold; and we have similar instances of the mother's perishing in the snow, while the infant has been found alive beside her. However, if we examine the internal structure of infants, we shall find an obvious reason for both these advantages. Their blood-vessels are known to be much larger than in adults; and their nerves much thicker and softer: thus, being furnished with a more copious quantity of juices, both of the nervous and sanguinary kinds, the infant finds a temporary sustenance

in this superfluity, and does not expire till both are exhausted. The circulation also being larger and quicker, supplies it with proportionable warmth, so that it is more capable of resisting the accidental rigours of the weather.

The first nourishment of infants is well known to be the mother's milk; and, what is remarkable, the infant has milk in its own breasts, which may be squeezed out by compression: this nourishment becomes less grateful as the child gathers strength; and perhaps, also, more unwholesome. However, in cold countries, which are unfavourable to propagation, and where the female has seldom above three or four children at the most, during her life, she continues to suckle the child for four or five years together. In this manner the mothers of Canada and Greenland are often seen suckling two or three children, of different ages, at a time.

The life of infants is very precarious, till the age of three or four, from which time it becomes more secure; and when a child arrives at its seventh year, it is then considered as a more certain life, as Mr. Buffon asserts, than at any other age whatever. It appears, from Simpson's Tables, that of a certain number of children born at the same time, a fourth part are found dead, at the end of the first year; more than two thirds at the end of the second; and, at least, half, at the end of the third: so that those who live to be above three years old, are indulged a longer term than half the rest of their fellow-creatures. Nevertheless, life, at that period, may be considered as mere animal existence; and rather a preparation for, than an enjoyment of, those satisfactions, both of mind and body, that make life of real value: and hence it is more natural for mankind to deplore a fellow-creature, cut off in the bloom of life, than one dying in early infancy. The one, by living up to youth, and thus wading through the disadvantageous parts of existence, seems to have earned a short continuance of its enjoyments; the infant, on the contrary, has served but a short apprenticeship to pain; and, when taken away, may be considered as rescued from a long continuance of misery.

There is something very remarkable in the growth of the human body. The embryo in the womb continues to increase still more and more, till it is born. On the other hand, the child's growth is less every year till the time of puberty, when it seems to start up of a sudden. Thus, for instance, the embryo, which is an inch long, in the first month, grows but one inch and a quarter in the second; it then grows one and a half in the third; two and a half in the fourth; and in this manner it keeps increasing, till in the last month of its continuance, it is actually found to grow four inches; and, in the whole, about eighteen inches long. But it is otherwise with the child when born: if we suppose it eighteen inches at that time, it grows, in the first year, six or seven inches; in the second year, it grows but four inches; in the third year about three; and so on, at the rate of about an inch and a half or two inches, each year, till the time of puberty, when Nature seems to make one great last effort, to complete her work, and unfold the whole animal machine.

The growth of the mind in children seems to correspond with that of the body. The comparative progress of the understanding is greater in infants than in children of three or four years old. If we only reflect a moment on the amazing acquisitions that an infant makes in the first and second years of life, we shall have much cause for wonder. Being sent into a world where every thing is new and unknown, the first months of life are spent in a kind of torpid amazement; an attention distracted by the multiplicity of objects that press to

be known. The first labour, therefore, of the little learner is, to correct the illusions of the senses, to distinguish one object from another, and to exert the memory, so as to know them again. In this manner a child of a year old has already made a thousand experiments; all which it has properly ranged, and distinctly remembers. Light, heat, fire, sweets, and bitters, sounds soft or terrible, are all distinguished at the end of a very few months. Besides this, every person the child knows, every individual object it becomes fond of, its rattles, or its bells, may be all considered as so many new lessons to the young mind, with which it has not become acquainted, without repeated exertions of the understanding. At this period of life, the knowledge of every individual object cannot be acquired without the same effort which, when grown up, is employed upon the most abstract idea: every thing the child hears or sees, all the marks and characters of nature, are as much unknown, and require the same attention to attain, as if the reader were set to understand the characters of an Ethiopic manuscript: and yet we see in how short a time the little student begins to understand them all, and to give evident marks of early industry.

It is very amusing to pursue the young mind, while employed in its first attainments. At about a year old, the same necessities that first engaged its faculties, increase, as its acquaintance with nature enlarges. Its studies, therefore, if we may so express it, are no way relaxed; for having experienced what gave pleasure at one time, it desires a repetition of it from the same object; and, in order to obtain this, that object must be pointed out: here, therefore, a new necessity arises, which, very often, neither its little arts nor importunities can remove; so that the child is at last obliged to set about naming the objects it desires to possess or avoid. In beginning to speak, which is usually about a year old, children find a thousand difficulties. It is not without repeated trials that they come to pronounce any one of the letters; nor without an effort of the memory, that they can retain them. For this reason, we frequently see them attempting a sound which they had learned, but forgot; and when they have failed, their attempt is often attended with apparent confusion. The letters soonest learned, are those which are most easily formed; thus A and B require an obvious disposition of the organs, and their pronunciation is consequently soon attained. Z and R, which require a more complicated position, are learned with greater difficulty. And this may, perhaps, be the reason why the children in some countries speak sooner than in others; for the letters mostly occurring in the language of one country, being such as are of easy pronunciation, that language is of course more easily attained. In this manner the children of the Italians are said to speak sooner than those of the Germans; the language of the one being smooth and open; that of the other, crowded with consonants, and extremely guttural.

But be this as it will, in all countries, children are found able to express the greatest part of their wants by the time they arrive at two years old; and from the moment the necessity of learning new words ceases, they relax their industry. It is then that the mind, like the body, seems every year to make slow advances; and, in order to spur up attention, many systems of education have been contrived.

Almost every philosopher who has written on the education of children, has been willing to point out a method of his own, chiefly professing to advance the health, and improve the intellects at the same time. These are usually found to begin with finding nothing right in the common practice; and

by urging a total reformation. In consequence of this, nothing can be more wild or imaginary than their various systems of improvement. Some will have the children every day plunged in cold water, in order to strengthen their bodies; they will have them converse with the servants in nothing but the Latin language, in order to strengthen their minds; every hour of the day must be appointed for its own studies, and the child must learn to make these very studies an amusement; till about the age of ten or eleven it becomes a prodigy of premature improvement. Quite opposite to this, we have others, whom the courtesy of mankind also calls philosophers: and they will have the child learn nothing till the age of ten or eleven; at which the former has attained so much perfection; with them the mind is to be kept empty, until it has a proper distinction of some metaphysical ideas about truth; and the promising pupil is debarred the use of even his own faculties, lest they should conduct him into prejudice and error. In this manner, some men; whom fashion has celebrated for profound and fine thinkers, have given their hazarded and untried conjectures, upon one of the most important subjects in the world, and the most interesting to humanity. When men speculate at liberty upon innate ideas, or the abstracted distinctions between will and power, they may be permitted to enjoy their systems at pleasure, as they are harmless, although they may be wrong; but when they alledge that children are to be every day plunged in cold water, and, whatever be their constitution, indiscriminately inured to cold and moisture; that they are to be kept wet in the feet, to prevent their catching cold; and never to be corrected when young, for fear of breaking their spirits when old; these are such noxious errors, that all reasonable men should endeavour to oppose them. Many have been the children whom these opinions began in speculation, have injured or destroyed in practice.

If any system be therefore necessary, it is one that would serve to shew, a very plain point; that very little system is necessary. The natural and common course of education is in every respect the best: We mean that in which the child is permitted to play among its little equals; from whose similar instructions it often gains the most useful stores of knowledge. A child is not idle because it is playing about the fields, or pursuing a butterfly; it is all this time storing its mind with objects, upon the nature, the properties, and the relations of which future curiosity may speculate.

It is a vain task to try to make a child's learning its amusement; nor would it answer any good end were it actually attained. The child, as was said, ought to have its share of play, and it will be benefited thereby; and for every reason also, it ought to have its share of labour. The mind, by early labour, will be thus accustomed to fatigues and subordination; and whatever be the person's future employment in life, he will be better fitted to endure it: he will be thus enabled to support the drudgeries of office, with content; or to fill up the vacancies of life with variety. The child, therefore, should by times be put to its duty; and be taught to know, that the task is to be done, or the punishment to be endured. We do not object against alluring it to duty by reward; but we well know, that the mind will be more strongly stimulated by pain; and both may, upon some occasions, take their turn to operate. In this manner, a child, by playing with its equals abroad, and labouring with them at school, will acquire more health and knowledge than by being bred up under the wing of any speculative system-maker; and will be thus qualified for a life of activity and obedience. It is true, indeed, that when educated in this manner, the boy may not be

so seemingly sensible and forward as one bred up under solitary instruction; and, perhaps, this early forwardness is more engaging than useful. It is well known, that many of those children who have been such prodigies of literature before ten, have not made an adequate progress to twenty. It should seem, that they only began learning manly things before their time; and, while others were busied in picking up that knowledge adapted to their age and curiosity, these were forced upon subjects unsuited to their years; and, upon that account alone, appearing extraordinary. The stock of knowledge in both may be equal; but with this difference, that each is yet to learn what the other knows.

But whatever may have been the acquisitions of children at ten or twelve, their greatest, and most rapid progress, is made when they arrive near the age of puberty. It is then that all the powers of nature seem at work in strengthening the mind, and completing the body; the youth acquires courage, and the virgin modesty; the mind, with new sensations, assumes new powers; it conceives with greater force, and remembers with greater tenacity. About this time, therefore, which is various in different countries, more is learned in one year than in any two of the preceding: and on this age, in particular, the greatest weight of instruction ought to be thrown.

CHAP. IV. Of PUBERTY.

IT is a common saying, that the season of youth is the season of pleasures: but this can only be true in savage countries, where but little preparation is made for the perfection of human nature; and where the mind has but a very small part in the enjoyment. It is otherwise in those places where nature is carried to the highest pitch of refinement, in which this season of the greatest sensual delight is wisely made subservient to the succeeding, and more rational one of manhood. Youth, with us, is but a scene of preparation; a drama, upon the right conduct of which all future happiness is to depend. The youth who follows his appetites, too soon seizes the cup, before it has received its best ingredients; and, by anticipating his pleasures, robs the remaining parts of life of their share; so that his eagerness only produces a manhood of imbecility, and an age of pain.

The time of puberty is different in various countries, and always more late in men than in women. In the warm countries, of India, the women are marriageable at nine or ten, and the men at twelve or thirteen. It is also different in cities where the inhabitants lead a more soft, luxurious life, from the country where they work harder, and fare less delicately. Its symptoms are seldom alike in different persons; but it is usually known by a swelling of the breasts in one sex, and a roughness of the voice in the other. At this season also, the women seem to acquire new beauty, while the men lose all that delicate effeminacy of countenance which they had when boys.

All countries, in proportion as they are civilized, or barbarous, improve, or degrade the nuptial satisfaction. In those miserable regions, where strength makes the only law, the stronger sex exerts its power, and becomes the tyrant over the weaker: while the inhabitant of Negroland is indolently taking his pleasure in the fields, his wife is obliged to till the grounds, that serve for their mutual support. It is thus in all barbarous countries, where the men throw all the laborious duties of life upon the

women; and, regardless of beauty, put the softer sex to those employments that must effectually destroy it.

But, in countries that are half barbarous, particularly wherever Mahometanism prevails, the men run into the very opposite extreme. Equally brutal with the former, they exert their tyranny over the weaker sex, and consider that half of the human creation as merely made to be subservient to the depraved desires of the other. The chief, and indeed the only aim of an Asiatic, is to be possessed of many women; and to be able to furnish a seraglio is the only tendency of his ambition. As the savage was totally regardless of beauty, he on the contrary, prizes it too highly; he excludes the person who is possessed of such personal attractions, from any share in the duties, or employments of life; and, as if willing to engross all beauty to himself, increases the number of his captives in proportion to the progress of his fortune. In this manner he vainly expects to augment his satisfactions, by seeking from many that happiness which he ought to look for in the society of one alone. He lives a gloomy tyrant, amidst wretches of his own making; he feels none of those endearments which spring from affection, none of those delicacies which arise from knowledge. His mistresses, being shut out from the world, and totally ignorant of all that passes there, have no arts to entertain his mind, or calm his anxieties; the day passes with them in fullen silence, or languid repose; appetite can furnish but few opportunities of varying the scene; and all that falls beyond it must be irksome expectation.

From this avarice of women, if we may so express it, has proceeded that jealousy and suspicion which ever attends the miser: hence those low and barbarous methods of keeping the women of those countries guarded, and of making, and procuring eunuchs to attend them. These unhappy creatures are of two kinds, the white and the black. The white are generally made in the country where they reside, being but partly deprived of the marks of virility; the black are generally brought from the interior parts of Africa, and are made entirely bare. These are chiefly chosen for their deformity: the thicker the lips, the flatter the nose, and the more black the teeth, the more valuable the eunuch; so that the vile jealousy of mankind here inverts the order of Nature; and the poor wretch finds himself valued in proportion to his deficiencies. In Italy, where this barbarous custom is still retained, and eunuchs are made, in order to improve the voice, the laws are severely aimed against such practice; so that being entirely prohibited, none but the poorest, and most abandoned of the people, still secretly practice it upon their children. Of those served in this manner, not one in ten is found to become a singer; but such is the luxurious folly of the times, that the success of one amply compensates for the failure of the rest. It is very difficult to account for the alterations which castration make in the voice, and the other parts of the body. The eunuch is shaped differently from others. His legs are of an equal thickness above and below; his knees weak; his shoulders narrow; and his beard thin and downy. In this manner his person is rendered more deformed; but his desires, as we are told, still continue the same; and actually, in Asia, some of them are found to have their seraglios, as well as their masters. Even in our country, we have an instance of a very fine woman's being married to one of them, whose appearance was the most unpromising; and, what is more extraordinary still, this couple continue perfectly happy in each other's society.

The mere necessities of life seem the only aim of
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the savage; the sensual pleasures are the only study of the semi-barbarian; but the refinement of sensuality, by reason, is the boast of real politeness. Among the merely barbarous nations, such as the natives of Madagascar, or the inhabitants of Congo, nothing is desired so ardently as to prostitute their wives, or daughters, to strangers, for the most trifling advantages; they will account it a dishonour not to be among the foremost who are thus received into favour; on the other hand, the Mahometan keeps his wife faithful, by confining her person; and would instantly put her to death if he but suspected her chastity. With the politer inhabitants of Europe both these barbarous extremes are avoided; the woman's person is left free, and no constraint is imposed but upon her affections. The passion of love, which may be considered as the nice conduct of ruder desire, is only known, and practised in this part of the world; so that what other nations guard as their right, the more delicate European is contented to ask as a favour. In this manner, the concurrence of mutual appetite contributes to increase mutual satisfaction; and the power on one side of refusing, makes every blessing more grateful when obtained by the other. In barbarous countries, woman is considered merely as an useful slave; in such as are somewhat more refined, she is regarded as a desirable toy; in countries entirely polished, she enjoys juster privileges; the wife being considered as an useful friend, and an agreeable mistress. Her mind is still more prized than her person; and without the improvement of both, she can never expect to become truly agreeable; for her good sense alone can preserve what she has gained by her beauty.

Female beauty, as was said, is always seen to improve about the age of puberty; but, if we should attempt to define in what this beauty consists or what constitutes its perfection, we should find nothing more difficult to determine. Every country has its peculiar way of thinking, in this respect; and even the same country thinks differently, at different times. The ancients had a very different taste from what prevails at present. The eye-brows joining in the middle was considered as a very peculiar grace, by Tibullus, in the enumeration of the charms of his mistress. Narrow foreheads were approved of, and scarce any of the Roman ladies that are celebrated for their other perfections, but are also praised for the redness of their hair. The nose also of the Grecian Venus, was such as would appear at present an actual deformity; as it fell in a straight line from the forehead, without the smallest sinking between the eyes; without which we never see a face at present.

Among the moderns, every country seems to have peculiar ideas of beauty. The Persians admire large eye-brows, joining in the middle; the edges and corners of the eyes are tintured with black, and the size of the head is increased by a great variety of bandages, formed into a turban. In some parts of India, black teeth and white hair, are desired with ardour; and one of the principal employments of the women of Thibet, is to redden the teeth with herbs, and to make their hair white by a certain preparation. The passion for coloured teeth obtains also in China, and Japan; where, to complete their idea of beauty, the object of desire must have little eyes, nearly closed, feet extremely small, and a waist far from being shapely. There are some nations of the American Indians, that flatten the head of their children, by keeping them, while young, squeezed between two boards, so as to make the visage much larger than it would naturally be. Others flatten the head at top; and others make it as round as they possibly can. The inhabitants along the western coasts of Africa, have

a very extraordinary taste for beauty. A flat nose, thick lips, and a jet black complexion, are these the most indulgent gifts of Nature. Such, indeed, they are all, in some degree, found to possess. However, they take care, by art, to increase the natural deformities, as they should seem to us; and they have many additional methods of rendering the persons still more frightfully pleasing. The whole body and visage is often scarred with the variety of monstrous figures; which is not done without great pain, and repeated incision; and even sometimes, parts of the body are cut away. But it would be endless to remark the various arts which caprice, or custom, has employed to distort and disfigure the body, in order to render it more pleasing: in fact, every nation, how barbarous soever, seems unsatisfied with the human figure, as Nature has left it, and has its peculiar arts of heightening beauty. Painting, powdering, cutting, boring the nose, and the ears, lengthening the one, and depressing the other, are arts practised in many countries; and, in some degree, admired in all. These arts might have been at first introduced to hide epidemic deformities; custom, by degrees, reconciles them to the view; till, from looking upon them with indifference, the eye at length begins to gaze with pleasure.

CHAP. V.

Of the Age of MANHOOD.

THE human body attains its full height during the age of puberty; or, at least a short time after. Some young people cease growing at fourteen, or fifteen; while others continue their growth till two or three and twenty. During this period they are mostly of slender make, their thighs and legs small, and the muscular parts as yet unfilled: but, by degrees, the fleshy fibres augment; the muscles swell, and assume their figure; the limbs become more proportioned; and more round; and, before the age of thirty, the body, in men, has acquired its most perfect symmetry.

In women, the body attains this symmetry much sooner, as with them the age of maturity is much earlier: the muscles, and all the other parts being less strong, less compact, and less solid than those of men, they require less time in coming to perfection; and, as they are less in size, that size is sooner completed. Hence it is, that the persons of women are found to be as complete at twenty, as those of men are found to be at thirty.

The body of a well-shaped man ought to be square, the muscles expressed with boldness, and the lines of the face distinctly marked. In women superior elegance prevails; her form is more delicate and more smooth. Strength and majesty belong to the former, grace and softness are the peculiar embellishments of the latter.

In both, does each part even of their form declare their sovereignty over every living creature. Man supports his body erect; his attitude is that of command; and his face, which is turned towards the heavens, displays the dignity of his station. The image of his soul is painted in his countenance; and the excellence of his nature penetrates through the material form in which it is inclosed. His majestic port, his sedate, and resolute step, announce the superiority of his rank. He touches the earth only with his extremity; and beholds it as if at a disdainful distance. His arms are not given to him for pillars of support; nor, by rendering his hands callous against the ground, does he lose the delicacy of which the hand is the principal organ. The arms and hands are formed for very different purposes; they

they are formed to second every intention of his will, and to perfect the gifts of Nature.

When the soul is at rest, all the features of the visage seem settled in a state of profound tranquility. Their proportion, their union, their harmony, seem to mark the sweet serenity of the mind, and to give a true information of what passes within. When the soul, however, is excited, the human visage becomes a living picture; where the passions are expressed with as much delicacy as energy, where every motion is designed by some correspondent feature, where every impression anticipates the will, and betrays those hidden agitations, that he would often wish to conceal.

It is particularly in the eyes that the passions are painted; and in which we may most readily discover their beginning. The eye seems to belong to the soul more than any other organ; it seems to participate of all its emotions; as well the most soft and tender, as the most violent and tumultuous. These it not only receives, but transmits by sympathy; the observing the eye of one catches the secret fire from another; and thus the passion often becomes general.

Such persons as are short-sighted, labour under a particular disadvantage, in this respect. They are, in a manner, entirely cut off from the language of the eyes; and this gives an air of stupidity to the face, which often produces very unfavourable prepossessions. However intelligent we may find such persons, it is with difficulty that we renounce our former prejudices against them. In this manner, we are too much induced to judge of men by their physiognomy; and having perhaps, at first, caught up our judgments prematurely, they mechanically influence us all our lives after. This extends even to the very colour, or the cut of people's cloaths; and we should for this reason be careful, even in such trifling particulars, since an article so paltry as dress go to make up a part of the total judgment which those we converse with may form to our advantage.

The vivacity, or the languid motion of the eyes, gives the strongest marks to physiognomy; and their colour contributes still more to enforce the expression. The different colours of the eye are the dark-hazle, the light-hazle, the green, the blue, the grey, the whitish-grey, and also the red. These different colours arise from the different colours of the little muscles that serve to contract the pupils, and they are very often found to change colour with disorder, and with age.

Those most frequent are, the hazle and the blue, and very often, both these colours are found in the eyes of the same person. Those eyes which are called black, are only of the dark-hazle, which may be easily seen upon closer inspection; however, those eyes are reckoned the most beautiful where the shade is the deepest; and either in these, or the blue eyes, the fire, which gives to the eye its finest expression, is more distinguishable in proportion to the darkness of the tint. For this reason, the black eyes, as they are called, have the greatest vivacity; but, probably, the blue have the most powerful effects in beauty, as they reflect a greater variety of lights, being composed of more various colours.

This variety, which is found in the colour of the eyes, is peculiar to man, and one or two of the brute-creation: but, in general, the colour in any one individual is the same in all the rest. The eyes of oxen are brown; those of sheep of a water colour; those of goats are grey, &c. and it may also be, in general remarked, that the eyes of most white animals are red; thus the rabbit, the ferret, and, even in the human race, the white Moor, all have their eyes of a red colour.

Though the eye, when put into motion, seems to

be drawn on one side, yet it only moves round its centre; by which its coloured part moves nearer, or farther from the angle of the eye-lids, or is elevated or depressed. The distance between the eyes is less in man than in any other animal; and in some of these it is so great, that it is impossible that they should ever view the same object with both eyes at once, unless it be at a great distance.

Next to the eyes, the features, which most give a character to the face, are the eye-brows; which being in some measure, more apparent than the other features, are most readily distinguished at a distance.

The eye-lashes have an effect, in giving expression to the eye, particularly when long and close; they soften its glances, and improve its sweetness. Man and apes are the only animals that have eye-lashes both upon the upper and lower lids; all other animals want them on the lid below.

The eye-lids serve to guard the ball of the eyes and to furnish it with a proper moisture. The upper lids rise and fall; the lower has scarce any motion; and though their being moved depends on the will, yet it often happens that the will is unable to keep them open, when sleep, or fatigue, oppresses the mind. In birds, and amphibious quadrupeds, the lower lid alone has motion; fishes and insects have no eye-lids whatsoever.

The forehead makes a large part of the face, and a part which chiefly contributes to its beauty. It ought to be justly proportioned; neither too round nor too flat, neither too narrow nor too low, and the hair should come thick upon its extremities. It is known to every body how much the hair tends to improve the face; and how much the being bald serves to take away from beauty. The highest part of the head is that which becomes bald the soonest, as well as that part which lies immediately above the temples; and as for the hair under the temples, and at the back of the head, it is seldom known to fail.

Of all parts, or appendages of the body, the hair is that which is found most different, in different climates; and often, it not only contributes to mark the country, but also the disposition of the man. It is in general thickest where the constitution is strongest; and more glossy and beautiful where the health is most permanent. The ancients held the hair to be a sort of excrement, produced like the nails; the part next the root pushing out that immediately contiguous. But the moderns have found that every hair may be truly said to live, to receive nutriment, to fill and distend itself like the other parts of the body. The roots, they observe, do not turn grey sooner than the extremities, but the whole hair changes colour at once; and we have many instances of persons who have grown grey in one night's time.

The nose is the most prominent feature in the face; but, as it has scarce any motion, and that only in the strongest passions, it rather adds to the beauty, than to the expression of the countenance.

The form of this feature, and its advanced position, are peculiar to the human visage alone. Other animals, for the most part, have nostrils, with a partition between them; but none of them have an elevated nose. Apes themselves have scarce any thing else of this feature, but the nostrils; the rest of the feature lying flat upon the visage, and scarce higher than the cheek-bones.

The mouth and lips, next to the eyes, are found to have the greatest expression. The passions have great power over this part of the face; and the mouth marks its different degrees, by its different forms. The organ of speech still more animates this part, and give it more life than any other feature in the countenance. The ruby colour of the lips, and the
white

white enamel of the teeth, give it such a superiority over every other feature, that it seems to make the principal object of our regards. In fact, the whole attention is fixed upon the lips of the speaker; however rapid his discourse, however various the subject, the mouth takes correspondent situations; and deaf men have been often found to see the force of those reasonings which they could not hear, understanding every word as it was spoken.

The under-jaw in man possesses a great variety of motions; while the upper has been thought, by many, to be quite immoveable. However, that it moves in man, a very easy experiment will suffice to convince us. If we keep the head fixed with any thing between our teeth, the edge of a table for instance, and then open our mouths, we shall find that both jaws recede from it at the same time; the upper jaw rises, the lower falls, and the table remains untouched between them. The upper jaw has motion as well as the under; and, what is remarkable, it has its proper muscles behind the head, for thus raising and depressing it. Whenever, therefore, we eat, both jaws move at the same time, though very unequally; for the whole head moving with the upper jaw, of which it makes a part, its motions are thus less observable. In the human embryo, the under jaw is very much advanced before the upper. In the adult, it hangs a good deal more backward; and those whose upper and under row of teeth are equally prominent, and strike directly against each other, are what the painters call under-hung; and they consider this as a great defect in beauty. The under jaw in a Chinese face falls greatly more backward than with us; and the difference is half an inch, when the mouth is shut naturally. In instances of the most violent passion, the under jaw has often an involuntary quivering motion; and often also, a state of languor produces another, which is that of yawning. Every one knows how very sympathetic this kind of languid motion is; and that for one person to yawn, is sufficient to set all the rest of the company a yawning. A ridiculous instance of this was commonly practised upon the famous M'Laurin, one of the professors at Edinburgh. He was very subject to have his jaw dislocated; so that when he opened his mouth wider than ordinary, or when he yawned, he could not shut it again. In the midst of his harangues, therefore, if any of his pupils began to be tired of his lecture, he had only to gape or yawn, and the professor instantly caught the sympathetic affection; so that he thus continued to stand speechless, with his mouth wide open, till his servant, from the next room, was called in to set his jaw again.

When the mind reflects with regret upon some good unattained or lost, it feels an internal emotion, which acting upon the diaphragm, and that upon the lungs, produces a sigh; this when the mind is strongly affected, is repeated; sorrow succeeds these first emotions; and tears are often seen to follow: sobbing is the sigh still more invigorated; and lamentation, or crying, proceeds from the continuance of the plaintive tone of the voice, which seems to implore pity. There is yet a silent agony, in which the mind appears to disdain all external help, and broods over its distresses with gloomy reserve. This is the most dangerous state of mind; accidents or friendship may lessen the louder kinds of grief; but all remedies for this, must be had from within: and there, despair too often finds the most deadly enemy.

Laughter is a sound of the voice, interrupted and pursued for some continuance. The muscles of the belly, and the diaphragm, are employed in the slightest exertions; but those of the ribs are strongly agitated in the louder: and the head sometimes is thrown backward, in order to raise them with greater

ease. The smile is often an indication of kindness and good-will: it is also often used as a mark of contempt and ridicule.

Blushing proceeds from different passions; being produced by shame, anger, pride, and joy. Paleness is often also the effect of anger; and almost ever attendant on fright and fear. These alterations in the colour of the countenance, are entirely involuntary; all the other expressions of the passions, are, in some small degree, under controul; but blushing and paleness, betray our secret purposes; and we might as well attempt to stop them, as the circulation of the blood, by which they are caused.

The whole head, as well as the features of the face, takes peculiar attitudes from its passions: it bends forward, to express humility, shame, or sorrow; it is turned to one side, in languor, or in pity; it is thrown with the chin forward, in arrogance and pride; erect, in self-conceit, and obstinacy; it is thrown backwards in astonishment; and combines its motion to the one side, and the other, to express contempt, ridicule, anger, and resentment. Painters, whose study leads to the contemplation of external forms, are much more adequate judges of these, than any naturalist can be; and it is with these a general remark, that no one passion is regularly expressed on different countenances in the same manner; but that grief often sits upon the face like joy; and pride assumes the air of passion. It would be vain, therefore, in words, to express their general effect, since they are often as various as the countenances they sit upon; and in making this distinction nicely, lies all the skill of the physiognomist. In being able to distinguish what part of the face is marked by nature, and what by the mind; what part has been originally formed, and what is made by habit, constitutes this science, upon which the ancients so much valued themselves, and which we at present so little regard. Some, however, of the most acute men among us, have paid great attention to this art; and, by long practice, have been able to give some character of every person whose face they examined. Montaigne is well known to have disliked those men who shut one eye in looking upon any object; and Fielding asserts, that he never knew a person with a steady glavering smile, but he found him a rogue. However, most of these observations, tending to a discovery of the mind by the face, are merely capricious; and Nature has kindly hid our hearts from each other to keep us in good humour with our fellow creatures.

The parts of the head which give the least expression to the face, are the ears; and they are generally found hidden under the hair. These, which are immoveable, and make so small an appearance in man, are very distinguishable features in quadrupeds. They serve in them as the principal marks of the passion; the ears discover their joys or their terrors, with tolerable precision; and denote all their internal agitations. The smallest ears, in men, are said to be most beautiful; but the largest are found the best for hearing. There are some savage nations who bore their ears, and so draw that part down, that the tip of the ears are seen to rest upon their shoulders.

The strange variety in the different customs of men, appears still more extravagant in their manner of wearing their beards. Some, and among others the Turks, cut the hair off their heads, and let their beards grow. The Europeans, on the contrary, shave their beards, and wear their hair. The Negroes shave their heads in figures at one time, in stars at another, in the manner of friars; and still more commonly in alternate stripes; and their little boys are shaved in the same manner. The Talapoints, of Siam, shave the heads and the eye-brows of such children as are committed to their care.

Every nation seems to have entertained different prejudices, at different times, in favour of one part or another of the beard. Some have admired the hair upon the cheeks on each side; as we see with some low-bred men among ourselves, who want to be fine. Some like the hair lower down; some chuse it curled; and others like it strait. Some have cut it into a peak; and others shave all but the whisker. This particular part of the beard was highly prized among the Spaniards; till of late, a man without whiskers was considered as unfit for company; and where Nature had denied them, Art took care to supply the deficiency. We are told of a Spanish general who, when he borrowed a large sum of money from the Venetians, pawned his whisker, which he afterwards took proper care to release. Kingston assures us, that a considerable part of the religion of the Tartars consists in the management of their whiskers; and that they waged a long and bloody war with the Persians, declaring them infidels, merely because they would not give their whiskers the orthodox cut. The kings of Persia carried the care of their beards to a ridiculous excess, when they chose to wear them matted with gold thread; and even the kings of France of the first race, had them knotted and buttoned with gold. But of all nations, the Americans take the greatest pains in cutting their hair, and plucking their beards. The under part of the beard, and all but the whisker, they take care to pluck up by the roots, so that many have supposed them to have no hair naturally growing on that part: and even Linnæus has fallen into that mistake. Their hair is also cut into bands; and no small care employed in adjusting the whisker. In fact, we have a very wrong idea of savage finery; and are apt to suppose that, like the beasts of the forest, they rise, and are dressed with a shake: but the reverse is true; for no birth-night beauty takes more time or pains in the adorning her person, than they. When the Cherokee kings were over here, they were often three hours in dressing. They never would venture to make their appearance till they had gone through the tedious ceremonies of the toilet; they had their boxes of oil and ochre, their fat, and their perfumes, like the most effeminate beau, and generally took up four hours in dressing, before they considered themselves as fit to be seen. We must not, therefore, consider a delicacy in point of dress, as a mark of refinement, since savages are much more difficult in this particular, than the most fashionable or tawdry European. The more barbarous the people, the sonder of finery. In Europe, the lustre of jewels, and the splendor of the most brilliant colours, are generally given up to women, or to the weakest part of the other sex, who are willing to be contemptibly fine: but in Asia, these trifling fineries are eagerly sought after by every condition of men; and, as the proverb has it, we find the richest jewels in an Ethiop's ear. The passion for glittering ornaments, is still stronger among the absolute barbarians, who often exchange their whole stock of provisions, and whatever else they happen to be possessed of, with our seamen, for a glass bead, or a looking-glass.

Although fashions have arisen in different countries from fancy and caprice, these, when they become general, deserve examination. Mankind have always considered it as a matter of moment, and they will ever continue desirous of drawing the attention of each other, by such ornaments as mark the riches, the power, or the courage of the wearer. The value of those shining stones which have at all times been considered as precious ornaments, is entirely founded upon their scarceness or their brilliancy. It is the same likewise, with respect to those shining metals, the weight of which is so little regarded, when spread over our cloaths. These orna-

ments are rather designed to draw the attention of others, than to add to any enjoyments of our own; and few there are that these ornaments will not serve to dazzle, and who can coolly distinguish between the metal and the man.

All things rare and brilliant, will, therefore, ever continue to be fashionable, while men derive greater advantage from opulence than virtue; while the means of appearing considerable are more easily acquired, than the title to be considered. The first impression we generally make, arises from our dress; and this varies, in conformity to our inclinations, and the manner in which we desire to be considered. The modest man, or he who would wish to be thought so, desires to shew the simplicity of his mind, by the plainness of his dress; the vain man, on the contrary, takes a pleasure in displaying his superiority, and is willing to incur the spectator's dislike, so he does but excite his attention.

Another point of view which men have in dressing, is to increase the size of their figure; and to take up more room in the world than Nature seems to have allotted them. We desire to swell out our cloaths by the stiffness of art, and raise our heels, while we add to the largeness of our heads. How bulky soever our dress may be, our vanities are still more bulky. The largeness of the doctor's wig arises from the same pride with the smallness of the beau's queue. Both want to have the size of their understanding measured by the size of their heads.

There are some modes that seem to have a more reasonable origin, which is to hide or to lessen the defects of Nature. To take men altogether, there are many more deformed and plain, than beautiful and shapely. The former, as being the most numerous, give law to fashion; and their laws are generally such as are made in their own favour. The women begin to colour their cheeks with red, when the natural roses are faded; and the younger are obliged to submit, though not compelled by the same necessity. In all parts of the world, this custom prevails more or less; and powdering and frizzing the hair, though not so general, seems to have arisen from a similar controul.

But leaving the draperies of the human picture let us return to the figure, unadorned by art. Man's head, whether considered externally or internally, is differently formed from that of all other animals, the monkey-kind only excepted, in which there is a striking similitude. There are some differences, however, which we shall take notice of in another place. The bodies of all quadrupede animals are covered with hair; but the head of man seems the part most adorned; and that more abundantly than in any other animal.

There is a very great variety in the teeth of all animals; some have them above and below; others have them in the under jaw only: in some they stand separate from each other; while in some they are continued and united. The palate of some fishes is nothing else but a bony plate studded with points, which perform the offices of teeth. All these substances, in every animal, derive their origin from the nerves, the substance of the nerves hardens by being exposed to the air; and the nerves that terminate in the mouth, being thus exposed, acquire a bony solidity. In this manner, the teeth and nails are formed in man; and in this manner also, the beak, the hoofs, the horns, and the talons of other animals, are found to be produced.

The neck supports the head, and unites it to the body. This part is much more considerable in the generality of quadrupeds, than in man. But fishes, and other animals that want lungs similar to ours, have no neck whatsoever. Birds, in general, have the neck longer than any other kind of animals: those

those of them, which have short claws, have also short necks; those, on the contrary, that have them long, are found to have the neck in proportion. In men, there is a lump upon the wind-pipe, formed by the thyroid cartilage, which is not to be seen in women; an Arabian fable says, that this is a part of the original apple, that has stuck in the man's throat by the way, but that the woman swallowed her part of it down.

The human breast is outwardly formed in a very different manner from that of other animals. It is larger in proportion to the size of the body; and none but man, and such animals as make use of their fore feet as hands, such as monkeys, bats, and squirrels, are found to have those bones called the clavicles, or, as we usually term them, the collar-bones. The breasts in women are larger than in men; however, they seem formed in the same manner; and, sometimes, milk is found in the breasts of men, as well as in those of women. Among animals, there is a great variety in this part of the body. The teats of some, as in the ape and elephant, are like those of men, being but two, and placed on each side of the breast. The teats of the bear amount to four. The sheep has but two, placed between the hinder legs. Other animals; such as the bitch, and the sow, have them all along the belly; and, as they produce many young, they have a great many teats for their support. The form also of the teats varies in different animals; and, in the same animal, at different ages. The bosom in females, seems to unite all our ideas of beauty; where the outline is continually changing, and the gradations are soft and regular.

The graceful fall of the shoulders, both in man and woman, constitute no small part of beauty. In apes, though otherwise made like us, the shoulders are high, and drawn up on each side towards the ears. In man they fall by a gentle declivity; and the more so, in proportion to the beauty of his form. In fact, being high-shouldered, is not without reason considered as a deformity, for we find very sickly persons are always so; and people, when dying, are ever seen with their shoulders drawn up in a surprising manner. The muscles that serve to raise the ribs, mostly rise near the shoulders; and the higher we raise the shoulders, we the more easily raise the ribs likewise. It happens, therefore, in the sickly and the dying, who do not breathe without labour, that to raise the ribs they are obliged to call in the assistance of the shoulders; and thus their bodies assume, from habit, that form which they are so frequently obliged to assume. Women with child also are usually seen to be high-shouldered; for the weight of the inferior parts drawing down the ribs, they are obliged to use every effort to elevate them, and thus they raise the shoulders of course.

The arms of men but very little resemble the fore-feet of quadrupeds, and much less the wings of birds. The ape is the only animal that is possessed of hands and arms; but these are much more rudely fashioned, and with less exact proportion than in men; the thumb not being so well opposed to the rest of the fingers, in their hands, as in ours.

The form of the back is not much different in man from that of other quadrupede animals, only that the reins are more muscular in him, and stronger. The buttock, however, in man, is different from that of all other animals whatsoever. What goes by that name, in other creatures, is only the upper part of the thigh: man being the only animal that supports himself perfectly erect; the largeness of this part is owing to the peculiarity of his position.

Man's feet also are different from those of all other animals, those even of apes not excepted. The

foot of the ape is rather a kind of aukward hand; its toes, or rather fingers, are long, and that of the middle longest of all. This foot also wants the heel, as in man; the sole is narrower, and less adapted to maintain the equilibrium of the body in walking, dancing or running.

The nails are less in man than in any other animal. If they were much longer than the extremities of the fingers, they would rather be prejudicial than serviceable, and obstruct the management of the hand. Such savages as let them grow long, make use of them in slaying animals, in tearing their flesh, and such like purposes; however, though their nails are considerably larger than ours, they are by no means to be compared to the hoofs, or the claws of other animals. They may sometimes be seen longer indeed than the claws of any animal whatsoever; as we learn that the nails of some of the learned men in China are longer than their fingers. But these want that solidity which might give force to their exertions; and could never, in a state of nature, have served them for annoyance, or defence.

There is little known exactly with regard to the proportion of the human figure; and the beauty of the best statues is better conceived by observing than by measuring them. The statues of antiquity, which were at first copied after the human form, are now become the models of it; nor is there one man found whose person approaches to those inimitable performances that have thus, in one figure, united the perfections of many. It is sufficient to say that, from being at first models, they are now become originals; and are used to correct the deviations in that form from whence they were taken. We will not, however, pretend to give the proportions of the human body as taken from these, there being nothing more arbitrary, and which good painters themselves so much contemn. Some, for instance, who have studied after these, divide the body into ten times the length of the face, and others into eight. Some pretend to tell us that there is a similitude of proportion in different parts of the body. Thus, that the hand is the length of the face; the thumb the length of the nose; the space between the eyes is the breadth of an eye; that the breadth of the thigh, at thickest, is double that of the thickest part of the leg, and treble the smallest; that the arms extended are as long as the figure is high; that the legs and thighs are half the length of the figure. All this, however, is extremely arbitrary; and the excellence of a shape, or the beauty of a statue, results from the attitude and position of the whole, rather than any established measurements; begun without experience, and adopted by caprice. In general, it may be remarked that the proportions alter in every age, and are obviously different in the two sexes. In woman, the shoulders are narrower, and the neck proportionably longer than in men. The hips also are considerably larger, and the thighs much shorter than in men. These proportions, however, vary greatly at different ages. In infancy the upper parts of the body are much larger than the lower; the legs and thighs do not constitute any thing like half the height of the whole figure; in proportion as the child increases in age, the inferior parts are found to lengthen; so that the body is not equally divided until it has acquired its full growth.

The size of men varies considerably. Men are said to be tall who are from five feet eight inches to six feet high. The middle stature is from five feet five to five feet eight, and these are said to be of small stature who fall under these measures. However, it ought to be remarked, that the same person is always taller when he arises in the morning; than upon going to bed at night; and sometimes there is an inch difference, and often more. Few persons are sensible of this remarkable variation; and, some

some say, it was first perceived, in England, by a recruiting officer. He often found that those men whom he had enlisted for soldiers, and answered to the appointed standard at one time, fell short of it when they came to be measured before the colonel, at the head quarters. This diminution in their size proceeded from the different times of the day, and the different states of the body when they happened to be measured. If, as was said; they were measured in the morning, after the night's refreshment, they were found to be commonly half an inch, and very often a whole inch taller than if measured after the fatigues of the day; if they were measured when fresh, in the country, and before a long fatiguing march to the regiment, they were found to be an inch taller than when they arrived at their journey's end. All this is now well known among those who recruit for the army; and the reason of this difference of stature is obvious. Between all the joints of the back-bone, which is composed of several pieces, there is a glutinous liquor deposited, which serves, like oil in a machine, to give the parts an easy play upon each other. This lubricating liquor, or synovia, as the anatomists call it, is poured in during the season of repose, and is consumed by exercise and employment; so that in a body, after hard labour, there is scarce any of it remaining; but all the joints grow stiff; and their motion becomes hard and painful. It is from hence, therefore, that the body diminishes in stature. For this moisture being drained away, from between the numerous joints of the back-bone, they lie closer upon each other; and their whole length is thus very sensibly diminished; but sleep, by restoring the fluid, again swells the spaces between the joints, and the whole is extended to its former dimensions.

As the human body is thus often found to differ from itself in size, so it is found to differ in its weight also; and the same person, without any apparent cause, is found to be heavier at one time than another. If, after having eaten an hearty dinner, or having drank hard, the person should find himself thus heavier, it would appear no way extraordinary; but the fact is, the body is very often found heavier some hours after eating an hearty meal, then immediately succeeding it. If, for instance, a person, fatigued by a day's hard labour, should eat a plentiful supper, and then get himself weighed upon going to bed; after sleeping soundly, if he is again weighed, he will find himself considerably heavier than before; and this difference is often found to amount to a pound, or sometimes to a pound and a half. From whence this adventitious weight is derived is not easy to conceive; the body, during the whole night, appears rather plentifully perspiring than imbibing any fluid, rather losing than gaining moisture: however, we have no reason to doubt but that either by the lungs, or, perhaps, by a peculiar set of pores, it is all this time inhaling a quantity of fluid, which thus increases the weight of the whole body, upon being weighed the next morning.

Although the human body is externally more delicate than any of the quadrupede kind, it is, notwithstanding, extremely muscular: and, perhaps, for its size, stronger than that of any other animal. If we should offer to compare the strength of the lion with that of man, we should consider that the claws of this animal give us a false idea of its power; we ascribe to its force what is only the effects of its arms. Those which man has received from Nature are not offensive; happy had art never furnished him with any more terrible than those which arm the paws of the lion!

But there is another manner of comparing the strength of man with that of other animals; namely,

by the weights which either can carry. We are assured that the porters of Constantinople, carry burdens of nine hundred pounds weight: Mr. Desaguliers tells us of a man, who, by distributing weights in such a manner as that every part of his body bore its share, he was thus able to raise a weight of two thousand pounds. An horse, which is about seven times our bulk, would be thus able to raise a weight of fourteen thousand pounds, if its strength were in the same proportion. But, the truth is, an horse will not carry upon its back, above a weight of two or three hundred pounds; while a man, of confessedly inferior strength, is thus able to support two thousand. Whence comes this seeming superiority? The answer is obvious. Because the load upon man's shoulder is placed to the greatest advantage; while upon the horse's back, it is placed at the greatest disadvantage. Let us suppose, for a moment, the man standing as upright as possible, under the great load abovementioned. It is obvious that all the bones of his body may be compared to a pillar supporting a building, and that his muscles have scarce any share in this dangerous duty. However, they are not entirely inactive; as man, let him stand never so upright, will have some bending in the different parts of his body. The muscles, therefore, give the bones some assistance, and that with the greatest possible advantage. In this manner, a man has been found to support two thousand weight; but may be capable of supporting a still greater. The manner in which this is done, is by strapping the load round the shoulders of the person, who is to bear it by a machine, something like that by which milk-vessels, or water-buckets are carried. The load being thus placed on a scaffold, on each side, contrived for that purpose, and the man standing erect in the midst, all parts of the scaffold, except that where the man stands, are made to sink; and thus the man maintaining his position, the load, whatever it is, becomes suspended, and the column of his bones may be fairly said to support it. If, however, he should but ever so little give way, he must inevitably drop; and no power of his can raise the weights again. But the case is very different with regard to a load laid upon an horse. The column of the bones there lies a different way; and a weight of five hundred pounds, as we are told, would break the back of the strongest horse that could be found. The great force of an horse and other quadrupedes, is exerted when the load is in such a position as that the column of the bones can be properly applied; which is lengthwise. When, therefore, we are to estimate the comparative strength of an horse, we are not to try what he can carry, but what he can draw; and, in this case, his amazing superiority over man is easily discerned; for one horse can draw a load that ten men cannot move. And in some cases it happens that a draft horse draws the better for being somewhat loaded; for, as the peasants say, the load upon the back keeps him the better to the ground.

There is still another way of estimating human strength by the perseverance and agility of our motions. Men, who are exercised in running, outstrip horses; or at least hold their speed for a longer continuance. In a journey, also, a man will walk down a horse; and, after they have both continued to proceed for several days, the horse will be quite tired, and the man will be fresher than in the beginning. The king's messengers of Isaphan, who are runners by profession, go thirty-six leagues in fourteen hours. Travellers assure us that the Hottentots outstrip lions in the chase; and that the savages, who hunt the elk, pursue with such speed, that they at last tire down, and take it. We are told many very surprising things of the great swiftness

of the savages, and of the long journeys they undertake, on foot, through the most craggy mountains, where there are no paths to direct, nor houses to entertain them. They are said to perform a journey of twelve hundred leagues in less than six weeks. But, notwithstanding what travellers report of this matter, we have been assured, from many of our officers and soldiers, who compared their own swiftness with that of the native Americans, during the last war, that although the savages held out, and, as the phrase is, had better bottoms, yet, for a spurt, the Englishmen were more nimble and speedy.

Nevertheless, in general, civilized man is ignorant of his own powers; he is ignorant how much he loses by effeminacy; and what might be acquired by habit and exercise. Here and there, indeed, men are found among us of extraordinary strength; but that strength, for want of opportunity, is seldom called into exertion. Among the ancients it was a quality of much greater use than at present; as in war the same man that had strength sufficient to carry the heaviest armour, had strength sufficient also to strike the most fatal blow. In this case, his strength was at once his protection and his power. We ought not to be surprised, therefore, when we hear of one man terrible to an army, and irresistible in his career, as we find some generals represented in ancient history. But we may be very certain that this prowess was exaggerated by flattery, and exalted by terror. An age of ignorance is ever an age of wonder. At such times, mankind, having no just ideas of the human powers, are willing rather to represent what they wish than what they know; and exalt human strength, to fill up the whole sphere of their limited conceptions. Great strength is an accidental thing; two, or three, in a country, may possess it; and these may have a claim to heroism. But what may lead us to doubt of the veracity of these accounts is, that the heroes of antiquity are represented as the sons of heroes; their amazing strength is delivered down from father to son; and this we know to be contrary to the course of nature. Strength is not hereditary; although titles are: and we are induced to believe, that this great tribe of heroes who are all represented as the descendants of heroes, are more obliged to their titles than to their strength, for their characters. With regard to the shining characters in Homer, they are all represented as princes, and as the sons of princes; while we are told of scarce any share of prowess in the meaner men of the army; who are only brought into the field for these to protect, or to slaughter. But nothing can be more unlikely than that those men, who were bred in the luxury of courts, should be strong; while the whole body of the people, who received a plainer and simpler education, should be comparatively weak. Nothing can be more contrary to the general laws of nature, than that all the sons of heroes should thus inherit not only the kingdoms, but the strength of their forefathers; and we may conclude, that they owe the greatest share of their imputed strength rather to the dignity of their stations than the force of their arms; and, like all fortunate princes, their flatterers happened to be believed. In later ages, indeed, we have some accounts of amazing strength, which we can have no reason to doubt of. But in these, nature is found to pursue her ordinary course; and we find their strength accidental. We find these strong men among the lowest of the people, and gradually rising into notice, as this superiority had more opportunity of being seen. Of this number was the Roman tribune, who went by the name of the second Achilles; who, with his own hand is said to have killed, at different times, three hundred of the enemy; and when treacherously set upon, by twenty-five of his own coun-

trymen, although then past his sixtieth year, killed fourteen of them before he was slain. Of this number was Milo, who, when he stood upright, could not be forced out of his place. Pliny, also, tells us of one Athanatus, who walked across the stage at Rome, loaded with a breast-plate weighing five hundred pounds, and buskins of the same weight. But of all the prodigies of strength; of whom we have any accounts in Roman history, Maximin, the emperor, is to be reckoned the foremost. Whatever we are told relative to him is well attested; his character was too exalted not to be thoroughly known; and that very strength, for which he was celebrated, at last procured him no less a reward than the empire of the world. Maximin was above nine feet in height, and the best proportioned man in the whole empire. He was by birth a Thracian; and, from being a simple herdsman, rose through the gradations of office, until he came to be Emperor of Rome. The first opportunity he had of exerting his strength, was in the presence of all the citizens, in the theatre, where he overthrew twelve of the strongest men, in wrestling, and outstript two of the fleetest horses, in running, all in one day. He could draw a chariot loaden, that two strong horses could not move; he could break a horse's jaw with a blow of his fist; and its thigh with a kick. In war he was always foremost, and invincible; happy had it been for him, and his subjects, if, from being formidable to his enemies, he had not become still more so to his subjects; he reigned, for some time, with all the world his enemy; all mankind wishing him dead, yet none daring to strike the blow. As if fortune had resolved that through life he should continue unconquerable, he was killed at last by his own soldiers, while he was sleeping. We have many other instances, in later ages, of very great strength, and not fewer of amazing swiftness; but these, merely corporeal perfections, are now considered as of small advantage, either in war or in peace. The invention of gunpowder has, in some measure, levelled all force to one standard; and has wrought a total change in martial education through all parts of the world. In peace also, the invention of new machines every day, and the application of the strength of the lower animals to the purposes of life, have rendered human strength less valuable. The boast of corporeal force is therefore consigned to savage nations, where those arts not being introduced, it may still be needful; but, in more polite countries, few will be proud of that strength which other animals can be taught to exert to as useful purposes as they.

If we compare the largeness and thickness of our muscles with those of any other animal, we shall find that, in this respect, we have the advantage: and if strength, or swiftness, depended upon the quantity of the muscular flesh alone, in this respect we should be more active and powerful than any other. But this is not the case; a great deal more than the size of the muscles goes to constitute activity, or force; and it is not he who has the thickest legs that can make the best use of them. Those, therefore, who have written elaborate treatises on muscular force, and have estimated the strength of animals by the thickness of their muscles, have been employed to very little purpose. It is, in general, observed that thin and raw-boned men are always stronger and more powerful than such as are seemingly more muscular; as in the former all the parts have better room for their exertions.

Women want much of the strength of men; and, in some countries, the stronger sex have availed themselves of this superiority, in cruelly and tyrannically enslaving those who were made with equal pretensions to a share in all the advantages life can bestow. Savage nations oblige their women to a life

NATURAL HISTORY of MAN

THE PASSIONS



DESIRE



FEAR



HOPE



SORROW



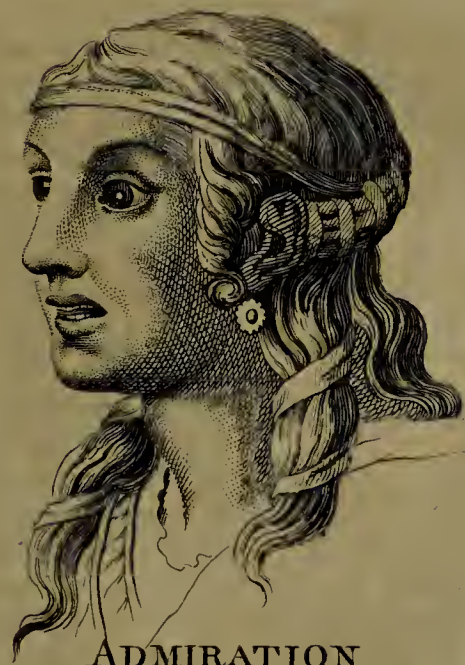
LOVE



RAGE



WEEPING



ADMIRATION



FIG. 1. HEAD

life of continual labour; upon them rest all the drudgeries of domestic duty; while the husband, indolently reclined in his hammock, is first served from the fruits of her industry. From this negligent situation he is seldom roused, except by the calls of appetite, when it is necessary, either by fishing or hunting, to make a variety in his entertainments. A savage has no idea of taking pleasure in exercise; he is surpris'd to see an European walk forward for his amusement, and then return back again. As for his part, he could be contented to remain for ever in the same situation, perfectly satisfied with sensual pleasures and undisturbed repose. The women, of these countries, are the greatest slaves upon earth; sensible of their weakness, and unable to resist, they are obliged to suffer those hardships which are naturally inflicted by such as have been taught that nothing but corporeal force ought to give pre-eminence. It is not, therefore, till after some degree of refinement, that women are treated with lenity; and not till the highest degree of politeness, that they are permitted to share in all the privileges of man. The first impulse of savage nature is to confirm their slavery; the next, of half barbarous nations, is to appropriate their beauty; and that, of the perfectly polite, to engage their affections. In civilized countries, therefore, women have united the force of modesty to the power of their natural charms; and thus obtain that superiority over the mind, which they are unable to extort by their strength.

When we come to treat of the different senses, we shall be able to determine what stress is to be laid on the ideas of beauty in general, which we receive from the eyes. In the mean time, and that our description of Man may not be found imperfect, let us examine the human countenance, as it appears among ourselves, when agitated by the Passions.

DESIRE may be represented, by the eyebrows being pressed and advanced over the eyes, which shall be more open than ordinary, with the eyeball in the middle full of fire; the nostrils drawn closest next the eyes, the mouth also is more open, than in the foregoing action, the corners drawn back; the tongue may approach upon the edge of the lips, the colour more inflamed than in love; all these motions shewing the agitation of the soul caused by the spirits, which dispose it to desire a good, as convenient for it.

FEAR. But if there be no appearance of obtaining what we desire, then instead of hope comes fear or despair; the motion of fear is expressed by the eyebrows a little raised next the nose, the eyebrows sparkling in an unquiet manner, situated in the middle of the eye; the mouth open, and drawn back, and more open at the corners than in the middle, having the under lip more drawn back than the upper; the complexion redder than in love or desire, but not so beautifully inclined to livid; with the lips of the same colour, and dry when love changes fear into jealousy.

HOPE. When there is an appearance of obtaining what we desire, that brings forth hope: but the motions of this passion being not so much external as internal, we shall speak but little of them, and only remark, that this passion keeps all the parts of the body suspended, between fear and assurance; in such a manner, that if one part of the eyebrow makes fear, the other makes security; and, in all the parts of the face and body, the motions of these two passions are particularly intermixed.

SORROW. As we have said, that sorrow is a disagreeable faintness, by which the soul receives the inconveniency or defect, which presents itself to it by the impression of the brain; so this passion is represented, by motions which seem to mark the

inquietude of the brain, and the dejection of the heart, the eyebrows being more raised in the middle of the forehead than next the temples. He that is troubled with this passion, has his eyeballs dull, the white of the eye inclining to yellow, the eyelids hanging down something swoln, and a livid look round them; the nostrils drawing downwards, the mouth open, the corners thereof drawn down; the head appears carelessly hanging on one of the shoulders, the complexion of a kind of lead colour, and the lips pale and wan.

SIMPLE LOVE. The motions of this passion, when it is simple, are very soft and sweet, for the forehead will be smooth, the eyebrows will be a little elevated over the place where the eyeballs shall be turned, the head inclined towards the object of the passion; the eyes may be moderately open, the white very lively and sparkling, and the eyeball being greatly turned toward the object, will appear a little sparkling and elevated; the nose receives no alteration, nor any of the parts of the face, which being only filled with spirits that warm and enliven it, render the complexion fresh and lively, and particularly the cheeks and lips; the mouth may be a little open, the corner a little turned up, the lips will appear moist, and this moistness may be caused by vapours arising from the heart.

RAGE hath the same motions as despair, but yet more violent; for the face will be almost black, covered with a cold sweat, the hair at an end, the eyes wandering in a contrary motion, the eyeballs sometimes rolling towards the nose, sometimes back towards the ear, all the parts of the face will be extremely marked and swoln.

WEeping. He that weeps, hath his eyebrows hanging down in the middle of the forehead, the eyes almost closed, very wet, and cast down towards the cheeks; the nostrils swelled, all the muscles of the forehead being apparent; the mouth shall be half open, the corners hanging down, and making wrinkles in the cheek; the under lip will appear turned down and pouting out, all the face will appear drawn together and wrinkled, the colour very red, especially about the eyes, eyebrows, nose, mouth, and cheeks.

ADMIRATION. As we have said, that admiration is the first and most temperate of all the passions, wherein the heart feels the least disturbance, so the face receives very little alteration; if any, it will be only in the raising of the eyebrows, the ends being parallel, the eye will be a little more open than ordinary, and the ball even between the lids, without motion, being fixed on the object which causes the admiration. The mouth will be open, but will appear without alteration, any more than the other parts of the face: this passion produces only a suspension of motion, to give time to the soul to consider what she has to do; and to consider attentively the object before her, if it be extraordinary. Out of this simple motion of admiration is engendered esteem.

CHAP. VI.

Of SLEEP and HUNGER.

AS man, in all the privileges he enjoys, and the powers he is invested with, has a superiority over all other animals, so, in his necessities, he seems inferior to the meanest of them all. Nature has brought him into life with a greater variety of wants and infirmities, than the rest of her creatures, unarmed in the midst of enemies. The lion has natural arms; the bear natural cloathing; but man is destitute of all such advantages; and, from the superiority of his mind alone, he is to supply

the deficiency. The number of his wants, however, were merely given, in order to multiply the number of his enjoyments; since the possibility of being deprived of any good, teaches him the value of its possession. Were man born with those advantages which he learns to possess by industry, he would very probably enjoy them with a blunter relish: it is by being naked, that he knows the value of a covering; it is by being exposed to the weather that he learns the comforts of an habitation. Every want thus becomes a means of pleasure, in the redressing; and the animal that has most desires, may be said to be capable of the greatest variety of happiness.

Besides the thousand imaginary wants peculiar to man, there are two, which he has in common with all other animals; and which he feels in a more necessary manner than they. These are the wants of sleep and hunger. Every animal that we are acquainted with, seems to endure the want of these with much less injury to health, than man; and some are most surprisingly patient in sustaining both. The little domestic animals that we keep about us, may often set a lesson of calm resignation, in supporting want and watchfulness, to the boasted philosopher. They receive their pittance at uncertain intervals, and wait its coming with cheerful expectation. We have instances of the dog, and the cat, living, in this manner, without food for several days; and yet still preserving their attachment to the tyrant that oppresses them; still ready to exert their little services for his amusement or defence. But the patience of these is nothing to what the animals of the forest endure. As these mostly live upon accidental carnage, so they are often known to remain without food for several weeks together. Nature, kindly sollicitous for their support, has also contracted their stomachs, to suit them for their precarious way of living; and kindly, while it abridges the banquet, lessens the necessity of providing for it. But the meaner tribes of animals are made still more capable of sustaining life without food, many of them remaining in a state of torpid indifference till their prey approaches, when they jump upon and seize it. In this manner, the snake, or the spider, continue, for several months together, to subsist upon a single meal; and some of the butterfly kinds live upon little or nothing. But it is very different with man: his wants daily make their importunate demands; and it is known, that he cannot continue to live many days without eating, drinking, and sleeping.

Hunger is a much more powerful enemy to man, than watchfulness, and kills him much sooner. It may be considered as a disorder that food removes; and that would quickly be fatal, without its proper antidote. In fact, it is so terrible to man, that to avoid it he would even encounter certain death; and, rather than endure its tortures, exchanges them for immediate destruction. However, by all accounts, it is much more dreadful in its approaches, than in its continuance; and the pains of a famishing wretch, decrease as his strength diminishes. In the beginning, the desire of food is dreadful indeed, as we know by experience, for there are few who have not in some degree felt its approaches. But, after the first or second day, its tortures become less terrible, and a total insensibility at length come kindly in to the poor wretch's assistance. A captain of a ship, who was one of six that endured it in its extremities, was the only person that had not lost his senses, when they received accidental relief. His pains at first were so great, as to be often tempted to eat a part of one of the men who died; and which the rest of his crew actually for some time lived upon: he said that, during the continuance of this paroxysm, he found his pains

insupportable; and was desirous, at one time, of anticipating that death which he thought inevitable: but his pains, he said, gradually decreased, after the sixth day, (for they had water in the ship, which kept them alive so long) and then he was in a state rather of languor than desire; nor did he much wish for food, except when he saw others eating; and that for a while revived his appetite, though with diminished importunity. The latter part of the time, when his health was almost destroyed, a thousand strange images rose upon his mind; and every one of his senses began to bring him wrong information. The most fragrant perfumes appeared to him to have a foetid smell; and every thing he looked at took a greenish hue, and sometimes a yellow. When he was presented with food by the ship's company that took him and his men up, four of whom died shortly after, he could not help looking upon it with loathing, instead of desire; and it was not till after four days, that his stomach was brought to its natural tone; when the violence of his appetite returned, with a sort of canine eagerness.

Thus dreadful are the effects of hunger; and yet, when we come to assign the cause that produces them, we find the subject involved in doubt and intricacy. This longing eagerness is, no doubt, given for a very obvious purpose; that of replenishing the body, wasted by fatigue and perspiration. Were not men stimulated by such a pressing monitor, they might be apt to pursue other amusements, with a perseverance beyond their power; and forget the useful hours of refreshment, in those more tempting ones of pleasure. But hunger makes a demand that will not be refused; and, indeed, the generality of mankind seldom await the call.

Hunger has been supposed by some to arise from the rubbing of the coats of the stomach against each other, without having any intervening substance to prevent their painful attrition. Others have imagined, that its juices, wanting their necessary supply, turn acrid, or, as some say, pungent; and thus fret its internal coats, so as to produce a train of the most uneasy sensations. Boerhaave, who established his reputation in physic, by uniting the conjectures of all those that preceded him, ascribes hunger to the united effect of both these causes; and asserts, that the pungency of the gastric juices, and the attrition of its coats against each other, cause those pains, which nothing but food can remove. These juices continuing still to be separated in the stomach, and every moment becoming more acrid, mix with the blood, and infect the circulation: the circulation being thus contaminated, becomes weaker, and more contracted; and the whole nervous frame sympathizing, an hectic fever and sometimes madness is produced; in which state the faint wretch expires. In this manner, the man who dies of hunger, may be said to be poisoned by the juices of his own body; and is destroyed less by the want of nourishment, than by the vitiated qualities of that which he had already taken.

However this may be, we have but few instances of men dying, except at sea, of absolute hunger; the decline of those unhappy creatures who are destitute of food, at land, being more slow and unperceived. These, from often being in need; and as often receiving an accidental supply, pass their lives between surfeiting and repining; and their constitution is impaired by insensible degrees. Man is unfit for a state of precarious expectation. That share of provident precaution which incites him to lay up stores for a distant day, becomes his torment, when totally unprovided against an immediate call. The lower race of animals, when satisfied, for the instant moment, are perfectly happy:

but it is otherwise with man; his mind anticipates distress, and feels the pangs of want even before it arrests him. Thus the mind, being continually harassed by the situation, it at length influences the constitution, and unfits it for all its functions. Some cruel disorder, but no way like hunger, seizes the unhappy sufferer; so that almost all those men who have thus long lived by chance, and whose every day may be considered as an happy escape from famine, are known at last to die in reality, of a disorder caused by hunger; but which, in the common language, is often called a broken-heart. The number of such as die in London for want, is much greater than one would imagine, about two thousand in a year.

But how numerous soever those who die of hunger may be, many times greater, on the other hand, are the number of those who die by repletion. It is not the province of the present page to speculate, with the physician, upon the danger of surfeits; or, with the moralist, upon the nauseousness of gluttony: it will only be proper to observe, that as nothing is so prejudicial to health as hunger by constraint, so nothing is more beneficial to the constitution than voluntary abstinence. It was not without reason that religion enjoined this duty; since it answered the double purpose of restoring the health oppressed by luxury, and diminished the consumption of provisions; so that a part might come to the poor. It should be the business of the legislature, therefore, to enforce this divine precept; and thus, by restraining one part of mankind in the use of their superfluities, to consult for the benefit of those who want the necessaries of life. The injunctions for abstinence are strict over the whole Continent; and were rigorously observed, even among ourselves, for a long time after the Reformation. Queen Elizabeth, by giving her commands, upon this head, the air of a political injunction, lessened, in a great measure, and very unwisely, the religious force of the obligation. She enjoined that her subjects should fast from flesh on Fridays and Saturdays; but at the same time declared, that this was not commanded from motives of religion, as if there were any differences in meats, but merely to favour the consumption of fish, and thus to multiply the number of mariners; and also to spare the stock of sheep, which might be more beneficial in another way. In this manner the injunction defeated its own force; and this most salutary law became no longer binding, when it was supposed to come purely from man. How far it may be enjoined in the Scriptures, we will not pretend to say; but this may be asserted, that if the utmost benefit to the individual, and the most extensive advantage to society, serve to mark any institution as of Heaven, this of abstinence may be reckoned among the foremost.

Were we to give an history of the various benefits that have arisen from this command, and how conducive it has been to long life, the instances would fatigue with their multiplicity. It is surprising to what a great age the primitive Christians of the East, who retired from persecution in the deserts of Arabia, continued to live in all the bloom of health, and yet all the rigours of abstemious discipline. Their common allowance, as we are told, for four and twenty hours, was twelve ounces of bread, and nothing but water. On this simple beverage, St. Anthony is said to have lived an hundred and five years; James, the hermit, an hundred and four; Arsenius, tutor to the emperor Arcadius, an hundred and twenty; St. Epiphanius, an hundred and fifteen; Simeon, an hundred and twelve; and Rombold, an hundred and twenty. In this manner did these holy temperate men live to an extreme old age, kept chearful by strong hopes, and healthful by moderate labour.

Abstinence which is thus voluntary, may be much more easily supported than constrained hunger. Man is said to live without food for seven days; which is the usual limit assigned him: and, perhaps, in a state of constraint, this is the longest time he can survive the want of it. But, in cases of voluntary abstinence, of sickness, or sleeping, he has been known to live much longer.

In the records of the Tower, there is an account of a Scotchman, imprisoned for felony, who, for the space of six weeks, took not the least sustenance, being exactly watched during the whole time; and for this he received the king's pardon.

When the American Indians undertake long journies, and when, consequently, a stock of provisions sufficient to support them the whole way, would be more than they could carry, in order to obviate this inconvenience, instead of carrying the necessary quantity, they contrive a method of palliating their hunger, by swallowing pills, made of calcined shells and tobacco. These pills take away all appetite, by producing a temporary disorder in the stomach; and, no doubt, the frequent repetition of this wretched expedient, must at last be fatal. By these means, however, they continue several days without eating, chearfully bearing such extremes of fatigue and watching, as would quickly destroy men bred up in a greater state of delicacy. For those arts by which we learn to obviate our necessities, do not fail to unfit us for their accidental encounter.

Upon the whole, therefore, man is less able to support hunger than any other animal; and he is not better qualified to support a state of watchfulness. Indeed, sleep seems much more necessary to him, than to any other creature; as, when awake, he may be said to exhaust a greater proportion of the nervous fluid; and, consequently, to stand in need of an adequate supply. Other animals, when most awake, are but little removed from a state of slumber; their feeble faculties, imprisoned in matter, and rather exerted by impulse than deliberation, require sleep rather as a cessation from motion, than from thinking. But it is otherwise with man; his ideas, fatigued with their various excursions, demand a cessation, not less than the body, from toil; and he is the only creature that seems to require sleep from double motives; not less for the refreshment of the mental than of the bodily frame.

There are some lower animals, indeed, that seem to spend the greatest part of their lives in sleep; but, properly speaking, the sleep of such may be considered as a kind of death; and their waking, a resurrection. Flies, and insects, are said to be asleep, at a time that all the vital motions have ceased; without respiration, without any circulation of their juices, if cut in pieces, they do not awake, nor does any fluid ooze out at the wound. These may be considered rather as congealed than as sleeping animals; and their rest, during winter, rather as a cessation from life, than a necessary refreshment: but in the higher races of animals, whose blood is not thus congealed, and thawed by heat, these all bear the want of sleep much better than man; and some of them continue a long time without seeming to take any refreshment from it whatsoever.

But man is more feeble; he requires its due return; and if it fails to pay the accustomed visit, his whole frame is in a short time thrown into disorder; his appetite ceases; his spirits are dejected; his pulse becomes quicker and harder; and his mind, abridged of its slumbering visions, begins to adopt waking dreams. A thousand strange phantoms arise, which come and go without his will: these, which are transient in the beginning, at last take firm possession of the mind, which yields to their

dominion,

dominion, and after a long struggle, runs into confirmed madness. In that horrid state, the mind may be considered as a city without walls, open to every insult, and paying homage to every invader: every idea that then starts with any force, becomes a reality; and the reason, over fatigued with its former importunities, makes no head against the tyrannical invasion, but submits to it from mere imbecillity.

But it is happy for mankind, that this state of inquietude is seldom driven to an extreme; and that there are medicines which seldom fail to give relief. However, man finds it more difficult than any other animal to procure sleep: and some are obliged to court its approaches for several hours together, before they incline to rest. It is in vain that all light is excluded; that all sounds are removed; that warmth and softness conspire to invite it; the restless and busy mind still retains its former activity; and reason that wishes to lay down the reins, in spite of herself, is obliged to maintain them. In this disagreeable state, the mind passes from thought to thought, willing to lose the distinctness of perception, by increasing the multitude of images. At last, when the approaches of sleep are near, every object of the imagination begins to mix with that next it; their outlines become, in a manner, rounder; a part of their distinctions fade away; and sleep, that ensues, fashions out a dream from the remainder.

If then it should be asked from what cause this state of repose proceeds, or in what manner sleep thus binds us for several hours together, we must fairly confess our ignorance, although it is easy to tell what philosophers say upon the subject. Sleep, says one of them, consists in a scarcity of spirits, by which the orifices or pores of the nerves in the brain, through which the spirits used to flow into the nerves, being no longer kept open by the frequency of the spirits, shut of themselves; thus the nerves, wanting a new supply of spirits, become lax, and unfit to convey any impression to the brain. All this, however, is explaining a very great obscurity by somewhat more obscure: leaving, therefore, those spirits to open and shut the entrances to the brain, let us be contented with simply enumerating the effects of sleep upon the human constitution.

In sleep, the whole nervous frame is relaxed, while the heart and the lungs seem more forcibly exerted. This fuller circulation produces also a swelling of the muscles, as they always find who sleep with ligatures on any part of their body. This increased circulation also, may be considered as a kind of exercise, which is continued through the frame; and, by this, the perspiration becomes more copious, although the appetite for food is entirely taken away. Too much sleep dulls the apprehension, weakens the memory, and unfits the body for labour. On the contrary, sleep too much abridged, emaciates the frame, produces melancholy, and consumes the constitution. It requires some care, therefore, to regulate the quantity of sleep, and just to take as much as will completely restore Nature, without oppressing it. The poor, as Otway says, sleep little; forced, by their situation, to lengthen out their labour to their necessities, they have but a short interval for this pleasing refreshment; and we are of opinion, that bodily labour demands a less quantity of sleep than mental. Labourers and artizans are generally satisfied with about seven hours; but we have known some scholars who usually slept nine, and perceived their faculties no way impaired by over-sleeping.

The famous Philip Barrettiere, who was considered as a prodigy of learning at the age of fourteen, was known to sleep regularly twelve hours in

the twenty-four; the extreme activity of his mind, when awake, in some measure called for an adequate alternation of repose: and, we are apt to think, that when students stint themselves in this particular, they lessen the waking powers of the imagination, and weaken its most strenuous exertions. Animals, that seldom think, as was said, can very easily dispense with sleep; and of men, such as think least, will very probably be satisfied with the smallest share. A life of study, it is well known, unfits the body for receiving this gentle refreshment; the approaches of sleep are driven off by thinking: when, therefore, it comes at last, we should not be too ready to interrupt its continuance.

Sleep is, indeed, to some, a very agreeable period of their existence: and it has been a question in the schools, which was most happy, the man who was a beggar by night, and a king by day; or he was a beggar by day, and a king by night? It is given in favour of the nightly monarch, by him who first started the question: for the dream, says he, gives the full enjoyment of the dignity, without its attendant inconveniencies; while, on the other hand, the king, who supposes himself degraded, feels all the misery of his fallen fortune, without trying to find the comforts of his humble situation. Thus, by day, both states have their peculiar distresses: but, by night, the exalted beggar is perfectly blessed, and the king completely miserable. All this, however, is rather fanciful than just; the pleasure dreams can give us, seldom reaches to our waking pitch of happiness: the mind often, in the midst of its highest visionary satisfactions, demands of itself, whether it does not owe them to a dream; and frequently awakes with the reply.

But it is seldom, except in cases of the highest delight, or the most extreme uneasiness, that the mind has power thus to disengage itself from the dominion of fancy. In the ordinary course of its operations, it submits to those numberless fantastic images that succeed each other; and which, like many of our waking thoughts, are generally forgotten. Of these, however, if any, by their oddity, or their continuance, affect us strongly, they are then remembered; and there have been some who felt their impressions so strongly, as to mistake them for realities, and to rank them among the past actions of their lives.

There are others, upon whom dreams seem to have a very different effect; and who, without seeming to remember their impressions the next morning, have yet shewn, by their actions during sleep, that they were very powerfully impelled by their dominion. We have numberless instances of such persons, who, while asleep, have performed many of the ordinary duties to which they had been accustomed when waking; and with a ridiculous industry, have completed by night, what they failed doing by day. We are told, in the German ephemerides, of a young student, who being enjoined a severe exercise by his tutor, went to bed, despairing of accomplishing it. The next morning, awaking, to his great surprize he found the task fairly written out, and finished in his own hand-writing. He was at first, as the account has it, induced to ascribe this strange production to the operations of an infernal agent; but his tutor, willing to examine the affair to the bottom, set him another exercise, still more severe than the former; and took precautions to observe his conduct the whole night. The young gentleman, upon being so severely tasked, felt the same inquietude that he had done on the former occasion; went to bed gloomy and pensive, pondering on the next day's duty, and, after some time, fell asleep. But shortly after, his tutor, who continued to observe him from a place that was concealed, was surprized to see

him get up, and very deliberately go to the table; there he took out pen, ink, and paper, drew himself a chair, and sat very methodically to thinking: it seems, that his being asleep only served to strengthen the powers of his imagination; for he very quickly and easily went through the task assigned him, put his chair aside, and then returned to bed to take out the rest of his nap. What credit we are to give to this account, we will not pretend to determine: but this may be said, that the book from whence it is taken, has some good marks of veracity; for it is very learned, and very dull, and is written in a country noted, if not for truth, at least for want of invention.

The ridiculous history of Arlotto is well known, who has had a volume written, containing a narrative of the actions of his life, not one of which was performed while he was awake: He was an Italian Franciscan friar, extremely rigid in his manners, and remarkably devout and learned in his daily conversation. By night, however, and during his sleep, he played a very different character from what he did by day, and was often detected in very atrocious crimes. He was at one time detected in actually attempting a rape, and did not awake till the next morning, when he was surprised to find himself in the hands of justice. His brothers of the convent often watched him while he went very deliberately into the chapel, and there attempted to commit sacrilege. They sometimes permitted him to carry the chalice and the vestments away into his own chamber, and the next morning amused themselves at the poor man's consternation for what he had done. But of all his sleeping transgressions, that was the most ridiculous, in which he was called to pray for the soul of a person departed: Arlotto, after having very devoutly performed his duty, retired to a chamber which was shewn him, to rest; but there he had no sooner fallen asleep, than he began to reflect that the dead body had got a ring upon one of the fingers, which might be useful to him: accordingly, with a pious resolution of stealing it, he went down, undressed as he was, in a room full of women, and, with great composure, endeavoured to seize the ring. The consequence was, that he was taken before the inquisition for witchcraft; and the poor creature had like to have been condemned, till his peculiar character accidentally came to be known: however, he was ordered to remain for the rest of life in his own convent, and upon no account whatsoever to stir abroad.

What are we to say to such actions as these; or how account for this operation of the mind in dreaming? It should seem, that the imagination, by day, as well as by night, is always employed; and that often, against our wills, it intrudes where it is least commanded or desired. While awake, and in health, this busy principle cannot much delude us: it may build castles in the air, and raise a thousand phantoms before us; but we have every one of the senses alive, to bear testimony to its falsehood. Our eyes shew us that the prospect is not present; our hearing, and our touch, depose against its reality; and our taste and smelling are equally vigilant in detecting the impostor. Reason, therefore, at once gives judgment upon the cause; and the vagrant intruder, imagination, is imprisoned, or banished from the mind. But in sleep it is otherwise; having, as much as possible, put our senses from their duty, having closed the eyes from seeing, and the ears, taste, and smelling, from their peculiar functions, and having diminished even the touch itself, by all the arts of softness, the imagination is then left to riot at large, and to lead the understanding without an opposer. Every incurative idea then becomes a reality; and the mind, not

having one power that can prove the illusion, takes them for truths. As in madness, the senses, from struggling with the imagination, are at length forced to submit, so, in sleep, they seem for a while soothed into the like submission: the smallest violence exerted upon any one of them, however, rouses all the rest in their mutual defence; and the imagination, that had for a while told its thousand falsehoods, is totally driven away, or only permitted to pass under the custody of such as are every moment ready to detect its imposition.

C H A P. VII.

Of S E E I N G.

HAVING mentioned the senses as correcting the errors of the imagination, and as forcing it, in some measure, to bring us just information, it will naturally follow that we should examine the nature of those senses themselves: we shall thus be enabled to see how far they also impose on us, and how far they contribute to correct each other. Let it be observed, however, that in this we are neither giving a treatise of optics, or phonics, but an history of our own perceptions; and to those we chiefly confine ourselves.

The eyes very soon begin to be formed in the human embryo, and in the chicken also. Of all the parts which the animal has double, the eyes are produced the soonest, and appear the most prominent. It is true, indeed, that in viviparous animals, and particularly in man, they are not so large in proportion, at first, as in the oviparous kinds; nevertheless, they are more speedily developed, when they begin to appear, than any other parts of the body. It is the same with the organ of hearing; the little bones that compose the internal parts of the ear, are entirely formed before the other bones, though much larger, have acquired any part of their growth, or solidity. Hence it appears, that those parts of the body which are furnished with the greatest quantity of the nerves, are the first in forming. Thus the brain, and the spinal marrow, are the first seen begun in the embryo; and in general, it may be said, that wherever the nerves go, or send their branches in great numbers, there the parts are soonest begun, and the most completely finished.

If we examine the eyes of a child some hours, or even some days after its birth, it will be easily discerned that it, as yet, makes no use of them. The humours of the organ not having acquired a sufficient consistence, the rays of light strike but confusedly upon the retina, or expansion of nerves at the back of the eye. It is not till about a month after they are born, that children fix them upon objects; for, before that time, they turn them indiscriminately every where, without appearing to be affected by any. At six, or seven weeks old, they plainly discover a choice in the objects of their attention; they fix their eyes upon the most brilliant colours, and seem peculiarly desirous of turning them towards the light. Hitherto, however, they only seem to fortify the organ for seeing distinctly; but they have still many illusions to correct.

The first great error in vision is, that the eye inverts every object; and it in reality appears to the child, until the touch has served to undeceive it, turned upside down. A second error in vision is, that every object appears double. The same object forms itself distinctly upon each eye; and is consequently seen twice. This error, also, can only be corrected by the touch; and although, in reality, every object we see appears inverted, and double, yet the judgment, and habit, have so often corrected the sense, that we no longer submit to its imposition,

position, but see every object in its just position, the very instant it appears. Were we, therefore, deprived of feeling, our eyes would not only misrepresent the situation, but also the number of all things round us.

To convince us that we see objects inverted, we have only to observe the manner in which images are represented, coming through a small hole, in a darkened room. If such a small hole be made in a dark room so that no light can come in, but through it, all the objects without will be painted on the wall behind, but in an inverted position, their heads downwards. For as all the rays which pass from the different parts of the object without, cannot enter the hole in the same extent which they had in leaving the object, since, if so, they would require the aperture to be as large as the object; and, as each part, and every point of the object, sends forth the image of itself on every side, and the rays, which form these images, pass from all points of the object as from so many centres; so such only can pass through the small aperture as come in opposite directions. Thus the little aperture becomes a centre for the entire object; through which the rays from the upper parts, as well as from the lower parts of it, pass in converging directions; and, consequently, they must cross each other in the central point, and thus paint the objects behind, upon the wall, in an inverted position.

It is, in like manner, easy to conceive, that we see all objects double, whatever our present sensations may seem to tell us to the contrary. For, to convince us of this, we have only to compare the situation of any one object on shutting one eye, and then compare the same situation by shutting the other. If, for instance, we hold up a finger, and shut the right eye, we shall find it hide a certain part of the room; if again reshutting the other eye, we shall find that part of the room visible, and the finger seeming to cover a part of the room that had been visible before. If we open both eyes, however, the part covered will appear to lie between the two extremes. But, the truth is, we see the object our finger had covered, one image of it to the right, and the other to the left; but, from habit, suppose that we see but one image placed between both; our sense of feeling having corrected the errors of sight. And thus, also, if instead of two eyes we had two hundred, we should, at first, fancy the objects increased in proportion, until one sense had corrected the errors of another.

The having two eyes might thus be said to be rather an inconvenience than a benefit, since one eye would answer the purposes of sight as well, and be less liable to illusion. But it is otherwise; two eyes greatly contribute, if not to distinct, at least to extensive vision. When an object is placed at a moderate distance, by the means of both eyes we see a larger share of it than we possibly could with one; the right eye seeing a greater portion of its right side, and the left eye of its correspondent side. Thus both eyes, in some measure, see round the object; and it is this that gives it, in nature, that bold relief, or swelling, with which they appear; and which no painting, how exquisite soever, can attain to. The painter must be contented with shading on a flat surface; but the eyes, in observing nature, do not behold the shading only, but a part of the figure also, that lies behind these very shadings, which gives it that swelling, which painters so ardently desire, but can never fully imitate.

There is another defect, which either of the eyes, taken singly, would have, but which is corrected, by having the organ double. In either eye there is a point, which has no vision whatsoever; so that if one of them only is employed in seeing, there is a part of the object to which it is always totally blind.

This is that part of the optic nerve where its vein and artery run; which being insensible, that point of the object that is painted there must continue unseen. To be convinced of this we have only to try a very easy experiment. If we take three black patches, and stick them upon a white wall, about a foot distant from each other, each about as high as the eye that is to observe them; then retiring six or seven feet back, and shutting one eye, by trying for some time we shall find, that while we distinctly behold the black spots that are to the right and left, that which is in the middle remains totally unseen. Or, in other words, when we bring that part of the eye, where the optic artery runs, to fall upon the object, it will then become invisible. This defect, however, in either eye, is always corrected by both, since the part of the object that is unseen by one, will be very distinctly perceived by the other.

Beside the former defects we can have no idea of distances from the sight, without the help of touch. Naturally every object we see appears to be within our eyes; and a child, who has as yet made but little use of the sense of feeling, must suppose that every thing it sees makes a part of itself. Such objects are only seen more or less bulky as they approach or recede from its eyes; so that a fly that is near will appear larger than an ox at a distance. It is experience alone that can rectify this mistake; and a long acquaintance with the real size of every object, quickly assures us of the distance at which it is seen. The last man in a file of soldiers appears in reality much less, perhaps ten times more diminutive, than the man next to us; however, we do not perceive this difference, but continue to think him of equal stature; for the numbers we have seen thus lessened by distance, and have found, by repeated experience, to be of the natural size, when we come closer, instantly corrects the sense, and every object is perceived with nearly its natural proportion. But it is otherwise, if we observe objects in such situations as we have not had sufficient experience to correct the errors of the eye; if, for instance, we look at men from the top of an high steeple, they, in that case appear very much diminished, as we have not had an habit of correcting the sense in that position.

Although a small degree of reflection will serve to convince us of the truth of these positions, it may not be amiss to strengthen them by an authority which cannot be disputed. Mr. Cheselden having couched a boy of thirteen for a cataract, who had hitherto been blind, and thus at once having restored him to sight, curiously marked the progress of his mind, upon that occasion. This youth, though he had been till then incapable of seeing, yet was not totally blind, but could tell day from night, as persons in his situation always may. He could also, with a strong light, distinguish black from white, and either from the vivid colour of scarlet; however, he saw nothing of the form of bodies; and, without a bright light, not even colours themselves. He was, at first, couched only in one of his eyes; and, when he saw for the first time, he was so far from judging of distances, that he supposed his eyes touched every object that he saw, in the same manner as his hands might be said to feel them. The objects that were most agreeable to him were such as were of plain surfaces and regular figures; though he could as yet make no judgment whatever of their different forms, nor give a reason why one pleased him more than another. Although he could form some idea of colours during his state of blindness, yet that was not sufficient to direct him at present; and he could scarcely be persuaded that the colours he now saw were the same with those he had formerly conceived such erroneous ideas of. He delighted most in green; but black objects, as if giving

ing him an idea of his former blindness, he regarded with horror. He had, as was said, no idea of forms; and was unable to distinguish one object from another, though never so different. When those things were shown him, which he had been formerly familiarized to, by his feeling, he beheld them with earnestness, in order to remember them a second time; but, as he had too many to recollect at once, he forgot the greatest number; and for one he could tell, after seeing, there was a thousand he was totally unacquainted with. He was very much surprised to find that those things and persons he loved best were not the most beautiful to be seen; and even testified displeasure in not finding his parents so handsome as he conceived them to be. It was near two months before he could find that a picture resembled a solid body. Till then he only considered it as a flat surface, variously shadowed; but, when he began to perceive that these kind of shadings actually represented human beings, he then began to examine, by his touch, whether they had not the usual qualities of such bodies, and was greatly surprised to find, what he expected a very unequal surface to be smooth and even. He was then shewn a miniature picture of his father, which was contained in his mother's watch-case, and he readily perceived the resemblance; but asked, with great astonishment, how so large a face could be contained in so small a compass? It seemed as strange to him as if a bushel was contained in a pint vessel. At first, he could bear but a very small quantity of light, and he saw every object much greater than the life; but in proportion as he saw objects that were really large, he seemed to think the former were diminished; and although he knew the chamber where he was contained in the house, yet until he saw the latter, he could not be brought to conceive how an house could be larger than a chamber. Before the operation he had no great expectations from the pleasure he should receive from a new sense; he was only excited by the hopes of being able to read and write; he said, for instance, that he could have no greater pleasure in walking, in the garden, with his sight than he had without it, for he walked there at his ease, and was acquainted with all the walks. He remarked also, with great justice, that his former blindness gave him one advantage over the rest of mankind, which was that of being able to walk in the night, with confidence and security. But, when he began to make use of his new sense, he seemed transported beyond measure. He said that every new object was a new source of delight, and that his pleasure was so great as to be past expression. About a year after, he was brought to Epsom, where there is a very fine prospect, with which he seemed greatly charmed; and he called the landscape before him a new method of seeing. He was couched in the other eye, a year after the former, and the operation succeeded equally well: when he saw with both eyes, he said that objects appeared to him twice as large as when he saw but with one; however, he did not see them doubled, or at least he shewed no marks as if he saw them so. Mr. Cheselden mentions instances of many more that were restored to sight in this manner; they all seemed to concur in their perceptions with this youth; and they all seemed particularly embarrassed in learning how to direct their eyes to the objects they wished to observe.

In this manner it is that our feeling corrects the sense of seeing, and that objects which appear of very different sizes, at different distances, are all reduced, by experience, to their natural standard. But not the feeling only, but also the colour, and brightness of the object, contributes, in some measure, to assist us in forming an idea of the distance at which it appears. Those which we see most

strongly marked with light and shade, we readily know to be nearer than those on which the colours are more faintly spread, and that, in some measure, take a part of their hue from the air between us and them. Bright objects also, are seen at a greater distance than such as are obscure, and, most probably, for this reason, that, being less similar in colour to the air which interposes, their impressions are less effaced by it, and they continue more distinctly visible. Thus a black and distant object is not seen so far off as a bright and glittering one; and a fire by night is seen much farther off than by day.

The power of seeing objects at a distance is very rarely equal in both eyes. When this inequality is in any great degree, the person so circumstanced then makes use only of one eye, shutting that which sees the least, and employing the other with all its power. And hence proceeds that aukward look which is known by the name of strabism.

There are many reasons to induce us to think that such as are near-sighted see objects larger than other persons; and yet the contrary is most certainly true, for they see them less. Mr. Buffon informs us that he himself is short-sighted, and that his left eye is stronger than his right. He has very frequently experienced, upon looking at any object, such as the letters of a book, that they appear less to the weakest eye; and that when he places the book, so as that the letters appear double, the images of the left eye, which is strongest, are greater than those of the right, which is the most feeble. He has examined several others, who were in similar circumstances, and has always found that the best eye saw every object the largest. This he ascribes to habit; for near-sighted people being accustomed to come close to the object, and view but a small part of it at a time, the habit ensues, when the whole of an object is seen, and it appears less to them than to others.

Infants having their eyes less than those of adults, must see objects also smaller in proportion. For the image formed on the back of the eye will be large, as the eye is capacious; and infants, having it not so great, cannot have so large a picture of the object. This may be a reason also why they are unable to see so distinctly, or at such distances as persons arrived at maturity.

Old men, on the contrary, see bodies close to them very indistinctly, but bodies at a great distance from them with more precision; and this may happen from an alteration in the coats, or, perhaps, humours of the eye; and not, as is supposed, from their diminution. The cornea, for instance, may become too rigid to adapt itself, and take a proper convexity for seeing minute objects; and its very flatness will be sufficient to fit it for distant vision.

When we cast our eyes upon an object extremely brilliant, or when we fix and detain them too long upon the same object, the organ is hurt and fatigued, its vision becomes indistinct, and the image of the body, which has thus too violently, or too perseveringly employed us, is painted upon every thing we look at, and mixes with every object that occurs. And this is an obvious consequence of the eye taking in too much light, either immediately, or by reflection. Every body exposed to the light, for a time, drinks in a quantity of its rays, which, being brought into darkness, it cannot instantly discharge. Thus the hand, if it be exposed to broad day-light, for some time, and then immediately snatched into a dark room, will appear still luminous; and it will be some time before it is totally darkened. It is thus with the eye; which, either by an instant gaze at the sun, or a steady continuance, upon some less brilliant object, has taken in too much light; its humours are, for a while, unfit

unfit for vision, until that be discharged, and room made for rays of a mild nature. How dangerous the looking upon bright and luminous objects is to the sight, may be easily seen, from such as live in countries, covered for most part of the year with snow, who become generally blind before their time. Travellers who cross these countries, are obliged to wear a crape before their eyes, to save them, which would otherwise be rendered totally unserviceable; and it is equally dangerous in the sandy plains of Africa. The reflection of the light is there so strong that it is impossible to sustain the effect, without incurring the danger of losing one's sight entirely. Such persons, therefore, as read, or write for any continuance, should chuse a moderate light, in order to save their eyes; and, although it may seem insufficient at first, the eye will accustom itself to the shade, by degrees, and be less hurt by the want of light than the excess.

It is, indeed, surprising how far the eye can accommodate itself to darkness, and make the best of a gloomy situation. When first taken from the light, and brought into a dark room, all things disappear; or, if any thing is seen, it is only the remaining radiations that still continue in the eye. But, after a very little time, when these are spent, the eye takes the advantage of the smallest ray that happens to enter; and this alone would, in time, serve for many of the purposes of life. There was a gentleman of great courage and understanding, who was a major under King Charles the First. This unfortunate man sharing in his master's misfortunes, and being forced abroad, ventured at Madrid to do his king a signal service; but, unluckily, failed in the attempt. In consequence of this, he was instantly ordered to a dark and dismal dungeon, into which the light never entered, and into which there was no opening but by a hole at the top; down which the keeper put his provisions, and presently closed it again on the other side. In this manner the unfortunate loyalist continued for some weeks, distressed and disconsolate; but, at last, began to think he saw some little glimmering of light. This internal dawn seemed to increase from time to time, so that he could not only discover the parts of his bed, and such other large objects, but, at length, he even began to perceive the mice that frequented his cell; and saw them as they ran about the floor, eating the crumbs of bread that happened to fall. After some months confinement he was at last set free; but, such was the effect of the darkness upon him, that he could not for some days venture to leave his dungeon, but was obliged to accustom himself by degrees to the light of the day.

C H A P. VIII.

Of HEARING.

AS the sense of hearing, as well as of sight, gives us notice of remote objects, so like that, it is subject to similar errors, being capable of imposing on us upon all occasions, where we cannot rectify it by the sense of feeling. We can have from it no distinct intelligence of the distance from whence a sounding body is heard; a great noise far off, and a small one very near, produces the same sensation; and, unless we receive information from some other sense, we can never distinctly tell whether the sound be a great or a small one. It is not till we have learned, by experience, that the particular sound which is heard, is of a peculiar kind; then we can judge of the distance from whence we hear it. When we know the tone of the bell, we can then judge how far it is from us.

Every body that strikes against another produces

a sound, which is simple, and but one in bodies which are not elastic, but which is often repeated in such as are. If we strike a bell, or a stretched string, for instance, which are both elastic, a single blow produces a sound, which is repeated by the undulations of the sonorous body, and which is multiplied as often as it happens to undulate, or vibrate. These undulations each strike their own peculiar blow; but they succeed so fast, one behind the other, that the ear supposes them one continued sound; whereas in reality, they make many. A person who should, for the first time, hear the toll of the bell, would very probably, be able to distinguish these breaks of sound; and, in fact, we can readily ourselves perceive an intension and remission in the sound.

In this manner, sounding bodies are of two kinds; those unelastic ones, which being struck, return but a single sound; and those more elastic returning a succession of sound; which uniting together form a tone. This tone may be considered as a great number of sounds, all produced one after the other, by the same body, as we find in a bell, or the string of an harpsichord, which continues to sound for some time after it is struck. A continuing tone may be also produced from a nonelastic body, by repeating the blow quick and often, as when we beat a drum, or when we draw a bow along the string of a fiddle.

Considering the subject in this light, if we should multiply the number of blows, or repeat them at quicker intervals upon the sounding body, as upon the drum, for instance, it is evident that this will have no effect in altering the tone; it will only make it either more even or more distinct. But it is otherwise, if we increase the force of the blow; if we strike the body with double weight, this will produce a tone twice as loud as the former. If, for instance, we strike a table with a switch, this will be very different from the sound produced by striking it with a cudgel. From hence, therefore, we may infer, that all bodies give a louder and graver tone, not in proportion to the number of times they are struck, but in proportion to the force that strikes them. And, if this be so, those philosophers who make the tone of a sonorous body, of a bell, or the string of an harpsichord, for instance, to depend upon the number only of its vibrations, and not the force, have mistaken what is only an effect for a cause. A bell, or an elastic string can only be considered as a drum beaten; and the frequency of the blows can make no alteration whatever in the tone. The largest bells, and the longest and thickest strings, have the most forceful vibrations; and, therefore, their tones are the most loud and the most grave.

To know the manner in which sounds thus produced become pleasing, it must be observed, no one continuing tone, how loud or swelling soever, can give us satisfaction; we must have a succession of them, and those in the most pleasing proportion. The nature of this proportion may be thus conceived. If we strike a body incapable of vibration with a double force, or, what amounts to the same thing, with a double mass of matter, it will produce a sound that will be doubly grave. Music has been said, by the ancients, to have been first invented from the blows of different hammers on an anvil. Suppose then we strike an anvil with an hammer of one pound weight, and again with an hammer of two pounds, it is plain that the two pound hammer will produce a sound twice as grave as the former. But if we strike with a two pound hammer, and then with a three pound, it is evident that the latter will produce a sound one third more grave than the former. If we strike an anvil with a three pound hammer, and then with a four pound,

it will likewise follow that the latter will be a quarter part more grave than the former. Now, in the comparing between all those sounds, it is obvious that the difference between one and two is more easily perceived than between two and three, three and four, or any numbers succeeding in the same proportion. The succession of sounds will be, therefore, pleasing in proportion to the ease with which they may be distinguished. That sound which is double the former, or, in other words, the octave to the preceding tone, will of all others be the most pleasing. The next to that, which is as two to three, or, in other words, the third, will be most agreeable. And thus universally, those sounds whose difference may be most easily compared are the most agreeable.

Musicians, therefore, have contented themselves with seven different proportions of sound, which are called notes, and which sufficiently answer all the purposes of pleasure. Not but that they might adopt a greater diversity of proportions; and some have actually done so; but, in these, the differences of the proportion are so imperceptible, that the ear is rather fatigued than pleased in making the distinction. In order, however, to give variety, they have admitted half tones; but, in all the countries where music is yet in its infancy, they have rejected such; and they can find music in none but the obvious. The Chinese, for instance, have neither flats nor sharps in their music; but the intervals between their other notes, are in the same proportion with ours.

Many more barbarous nations have their peculiar instruments of music; and, what is remarkable, the proportion between their notes is in all the same as in ours. This is not the place for entering into the nature of these sounds, their effects upon the air, or their consonances with each other. We are not now giving an history of sound, but of human perception.

All countries are pleased with music; and, if they have not skill enough to produce harmony, at least they seem willing to substitute noise. Without all question, noise alone is sufficient to operate powerfully on the spirits; and, if the mind be already predisposed to joy, we have seldom found noise fail of increasing it into rapture. The mind feels a kind of distracted pleasure in such powerful sounds; braces up every nerve, and riots in the excess. But, as in the eye, an immediate gaze upon the sun will disturb the organ, so, in the ear, a loud, unexpected noise, disorders the whole frame, and sometimes disturbs the sense ever after. The mind must have time to prepare for the expected shock, and to give its organs the proper tension for its arrival.

Musical sounds, however, seem of a different kind. These are generally most pleasing, which are most unexpected. It is not from bracing up the nerves, but from the grateful succession of the sounds, that these become so charming. There are few, how indifferent soever, but have at times felt their pleasing impression; and, perhaps, even those who have stood out against the powerful persuasion of sounds, only wanted the proper tune, or the proper instrument to allure them.

The ancients give us a thousand strange instances of the effects of music, upon men and animals. The story of Arion's harp, that gathered the dolphins to the ship's side, is well known; and, what is remarkable, Schotteus assures us, that he saw a similar instance of fishes being allured by music. They tell us of diseases that have been cured; unchastity corrected, seditions quelled, passions removed, and sometimes excited even to madness. Doctor Wallis has endeavoured to account for these surprising effects, by ascribing them to the novelty

of the art; but we can scarce hesitate to impute them to the exaggeration of their writers. They are as hyperbolic in the effects of their oratory; and yet, we well know, there is nothing in the orations which they have left us, capable of exciting madness, or of raising the mind to that ungovernable degree of fury which they describe. As they have exaggerated, therefore, in one instance, we may naturally suppose, that they have done the same in the other: and, indeed, from the few remains we have of their music, collected by Meibomius, one might be apt to suppose, there was nothing very powerful in what is lost. Nor does any one of the ancient instruments, such as we see them represented in statues, appear comparable to our fiddle.

However this be, we have many odd accounts, not only among them, but the moderns, of the power of music; and it must not be denied, but that, on some particular occasions, musical sounds may have a very powerful effect. We have seen all the horses and cows in a field, where there were above an hundred, gather round a person that was blowing the French horn, and seeming to testify an awkward kind of satisfaction. Dogs are well known to be very sensible of different tones in music; and we have sometimes heard them sustain a very ridiculous part in a concert, where their assistance was neither expected nor desired.

We are told, of Henry IV. of Denmark, that being one day desirous of trying in person whether a musician who boasted that he could excite men to madness, was not an impostor, he submitted to the operation of his skill: but the consequence was much more terrible than he expected; for, becoming actually mad, he killed four of his attendants in the midst of his transports. A contrary effect of music we have, in the cure of a madman of Alais, in France, by music. This man, who was a dancing-master, after a fever of five days grew furious, and so ungovernable that his hands were obliged to be tied to his sides: what at first was rage, in a short time was converted into silent melancholy, which no arts could exhilarate, nor no medicines remove. In this sullen and dejected state, an old acquaintance accidentally came to enquire after his health; he found him sitting up in bed, tied, and totally regardless of every external object round him. Happening, however, to take up a fiddle that lay in the room, and touching a favourite air, the poor madman instantly seemed to brighten up at the sound; from a recumbent posture, he began to sit up; and as the musician continued playing, the patient seemed desirous of dancing to the sound: but he was tied, and incapable of leaving his bed, so that he could only humour the tune with his head, and that part of his arms which were at liberty. Thus the other continued playing, and the dancing-master practised his own art, as far as he was able, for about a quarter of an hour, when suddenly falling into a deep sleep, in which his disorder came to a crisis, he awaked perfectly recovered.

A thousand other instances might be added, equally true: let it suffice to add one more, which is not true; we mean that of the tarantula. Every person who has been in Italy, now well knows, that the bite of this animal, and its being cured by music, is all a deception. When strangers come into that part of the country, the country people are ready enough to take money for dancing to the tarantula. A gentleman had a servant who suffered himself to be bit; the wound, which was little larger than the puncture of a pin, was uneasy for a few hours, and then became well without any farther assistance. Some of the country people, however, still make a tolerable livelihood of the credulity

lity of strangers, as the musician finds his account in it not less than the dancer.

Sounds, like light, are not only extensively diffused, but are frequently reflected. The laws of this reflection, it is true, are not as well understood as those of light; all we know is, that sound is principally reflected by hard bodies; and their being hollow also, sometimes increases the reverberation. No art, however, can make an echo; and some, who have bestowed great labour and expence upon such a project, have only erected shapeless buildings whose silence was a mortifying lecture upon their presumption.

The internal cavity of the ear seems to be fitted up for the purposes of echoing sound with the greatest precision. This part is fashioned out in the temporal bone, like a cavern cut into a rock. In this the sound is repeated and articulated; and, as some anatomists tell us, (for we have as yet but very little knowledge on this subject) is beaten against the tympanum, or drum of the ear, which moves four little bones joined thereto; and these move and agitate the internal air which lies on the other side; and lastly, this air strikes and affects the auditory nerves, which carry the sound to the brain.

One of the most common disorders in old age is deafness; which probably proceed from the rigidity of the nerves in the labyrinth of the ear. This disorder also, sometimes proceeds from a stoppage of the wax, which art may easily remedy. In order to know whether the defect be an internal or an external one, let the deaf person put a repeating watch into his mouth; and if he hears it strike, he may be assured that his disorder proceeds from an external cause, and is, in some measure, curable: for there is a passage for the ears into the mouth, by what anatomists call the eustachian tube; and, by this passage, people often hear sounds, when they are utterly without hearing through the larger channel: and this also is the reason that we often see persons who listen with great attention, hearken with their mouths open, in order to catch all the sound at every aperture.

It often happens, that persons hear differently with one ear from the other; and it is generally found that these have what is called, by musicians, a bad ear. Mr. Buffon, who has made many trials upon persons, of this kind, always found that their defect in judging properly of sounds, proceeded from the inequality of their ears; and receiving by both, at the same, unequal sensations, they form an unjust idea. In this manner, as those people hear false, they also, without knowing it, sing false. Those persons also frequently deceive themselves with regard to the side from whence the sound comes, generally supposing the noise to come on the part of the best ear.

Such as are hard of hearing find the same advantage in the trumpet made for this purpose, that short-sighted persons do from glasses. These trumpets might be easily improved, so as to increase sounds, in the same manner that the telescope does objects: however, they could be used to advantage only in a place of solitude and stillness, as the neighbouring sounds would mix with the more distant, and the whole would produce in the ear nothing but tumult and confusion.

Hearing is a much more necessary sense to man than to animals. With these it is only a warning against danger, or an encouragement to mutual assistance. In man, it is the source of most of his pleasures; and without which, the rest of his senses would be of little benefit. A man born deaf, must necessarily be dumb; and his whole sphere of knowledge must be bounded only by sensual objects. We have an instance of a young man who, being

born deaf, was restored, at the age of twenty-four, to perfect hearing: the account is given in the Memoirs of the Academy of Sciences, 1793, page 18.

A young man of the town of Chartres, between the age of twenty-three and twenty-four, the son of a tradesman, and deaf and dumb from his birth, began to speak all of a sudden, to the great astonishment of the whole town. He gave them to understand that, about three or four months before he had heard the sound of bells for the first time, and was greatly surpris'd at this new and unknown sensation. After some time a kind of water issued from his left ear, and he then heard perfectly well with both. During these three months, he was sedulously employed in listening, without saying a word, and accustoming himself to speak softly, so as not to be heard, the words pronounced by others. He laboured hard also in perfecting himself in the pronunciation, and in the ideas attached to every sound. At length, having supposed himself qualified to break silence, he declared, that he could now speak, although as yet but imperfectly. Soon after, some able divines questioned him concerning his ideas of his past state; and principally with respect to God, his soul, the morality or turpitude of actions. The young man, however, had not driven his solitary speculations into that channel. He had gone to mass indeed with his parents, had learned to sign himself with the cross, to kneel down and assume all the grimaces of a man that was praying; but he did all this without any manner of knowledge of the intention or the cause; he saw others do the like, and that was enough for him; he knew nothing even of death, and it never entered into his head; he led a life of pure animal instinct; entirely taken up with sensible objects, and such as were present, he did not seem even to make as many reflections upon these, as might reasonably be expected from his improving situation: and yet, the young man was not in want of understanding; but the understanding of a man deprived of all commerce with others, is so very confined, that the mind is in some measure totally under the controul of its immediate sensations.

Notwithstanding, it is very possible to communicate ideas to deaf men, which they previously wanted, and even give them very precise notions of some abstract subjects, by means of signs, and of letters. A person born deaf, may, by time, and sufficient pains, be taught to write and read, to speak, and, by the motions of the lips, to understand what is said to him: however, it is probable that, as most of the motions of speech are made within the mouth by the tongue, the knowledge from the motion of the lips, is but very confined: nevertheless, a gentleman thus taught has been conversed with, and in all the commonly occurring questions, and the usual salutations, he was ready enough, merely by attending to the motion of the lips alone; but when he was spoke to for a short continuance, he was totally at a loss, although he understood the subject, when written, extremely well. Persons taught in this manner, were at first considered as prodigies; but there have been so many instances of success of late, and so many are skilful in the art of instructing in this way, that, though still a matter of some curiosity, it ceases to be an object of wonder.

CHAP. IX.

Of SMELLING, FEELING, and TASTING.

AN animal may be said to fill up that sphere which he can reach by his senses; and is actually large in proportion to the sphere to which its organ

organ extends. By sight, man's enjoyments are diffused into a wide circle; that of hearing, though less widely diffused, nevertheless extends his powers; the sense of smelling is more contracted still; and the taste and touch are the most confined of all. Thus man enjoys very distant objects, but with one sense only; more nearly he brings two senses at once to bear upon them; his sense of smelling assists the other two, at its own distance; and of such objects, as a man, he may be said to be in perfect possession.

Each sense, however, the more it acts at a distance, the more capable it is of making combinations; and is, consequently, the more improveable: Refined imaginations, and men of strong minds, take more pleasure, therefore, in improving the delights of the distant senses, than in enjoying such as are scarce capable of improvement.

By combining the objects of the extensive senses, all the arts of poetry, painting, and harmony, have been discovered; but the closer senses, if we may so call them, such as smelling, tasting, and touching, are, in some measure, as simple as they are limited, and admit of little variety. The man of imagination makes a great and an artificial happiness, by the pleasure of altering and combining; the sensualist just stops where he began, and cultivates only those pleasures which he cannot improve. The sensualist is contented with those enjoyments that are already made to his hand; but the man of pleasure is best pleased with growing happiness.

Of all the senses, perhaps, there is not one in which man is more inferior to other animals than in that of smelling. With man, it is a sense that acts in a narrow sphere, and disgusts almost as frequently as it gives him pleasure. With many other animals it is diffused to a very great extent; and never seems to offend them. Dogs not only trace the steps of other animals, but also discover them by the scent, at a very great distance; and, while they are thus exquisitely sensible of all smells, they seem no way disgusted by any.

But, although this sense is, in general, so very inferior in man, it is much stronger in those nations that abstain from animal food, than among Europeans. The Bramins of India have a power of smelling equal to what it is in most other creatures. They can smell the water which they drink, that to us seems quite inodorous; and have a word, in their language, which denotes a country of fine water. We are told, also, that the Negroes of the Antilles, by the smell alone, can distinguish between the footsteps of a Frenchman and a Negro. It is possible, therefore, that we may dull this organ by our luxurious way of living; and sacrifice to the pleasures of taste those which might be received from perfume.

However, it is a sense that we can, in some measure, dispense with; and we have known many that wanted it entirely, with but very little inconvenience from its loss. In a state of nature it is said to be useful in guiding us to proper nourishment, and deterring us from that which is unwholesome; but, in our present situation, such information is but little wanted; and, indeed, but little attended to. In fact, the sense of smelling gives us very often false intelligence. Many things that have a disagreeable odour are, nevertheless, wholesome, and pleasant to the taste; and such as make eating an art, seldom think a meal fit to please the appetite till it begins to offend the nose. On the other hand, there are many things that smell most gratefully, and yet are noxious, or fatal to the constitution. Some physicians think that perfumes, in general, are unwholesome; that they relax the nerves, produce head-aches, and even retard digestion. The machinel apple, which

is known to be deadly poison, is possessed of the most grateful odour. Some of those mineral vapours that are often found fatal, in the stomach, smell like the sweetest flowers, and continue thus to flatter till they destroy. This sense, therefore, as it should seem, was never meant to direct us in the choice of food, but appears rather as an attendant than a necessary pleasure.

Indeed, if we examine the natives of different countries, or even different natives of the same, we shall find no pleasure in which they differ so widely as that of smelling. Some persons are pleased with the smell of a rose; while we have known others that could not abide to have it approach them. The savage nations are highly delighted with the smell of assafœtida, which is to us the most nauseous stink in nature. It would in a manner seem that our delight in perfumes was made by habit; and that a very little industry could bring us totally to invert the perception of odours.

Thus much is certain, that many bodies which at one distance are an agreeable perfume, when nearer are a most ungrateful odour. Musk, and amber-grease, in small quantities, are considered by most persons as highly fragrant; and yet, when in larger masses, their scent is insufferable. From a mixture of two bodies, each whereof is, of itself, void of all smell, a very powerful smell may be drawn. Thus, by grinding quick-lime with sal-ammoniac, may be produced a very foetid mixture. On the contrary, from a mixture of two bodies, that are separately disagreeable, a very pleasant aromatic odour may be gained. A mixture of aqua fortis with spirit of wine produces this effect. But not only the alterations of bodies, by each other, but the smallest change in us, makes a very great alteration in this sense, and frequently deprives us of it totally. A slight cold often hinders us from smelling; and as often changes the nature of odours. Some persons, from disorder, retain an incurable aversion to those smells which most pleased them before; and many have been known to have an antipathy to some animals, whose presence they instantly perceive by the smell. From all this, therefore, the sense of smelling appears to be an uncertain monitor, easily disordered, and not much missed when totally wanting.

The sense most nearly allied to smelling is that of tasting. This, some have been willing to consider merely as a nicer kind of touch, and have undertaken to account, in a very mechanical manner, for the difference of flavours. Such bodies, say they, as are pointed, happening to be applied to the papillæ of the tongue, excite a very powerful sensation, and give us the idea of saltness. Such, on the contrary, as are of a rounder figure, slide smoothly along the papillæ, and are perceived to be sweet. In this manner they have, with minute labour, gone through the variety of imagined forms in bodies, and have given them as imaginary effects. All we can precisely determine upon the nature of tastes is, that the bodies to be tasted must be either somewhat moistened, or, in some measure, dissolved by the saliva before they can produce a proper sensation: when both the tongue itself, and the body to be tasted, are extremely dry, no taste whatever ensues. The sensation is then changed; and the tongue, instead of tasting can only be said, like any other part of the body, to feel the object.

It is for this reason, that children have a stronger relish of tastes than those who are more advanced in life. This organ with them, from the greater moisture of their bodies, is kept in greater perfection; and is, consequently, better adapted to perform its functions. Every person remembers how great a pleasure he found in sweets while a child; but his taste growing more obtuse, with age, he is obliged to

to use artificial means to excite it. It is then that he is found to call in the assistance of poignant sauces, and strong relishes, of salts and aromatics; all which the delicacy of his tender organ, in childhood, were unable to endure. His taste grows callous to the natural relishes; and is artificially formed to others more unnatural; so that the highest epicure may be said to have the most depraved taste; as it is owing to the bluntness of his organs that he is obliged to have recourse to such a variety of expedients, to gratify his appetite.

As smells are often rendered agreeable by habit, so also tastes may be. Tobacco, and coffee, so pleasing to many, are yet, at first, very disagreeable to all. It is not without perseverance that we begin to have a relish for them; we force nature so long, that what was constraint, in the beginning, at last becomes inclination.

The grossest, and yet the most useful of all the senses, is that of feeling. We are often seen to survive under the loss of the rest; but of this we can never be totally deprived, but with life. Although this sense is diffused over all parts of the body, yet it most frequently happens that those parts which are most exercised in touching, acquire the greatest degree of accuracy. Thus the fingers, by long habit, become greater masters in the art than any others, even where the sensation is more delicate and fine. It is from this habit, therefore, and their peculiar formation, and not, as is supposed, from their being furnished with a greater quantity of nerves, that the fingers are thus perfectly qualified to judge of forms. Blind men, who are obliged to use them much oftner, have this sense much finer; so that the delicacy of the touch arises rather from the habit of constantly employing the fingers, than from any fancied nervousness in their conformation.

All animals that are furnished with hands, seem to have more understanding than others. Monkeys have so many actions, like those of men, that they appear to have similar ideas of the form of bodies. All other creatures, deprived of hands, can have no distinct ideas of the shape of the objects, by which they are surrounded, as they want this organ, which serves to examine and measure their forms; their risings and depressions. A quadrupede probably conceives as erroneous an idea of any thing near him, as a child would of a rock, or a mountain, that it beheld at a distance. It may be for this reason, that we often see them frightened at things with which they ought to be better acquainted. Fishes, whose bodies are covered with scales, and who have no organs for feeling, must be the most stupid of all animals. Serpents, that are likewise destitute, are yet, by winding round several bodies, better capable of judging of their form. All these, however, can have but very imperfect ideas from feeling; and we have already seen, when deprived of this sense, how little the rest of the senses are to be relied on.

The feeling therefore, is the guardian, the judge, and the examiner of all the rest of the senses. It establishes their information, and detects their errors. All the other senses are altered by time, and contradict their former evidence; but the touch still continues the same; and though extremely confined in its operations, yet it is never found to deceive. The universe, to a man who had only used the rest of his senses, would be but a scene of illusion; every object misrepresented, and all its properties unknown. Mr. Buffon has imagined a man just newly brought into existence, describing the illusion of his first sensations, and pointing out the steps by which he arrived at reality. He considers him as just created, and awaking amidst the productions of Nature; and to animate the narrative still more strongly, has made his philosophical man a speaker.

The reader will, no doubt, recollect Adam's speech in Milton, as being similar. One treats the subject more as a poet, the other more as a philosopher. The philosopher's man describes his first sensation in the following manner:

"I well remember that joyful anxious moment when I first became acquainted with my own existence. I was quite ignorant of what I was, how I was produced, or from whence I came. I opened my eyes: what an addition to my surprize! the light of the day, the azure vault of heaven, the verdure of the earth, the chrystal of the waters, all employed me at once, and animated and filled me with inexpressible delight. I at first imagined that all those objects were within me, and made a part of myself.

"Impressed with this idea, I turned my eyes to the sun; its splendor dazzled and overpowered me: I shut them once more; and, to my great concern, I supposed that, during this short interval of darkness, I was again returning to nothing.

"Afflicted, seized with astonishment, I pondered a moment on this great change, when I heard a variety of unexpected sounds. The whistling of the wind, and the melody of the grove, formed a concert, the soft cadence of which sunk upon my soul. I listened for some time, and was persuaded that all this music was within me.

"Quite occupied with this new kind of existence, I had already forgotten the light which was my first inlet into life; when I once more opened my eyes, and found myself again in possession of my former happiness. The gratification of the two senses at once, was a pleasure too great for utterance.

"I turned my eyes upon a thousand various objects: I soon found that I could lose them, and restore them at will; and amused myself more at leisure with a repetition of this new-made power.

"I now began to gaze without emotion, and to hearken with tranquillity, when a light breeze, the freshness of which charmed me, wafted its perfumes to my sense of smelling; and gave me such satisfaction as even increased my self-love.

"Agitated, roused by the various pleasures of my new existence, I instantly arose, and perceived myself moved along, as if by some unknown and secret power.

"I had scarce proceeded forward, when the novelty of my situation once more rendered me immoveable. My surprize returned; I supposed that every object around me had been in motion: I gave to them that agitation which I produced by changing place; and the whole creation seemed once more in disorder.

"I lifted my hand to my head; I touched my forehead; I felt my whole frame: I then supposed that my hand was the principal organ of my existence; all its informations were distinct and perfect; and so superior to the senses I had yet experienced, that I employed myself for some time in repeating its enjoyments: every part of my person I touched, seemed to touch my hand in turn; and gave back sensation for sensation.

"I soon found, that this faculty was expanded over the whole surface of my body; and I now first began to perceive the limits of my existence, which I had in the beginning supposed spread over all the objects I saw.

"Upon casting my eyes upon my body, and surveying my own form, I thought it greater than all the objects that surrounded me. I gazed upon my person with pleasure; I examined the formation of my hand, and all its motions; it seemed to me large or little in proportion as I approached it to my eyes; I brought it very near, and it then hid almost every other object from my sight. I began soon, however,

ever,

ever, to find that my sight gave me uncertain information, and resolved to depend upon my feeling for redress.

“ This precaution was of the utmost service; I renewed my motions, and walked forward with my face turned towards the heavens. I happened to strike lightly against a palm-tree, and this renewed my surprize: I laid my hand on this strange body; it seemed replete with new wonders, for it did not return me sensation for sensation, as my former feelings had done. I perceived that there was something external, and which did not make a part of my own existence.

“ I now, therefore, resolved to touch whatever I saw, and vainly attempted to touch the sun; I stretched forth my arm, and felt only yielding air: at every effort, I fell from one surprize into another, for every object appeared equally near me; and it was not till after an infinity of trials, that I found some objects further removed than the rest.

“ Amazed with the illusions, and the uncertainty of my state, I sat down beneath a tree; the most beautiful fruits hung upon it, within my reach; I stretched forth my hand, and they instantly separated from the branch. I was proud of being able to grasp a substance without me; I held them up, and their weight appeared to me like an animated power that endeavoured to draw them to the earth. I found a pleasure in conquering their resistance.

“ I held them near my eye; I considered their form and beauty; their fragrance still more allured me to bring them nearer; I approached them to my lips, and drank in their odours; the perfume invited my sense of tasting, and I soon tried a new sense—How new! how exquisite! Hitherto I had tasted only of pleasure; but now it was luxury. The power of tasting gave me the idea of possession.

“ Flattered with this new acquisition, I continued its exercise, till an agreeable languor stealing upon my mind, I felt all my limbs become heavy, and all my desires suspended. My sensations were now no longer vivid and distinct; but seemed to lose every object, and presented only feeble images, confusedly marked. At that instant I sunk upon the flowery bank, and slumber seized me. All now seemed once more lost to me. It was then as if I was returning into my former nothing. How long my sleep continued, I cannot tell; as I yet had no perception of time. My awaking appeared like a second birth; I then perceived that I had ceased for a time to exist. This produced a new sensation of fear; and from this interruption in life, I began to conclude that I was not formed to exist for ever.

“ In this state of doubt and perplexity, I began to harbour new suspicions; and to fear that sleep had robbed me of some of my late powers: when, turning on one side, to resolve my doubts, what was my amazement, to behold another being, like myself, stretched by my side! New ideas now began to arise; new passions, as yet unperceived, with fears, and pleasures, all took possession of my mind, and prompted my curiosity: love served to complete that happiness which was begun in the individual; and every sense was gratified in all its varieties.”

C H A P. X.

Of old AGE and DEATH.

EVERY thing in nature has its improvement and decay. The human form is no sooner arrived at its state of perfection than it begins to decline. The alteration is, at first, insensible; and, often, several years are elapsed before we find our-

elves grown old. The news of this disagreeable change, too generally, comes from without, and we learn from others that we grow old, before we are willing to believe the report.

When the body has come to its full height, and is extended into its just dimensions; it then also begins to receive an additional bulk, which rather loads than assists it. This is formed from fat; which generally, at the age of thirty-five, or forty, covers all the muscles, and interrupts their activity: Every action is then performed with greater labour, and the increase of size only serves as a forerunner of decay.

The bones, also, become every day more solid. In the embryo they are as soft almost as the muscles and the flesh; but, by degrees, they harden, and acquire their natural vigour; but still, however, the circulation is carried on through them; and, how hard soever the bones may seem, yet the blood holds its current through them as through all other parts of the body. Of this we may be convinced, by an experiment, which was first accidentally discovered, by our ingenious countryman Mr. Belcher. Perceiving, at a friend's house, that the bones of hogs, which were fed upon madder, were red, he tried it upon various animals, by mixing this root with their usual food; and he found that it tintured the bones in all: an evident demonstration that the juices of the body had a circulation through the bones. He fed some animals alternately upon madder and their common food, for some time, and he found their bones tintured with alternate layers, in conformity to their manner of living. From all this, he naturally concluded, that the blood circulated through the bones as it does through every other part of the body; and that, how solid soever they seemed, yet, like the softest parts, they were furnished, through all their substance, with their proper canals. Nevertheless, these canals are of very different capacities, during the different stages of life. In infancy they are capacious; and the blood flows almost as freely through the bones as through any other part of the body; in manhood their size is greatly diminished; the vessels are almost imperceptible; and the circulation through them is proportionably slow. But, in the decline of life, the blood, which flows through the bones, no longer contributing to their growth, must necessarily serve to increase their hardness. The channels, that every where run through the human frame, may be compared to those pipes that we every where see crusted on the inside, by the water, for a long continuance, running through them. Both, every day grow less and less, by the small rigid particles which are deposited within them. Thus as the vessels are by degrees diminished, the juices, also, which were necessary for the circulation through them, are diminished in proportion; till, at length, in old age, those props of the human frame are not only more solid but more brittle.

The cartilages, or gristles, which may be considered as bones beginning to be formed, grow also more rigid. The juices circulating through them, for there is a circulation through all parts of the body, every day contributes to render them harder; so that these substances, which in youth are elastic and pliant, in age become hard and bony. As these cartilages are generally placed near the joints, the motion of the joints also must, of consequence, become more difficult. Thus, in old age, every action of the body is performed with labour; and the cartilages, formerly so supple, will now sooner break than bend.

As the cartilages acquire hardness, and unfit the joints for motion, so also that mucous liquor, which is always separated between the joints, and which serves, like oil to an hinge, to give them an easy

and ready play, is now grown more scanty. It becomes thicker, and more clammy, more unfit for answering the purposes of motion; and from thence, in old age, every joint is not only stiff, but awkward. At every motion, this clammy liquor is heard to crack; and it is not without the greatest effort of the muscle, that its resistance is overcome.

The membranes that cover the bones, the joints, and the rest of the body, become, as we grow old, more dense and more dry. These which surround the bones, soon cease to be ductile. The fibres, of which the muscles or flesh is composed, become every day more rigid; and, while to the touch the body seems, as we advance in years, to grow softer, it is, in reality, increasing in hardness. It is the skin, and not the flesh, that we feel upon such occasions. The fat, and the flabbiness of that, seems to give an appearance of softness, which the flesh itself is very far from having. There are few can doubt this after trying the difference between the flesh of young and old animals. The first is soft and tender, the last is hard and dry.

The skin is the only part of the body that age does not contribute to harden. That stretches to every degree of tension; and we have horrid instances of its pliancy, in many disorders incident to humanity. In youth, therefore, while the body is vigorous and increasing, it still gives way to its growth. But, although it thus adapts itself to our increase, it does not in the same manner conform to our decay. The skin, which in youth was filled, and glossy, when the body begins to decline, has not elasticity enough to shrink entirely with its diminution. It hangs, therefore, in wrinkles, which no art can remove. The wrinkles of the body, in general, proceed from this cause. But those of the face seem to proceed from another; namely, from the many varieties of positions into which it is put by the speech, the food, or the passions. Every grimace, and every passion wrinkles up the visage into different forms. These are visible enough in young persons; but what at first was accidental, or transitory, becomes unalterably fixed in the visage as it grows older. From hence we may conclude, that a freedom from passions not only adds to the happiness of the mind, but preserves the beauty of the face; and the person that has not felt their influence, is less strongly marked by the decays of nature.

Hence, therefore, as we advance in age, the bones, the cartilages, the membranes, the flesh, the skin, and every fibre of the body, becomes more solid, more brittle, and more dry. Every part shrinks, every motion becomes more slow; the circulation of the fluids is performed with less freedom; perspiration diminishes; the secretions alter; the digestion becomes slow and laborious; and the juices, no longer serving to convey their accustomed nourishment, those parts may be said to live no longer when the circulation ceases. Thus the body dies by little and little: all its functions are diminished by degrees; life is driven from one part of the frame to another; universal rigidity prevails; and death at last seizes upon the little that is left.

As the bones, the cartilages, the muscles, and all other parts of the body are softer in women than in men, these parts must, of consequence, require a longer time to come to that hardness which hastens death. Women, therefore, ought to be a longer time in growing old than men; and this is actually the case. If we consult the tables which have been drawn up respecting human life, we shall find, that after a certain age they are more long lived than men, all other circumstances the same. A woman of sixty has a better chance than a man of the same age to live till eighty. Upon the whole we may infer, that such persons as have been slow in coming up to maturity, will also be slow in growing old; and

this holds as well with regard to other animals as to man.

The whole duration of the life of either vegetables, or animals, may be, in some measure, determined from their manner of coming to maturity. The tree, or the animal, which takes but a short time to increase to its utmost pitch, perishes much sooner than such as are less premature. In both, the increase upwards is first accomplished; and not till they have acquired their greatest degree of height do they begin to spread in bulk. Man grows in stature till about the age of seventeen; but his body is not completely developed till about thirty. Dogs, on the other hand, are at their utmost size, in a year, and become as bulky as they usually are in another. However, man who is so long in growing, continues to live for fourscore, or an hundred years; but the dog seldom above twelve, or thirteen. In general, also, it may be said that large animals live longer than little ones, as they usually take a longer time to grow. But in all animals one thing is equally certain, that they carry the causes of their own decay about them; and that their deaths are necessary and inevitable. The prospects which some visionaries have formed of perpetuating life by remedies, have been often enough proved false by their own example. Such unaccountable schemes would, therefore, have died with them, had not the love of life always augmented our credulity.

When the body is naturally well formed, it is possible to lengthen out the period of life for some years by management. Temperance in diet is often found conducive to this end. The famous Cornaro, who lived to above an hundred years although his constitution was naturally feeble, is a strong instance of the benefit of an abstemious life. Moderation in the passions, also many contribute to extend the term of our existence. Fontenelle, the celebrated writer, was naturally of a very weak and delicate habit of body. He was affected by the smallest irregularities; and had frequently suffered severe fits of illness from the slightest causes. But the remarkable equality of his temper, and his seeming want of passion, lengthened out his life to above an hundred. It was remarkable of him, that nothing could vex or make him uneasy; every occurrence seemed equally pleasing; and no event, however unfortunate, seemed to come unexpected. However, the term of life can be prolonged but for a very little time by any art we can use. We are told of men who have lived beyond the ordinary duration of human existence; such as Par, who lived to an hundred and forty-four; and Jenkins to an hundred and sixty-five; yet these men used no peculiar arts to prolong life; on the contrary, it appears that these, as well as some others, remarkable for their longevity, were peasants, accustomed to the greatest fatigues, who had no settled rules of diet, but who often indulged in accidental excesses. Indeed, if we consider that the European, the Negro, the Chinese, and the American, the civilized man, and the savage, the rich and the poor, the inhabitants of the city, and of the country, though all so different in other respects, are yet entirely similar in the period allotted them for living; if we consider that neither the difference of race, of climate, of nourishment, of convenience, or of soil, makes any difference in the term of life; if we consider that those men who live upon raw flesh, or dried fishes, upon seago, or rice, upon cassava, or upon roots, nevertheless live as long as those who are fed upon bread and meat, we shall readily be brought to acknowledge, that the duration of life depends neither upon habit, customs, or the quantity of food; we shall confess, that nothing can change the laws of that mechanism which regulates the number of our years, and which can chiefly be affected only by long fasting, or great excess.

If there be any difference in the different periods of man's existence, it ought principally to be ascribed to the quality of the air. It has been observed, that in elevated situations there have been found more old people than in those that were low. The mountains of Scotland, Wales, Auvergne, and Switzerland, have furnished more instances of extreme old age than the plains of Holland, Flanders, Germany, or Poland. But, in general, the duration of life is nearly the same in most countries. Man, if not cut off by accidental diseases, is often found to live to ninety or an hundred years. Our ancestors did not live beyond that date; and, since the time of David, this term has undergone little alteration.

If we be asked how in the beginning men lived so much longer than at present, and by what means their lives were extended to nine hundred and thirty, or even nine hundred and sixty years, it may be answered, that the productions of the earth, upon which they fed, might be of a different nature at that time, from what they are at present. It may be answered, that the term was abridged by Divine command, in order to keep the earth from being over-stocked with human inhabitants; since, if every person were now to live and generate for nine hundred years, mankind would be increased to such a degree, that there would be no room for subsistence: so that the plan of Providence would be altered; which is seen not to produce life, without providing a proper supply.

But, to whatever extent life may be prolonged, or however some may have delayed the effects of age, death is the certain goal to which all are hastening. All the causes of decay which have been mentioned, contribute to bring on this dreaded dissolution. However, nature approaches to this awful period, by slow and imperceptible degrees; life is consuming day after day; and some one of our faculties, or vital principles, is every hour dying before the rest; so that death is only the last shade in the picture: and it is probable, that man suffers a greater change in going from youth to age, than from age into the grave. When we first begin to live, our lives may scarcely be said to be our own; as the child grows, life increases in the same proportion: and is at its height in the prime of manhood. But as soon as the body begins to decrease, life decreases also; for, as the human frame diminishes, and its juices circulate in smaller quantity, life diminishes and circulates with less vigour; so that as we begin to live by degrees, we begin to die in the same manner.

Why then should we fear death, if our lives have been such as not to make eternity dreadful! Why should we fear that moment which is prepared by a thousand other moments of the same kind! the first pangs of sickness being probably greater than the last struggles of departure. Death, in most persons, is as calmly endured as the disorder that brings it on. If we enquire from those whose business it is to attend the sick and the dying, we shall find that, except in a very few acute cases, where the patient dies in agonies, the greatest number die quietly, and seemingly without pain; and even the agonies of the former, rather terrify the spectators, than torment the patient; for how many have we not seen who have been accidentally relieved from this extremity, and yet had no memory of what they then endured? In fact, they had ceased to live, during that time when they ceased to have sensation; and their pains were only those of which they had an idea.

The greatest number of mankind die, therefore, without sensation; and of those few that still preserve their faculties entire to the last moment, there is scarce one of them that does not also preserve the hopes of still out-living his disorder. Nature, for

the happiness of man, has rendered this sentiment stronger than his reason. A person dying of an incurable disorder, which he must know to be so, by frequent examples of his case; which he perceives to be so, by the inquietude of all around him, by the tears of his friends, and the departure or the face of the physician, is, nevertheless, still in hopes of getting over it. His interest is so great that he only attends to his own representations; the judgment of others is considered as an hasty conclusion; and while death every moment makes new inroads upon his constitution, and destroys life in some part, hope still seems to escape the universal ruin, and is the last that submits to the blow.

Cast your eyes upon a sick man, who has an hundred times told you that he felt himself dying, that he was convinced he could not recover, and that he was ready to expire; examine what passes on his visage, when, through zeal or indiscretion, any one comes to tell him that his end is at hand. You will see him change, like one who is told an unexpected piece of news. He now appears not to have thoroughly believed what he had been telling you himself; he doubted much; and his fears were greater than his hopes: but he still had some feeble expectations of living, and would not have seen the approaches of death, unless he had been alarmed by the mistaken assiduity of his attendants.

Death, therefore, is not that terrible thing which we suppose it to be. It is a spectre which frights us at a distance, but which disappears when we come to approach it more closely. Our ideas of its terrors are conceived in prejudice, and dressed up by fancy; we regard it not only as the greatest misfortune, but also as an evil accompanied with the most excruciating tortures: we have even increased our apprehensions, by reasoning on the extent of our sufferings. It must be dreadful, say some, since it is sufficient to separate the soul from the body; it must be long, since our sufferings are proportioned to the succession of our ideas; and these being painful, must succeed each other with extreme rapidity. In this manner has false philosophy laboured to augment the miseries of our nature; and to aggravate that period, which Nature has kindly covered with insensibility. Neither the mind, nor the body, can suffer these calamities; the mind is, at that time, mostly without ideas; and the body too much enfeebled to be capable of perceiving its pain. A very acute pain produces either death, or fainting, which is a state similar to death: the body can suffer but to a certain degree; if the torture becomes excessive, it destroys itself; and the mind ceases to perceive, when the body can no longer endure.

In this manner, excessive pain admits of no reflection; and wherever there are any signs of it, we may be sure that the sufferings of the patient are no greater than what we ourselves may have remembered to endure.

But, in the article of death, we have many instances in which the dying person has shewn that very reflection which pre-supposes an absence of the greatest pain; and, consequently, that pang which ends life, cannot even be so great as those which have preceded. Thus, when Charles XII. was shot at the siege of Frederickshall, he was seen to clap his hand on the hilt of his sword; and although the blow was great enough to terminate one of the boldest and bravest lives in the world, yet it was not painful enough to destroy reflection. He perceived himself attacked; he reflected that he ought to defend himself, and his body obeyed the impulse of his mind, even in the last extremity. Thus it is the prejudice of persons in health, and not the body in pain, that makes us suffer from the approach of death: we have, all our lives, contracted an habit of making out excessive pleasures
and

and pains; and nothing but repeated experience shews us, how seldom the one can be suffered, or the other enjoyed to the utmost.

If there be any thing necessary to confirm what we have said, concerning the gradual cessation of life, or the insensible approaches of our end, nothing can more effectually prove it, than the uncertainty of the signs of death. If we consult what Winslow or Bruhier have said upon this subject, we shall be convinced, that between life and death, the shade is so very undistinguishable, that even all the powers of art can scarcely determine where the one ends, and the other begins. The colour of the visage, the warmth of the body, the suppleness of the joints, are but uncertain signs of life still subsisting; while on the contrary, the paleness of the complexion, the coldness of the body, the stiffness of the extremities, the cessation of all motion, and the total insensibility of the parts, are but uncertain marks of death begun. In the same manner also, with regard to the pulse, and the breathing, these motions are often so kept under, that it is impossible to perceive them. By approaching a looking-glass to the mouth of the person supposed to be dead, people often expect to find whether he breathes or not. But this is a very uncertain experiment: the glass is frequently sullied by the vapour of the dead man's body; and often the person is still alive, although the glass is no way tarnished. In the same manner, neither burning, nor scarifying, neither noises in the ears, nor pungent spirits applied to the nostrils, give certain signs of the discontinuance of life; and there are many instances of persons who have endured them all, and afterwards recovered, without any external assistance, to the astonishment of the spectators. How careful, therefore, should we be, before we commit those who are dearest to us to the grave, to be well assured of their departure? Experience, justice, humanity, all persuade us not to hasten the funerals of our friends, but to keep their bodies unburied, until we have certain signs of their real decease.

C H A P. XI.

Of the Varieties in the HUMAN Race.

WE have hitherto considered man as an individual, endowed with excellencies above the rest of the creation; we now come to consider the advantages which men have over men, and the various kinds with which our earth is inhabited.

If we compare the minute differences of mankind, there is scarce one nation upon the earth that entirely resembles another; and there may be said to be as many different kinds of men as there are countries inhabited. One polished nation does not differ more from another, than the merest savages do from those savages that lie even contiguous to them; and it frequently happens that a river, or a mountain, divides two barbarous tribes that are unlike each other in manners, customs, features, and complexion. But these differences, however perceivable, do not form such distinctions as come within a general picture of the varieties of mankind. Custom, accident, or fashion, may produce considerable alterations in neighbouring nations; their being derived from ancestors of a different climate, or complexion, may contribute to make accidental distinctions, which every day grow less; and it may be said, that two neighbouring nations, how unlike to each other at first, will assimilate by degrees; and, by long continuance, the difference between them will at last become almost imperceptible. It is not, therefore, between contiguous nations we are to look for any strong marked varieties in the human species;

it is by comparing the inhabitants of opposite climates, and distant countries; those who live within the polar circle with those beneath the equator; those that live on one side of the globe with those that occupy the other.

Of all animals, the differences between mankind are the smallest. Of the lower races of creatures, the changes are so great as often entirely to disguise the natural animal, and to distort, or to disfigure its shape. But the chief differences in man are rather taken from the tincture of his skin than the variety of his figure; and in all climates he preserves his erect deportment, and the marked superiority of his form. If we look round the world there seem to be not above six distinct varieties in the human species, each of which is strongly marked, and speaks the kind seldom to have mixed with any other. But there is nothing in the shape, nothing in the faculties, that shews their coming from different originals; and the varieties of climate, of nourishment, and custom, are sufficient to produce every change.

The first distinct race of men is found round the polar regions. The Laplanders, the Esquimaux Indians, the Samœid Tartars, the inhabitants of Nova Zembla, the Borandians, the Greenlanders, and the natives of Kamtschatka, may be considered as one peculiar race of people, all greatly resembling each other in their stature, their complexion, their customs, and their ignorance. These nations being under a rigorous climate, where the productions of nature are but few, and the provisions coarse and unwholesome, their bodies have shrunk to the nature of their food; and their complexions have suffered, from cold, almost a similar change to what heat is known to produce; their colour being a deep brown, in some places inclining to actual blackness. These, therefore, in general, are found to be a race of short stature, and odd shape, with countenances as savage as their manners are barbarous. The visage, in these countries, is large and broad, the nose flat and short, the eyes of a yellowish brown inclining to blackness, the eye-lids drawn towards the temples, the cheek-bones extremely high, the mouth very large, the lips thick and turned outwards, the voice thin and squeaking, the head large, the hair black and straight, the colour of the skin of a dark greyish. They are short in stature, the generality not being above four feet high, and the tallest not above five. Among all these nations the women are as deformed as the men, and resemble them so nearly that one cannot, at first, distinguish the sexes among them.

These nations not only resemble each other in their deformity, their dwarfishness, the colour of their hair and eyes, but they have, in a great measure, the same inclinations, and the same manners, being all equally rude, superstitious, and stupid. The Danish Laplanders have a large black cat, to which they communicate their secrets, and consult in all their affairs. Among the Swedish Laplanders there is in every family a drum for consulting the devil; and, although these nations are robust, and nimble, yet they are so cowardly, that they never can be brought into the field. Gustavus Adolphus attempted to form a regiment of Laplanders; but he found it impossible to accomplish his design; for it should seem that they can live only in their own country, and in their own manner. They make use of skates, which are made of fir, of near three feet long, and half a foot broad; these are pointed, and raised before, and tied to the foot by straps of leather. With these they skate upon the icy snow with such velocity, that they very easily overtake the swiftest animals. They make use also of a pole, pointed with iron at one end, and rounded at the other. This pole serves to push them along, to direct

NATURAL HISTORY of MAN.

THE HOTTENTOT



THE AMERICAN



THE LAPLANDER



THE CHINESE



THE AFRICAN



A GREENLANDER



rect their course, to support them from falling, to stop the impetuosity of their motion, and to kill that game which they have overtaken. Upon these skates they descend the steepest mountains, and scale the most craggy precipices; and, in these exercises, the women are not less skilful than the men. They have all the use of the bow and arrow, which seems to be a contrivance common to all barbarous nations; and which, however, at first, required no small skill to invent. They launch a javelin also, with great force; and some say that they can hit a mark, no larger than a crown, at thirty yards distance, and with such force as would pierce a man through. They are all hunters; and particularly pursue the ermine, the fox, the ounce, and the martin, for the sake of their skins. These they barter, with their southern neighbours, for brandy and tobacco; both which they are fond of to excess. Their food is principally dried fish, the flesh of rein-deer and bears. Their bread is composed of the bones of fishes, pounded and mixed with the inside bark of the pine-tree. Their drink is train-oil, or brandy, and, when deprived of these, water, in which juniper berries have been infused. With regard to their morals, they have all the virtues of simplicity, and all the vices of ignorance. They offer their wives and daughters to strangers; and seem to think it a particular honour if their offer be accepted. They have no idea of religion, or a Supreme Being; the greatest number of them are idolaters; and their superstition is as profound as their worship is contemptible. Wretched and ignorant as they are, yet they do not want pride; they set themselves far above the rest of mankind; and Krantz assures us, that when the Greenlanders are got together, nothing is so customary among them as to turn the Europeans into ridicule. They are obliged, indeed, to yield them the pre-eminence in understanding, and mechanic arts; but they do not know how to set any value upon these. They therefore count themselves the only civilized and well-bred people in the world; and it is common with them, when they see a quiet, or a modest stranger, to say that he is almost as well bred as a Greenlander.

From this description, therefore, this whole race of people may be considered as distinct from any other. Their long continuance in a climate the most inhospitable, their being obliged to subsist on food the most coarse and ill prepared, the savageness of their manners, and their laborious lives, all have contributed to shorten their stature, and to deform their bodies. In proportion as we approach towards the north pole, the size of the natives appears to diminish, growing less and less as we advance higher, till we come to those latitudes that are destitute of all inhabitants whatsoever.

The wretched natives of these climates seem fitted by nature to endure the rigours of their situation. As their food is but scanty and precarious, their patience in hunger is amazing. A man, who has ate nothing for four days, can manage his little canoe, in the most furious waves, and calmly subsist in the midst of a tempest, that would quickly dash an European boat to pieces. Their strength is not less amazing than their patience; a woman among them will carry a piece of timber, or a stone, near double the weight of what an European can lift. Their bodies are of a dark grey all over; and their faces brown, or olive. The tincture of their skins partly seems to arise from their dirty manner of living, being generally daubed with train-oil; and partly from the rigours of climate, as the sudden alterations of cold and raw air in winter, and of burning heats in summer, shade their complexions by degrees, till, in a succession of generations, they at last become almost black. As the countries in

which these reside are the most barren, so the natives seem the most barbarous of any part of the earth. Their more southern neighbours of America, treat them with the same scorn that a polished nation would treat a savage one; and we may readily judge of the rudeness of those manners, which even a native of Canada can think more barbarous than his own.

But the gradations of nature are imperceptible; and, while the north is peopled with such miserable inhabitants, there are here and there to be found, upon the edges of these regions, people of larger stature, and completer figure. A whole race of the dwarfish breed is often found to come down from the north, and settle more to the southward; and, on the contrary, it sometimes happens that southern nations are seen higher up, in the midst of these diminutive tribes, where they have continued for time immemorial. Thus the Ostiac Tartars seem to be a race that have travelled down from the north, and to be originally sprung from the minute savages we have been describing. There are also Norwegians, and Finlanders, of proper stature, who are seen to inhabit in latitudes higher even than Lapland. These, however, are but accidental migrations, and serve as shades to unite the distinct varieties of mankind.

The second great variety, in the human species, seems to be that of the Tartar race; from whence, probably, the little men we have been describing originally proceeded. The Tartar country, taken in general, comprehends the greatest part of Asia; and is, consequently, a general name given to a number of nations, of various forms and complexions. But, however they seem to differ from each other, they all agree in being very unlike the people of any other country. All these nations have the upper part of the visage very broad, and wrinkled even while yet in their youth. Their noses are short and flat, their eyes little and sunk in their heads; and, in some of them, they are seen five or six inches asunder. Their cheek-bones are high, the lower part of their visage narrow, the chin long and advanced forward, their teeth of an enormous size and growing separate from each other, their eyebrows thick, large, and covering their eyes, their eye-lids thick, the face broad and flat, the complexion olive coloured, and the hair black. They are of a middle size, extremely strong, and very robust. They have but little beard, which grows stragglingly on the chin. They have large thighs, and short legs. The ugliest of all are the Calmoucks, in whose appearance there seems to be something frightful. They all lead an erratic life, remaining under tents of hair, or skins. They live upon horse-flesh and that of camels, either raw or a little sodden between the horse and the saddle. They eat also fish dried in the sun. Their most usual drink is mares milk fermented with millet ground into meal. They all have the head shaven, except a lock of hair, on the top, which they let grow sufficiently long to form into tresses, on each side of the face. The women, who are as ugly as the men, wear their hair, which they bind up with bits of copper and other ornaments of a like nature. The majority of these nations have no religion, no settled notions of morality, no decency of behaviour. They are chiefly robbers; and the natives of Dagestan, who live near their more polished neighbours, make a traffic of Tartar slaves who have been stolen, and sell them to the Turks and the Persians. Their chief riches consist in horses, of which perhaps there are more in Tartary, than in any other part of the world. The natives are taught by custom to live in the same place with their horses; they are continually employed in managing them,

and at last bring them to such great obedience, that the horse seems actually to understand the rider's intention.

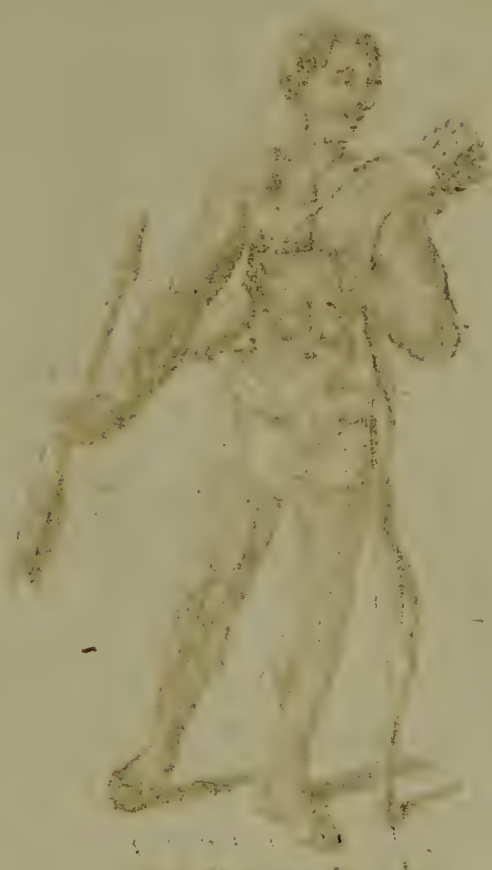
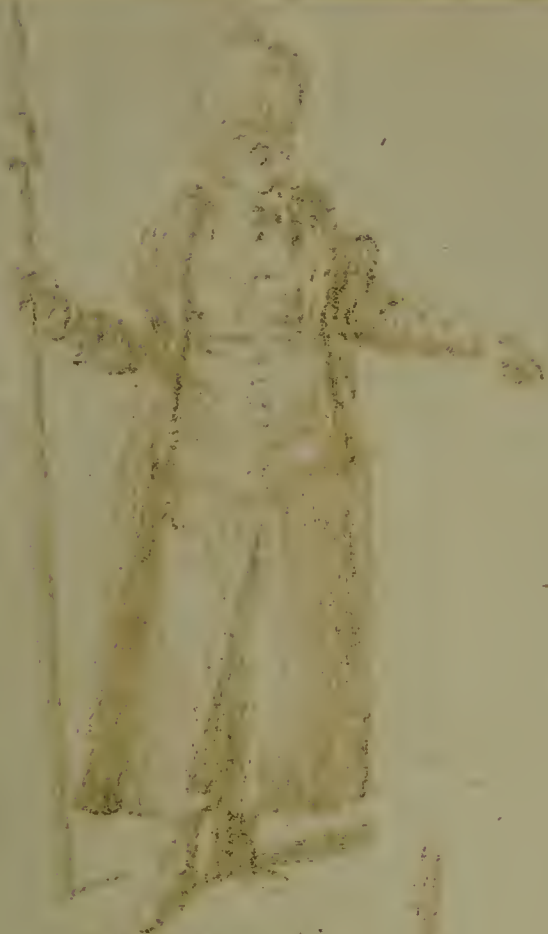
To this race of men also, we must refer the Chinese and the Japanese, however different they seem in their manners and ceremonies. It is the form of the body we are now principally considering; and there is, between these countries, a surprising resemblance. It is in general allowed that the Chinese have broad faces, small eyes, flat noses, and scarce any beard; that they are broad and square-shouldered, and rather less in stature than Europeans. These are marks common to them and the Tartars, and they may, therefore, be considered as being derived from the same original. "I have observed," says Chardin, "that in all the people from the east and the north of the Caspian sea, to the peninsula of Malacca, that the lines of the face, and the formation of the visage, is the same. This has induced me to believe, that all these nations are derived from the same original, however different either their complexions or their manners may appear: for as to the complexion, that proceeds entirely from the climate and the food; and as to the manners, these are generally the result of their different degrees of wealth or power." That they come from one stock, is evident also, from this; that the Tartars who settle in China, quickly resemble the Chinese; and, on the contrary, the Chinese who settle in Tartary, soon assume the figure, and the manners of the Tartars.

The Japanese so much resemble the Chinese, that one cannot hesitate to rank them in the same class. They only differ in being rather browner, as they inhabit a more southern climate. They are, in general, described, as of a brown complexion, a short stature, a broad flat face, a very little beard, and black hair. Their customs and ceremonies are nearly the same; their ideas of beauty similar; and their artificial deformities of blackening the teeth, and bandaging the feet, entirely alike in both countries. They both, therefore, proceed from the same stock; and although they differ very much from their brutal progenitors, yet they owe their civilization wholly to the mildness of the climate in which they reside, and to the peculiar fertility of the soil. To this tribe also, we may refer the Cochinchinese, the Siamese, the Tonquinese, and the inhabitants of Aracan, Laos, and Pegu, who, though all differing from the Chinese, and each other, nevertheless, have too strong a resemblance, not to betray their common original.

Another, which makes the third variety in the human species, is that of the southern Asiatics; the form of whose features and persons may be easily distinguished from those of the Tartar races. The nations that inhabit the peninsula of India, seem to be the principal stock from whence the inhabitants of the islands that lie scattered in the Indian ocean, have been peopled. They are, in general, of a slender shape, with long straight black hair, and often with Roman noses. Thus they resemble the Europeans in stature and features; but greatly differ in colour and habit of body. The Indians are of an olive colour, and, in the more southern parts, quite black; although the word Mogul, in their language, signifies a white man. The women are extremely delicate, and bathe very often: they are of an olive colour, as well as the men; their legs and thighs are long, and their bodies short, which is the opposite to what is seen among the women of Europe. They are, it is said, by no means so fruitful as the European women; but they feel the pains of child-birth with much less sensibility, and are generally up and well the day following. In fact, these pains seem greatest in all countries where the women are most delicate, or the constitution enfee-

bled by luxury or indolence. The women of savage nations seem, in a great measure, exempt from painful labours; and even the hard-working wives of the peasants among ourselves, have this advantage, from a life of industry, that their child-bearing is less painful. Over all India, the children arrive sooner at maturity, than with us of Europe. They often marry, and consummate, the husband at ten years old, and the wife at eight; and they frequently have children at that age. However, the women who are mothers so soon, cease bearing before they are arrived at thirty; and, at that time, they appear wrinkled, and seem marked with all the deformities of age. The Indians have long been remarkable for their cowardice and effeminacy; every conqueror that has attempted the invasion of their country, having succeeded. The warmth of the climate entirely influences their manners; they are slothful, submissive and luxurious: satisfied with sensual happiness alone, they find no pleasure in thinking; and contented with slavery, they are ready to obey any master. Many tribes among them eat nothing that has life; they are fearful of killing the meanest insect; and have even erected hospitals for the maintainance of all kinds of vermin. The Asiatic dress is a loose flowing garment, rather fitted for the purposes of peace and indolence, than of industry or war. The vigour of the Asiatics is in general conformable to their dress and nourishment; fed upon rice, and cloathed in effeminate silk vestments, their soldiers are unable to oppose the onset of an European army; and, from the times of Alexander to the present day, we have scarce any instances of their success in arms. Upon the whole, therefore, they may be considered as a feeble race of sensualists, too dull to find rapture in any pleasures, and too indolent to turn their gravity into wisdom. To this class we may refer the Persians and Arabians, and, in general, the inhabitants of the islands that lie scattered in the Indian ocean.

The fourth striking variety in the human species, is to be found among the Negroes of Africa. This gloomy race of mankind is found to blacken all the southern parts of Africa, from eighteen degrees north of the line, to its extreme termination, at the Cape of Good Hope. It is said, that the Caffres, who inhabit the southern extremity of that large continent, are not to be ranked among the Negroe race; however, the difference between them, in point of colour and features, is so small, that they may very easily be grouped in this general picture. Each of the Negroe nations, it must be owned, differ from each other; they have their peculiar countries for beauty, like us; and different nations, as in Europe, pride themselves upon the regularity of their features. Those of Guinea, for instance, are extremely ugly, and have an insupportable scent; those of Mosambique are reckoned beautiful, and have no ill smell whatsoever. The Negroes, in general, are of a black colour, with a smooth soft skin. This smoothness proceeds from the downy softness of the hair which grows upon it; the strength of which gives a roughness to the feel, in those of a white complexion. Their skins, therefore, have a velvet smoothness, and seem less braced upon the muscles than ours. The hair of their heads differs entirely from what we are accustomed to, being soft, woolly, and short. The beard also, partakes of the same qualities; but in this it differs, that it soon turns grey, which the hair is seldom found to do; so that several are seen with white beards, and black hair, at the same time. Their eyes are generally of a deep hazle; their noses flat and short; their lips thick and tumid; and their teeth of an ivory whiteness. This their only beauty, however, is set off by the colour of their skin; the contrast between the



NATURAL HISTORY of MAN.



A MALABAR



A TARTAR



An ALGERINE



A JAVANESE



A HIGHLANDER



An HUNGARIAN

black and white being the more observable. It is false to say that their features are deformed by art; since, in the Negroe children born in European countries, the same deformities are seen to prevail; the same flatness in the nose; and the same prominence in the lips. They are, in general, said to be well shaped; but there is seldom found one that might be justly called so; their legs being mostly ill formed, and commonly bending outward on the shin-bone. But it is not only in those parts of their bodies that are obvious, that they are disproportioned; those parts which among us are usually concealed by dress, with them are large and languid. The women's breasts, after bearing one child, hang down below the navel; and it is customary, with them, to suckle the child at their backs, by throwing the breast over the shoulder. As their persons are thus naturally deformed, at least to our imaginations, their minds are equally incapable of strong exertions. The climate seems to relax their mental powers still more than those of the body; they are, therefore, in general, found to be stupid, indolent, and mischievous. The Arabians themselves, many colonies of whom have migrated southward into the most inland parts of Africa, seem to have degenerated from their ancestors; forgetting their ancient learning, and losing their beauty, they have become a race scarce any way distinguishable from the original natives. Nor does it seem to have fared otherwise with the Portuguese, who, about two centuries ago, settled along this coast. They also are become almost as black as the Negroes; and are said, by some, to be even more barbarous.

The inhabitants of America make a fifth race, as different from all the rest in colour, as they are distinct in habitation. The natives of America (except in the northern extremity, where they resemble the Laplanders) are of a red or copper colour; and although, in the old world, different climates produce a variety of complexions and customs, the natives of the new continent seem to resemble each other in almost every respect. They are all nearly of one colour; all have black thick straight hair, and thin black beards; which, however, they take care to pluck out by the roots. They have, in general, flat noses, with high cheek bones, and small eyes; and these deformities of nature they endeavour to increase by art; they flatten the nose, and often the whole head of their children, while the bones are yet susceptible of every impression. They paint the body and face of various colours, and consider the hair upon any part of it, except the head, as a deformity which they are careful to eradicate. Their limbs are generally slighter made than those of the Europeans; and they are far from being so strong. All these savages seem to be cowardly; they seldom are known to face their enemies in the field, but fall upon them at an advantage; and the greatness of their fears serves to increase the rigours of their cruelty. The wants which they often sustain, makes them surprisngly patient in adversity; distress, by being grown familiar, becomes less terrible; so that their patience is less the result of fortitude than of custom. They have all a serious air, although they seldom think; and, however cruel to their enemies, are kind and just to each other. In short, the customs of savage nations in every country are almost the same; a wild, independent, and precarious life, produces a peculiar train of virtues and vices: and patience and hospitality, indolence and rapacity, content and sincerity, are found not less among the natives of America, than all the barbarous nations of the globe.

The sixth and last variety of the human species, is that of the Europeans, and the nations bordering on them. In this class we may reckon the Georgians, Circassians, and Mingrelians, the inha-

bitants of Asia Minor, and the northern parts of Africa, together with a part of those countries which lie north-west of the Caspian sea. The inhabitants of these countries differ a good deal from each other; but they generally agree in the colour of their bodies, the beauty of their complexions, the largeness of their limbs, and the vigour of their understandings. Those arts which might have had their invention among the other races of mankind, have come to perfection there. In barbarous countries, the inhabitants go either naked, or are awkwardly clothed in furs or feathers; in countries semi-barbarous, the robes are loose and flowing; but here the cloathing is less made for shew than expedition, and unites, as much as possible, the extremes of ornament and dispatch.

To one or other of these classes, we may refer the people of every country; and as each nation has been less visited by strangers, or has had less commerce with the rest of mankind, we find their persons, and their manners, more strongly impressed with one or other of the characters mentioned above. On the contrary, in those places where trade has long flourished, or where enemies have made many incursions, the races are usually found blended, and properly fall beneath no one character. Thus, in the islands of the Indian ocean, where a trade has been carried on for time immemorial, the inhabitants appear to be a mixture of all the nations upon the earth; white, olive, brown, and black men, are all seen living together in the same city, and propagate a mixed breed, that can be referred to none of the classes into which naturalists have thought proper to divide mankind.

Of all the colours by which mankind is diversified, it is easy to perceive, that ours is not only the most beautiful to the eye, but the most advantageous. The fair complexion seems, if we may so express it, as a transparent covering to the soul; all the variations of the passions, every expression of joy or sorrow, flows to the cheek, and, without language, marks the mind. In the slightest change of health also, the colour of the European face is the most exact index, and often teaches us to prevent those disorders that we do not as yet perceive; not but that the African black, and the Asiatic olive complexions, admit of their alterations also; but these are neither so distinct, nor so visible, as with us; and, in some countries, the colour of the visage is never found to change; but the face continues in the same settled shade in shame, and in sickness, in anger, and despair.

The colour, therefore, most natural to man, ought to be that which is most becoming; and it is found, that, in all regions, the children are born fair, or at least red; and that they grow more black or tawny, as they advance in age. It should seem, consequently, that man is naturally white; since the same causes that darken the complexion in infants, may have originally operated, in slower degrees, in blackening whole nations. We could, therefore, readily account for the blackness of different nations, did we not see the Americans, who live under the line, as well as the natives of Negroeland, of a red colour, and but a very small shade darker than the natives of the northern latitudes, in the same continent. For this reason, some have sought for other causes of blackness than the climate; and have endeavoured to prove that the blacks are a race of people, bred from one man, who was marked with accidental blackness. This, however, is but mere ungrounded conjecture; and, although the Americans are not so dark as the Negroes, yet we must still continue in the ancient opinion, that the deepness of the colour proceeds from the excessive heat of the climate: for, if we compare the heats of Africa with those of America, we shall find they bear no proportion

proportion to each other. In America, all that part of the continent which lies under the line, is cool and pleasant, either shaded by mountains, or refreshed by breezes from the sea; but, in Africa, the wide tract of country that lies under the line is very extensive, and the soil sandy: the reflection of the sun, therefore, from so large a surface of the earth, is almost intolerable; and it is not to be wondered at, that the inhabitants should bear, in their looks, the marks of the inhospitable climate. In America, the country is but thinly inhabited; and the more torrid tracts are generally left desert by the inhabitants; for which reason they are not so deeply tinged by the beams of the sun. But in Africa the whole face of the country is fully peopled; and the natives are obliged to endure their situation, without a power of migration. It is there, consequently, that they are in a manner tied down to feel all the severity of the heat; and their complexions take the darkest hue they are capable of receiving. We need not, therefore, have recourse to any imaginary propagation, from persons accidentally black, since the climate is a cause obvious, and sufficient to produce the effect.

In fact, if we examine the complexion of different countries, we shall find them darken in proportion to the heat of their climate; and the shades gradually to deepen as they approach the line. Some nations, indeed, may be found not so much tinged by the sun as others, although they lie nearer the line. But this ever proceeds from some accidental causes; either from the country lying higher, and consequently being colder; or from the natives bathing oftener, and leading a more civilized life. In general, it may be asserted, that as we approach the line, we find the inhabitants of each country grow browner until the colour deepens into perfect blackness. Thus taking our standard from the whitest race of people, and beginning with our own country, which certainly bids fairest for the pre-eminence, we shall find the French, who are more southern, a slight shade deeper than we; going farther down, the Spaniards are browner than the French; the inhabitants of Fez darker than they; and the natives of Negroeland the darkest of all. In what manner the sun produces this effect, and how the same luminary which whitens wax and linen, should darken the human complexion, is not easy to conceive. Sir Thomas Brown first supposed that a mucous substance, which had something of a vitriolic quality, settled under the reticular membrane, and grew darker with heat. Others have supposed that the blackness lay in the epidermis, or scarf skin, which was burnt up like leather. But nothing has been satisfactorily discovered upon the subject; it is sufficient that we are assured of the fact; and that we have no doubt of the sun's tinging the complexion in proportion to its vicinity.

But we are not to suppose that the sun is the only cause of darkening the skin; the wind, extreme cold, hard labour, or coarse and sparing nourishment, are all found to contribute to this effect. We find the peasants of every country, who are most exposed to the weather, a shade darker than the higher ranks of people. The savage inhabitants of all places are exposed still more, and, therefore, contract a still deeper hue; and this will account for the tawny colour of the North American Indians. Although they live in a climate the same, or even more northerly than ours, yet they are found to be of complexions very different from those of Europe. But it must be considered that they live continually exposed to the sun; that they use many methods to darken their skins by art, painting them with red ochre, and anointing them with the fat of bears. Had they taken, for a succession of several generations, the same precautions to brighten their co-

lour that an European does, it is very probable that they would in time come to have similar complexions; and, perhaps, dispute the prize of beauty.

The extremity of cold is not less productive of a tawny complexion than that of heat. The natives of the arctic circle, as was observed, are all brown; and those that lie most to the north are almost entirely black. In this manner both extremes are unfavourable to the human form and colour, and the same effects are produced under the poles that are found at the line.

With regard to the stature of different countries, that seems chiefly to result from the nature of the food, and the quantity of the supply. Not but that the severity of heat or cold, may, in some measure, diminish the growth, and produce a dwarfishness of make. But, in general, the food is the great agent in producing this effect; where that is supplied in large quantities, and, where its quality is wholesome and nutrimental, the inhabitants are generally seen above the ordinary stature. On the contrary, where it is afforded in a sparing quantity, or very coarse, and void of nourishment in its kind, the inhabitants degenerate, and sink below the ordinary size of mankind. In this respect they resemble other animals, whose bodies, by proper feeding, may be greatly augmented. An ox, on the fertile plains of India, grows to a size four times as large as the diminutive animal of the same kind bred in the Alps. The horses bred in the plains are larger than those of the mountain. So it is with man; the inhabitants of the valley are usually found taller than those of the hill: the natives of the Highlands of Scotland, for instance, are short, broad, and hardy; those of the Lowlands are tall and shapely. The inhabitants of Greenland, who live upon dried fish and seals, are less than those of Gambia or Senegal, where Nature supplies them with vegetable and animal abundance.

The form of the face seems rather to be the result of custom. Nations who have long considered some artificial deformity as beautiful, who have industriously lessened the feet, or flattened the nose, by degrees, begin to receive the impression they are taught to assume; and Nature, in a course of ages, shapes itself to the constraint, and assumes hereditary deformity. We find nothing more common in births than for children to inherit sometimes even the accidental deformities of their parents. We have many instances of squinting in the father, which he received from fright, or habit, communicated to the offspring; and we have seen a child distinctly marked with a scar, similar to one the father had received in battle. In this manner accidental deformities may become natural ones; and by assiduity may be continued, and even increased, through successive generations. From this, therefore, may have arisen the small eyes and long ears of the Tartars, and Chinese nations. From hence originally may have come the flat noses of the blacks, and the flat heads of the American Indians.

In this slight survey, therefore, we may see that all the variations in the human figure, as far as they differ from our own, are produced either by the rigour of the climate, the bad quality, or the scantiness of the provisions, or by the savage customs of the country. They are actual marks of the degeneracy in the human form; and we may consider the European figure and colour as standards to which to refer all other varieties, and with which to compare them. In proportion as the Tartar or American approaches nearer to European beauty, we consider the race as less degenerated; in proportion as he differs more widely, he has made greater deviation from his original form.

That we have all sprung from one common parent, we are taught, both by reason and religion, to believe;

lieve; and we have good reason also to think that the Europeans resemble him more than any of the rest of his children. However, it must not be concealed that the olive coloured Asiatic, and even the jet black Negroe, claim this honour of hereditary resemblance; and assert that white men are mere deviations from original perfection. Odd as this opinion may seem, they have Linnæus, the celebrated naturalist, on their side; who supposes man a native of the tropical climates, and only a sojourner more to the north. But, not to enter into a controversy upon a matter of a very remote speculation, one argument alone will suffice to prove the contrary, and shew that the white man is the original source from whence the other varieties have sprung. We have frequently seen white children produced from black parents, but have never seen a black offspring the production of two whites. From hence we may conclude that whiteness is the colour to which mankind naturally tends; for, as in the tulip, the parent stock is known by all the artificial varieties breaking into it; so in man, that colour must be original which never alters, and to which all the rest are accidentally seen to change. We have seen in London, at different times, two white Negroes, the issue of black parents, that served to convince us of the truth of this theory. We had before been taught to believe that the whiteness of the Negroe skin was a disease, a kind of milky whiteness, that might be called rather a leprous crust than a natural complexion. We were taught to suppose that the numberless white Negroes, found in various parts of Africa, the white men that go by the name of Chacrelas, in the East-Indies, and the white Americans, near the Isthmus of Darien, in the West Indies, were all as so many diseased persons, and even more deformed than the blackest of the natives. But, upon examining that Negroe which was last shewn in London, the colour was found to be exactly like that of an European; the visage white and ruddy, and the lips of the proper redness. However, there were sufficient marks to convince us of its descent. The hair was white and woolly, and very unlike any thing ever seen before. The iris of the eye was yellow, inclining to red; the nose was flat, exactly resembling that of a Negro; and the lips thick, and prominent. No doubt, therefore, remained of the child's having been born of Negroe parents; and the person who shewed it had attestations to convince the most incredulous. From this then we see that the variations of the Negroe colour is into whiteness, whereas the white are never found to have a race of Negroe children. Upon the whole, all those changes which the African, the Asiatic, or the American undergo, are but accidental deformities, which a kinder climate, better nourishment, or more civilized manners, would, in a course of centuries, very probably remove.

CHAPTER XII.

OF MONSTERS.

HITHERTO we have only spoken of those varieties in the human species, that are common to whole nations; but there are varieties of another kind, which are only found in the individual; and, being more rarely seen, are, therefore, called monstrous. If we examine into the varieties of distorted nature, there is scarce a limb of the body, or a feature in the face, that has not suffered some reprobation, either from art or nature; being enlarged or diminished, lengthened or wrested, from its due proportion. Linnæus, after having given

No. 57.

a catalogue of monsters, particularly adds, the flat heads of Canada, the long heads of the Chinese, and the slender waists of the women of Europe, who, by strait lacing, take such pains to destroy their health, through a mistaken desire to improve their beauty. It belongs more to the physician than the naturalist to attend to these minute deformities; and, indeed, it is a melancholy contemplation to speculate upon a catalogue of calamities, inflicted by un pitying nature, or brought upon us by our own caprice. Some, however, are fond of such accounts; and there have been books filled with nothing else. It is sufficient here to observe, that every day's experience must have shewn us miserable instances of this kind, produced by nature, or affectation; calamities that no pity can soften, nor assiduity relieve.

Passing over, therefore, every other account, we shall only mention the famous instance, quoted by Father Malbranche; upon which he founds his beautiful theory of monstrous productions. A woman of Paris, the wife of a tradesman, went to see a criminal broke alive upon the wheel, at the place of public execution. She was at that time two months advanced in her pregnancy, and no way subject to any disorders to affect the child in her womb. She was, however, of a tender habit of body; and, though led by curiosity to this horrid spectacle, very easily moved to pity and compassion. She felt, therefore, all those strong emotions which so terrible a sight must naturally inspire; shuddered at every blow the criminal received, and almost swooned at his cries. Upon returning from this scene of blood, she continued for some days pensive, and her imagination still wrought upon the spectacle she had lately seen. After some time, however, she seemed perfectly recovered from her fright, and had almost forgotten her former uneasiness. When the time of her delivery approached, she seemed no ways mindful of her former terrors, nor were her pains in labour more than usual in such circumstances. But, what was the amazement of her friends, and assistants, when the child came into the world! It was found that every limb in its body was broken like those of the malefactor, and just in the same place. This poor infant that had suffered the pains of life, even before its coming into the world, did not die, but lived in an hospital, in Paris, for twenty years after; a wretched instance of the supposed powers of imagination in the mother, of altering and distorting the infant in the womb. The manner in which Malbranche reasons upon this fact, is as follows: The Creator has established such a sympathy between the several parts of nature, that we are led not only to imitate each other, but also to partake in the same affections and desires. The animal spirits are thus carried to the respective parts of the body, to perform the same actions which we see others perform, to receive in some measure their wounds, and take part in their sufferings. Experience tells us, that if we look attentively on any person severely beaten, or sorely wounded, the spirits immediately flow into those parts of the body which correspond to those we see in pain. The more delicate the constitution, the more it is thus affected; the spirits making a stronger impression on the fibres of a weakly habit than of a robust one. Strong vigorous men see an execution without much concern, while women of nicer texture are struck with horror and concern. This sensibility in them must, of consequence, be communicated to all parts of their body; and, as the fibres of the child, in the womb, are incomparably finer than those of the mother, the course of the animal spirits must, consequently, produce greater alterations. Hence, every stroke given to the criminal, forcibly struck the imagination of the

woman; and by a kind of counter stroke, the delicate tender frame of the child.

Such is the reasoning of an ingenious man, upon a fact the veracity of which many since have called in question. They have allowed, indeed, that such a child might have been produced; but have denied the cause of its deformity. How could the imagination of the mother, say they, produce such dreadful effects upon her child? She has no communication with the infant; she scarce touches it in any part; quite unaffected with her concerns, it sleeps in security, in a manner secluded by a fluid in which it swims, from her that bears it. With what a variety of deformities, say they, would all mankind be marked, if all the vain and capricious desires of the mother were thus readily written upon the body of child? Yet, notwithstanding this plausible way of reasoning, we cannot avoid giving some credit to the variety of instances we have either read, or seen, upon this subject. If it be a prejudice, it is as old as the days of Aristotle, and to this day as strongly believed, by the generality of mankind, as ever. It does not admit of a reason; and, indeed, we can give none even why the child should, in any respect, resemble the father, or the mother. The fact we generally find to be so. But why it should take the particular print of the father's features in the womb, is as hard to conceive, as why it should be affected by the mother's imagination. We all know what a strong effect the imagination has on those parts in particular, without being able to assign a cause how this effect is produced; and why may not the imagination produce the same effect in marking the child that it does in forming it? Those persons whose employment it is to rear up pigeons of different colours, can breed them, as their expression is, to a feather. In fact, by properly paring them, they can give what colour they will to any feather, in any part of the body. Were we to reason upon this fact, what could we say? Might it not be asserted, that the egg, being distinct from the body of the female, cannot be influenced by it? Might it not be plausibly said, that there is no similitude between any part of the egg and any particular feather, which we expect to propagate? and yet, for all this, the fact is known to be true, and what no speculation can invalidate. In the same manner, a thousand various instances assure us that the child, in the womb, is sometimes marked by the strong affections of the mother; how this is performed we know not; we only see the effect, without any connexion between it and the cause. The best physicians have allowed it; and have been satisfied to submit to the experience of a number of ages; but many disbelieve it, because they expect a reason for every effect. This, however, is very hard to be given, while it is very easy to appear wise by pretending incredulity.

Among the number of monsters, dwarfs and giants are usually reckon'd; though not, perhaps, with the strictest propriety, since they are no way different from the rest of mankind, except in stature. It is a dispute, however, about words; and, therefore, scarce worth contending about. But there is a dispute of a more curious nature, on this subject; namely, whether there are races of people thus very diminutive, or vastly large, or whether they be merely accidental varieties, that now and then are seen in the country, in a few persons, whose bodies some external cause has contributed to lessen or enlarge.

With regard to men of diminutive stature, all antiquity has been unanimous in asserting their national existence. Homer was the first who has given us an account of the pigmy nation, contending with the cranes; and what poetical licence might be supposed to exaggerate, Athenæus has attempted se-

riously to confirm by historical assertion. If we attend to these, we must believe that in the internal parts of Africa, there are whole nations of pigmy beings, not more than a foot in stature, who continually wage an unequal war with the birds and beasts that inhabit the plains in which they reside. Some of the ancients, however, and Strabo in particular, have supposed all these accounts to be fabulous; and have been more inclined to think this supposed nation of pigmies, nothing more than a species of apes, well known to be numerous in that part of the world. With this opinion the moderns have all concurred; and that diminutive race, which was described as human, has been long degraded into a class of animals that resemble us but very imperfectly.

The existence, therefore, of a pigmy race of mankind, being founded in error, or in fable, we can expect to find men of diminutive stature only by accident, among men of the ordinary size. Of these accidental dwarfs, every country, and almost every village, can produce numerous instances. There was a time, when these unfavoured children of Nature were the peculiar favourites of the great; and no prince, or nobleman, thought himself completely attended, unless he had a dwarf among the number of his domestics. These poor little men were kept to be laughed at; or to raise the barbarous pleasure of their masters, by their contrasted inferiority. Even in England, as late as the times of king James the First, the court was at one time furnished with a dwarf, a giant, and a jester: these the king often took a pleasure in opposing to each other, and often fomented quarrels among them, in order to be a concealed spectator of their animosity. It was a particular entertainment of the courtiers at that time, to see little Jeffery, for so the dwarf was called, ride round the lists, expecting his antagonist; and discovering, in his actions, all the marks of contemptible resolution.

It was in the same spirit, that Peter of Russia, in the year 1710, celebrated a marriage of dwarfs. This monarch, though raised by his native genius far above a barbarian, was, nevertheless, still many degrees removed from actual refinement. His pleasures, therefore, were of the vulgar kind; and this was among the number. Upon a certain day, which he had ordered to be proclaimed several months before, he invited the whole body of his courtiers, and all the foreign ambassadors, to be present at the marriage of a pigmy man and woman. The preparations for this wedding were not only very grand, but executed in a style of barbarous ridicule. He ordered, that all the dwarf men and women, within two hundred miles, should repair to the capital; and also insisted, that they should be present at the ceremony. For this purpose, he supplied them with proper vehicles; but so contrived it, that one horse was seen carrying in a dozen of them into the city at once, while the mob followed shouting, and laughing, from behind. Some of them were at first unwilling to obey an order, which they knew was calculated to turn them into ridicule, and did not come; but he soon obliged them to obey; and, as a punishment, enjoined, that they should wait upon the rest at dinner. The whole company of dwarfs amounted to seventy, beside the bride and bridegroom, who were richly adorned, and in the extremity of the fashion. For this little company in miniature, every thing was suitably provided; a low table, small plates, little glasses, and, in short, every thing was so fitted, as if all things had been dwindled to their own standard. It was his great pleasure to see their gravity and their pride; the contention of the women for places, and the men for superiority. This point he attempted to adjust, by ordering, that the most dimi-

nutive

native should take the lead; but this bred disputes, for none would then consent to sit foremost. All this, however, being at last settled, dancing followed the dinner, and the ball was opened with a minuet by the bridegroom, who measured exactly three feet two inches high. In the end, matters were so contrived, that this little company, who met together in gloomy pride, and unwilling to be pleased, being at last familiarized to laughter, joined in the diversion, and became, as the journalist has it, extremely sprightly and entertaining.

But whatever may be the entertainment such guests might afford, when united, a dwarf is seldom found capable of affording any when alone. They, in general, seem to have faculties very much resembling those of children, and their desires of the same kind; being diverted with the same sports, and best pleased with such companions. The little man, whose name was Coan, that died lately at Chelsea, was the most intelligent and sprightly we ever heard of. But this mirth, and seeming sagacity, were but assumed. He had, by long habit, been taught to look cheerful upon the approach of company; and his conversation was but the mere etiquette of a person that had been used to receive visitors. When driven out of his walk, nothing could be more stupid or ignorant, nothing more dejected or forlorn. But, we have a compleat history of a dwarf, very accurately related by Mr. Daubenton, in his part of the *Histoire Naturelle*; which we will here take leave to translate.

This dwarf, whose name was Baby, was well known, having spent the greatest part of his life at Lunenville, in the palace of Stanislaus, the titular king of Poland. He was born in the village of Plaisne, in France, in the year 1741. His father and mother were peasants, both of good constitutions, and inured to a life of husbandry and labour. Baby, when born, weighed but a pound and a quarter. We are not informed of the dimensions of his body at that time; but we may conjecture they were very small, as he was presented on a plate to be baptized, and for a long time lay in a slipper. His mouth, although proportioned to the rest of his body, was not, at that time, large enough to take in the nipple; and he was, therefore, obliged to be suckled by a she-goat that was in the house; and that served as a nurse, attending to his cries with a kind of maternal fondness. He began to articulate some words when eighteen months old; and at two years he was able to walk alone. He was then fitted with shoes that were about an inch and a half long. He was attacked with several acute disorders; but the small-pox was the only one which left any marks behind it. Until he was six years old, he eat no other food but pulse, potatoes, and bacon. His father and mother were, from their poverty, incapable of affording him any better nourishment; and his education was little better than his food, being bred up among the rustics of the place. At six years old he was about fifteen inches high; and his whole body weighed but thirteen pounds. Notwithstanding this, he was well proportioned, and handsome; his health was good, but his understanding scarce passed the bounds of instinct. It was at that time that the king of Poland, having heard of such a curiosity, had him conveyed to Lunenville, gave him the name of Baby, and kept him in his palace.

Baby, having thus quitted the hard condition of a peasant, to enjoy all the comforts and the conveniences of life, seemed to receive no alteration from his new way of living, either in mind or person. He preserved the goodness of his constitution till about the age of sixteen, but his body seemed to increase very slowly during the whole time; and his stupidity was such, that all instructions were lost in improving his understanding. He could never be

brought to have any sense of religion, nor even to shew the least signs of a reasoning faculty. They attempted to teach him dancing and music, but in vain; he never could make any thing of music; and as for dancing, although he beat time tolerably exact, yet he could never remember the figure, but while his dancing-master stood by to direct his motions. Notwithstanding, a mind thus destitute of understanding was not without its passions; anger and jealousy harrassed it at times; nor was he without desires of another nature.

At the age of sixteen, Baby was twenty-nine inches tall; at this he rested; but having thus arrived at his acme, the alterations of puberty, or rather, perhaps, of old age, came fast upon him. From being very beautiful, the poor little creature now became quite deformed; his strength quite forsook him; his back bone began to bend; his head hung forward; his legs grew weak; one of his shoulders turned awry; and his nose grew disproportionably large. With his strength, his natural spirits also forsook him; and, by the time he was twenty, he was grown feeble, decrepid, and marked with the strongest impression of old age. It had been before remarked by some, that he would die of old age before he arrived at thirty; and, in fact, by the time he was twenty-two, he could scarcely walk an hundred paces, being worn with the multiplicity of his years, and bent under the burthen of protracted life. In this year he died; a cold, attended with a slight fever, threw him into a kind of lethargy, which had a few momentary intervals; but he could scarce be brought to speak. However, it is asserted, that in the five last days of his life, he shewed a clearer understanding, than in his times of best health: but at length he died, after enduring great agonies, in the twenty-second year of his age.

Opposite to this accidental diminution of the human race, is that of its extraordinary magnitude. Concerning the reality of a nation of Giants, there have been many disputes among the learned. Some have affirmed the probability of such a race; and others, as warmly have denied the possibility of their existence. But it is not from any speculative reasonings, upon a subject of this kind, that information is to be obtained; it is not from the disputes of the scholar, but the labours of the enterprising, that we are to be instructed in this enquiry. Indeed, nothing can be more absurd, than what some learned men have advanced upon this subject. It is very unlikely, says Grew, that there should either be dwarfs or giants; or if such, they cannot be fitted for the usual enjoyment of life and reason. Had man been born a dwarf, he could not have been a reasonable creature; for to that end, he must have a jolt head, and then he would not have body and blood enough to supply his brain with spirits: or if he had a small head, proportionable to his body, there would not be brain enough for conducting life. But it is still worse with giants; and there could never have been a nation of such, for there would not be food enough found in any country to sustain them; or if there were beasts sufficient for this purpose, there would not be grass enough for their maintainance. But what is still more, add others, giants could never be able to support the weight of their own bodies; since a man of ten feet high, must be eight times as heavy as one of the ordinary stature; whereas, he has but twice the size of muscles to support such a burthen: and, consequently, would be overloaded with the weight of his own body. Such are the theories upon this subject; and they require no other answer, but that experience proves them both to be false: dwarfs are found capable of life and reason; and giants are seen to carry their own bodies. We have several accounts from mariners, that a nation of giants actually exists; and mere speculation

speculation should never induce us to doubt their veracity.

Ferdinand Magellan was the first who discovered this race of people along the coast, towards the extremity of South America. Magellan was a Portuguese of noble extraction, who having long behaved with great bravery under Albuquerque, the conqueror of India, he was treated with neglect by the court, upon his return. Applying, therefore, to the king of Spain, he was entrusted with the command of five ships, to subdue the Molucca islands; upon one of which he was slain. It was in his voyage thither, that he happened to winter in St. Julian's Bay, an American harbour, forty-nine degrees south of the line. In this desolate region, where nothing was seen but objects of terror, where neither trees nor verdure dress the face of the country, they remained for some months without seeing any human creature. They had judged the country to be utterly uninhabitable; when one day, they saw approaching, as if he had been dropt from the clouds, a man of enormous stature, dancing and singing, and putting dust upon his head, as they supposed, in token of peace. This overture for friendship was, by Magellan's command, quickly answered by the rest of his men; and the giant approaching, testified every mark of astonishment and surprize. He was so tall, that the Spaniards only reached his waist; his face was broad, his colour brown, and painted over with a variety of tints; each cheek had the resemblance of an heart drawn upon it; his hair was approaching to whiteness; he was cloathed in skins and armed with a bow. Being treated with kindness, and dismissed with some trifling presents, he soon returned, with many more of the same stature; two of whom the mariners decoyed on ship-board: nothing could be more gentle than they were in the beginning; they considered the fetters that were preparing for them, as ornaments, and played with them, like children with their toys; but when they found for what purpose they were intended, they instantly exerted their amazing strength, and broke them in pieces with a very easy effort. This account, with a variety of other circumstances, has been confirmed by succeeding travellers: Herrera, Sebald Wert, Oliver Van Noort, and James le Maire, all correspond in affirming the fact, although they differ in many particulars of their respective descriptions. The last voyager we have had, that has seen this enormous race, is Byron. We can no longer, therefore, refuse our assent to the existence of this gigantic race of mankind; in what manner they are propagated, or under what regulations they live, is a subject that remains for future investigation. It should appear, however, that they are a wandering nation, changing their abode with the course of the sun, and shifting their situation, for the convenience of food, climate, or pasture.

This race of giants are described as possessed of great strength; and, no doubt, they must be very different from those accidental giants that are to be seen in different parts of Europe. Stature with these, seems rather their infirmity than their pride; and adds to their burthen, without increasing their strength. The generality of these were ill-formed and unhealthful; weak in their persons, or incapable of exerting what strength they were possessed of. The same defects of understanding that attended those of suppressed stature, were found in those who were thus overgrown: they were heavy, phlegmatic, stupid, and inclining to sadness. The numbers, however, are but few; and it is thus kindly ordered by Providence, that as the middle state is the best fitted

for happiness, so the middle ranks of mankind are produced in the greatest variety.

However, mankind seems naturally to have a respect for men of extraordinary stature; and it has been a supposition of long standing, that our ancestors were much taller, as well as much more beautiful than we. This has been, indeed, a theme of poetical declamation from the beginning; and man was scarce formed, when he began to deplore an imaginary decay. Nothing is more natural than this progress of the mind, in looking up to antiquity with reverential wonder. Having been accustomed to compare the wisdom of our fathers, with our own in early imbecillity, the impression of their superiority remains when they no longer exist, and when we cease to be inferior. Thus the men of every age consider the past as wiser than the present; and the reverence seems to accumulate as our imaginations ascend. For this reason, we allow remote antiquity many advantages, without disputing their title: the inhabitants of uncivilized countries, represent them as taller and stronger; and the people of a more polished nation, as more healthy and more wise. Nevertheless, these attributes seem to be only the prejudices of ingenuous minds; a kind of gratitude, which we hope in turn to receive from posterity. The ordinary stature of men, Mr. Derham observes, is, in all probability, the same now as at the beginning. The oldest measure we have of the human figure, is in the monument of Cheops, in the first pyramid of Egypt. This must have subsisted many hundred years before the times of Homer, who is the first that deplores the decay. This monument, however, scarce exceeds the measure of our ordinary coffins: the cavity is no more than six feet long, two feet wide, and deep in about the same proportion. Several mummies also, of a very early age, are found to be only of the ordinary stature; and shew that, for these three thousand years at least, men have not suffered the least diminution. We have many corroborating proofs of this, in the ancient pieces of armour which are dug up in different parts of Europe. The brass helmet dug up at Medauro, fits one of our men, and yet is allowed to have been left there at the overthrow of Asdrubal. Some of our finest antique statues, which we learn from Pliny and others, to be exactly as big as the life, still continue to this day, remaining monuments of the superior excellence of their workmen indeed, but not of the superiority of their stature. We may conclude, therefore, that men have been, in all ages, pretty much of the same size they are at present; and that the only difference must have been accidental, or perhaps national.

As to the superior beauty of our ancestors, it is not easy to make the comparison; beauty seems a very uncertain charm; and frequently is less in the object, than in the eye of the beholder. Were a modern lady's face formed exactly like the Venus of Medicis, or the sleeping vestal, she would scarce be considered beautiful, except by the lovers of antiquity, whom, of all her admirers, perhaps, she would be least desirous of pleasing. It is true, that we have some disorders among us that disfigure the features, and from which the ancients were exempt; but it is equally true, that we want some which were common among them, and which were equally deforming. As for their intellectual powers, these also were probably the same as ours: we excel them in the sciences, which may be considered as an history of accumulated experience; and they excel us in the poetic arts, as they had the first risling of all the striking images of Nature.

C H A P. XIII.

Containing a particular Account of MUMMIES,
WAX - WORKS, &c.

MAN is not content with the usual term of life, but he is willing to lengthen out his existence by art; and although he cannot prevent death, he tries to obviate his dissolution. It is natural to attempt to preserve even the most trifling relicks of what has long given us pleasure; nor does the mind separate from the body, without a wish, that even the wretched heap of dust it leaves behind, may yet be remembered. The embalming, practised in various nations, probably had its rise in this fond desire: an urn filled with ashes, among the Romans, served as a pledge of continuing affection; and even the grassy graves in our own churchyards, are raised above the surface, with the desire that the body below should not be wholly forgotten. The soul, ardent after eternity for itself, is willing to procure, even for the body, a prolonged duration.

But of all nations, the Egyptians carried this art to the highest perfection: as it was a principle of their religion, to suppose the soul continued only coeval to the duration of the body, they tried every art to extend the life of the one, by preventing the dissolution of the other. In this practice they were exercised from the earliest ages; and the mummies they have embalmed in this manner, continue in great numbers to the present day. We are told, in Genesis, that Joseph seeing his father expire, gave orders to his physicians to embalm the body, which they executed in the compass of forty days, the usual time of embalming. Herodotus also, the most ancient of the profane historians, gives us a copious detail of this art, as it was practised, in his time, among the Egyptians. There are certain men among them, says he, who practice embalming as a trade; which they perform with all expedition possible. In the first place, they draw out the brain through the nostrils, with irons adapted to this purpose; and in proportion as they evacuate it in this manner, they fill up the cavity with aromatics; they next cut open the belly, near the sides, with a sharpened stone; and take out the entrails, which they cleanse, and wash in palm oil: having performed this operation, they roll them in aromatic powder, fill them with myrrh, cassia, and other perfumes, except incense: and replace them, sewing up the body again. After these precautions, they salt the body with nitre, and keep it in the salting-place for seventy days, it not being permitted to preserve it so any longer. When the seventy days are accomplished, and the body washed once more, they swathe it in bands made of linen, which have been dipt in a gum the Egyptians use instead of salt. When the friends have taken back the body, they make an hollow trough, something like the shape of a man, in which they place the body; and this they inclose in a box, preserving the whole as a most precious relick, placed against the wall. Such are the ceremonies used with regard to the rich; as for those who are contented with an humbler preparation, they treat them as follows: they fill a syringe with an odoriferous liquor extracted from the cedar tree, and, without making an incision, inject it up the body of the deceased, and then keep it in nitre, as long as in the former case. When the time is expired,

they evacuate the body of the cedar liquor which had been injected; and such is the effect of this operation, that the liquor dissolves the intestines, and brings them away: the nitre also serves to eat away the flesh; and leaves only the skin and the bones remaining. This done, the body is returned to the friends, and the embalmer takes no farther trouble about it. The third method of embalming those of the meanest condition, is merely by purging and cleansing the intestines by frequent injections, and preserving the body for a similar term in nitre, at the end of which it is restored to the relations.

Diodorus Siculus also, makes mention of the manner in which these embalmings are performed. According to him, there were several officers appointed for this purpose: the first of them, who was called the scribe, marked those parts of the body, on the left side, which were to be opened; the cutter made the incision; and one of those that were to salt it, drew out all the bowels, except the heart and the kidneys; another washed them in palm-wine, and odoriferous liquors; afterwards, they anointed for above thirty days, with cedar, gum, myrrh, cinnamon, and other perfumes. These aromatics preserved the body entire for a long time, and gave it a very agreeable odour. It was not in the least disfigured by this preparation; after which it was returned to the relations, who kept it in a coffin, placed upright against the wall.

Most of the modern writers who have treated on this subject, have merely repeated what has been said by Herodotus; and if they add any thing of their own, it is but merely from conjecture. Dumont observes, that it is very probable, that aloes, bitumen, and cinnamon, make a principal part of the composition which is used on this occasion: he adds, that after embalming, the body is put into a coffin, made of the sycamore-tree, which is almost incorruptible. Mr. Grew remarks, that in an Egyptian mummy, in the possession of the Royal Society, the preparation was so penetrating, as to enter into the very substance of the bones, and rendered them so black, that they seemed to have been burnt. From this he is induced to believe, that the Egyptians had a custom of embalming their dead, by boiling them in a kind of liquid preparation, until all the aqueous parts of the body were exhaled away; and until the oily or gummy matter had penetrated throughout. He proposes, in consequence of this, a method of macerating; and afterwards of boiling the dead body in oil of walnut.

We are of opinion, that there were several ways of preserving dead bodies from putrefaction; and that this would be no difficult matter, since different nations have all succeeded in the attempt. We have an example of this kind among the Guanches, the ancient inhabitants of the island of Teneriff. Those who survived the general destruction of this people, by the Spaniards, when they conquered this island, informed them, that the art of embalming was still preserved there; and that there was a tribe of priests among them, possessed of the secret, which they kept concealed as

a sacred mystery. As the greatest part of the nation was destroyed, the Spaniards could not arrive at a complete knowledge of this art; they only found out a few of the particulars. Having taken out the bowels, they washed the body several times in a lee, made of the dried bark of the pine-tree, warmed, during the summer, by the sun, or by a stove in the winter. They afterwards anointed it with butter, or the fat of bears, which they had previously boiled with odoriferous herbs, such as sage and lavender. After this unction, they suffered the body to dry; and then repeated the operation, as often as it was necessary, until the whole substance was impregnated with the preparation. When it was become very light, it was then a certain sign that it was fit, and properly prepared. They then rolled it up in the dried skins of goats; which, when they had a mind to save expence, they suffered to remain with the hair still growing upon them. Purchas assures us, that he has seen mummies of this kind in London; and mentions the name of a gentleman who had seen several of them in the island of Teneriff; which were supposed to have been two thousand years old; but without any certain proofs of such great antiquity. This people, who probably came first from the coasts of Africa, might have learned this art from the Egyptians, as there was a traffic carried on from thence into the most internal parts of Africa.

Father Acoſta, and Garcilaffo de la Vega, make no doubt but that the Peruvians understood the art of preserving their dead for a very long space of time. They assert their having seen the bodies of several Incas, that were perfectly preserved. They still preserved their hair, and their eye-brows; but they had eyes, made of gold, put in the places of those taken out. They were clothed in their usual habits, and seated in the manner of the Indians, their arms placed on their breasts. Garcilaffo touched one of their fingers, and found it apparently as hard as wood; and the whole body was not heavy enough to over-burthen a weak man, who should attempt to carry it away. Acoſta presumes, that these bodies were embalmed with a bitumen, of which the Indians knew the properties. Garcilaffo, however, is of a different opinion, as he saw nothing bituminous about them; but he confesses, that he did not examine them very particularly; and he regrets his not having enquired into the methods used for that purpose. He adds, that being a Peruvian, his countrymen would not have scrupled to inform him of the secret, if they really had it still among them.

Garcilaffo, thus being ignorant of the secret, makes use of some inductions, to throw light upon the subject; he asserts, that the air is so dry and so cold at Cusco, that flesh dries there like wood, without corrupting: and he is of opinion, that they dried the body in snow, before they applied the bitumen: he adds, that in the times of the Incas, they usually dried the flesh which was designed for the army; and that when they had lost their humidity, they might be kept without salt, or any other preparation.

It is said, that at Spitzbergen, which lies within the arctic circle, and, consequently, in the coldest climate, bodies never corrupt, nor suffer any apparent alteration, even though buried for thirty years: nothing corrupts or putrefies in that climate; the wood which has been employed in building those houses where the train-oil is separated, appears as fresh as the day they were first cut.

If excessive cold, therefore, be thus capable of preserving bodies from corruption, it is not less certain, that a great degree of dryness, produced by heat, produces the same effect. It is well

known, that the men and animals that are buried in the sands of Arabia, quickly dry up; and continue in preservation for several ages, as if they had actually been embalmed. It has often happened, that whole caravans have perished in crossing those deserts, either by the burning winds that infest them, or by the sands which are raised by the tempest, and overwhelm every creature in certain ruin. The bodies of those persons are preserved entire; and they are often found in this condition by some accidental passenger. Many authors, both ancient and modern, make mention of such mummies as these: and Shaw says, that he has been assured, that numbers of men, as well as other animals, have been thus preserved for times immemorial, in the burning sands of Saibah, which is a place, he supposes, situate between Rasein and Egypt.

The corruption of dead bodies being entirely caused by the fermentation of the humours, whatever is capable of hindering or retarding this fermentation, will contribute to their preservation. Both heat and cold, though so contrary in themselves, produce similar effects in this particular, by drying up the humours. The cold in condensing and thickening them, and the heat in evaporating them before they have time to act upon the solids. But it is necessary, that these extremes should be constant; for if they succeed each other so as that cold shall follow heat, or dryness humidity, it must then necessarily happen, that corruption must ensue. However, in temperate climates, there are natural causes capable of preserving dead bodies; among which we may reckon the qualities of the earth in which they are buried. If the earth be drying and astringent, it will imbibe the humidity of the body; and it may be probably for this reason that the bodies buried in the monastery of the Cordeliers, at Thoulouse, do not putrefy, but dry in such a manner that they may be lifted up by one arm.

The gums, resins, and bitumens, with which dead bodies are embalmed, keep off the impressions, which they would else receive from the alteration of the temperature of the air; and still more, if a body thus prepared be placed in a dry or burning sand, the most powerful means will be united for its preservation. We are not to be surprised, therefore, at what we are told by Chardin, of the country of Chorofan, in Persia. The bodies which have been previously embalmed, and buried in the sands of that country, as he assures us, are found to petrify, or, in other words, to become extremely hard; and are preserved for several ages. It is asserted that some of them have continued for a thousand years.

The Egyptians, as has been mentioned above, swathed the body with linen bands; and enclosed it in a coffin; however, it is probable that, with all these precautions, they would not have continued till now, if the tombs, or pits, in which they were placed, had not been dug in a dry chalky soil, which was not susceptible of humidity; and which was, besides, covered over with a dry sand of several feet thickness.

The sepulchres of the ancient Egyptians subsist to this day. Most travellers who have been in Egypt, have described those of ancient mummies, and have seen the mummies interred there. These catacombs are within two leagues of the ruins of this city, nine leagues from Grand Cairo, and about two miles from the village of Zaccara. They extend from thence to the pyramids of Pharaoh, which are about eight miles distant. These sepulchres lie in a field, covered with a fine running sand, of a yellowish colour. The country is dry and hilly; the entrance of the tomb is

choaked

choaked up with sand; there are many open, but several more that are still concealed. The inhabitants of the neighbouring village have no other commerce, or method of subsisting, but by seeking out mummies, and selling them to such strangers as happen to be at Grand Cairo. This commerce, some years ago, was not only a very common, but a very gainful one. A complete mummy was often sold for twenty pounds: but it must not be supposed that it was bought at such an high price from a mere passion for antiquity; there were much more powerful motives for this traffic. Mummy at that time made a considerable article in medicine; and a thousand imaginary virtues were ascribed to it, for the cure of most disorders, particularly of the paralytic kind. There was no shop, therefore, without mummy in it; and no physician thought he had properly treated his patient, without adding this to his prescription. Induced by the general repute, in which this supposed drug was at that time, several Jews, both of Italy and France, found out the art of imitating mummy so exactly, that they, for a long time, deceived all Europe. This they did by drying dead bodies in ovens, after having prepared them with myrrh, aloes, and bitumen. Still, however, the request for mummies continued, and a variety of cures were daily ascribed to them. At length, Paræus wrote a treatise on their total inefficacy in physic; and shewed their abuse in loading the stomach, to the exclusion of more efficacious medicines.

From that time, their reputation began to decline; the Jews discontinued their counterfeits, and the trade returned entire to the Egyptians, when it was no longer of value. The industry of seeking after mummies is now totally relaxed, their price merely arbitrary, and just what the curious are willing to give.

In seeking for mummies, they first clear away the sand, which they may do for weeks together, without finding what is wanted. Upon coming to a little square opening, of about eighteen feet in depth, they descend into it, by holes for the feet, placed at proper intervals; and there they are sure of finding what they seek for. These caves, or wells, as they call them, are hollowed out of a white freestone, which is found in all this country a few feet below the covering of sand.

When one gets to the bottom of these, which are sometimes forty feet below the surface, there are several square openings, on each side, into passages of ten or fifteen feet wide, and these lead to chambers of fifteen or twenty feet square. These are all hewn out of the rock; and in each of the catacombs are to be found several of these apartments, communicating with each other. They extend a great way under ground, so as to be under the city of Memphis, and in a manner to undermine its environs.

In some of the chambers, the walls are adorned with figures and hieroglyphics; in others, the mummies are found in tombs, round the apartment hollowed out in the rock. These tombs are upright, and cut into the shape of a man, with his arms stretched out. There are others found, and these in the greatest number, in wooden coffins, or in cloths covered with bitumen. These coffins, or wrappers, are covered all over with a variety of ornaments. There are some of them painted, and adorned with figures, such as that of death, and the leaden seals, on which several characters are engraven.

Some of these coffins are carved into the human shape; but the head alone is distinguishable; the rest of the body is all of a piece, and terminated

by a pedestal, while there are some with their arms hanging down; and it is by these marks that the bodies of persons of rank are distinguished from those of the meaner order. These are generally found lying on the floor, without any profusion of ornaments; and in some chambers the mummies are found indiscriminately piled upon each other, and buried in the sand.

Many mummies are found lying on their backs; their heads turned to the north, and the hands placed on the belly. The bands of linen, with which these are swathed, are found to be more than a thousand yards long; and, of consequence, the number of circumvolutions they make about the body must have been amazing. These were performed by beginning at the head, and ending at the feet; but they contrived it so as to avoid covering the face. However, when the face is entirely uncovered, it moulders into dust immediately upon the admission of the air. When, therefore, it is preserved entire, a slight covering of cloth is so disposed over it, that the shape of the eye, the nose, and the mouth, are seen under it. Some mummies have been found with a long beard, and hair that reached down to the mid-leg, nails of a surprising length, and some gilt, or at least painted of a gold colour. Some are found with bands upon the breast, covered with hieroglyphics, in gold, silver, or in green; and some with tutelary idols, and other figures of jasper, within their body. A piece of gold, also, has often been found under their tongues, of about two pistoles value; and, for this reason, the Arabians spoil all the mummies they meet with, in order to get at the gold.

But, although art, or accident, has thus been found to preserve dead bodies entire, it must by no means be supposed that it is capable of preserving the exact form and lineaments of the deceased person. Those bodies which are found dried away in the Deserts, or in some particular church-yards, are totally deformed, and scarce any lineaments remain of their external structure. Nor are the mummies preserved by embalming, in a better condition. The flesh is dried away, hardened, and hidden under a variety of bandages; the bowels, as we have seen, are totally removed; and from hence, in the most perfect of them, we see only a shapeless mass of skin discoloured; and even the features scarce distinguishable. The art is, therefore, an effort rather of preserving the substance than the likeness of the deceased; and has, consequently, not been brought to its highest pitch of perfection. It appears from a mummy, not long since dug up in France, that the art of embalming was more completely understood in the western world than even in Egypt. This mummy, which was dug up at Auvergne, was an amazing instance of their skill, and is one of the most curious relics in the art of preservation. As some peasants, in that part of the world, were digging in a field near Rion, within about twenty-six paces of the highway, between that and the river Artier, they discovered a tomb, about a foot and a half beneath the surface. It was composed only of two stones; one of which formed the body of the sepulchre, and the other the cover. This tomb was of free-stone; seven feet and a half long, three feet and a half broad, and about three feet high. It was of rude workmanship; the cover had been polished, but was without figure or inscription: within this tomb was placed a leaden coffin, four feet seven inches long, fourteen inches broad, and fifteen high. It was not made in the form of a coffin, but oblong, like a box, equally broad at both ends, and covered with a lid that fitted on like a snuff-box, without an hinge. This cover had two holes in it, each of about

about two inches long, and very narrow, filled with a substance resembling butter; but for what purpose intended remains unknown. Within this coffin was a mummy, in the highest and most perfect preservation. The internal sides of the coffin were filled with an aromatic substance, mingled with clay. Round the mummy was wrapped a coarse cloth, in form of a napkin, under this were two shirts, or shrouds, of the most exquisite texture; beneath these a bandage, which covered all parts of the body, like an infant in swaddling cloaths; still, under this general bandage there was another, which went particularly round the extremities, the hands and the legs. The head was covered with two caps; the feet and hands were without any particular bandages; and the whole body was covered with an aromatic substance, an inch thick. When these were removed, and the body exposed naked to view, nothing could be more astonishing than the preservation of the whole, and the exact resemblance it bore to a body that had been dead a day or two before. It appeared well proportioned, except that the head was rather large, and the feet small. The skin had all the pliancy and colour of a body lately dead; the visage, however, was of a brownish hue. The belly yielded to the touch; all the joints were flexible, except those of the legs and feet; the fingers stretched forth of themselves when bent inwards. The nails still continued entire; and all the marks of the joints, both in the fingers, the palms of the hands, and the soles of the feet, remained perfectly visible. The bones of the arms and legs were soft and pliant; but, on the contrary, those of the skull preserved their rigidity; the hair, which only covered the back of the head, was of a chestnut colour, and about two inches long. The pericranium at top was separated from the skull, by an incision, in order to open it for the introducing proper aromatics in the place of the brain, where they were found mixed with clay. The teeth, the tongue, and the ears, were all preserved in perfect form. The intestines were not taken out of the body, but remained pliant and entire, as in a fresh subject; and the breast was made to rise and fall like a pair of bellows. The embalming preparation had a very strong and pungent smell, which the body preserved for more than a month after it was exposed to the air. This odour was perceived wherever the mummy was laid; although

it remained there but a very short time, it was even pretended that the peasants of the neighbouring villages were incommoded by it. If one touched either the mummy, or any part of the preparation, the hands smelt of it several hours after, although washed with water, spirit of wine, or vinegar. This mummy, having remained exposed for some months to the curiosity of the public, began to suffer some mutilations. A part of the skin of the forehead was cut off; the teeth were drawn out, and some attempts were made to pull away the tongue. It was, therefore, put into a glass-case, and shortly after transmitted to the king of France's cabinet, at Paris.

There are many reasons to believe this to be the body of a person of the highest distinction; however, no marks remain to assure us either of the quality of the person, or the time of his decease. There only are to be seen some irregular figures on the coffin; one of which represents a kind of star. There were also some singular characters upon the bandages, which were totally defaced by those who had torn them away. However, it should seem that it had remained for several ages in this state, since the first years immediately succeeding the interment, are usually those in which the body is most liable to decay. It appears also to be a much more perfect method of embalming than that of the Egyptians; as in this the flesh continues with its natural elasticity and colour, the bowels remain entire, and the joints have almost the pliancy which they had when the person was alive. Upon the whole, it is probable that a much less tedious preparation than that used by the Egyptians would have sufficed to keep the body from putrefaction; and that an injection of petreoleum inwardly, and a layer of asphaltum without, would have sufficed to have made a mummy; and it is remarkable that Auvergne, where this was found, affords these two substances in sufficient plenty. This art, therefore, might be brought to greater perfection than it has arrived at hitherto, were the art worth preserving. But mankind have long since grown wiser in this respect, and think it unnecessary to keep by them a deformed carcass, which, instead of aiding their magnificence, must only serve to mortify their pride.



MUSCLES.



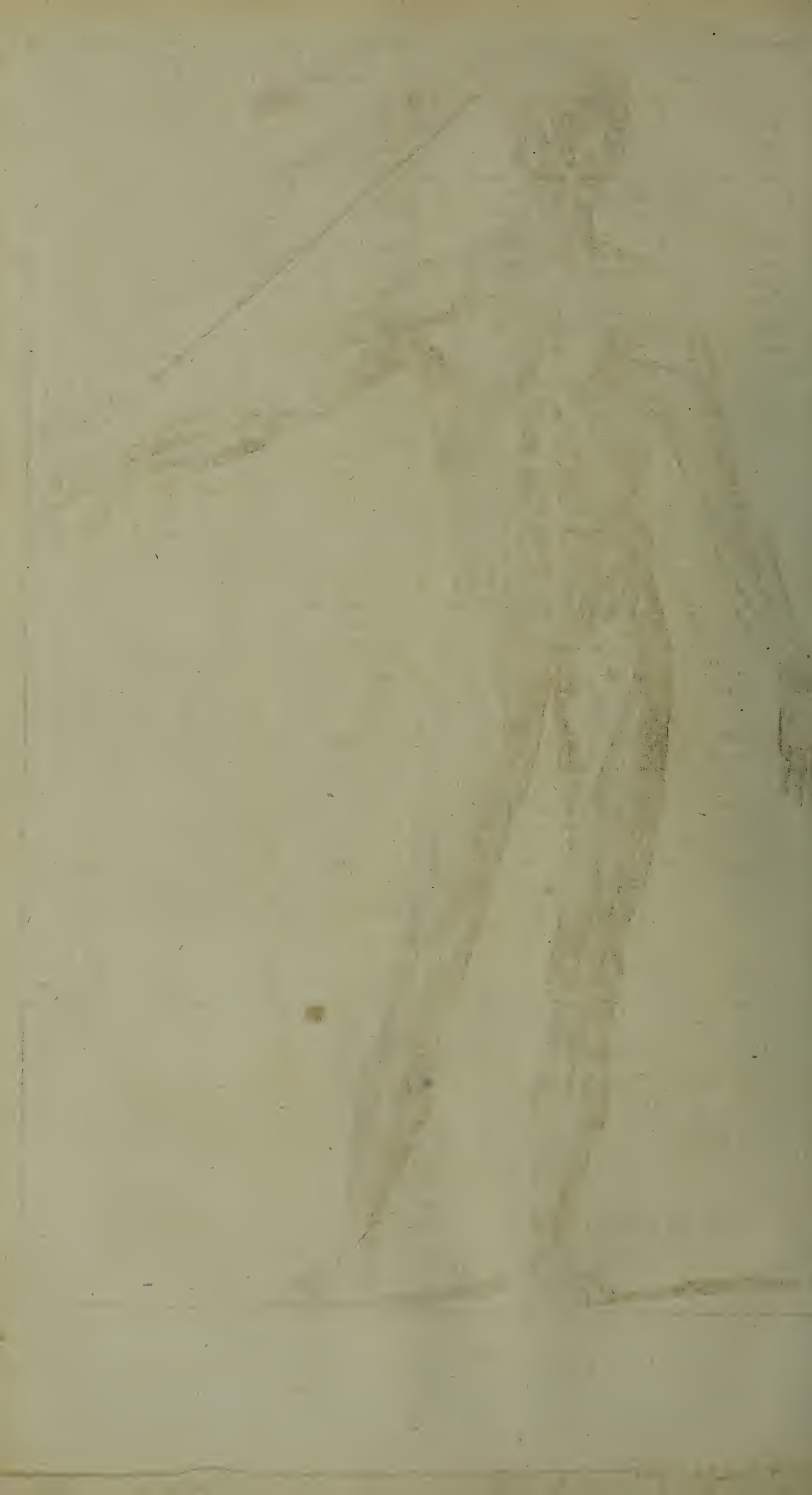
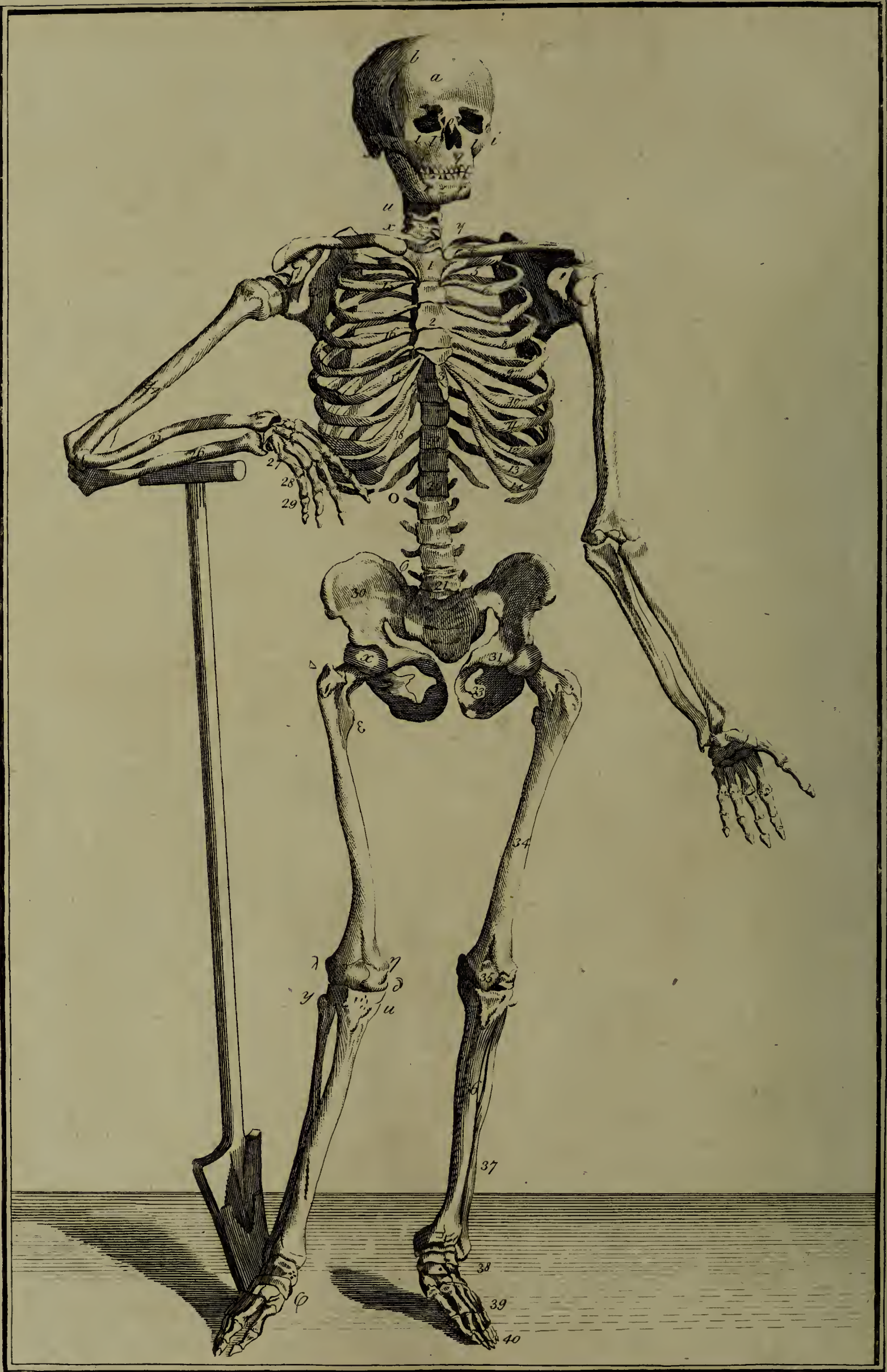


PLATE I



SKELETON.



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ZODIAC.

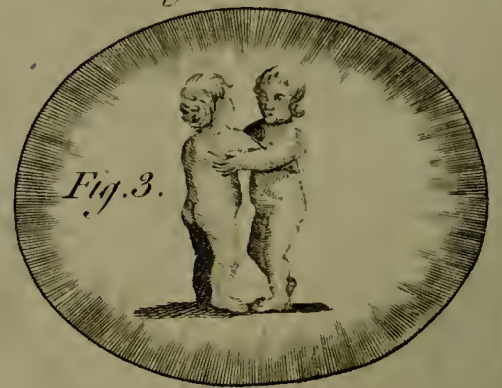
Aries



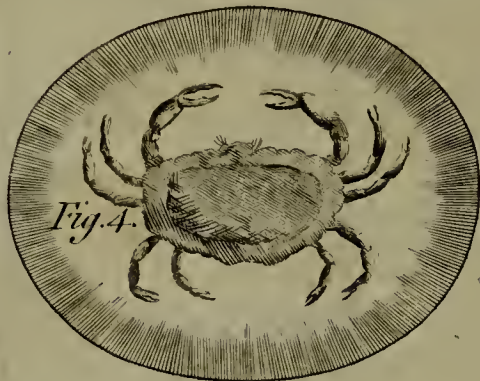
Taurus



Gemini



Cancer



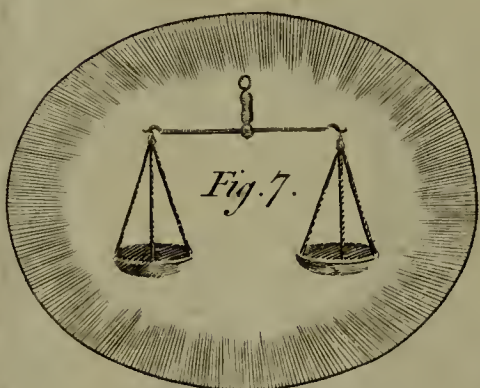
Leo



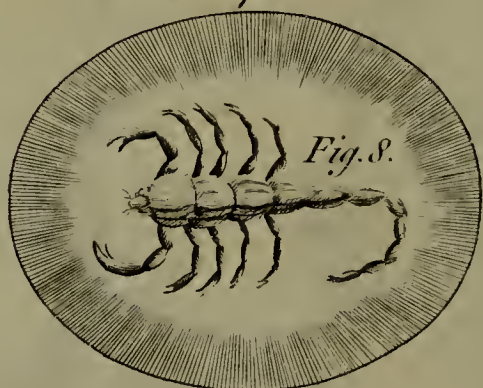
Virgo



Libra



Scorpio



Sagittarius



Capricornus



Aquarius



Pisces



A P P E N D I X.

In our SKETCH of the UNIVERSE, in Page 477, the Printer having omitted to mention our Plate containing the twelve Signs of the Zodiac—we shall here insert the following Explanation:

THE ZODIACK is one of the greatest imaginary circles of the heavens, which passes obliquely between the two poles of the world; it is cut into two equal parts, by the equator, one of which comprehends the six northern signs towards the Arctick pole, and the other the six southern signs towards the Antarctick pole; it is furnished with twelve constellations represented upon globes, by the figure of twelve living creatures. The sun goes about this circle once every year, and the moon once a month, and in the middle of it is the Ecliptick line, from which the sun never departs; but the moon and planets wander up and down from the space of eight degrees, and sometimes more in both.

Figure 1. Shews ARIES, a constellation in the heavens represented by a ram, which is the first sign of the zodiack. The number of stars in this constellation, are 18 in Ptolemy's catalogue, 21 in Tycho's, and 65 in Mr. Flamsteed's.

Fig. 2. Is TAURUS, the bull, and is thus characterised, ♉ . The stars in the constellation Taurus, in Ptolemy's catalogue, are 44; in Tycho's catalogue, 41; in the Britannick catalogue, 135.

Fig. 3. Is GEMINI, *the Twins*, represented by two beautiful children, embracing and looking very affectionately in the face of each other; and is thus marked ♊ .

The poets say they represent Castor and Pollux, sons to Jupiter and Leda. The stars of Gemini in Ptolemy's catalogue contain 24; in Tycho's 29; in the Britannick catalogue 89.

Fig. 4. Is CANCER, represented on the globe in the form of a crab, and thus marked, ♋ . Ptolemy makes it contain only 13 stars; Tycho Brahe 15; Bayer and Hevelius 29; and Flamsteed no less than 71.

Fig. 5. Is LEO, containing, according to Ptolemy, 32 stars; according to Tycho, 37; and according to Flamsteed, 94.

The famous star of the first magnitude, called basilicus, regulus, cor leonis, or the lion's heart, is in this constellation.

Fig. 6. Is VIRGO, in which the sun enters in the middle of August. The stars in the constellation Virgo, in Ptolemy's catalogue, are 32; in Tycho's 39; in the Britannick, 89.

Fig. 7. Is LIBRA, or the balance, so called, because when the sun enters it, the days and nights are equal, as if weighed in a balance.

Fig. 8. Is SCORPIO, *Scorpion*, denoted by this character. ♌ . The stars in Scorpio, in Ptolemy's catalogue, are 20; in that of Tycho, 10; but in that of Mr. Flamsteed, 49.

Fig. 9. Is SAGITTARIUS, the archer, marked thus, ♍ . The stars in this constellation in Ptolemy's catalogue are 31, in Tycho's 16, and in Mr. Flamsteed's 52.

Fig. 10. Is CAPRICORNUS, or *Capricorn*, represented on the globe in the form of a goat, with a fish's tail. It is marked thus, ♎ . According to Ptolemy and Tycho, it contains 19 stars, according to Hevelius 29, and according to Flamsteed 51.

This constellation is very properly represented by No. 58.

the wild goat, whose nature being to seek its food from the bottom to the top of mountains, climbing from rock to rock, fitly emblemized the ascent of the sun, from the lowest point, in the beginning of this sign to its highest pitch or summit, in the summer solstice.

Fig. 11. Is AQUARIUS, a constellation, marked thus, ♏ . This constellation, consists of 45 stars in Ptolemy's catalogue, of 40 in Tycho's, and in Mr. Flamsteed's of 108.

Fig. 12. Is PISCES, marked thus, ♐ . The stars in Pisces, in Ptolemy's catalogue, are 38; in Tycho's, 33; and in the Britannick catalogue, 109.

In our NATURAL HISTORY of MAN have been also omitted, Explanations of several Plates belonging to this Work. We shall therefore give them as follow:

Explanation of the Plate representing the Skeleton of the Human Body.

a, The frontal bone. *b*, The coronal suture, *c*, The parietal bone. *d*, The occipital suture. *e*, The temporal bone. *f*, The mastoid apophysis. *g*, The zygomatic apophysis. *h*, The temporal apophysis. *i, i*, The bones of the cheek. *k*, The external part of the bone that lines the orbits of the eye. *l*, The os planum. *m*, The os unguis. *n*, The upper apophysis of the maxillary bone. *o*, The bone of the nose. *p*, The partition of the nose. *q, q*, The maxillary bone. *r, r*, The lower jaw. *s*, The orbit of the eye. *t*, The inferior part of the orbit. *u*, The fifth vertebræ of the neck. *x*, The sixth. *y*, The hole of their transverse apophysis. *z*, The chin. 1, 2, 3, The sternum. 4, The clavicles. 5, 6, 7, 8, 9, 10, 11, The true ribs. 12, 13, 14, The false ribs. 15, 16, 17, 18, The cartilages which unite the true ribs to the sternum. 19, The last vertebræ of the back. 20, 21, The five vertebræ of the loins. *θ, α*, Their transverse apophysis. 22, 22, The os sacrum. *τ, τ*, The orifice of the os sacrum. 23, The amoplata. 24, The humerus, or bone of the arm. 25, The radius. 26, The os cubitus. 27, The carpus. 28, The metacarpus. 29, The phalanges, or bones of the fingers. 30, The os ilium. 31, The os pubis. 32, The os ischium. These three last bones compose the ossa innominata. 33, The foramen ovale. 34, The os femoris. *α*, Its head. *β*, Its neck. *Δ*, The great trochanter. *ε*, the little trochanter. *η*, The internal condyle. *ζ*, The external condyle. 35, The rotula. 36, The tibia. *γ*, The external condyle. *δ*, The internal condyle. *μ*, The ligament of rotulo. *φ*, The malleolus internus. 37, The fibula. *ω*, The malleolus externus. 38, The tarsus. 39, The metatarsus. 40, The phalanges of the toes.

Explanation of the Plate representing a Front View of the Muscles.

1, 1, The muscoli frontales. 2, 2, The orbiculares palpebrarum. 3, The attollens auriculam. 4, The

4, The temporalis. 5, The maffeter. 6, Represents the muscle called by Lancisi constrictor, or depressor pinnæ narium. 7, The dilatator alæ nasi. 8, The zygomaticus. 9, The place of the elevato labiorum, or elevato labiorum communis, called by Lancisi gracilis. 10, The elevato labii superioris proprius. 11, 11, The constrictor or sphincter labiorum, or orbicularis labiorum; by some called osculatorius. 12, The buccinator. 13, 13, The muscoli mastoidæi. 14, 14, The sternohyoidei. 15, 15, Those parts of these muscles which arise from the clavicle. 16, 16, The coracohyoidei. 17, The scaleni. 18, Represents part of the cucullaris on the right side. 18, On the left side is the levator or elevato scapulæ, otherwise called musculus patientiæ. 19, 19, The place where the fibres of the pectoralis unite, in some measure, with those of the deltoïdes. 20, 20, The deltoïdes. 21, The place in the carpus, where the palmaris longus passes through a ring in the annular ligament. 22, A remarkable union of the tendons of the extensors of the three last fingers. 23, 23, The productions of the peritonæum, which, perforating the muscles of the abdomen at the rings descend to the scrotum. 24, 24, The place where the three tendons of the sartorius, gracilis, and feminovosus are inserted into the anterior and internal part of the tibia, just under the knee. 25, 25, The tendons of the extensors of the toes, which are secured by a ligament at the ankle, as appears on both sides. But on the right side internally another ligament is represented, which fixes the tendons of the extensor longus digitorum, the tibius posticus, and the flexor pollicis. 26, 26, The musculus pectoralis. 27, The triceps extensor cubiti on the right side. 28, and 30, The biceps on the left side, according to Lancisi's explication. 29, Part of the triceps extensor on the left side. 30, The biceps on the right side. 31, The brachius internus. 32, The anconæus. 33, The pronator rotundus. 34, 34, The supinator longus. 35, 35, The radius externus, according to Lancisi. 36, The extensor carpi ulnaris. 37, 37, The cubitanus interus, according to Lancisi. 38, The radius internus, according to Lancisi. 39, The palmaris, with its tendinous expansion. 40, 40, The tendons of the muscles of the thumb. 41, The tendon of the adductor pollicis. 42, The extensor magnus digitorum. 43, Ligamentum carpi. 44, 44, The tendons of the iliaci interni. 45, The pectinæus. 46, One of the heads of the triceps. 47, 47, The rectus femoris on each side. 48, 48, The vastus externus on each side. 49, The vastus internus on each side. 50, The gracilis. 51, The feminovosus. 52, The sartorius on each side. 53, A part of the origin of the vastus externus. 54, 54, The membranofus. 55, 55, The tibialis anticus. 56, The gemelli. 57, 57, The solæi. 58, The tendo Achillis. 59, According to Lancisi, is the extensor digitorum longus. 60, 60, The tendons of the extensors of the toes. 61, The tendons of the extensor longus, tibius, posticus, and flexor pollicis. A, A, Portions of the latissimus dorsi on each side. B, B, The indentations of the ferratus major anticus. C, C, The sternum.

Explanation of the Plate representing a Back View of the Muscles.

1, Two muscles upon the occiput called by Eustachius quadrati. 2, The musculus cucullaris. 3, The splenius. 4, The musculus mastoidæus. 5, The musculus patientiæ, or levator scapulæ proprius. 6, The rhomboides. 7, The articulation of the clavicle with the scapula on the right side. 8, The deltoïdes. 9, The teres minor. 10, The teres major. 11, 11, The latissimus dorsi on each

side. 12, The glutæus major. 13, The glutæus medius. 14, The musculus pyriformis. 15, The quadratus femoris. 16, The biceps femoris. 17, The semi-membranosus. 18, The membranofus, according to Lancisi. 19, 19, The vasti externi. 20, The gastrocnemii. 21, The solæus. 22, The plantaris.

Explanation of the Plate of Arteries.

Fig. 1. Will give a much better idea of the arteries of the human body, than is possible to be conveyed by words.

1. The aorta cut from its origin at the left ventricle of the heart. Fig. 3. of the same plate, represents part of the trunk of the aorta, turned inside out; *a, a*, the internal, or nervous coat; *b, b*, the muscular coat; *c*, the external, or vascular coat.

A. The three semi-lunar valves of the aorta, as they appear when they hinder the blood from coming back into the left ventricle of the heart, in its diastole.

2. 2. The trunk of the coronary arteries arising from the aorta.

3. Ligamentum arteriosum.

4. 4. The subclavian arteries.

5. 5. The two carotid arteries.

6. 6. The two vertebral arteries, which arise from the subclavica, and pass through all the transverse processes of the vertebræ of the neck.

7. 7. The arteries which convey blood to the lower part of the face, tongue, adjacent muscles and glands.

8. 8. The trunks of the temporal arteries, springing from the carotids, and giving branches to the parotid glands.

9. 9. Branches of the temporal arteries, conveying blood to the neighbouring muscles, the hairy scalp, and forehead.

10. 10. The trunks which send blood to the foramina narium, particularly to the glands of its mucous membranes.

11. 11. The occipital arteries, whose trunks pass close by the mamiform process.

12. 12. Muscles which carry blood to the fauces, gargareon, and muscles of those parts.

B. B. Small portions of the basis of the skull, perforated by the artery of the dura mater, part of which is represented as hanging to the arteries.

13. 13. The contortions of the carotid arteries before they pass the basis of the skull to the brain.

14. 14. These parts of the carotid arteries, where they pass by each side of the sella turcica, where several small branches arise from them, and help to compose the rete mirabile.

C. The glandula pituitaria, taken out of the sella turcica, lying between the two contorted trunks of the carotid arteries, marked 14. 14.

D. D. The arteriæ ophthalmicæ, which spring from the carotids before they enter the pia mater.

15. The contortions of the vertebral arteries, as they pass the transverse processes of the first vertebra of the neck, towards the os occipitis.

16. The two trunks of the vertebral arteries that lie on the medulla oblongata.

17. The communicant branches between the carotid and cervical artery.

18. 18. The rammifications of the arteries within the skull, the larger trunks of which lie between the lobes of the brain, and its fulci.

E. E. The arteries of the cerebellum.

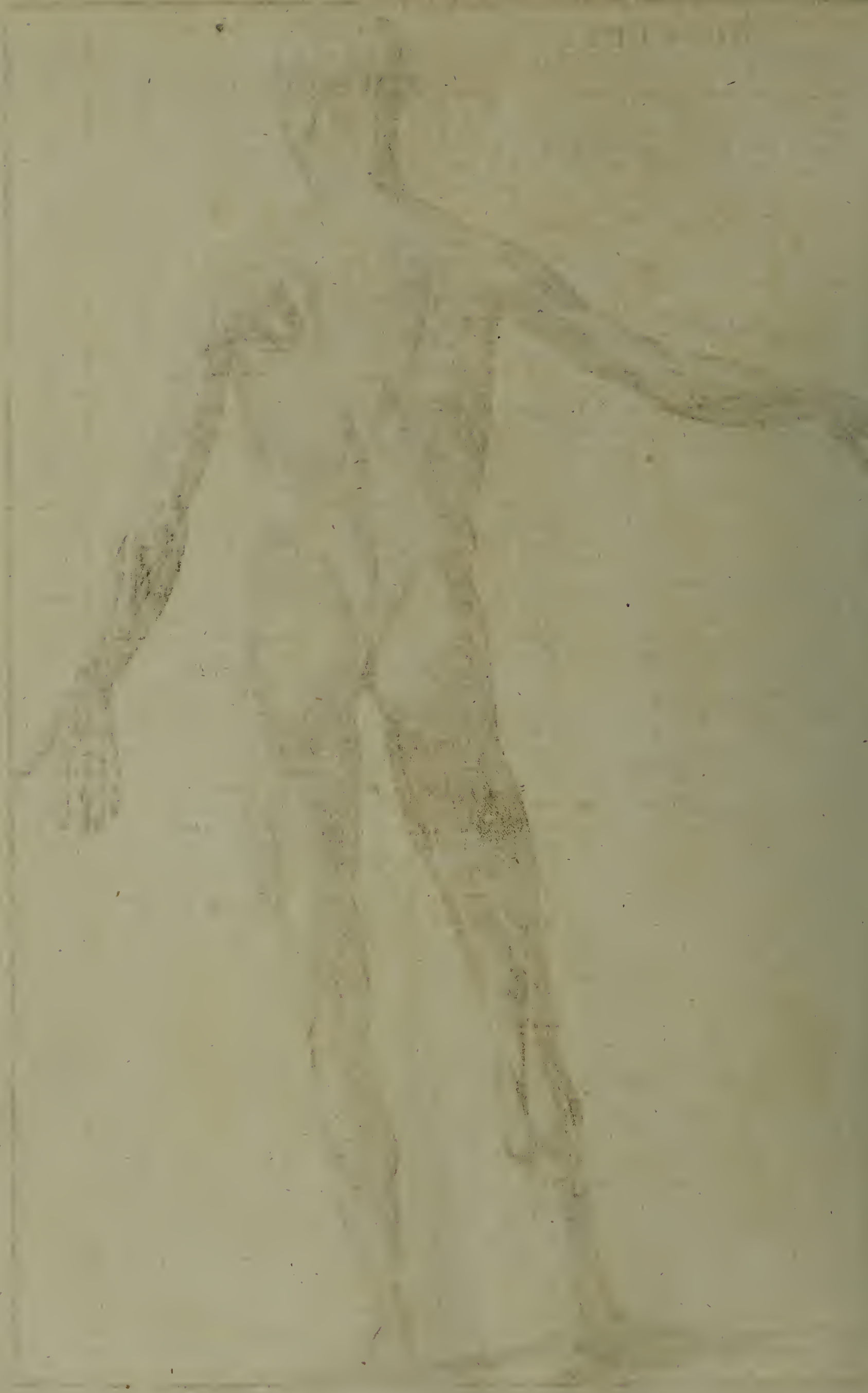
19. 19. The arties of the larynx; thyroid glands and adjacent muscles and parts arising from the subclavian arteries.

20. 20. Others arising near the former, which convey blood to the muscles of the neck and scapula.

21. 21. The

MUSCLES .





ARTERIES.

Fig. 1.

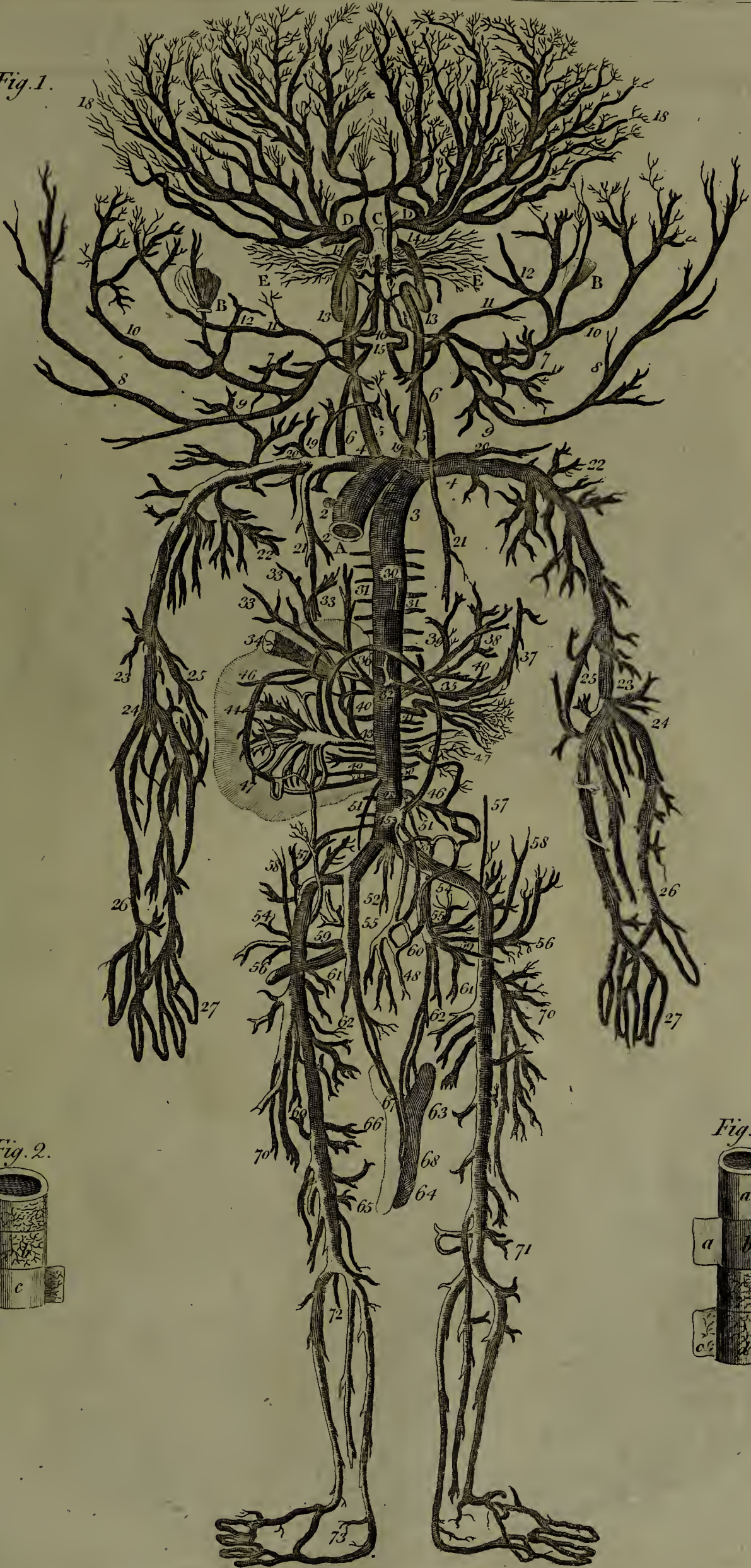
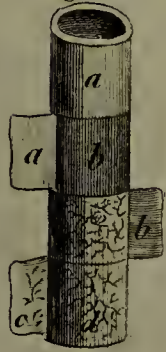


Fig. 2.



Fig. 3.



BRAIN.

Fig. 1.

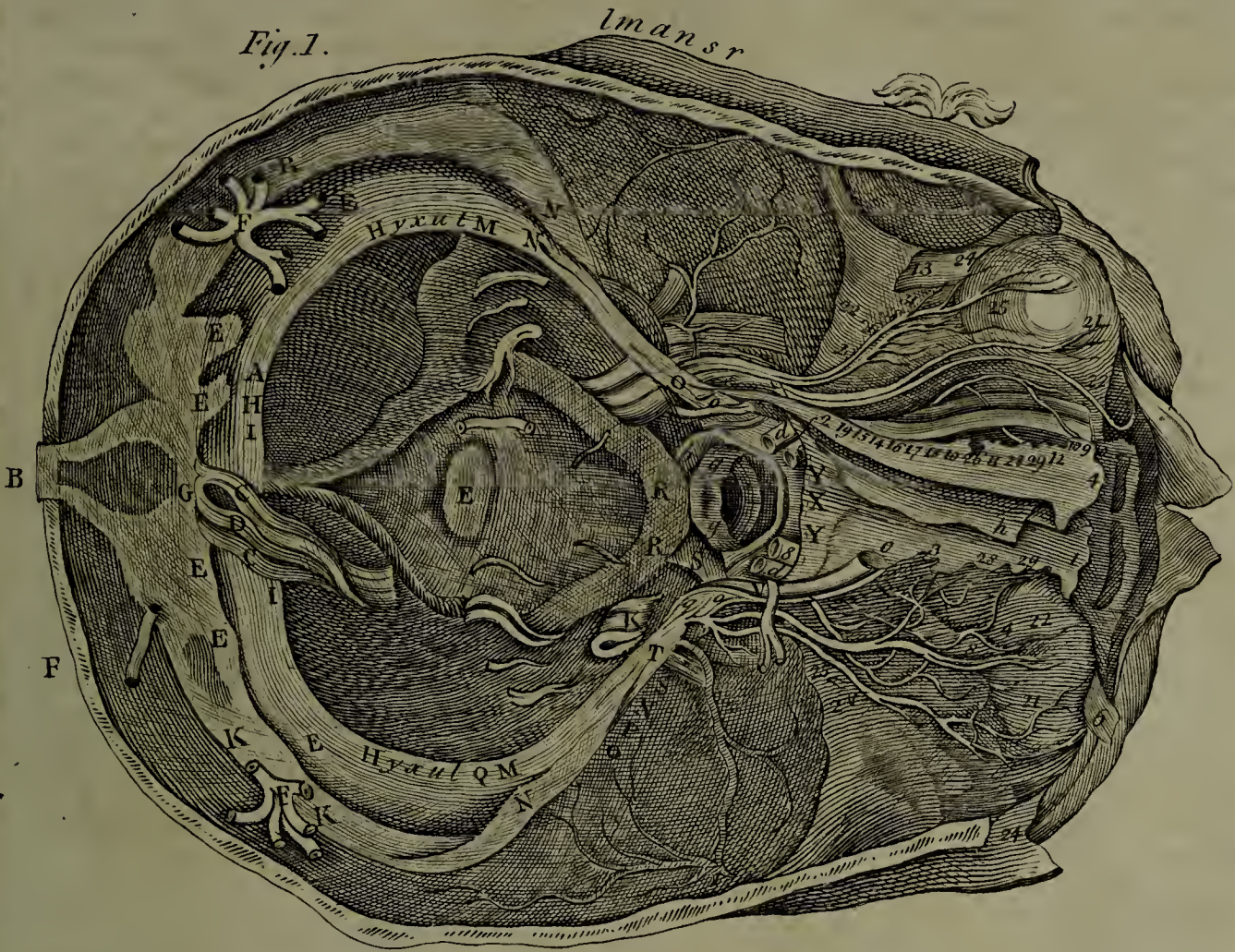
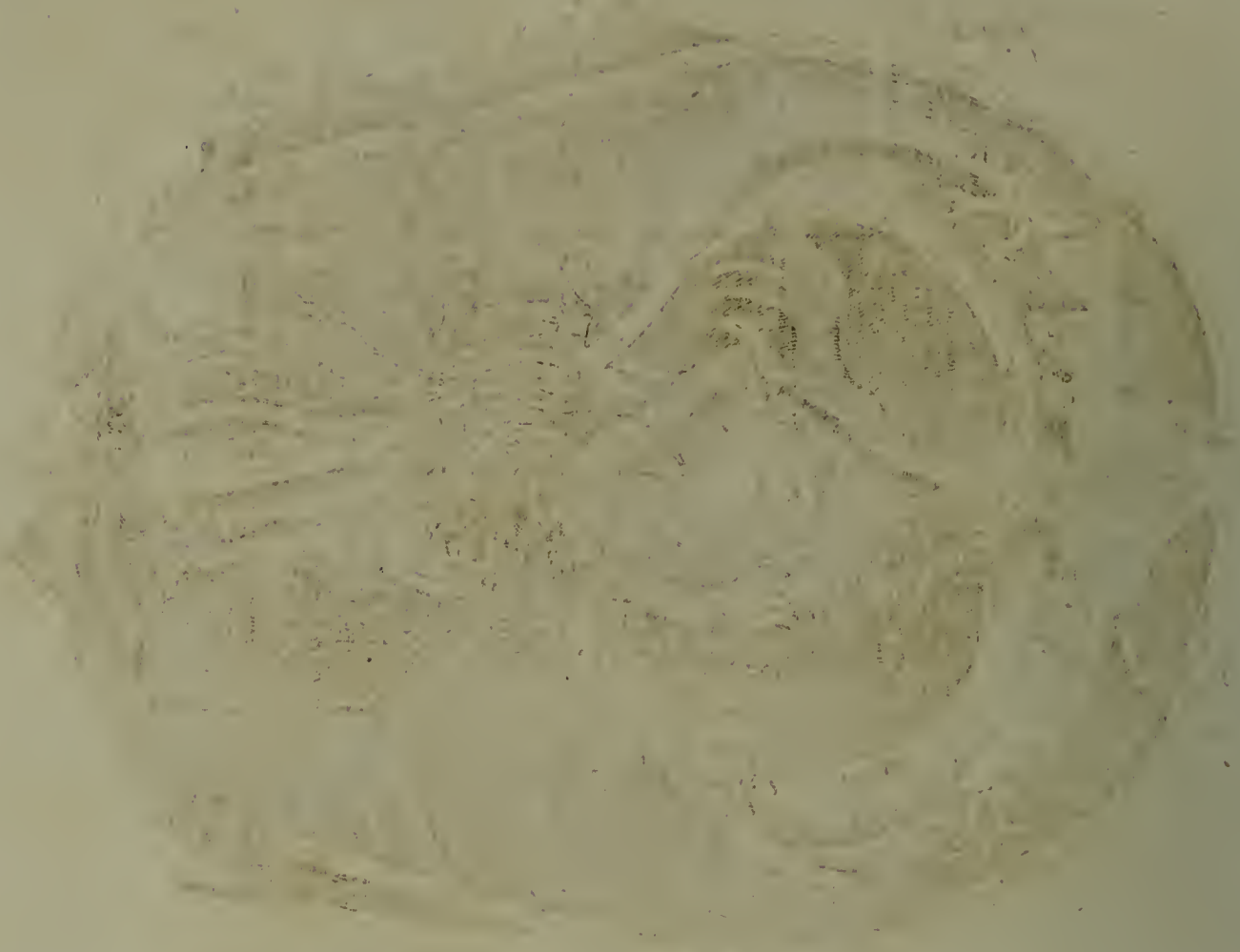


Fig. 2.





21. 21. The mammariæ, which arise from the subclavian arteries, and descend to the cartilages of the true ribs internally, on each side the os pectoris or sternum. Some branches of these pass through the pectoral as well as intercostal muscles, and give blood to the breast, where they meet some branches of the intercostal arteries.
22. 22. The arteries of the muscles of the os humeri, and some of those of the scapula.
23. 23. 24. 24. Those parts of the large trunks of the arteries of the arm, which are liable to be wounded in opening the vena basilica, or innermost of the three veins in the bending of the cubit.
25. 25. A communicant branch of an artery arising from the trunk of the artery of the arm, above its flexure at the cubit, which is inosculated with the arteries below the cubit.
26. 26. The external artery of the cubit, which makes the pulse near the carpus.
27. 27. Arteries of the hands and fingers.
28. 28. The descending trunk of the arteria magna.
29. The bronchial artery, springing from one of the intercostal arteries: it sometimes arises immediately from the descending trunk of the aorta; and at other times from the superior intercostal artery which springs from the subclavian.
30. A small artery, springing from the fore parts of the aorta descendens, and passing to the gula.
31. 31. The intercostal arteries on each side the arteria magna descendens.
32. The trunk of the arteria cæliaca, whence spring,
33. 33. The hepatick arteries, and
34. The arteria cystica, or the gall-bladder.
35. Arteria coronaria ventriculi inferior.
36. The pylorica.
37. The epiploica dextra, sinistra, and media, springing from the coronaria.
38. The ramifications of the coronary artery, which embrace the bottom of the stomach.
39. Coronaria ventriculi superior.
40. 40. The phrenick arteries, or the two arteries of the diaphragm; that on the left side arising from the trunk of the arteria magna; the right springing from the cæliaca.
41. The trunk of the splenick artery, arising from the cæliaca, contorted.
42. The two small arteries going to the upper part of the duodenum and pancreas; the rest of the arteries of the pancreas spring from the splenick artery in its passage to the spleen.
43. The trunk of the arteria mesenterica superior turned towards the right side.
44. The branches of the superior mesenterick artery, freed from the small guts. Here the various anastomoses the branches of this artery make in the mesentery, before they arrive at the intestines, may be observed.
45. The inferior mesenterick artery, arising from the arteria magna.
46. Remarkable anastomoses of the mesenterick artery with the superior.
47. 47. The branches of the inferior mesenterick artery, as they pass to the intestinum colon.
48. Those of the rectum.
49. The emulgent arteries of the kidneys.
50. The vertebral arteries of the loins.
51. 51. The spermatick arteries, which descend to the testes, and are so small as to escape being filled with wax.
52. Arteria sacra.
53. Arteriæ iliaci.
54. 54. Rami iliaci externi.
55. 55. Iliaci interni.
56. 56. The two umbilical arteries cut off; that

- on the right side is drawn as in the foetus, and the left expressed as in an adult.
57. 57. The epigastick arteries, which ascend under the right muscles of the abdomen, and are inosculated with the mammariæ.
58. 58. Branches of the external iliac arteries, passing between the two oblique muscles of the abdomen.
59. 59. Branches of the internal iliac arteries, which convey the blood to the extensores and obturatores muscles of the thighs.
60. The trunks of the arteries which pass to the penis.
61. 61. The arteries of the bladder.
62. 62. The internal arteries of the pudentum, which, with those here expressed with the penis, make the hypogastrick arteries in women.
63. The penis extended with wax, and dried.
64. The glans penis.
65. The upper part of the dorsum penis, cut from the body of the penis, and raised, to shew the corpora cavernosa penis.
66. Corpora cavernosa penis, freed from the ossa pubis, and tied after inflation.
67. The two arteries of the penis, as they appear injected with wax.
68. The capsula and septum of the corpora cavernosa penis.
69. The crural arteries.
70. 70. The arteries which pass to the muscles of the thighs and tibiæ.
71. That part of the crural artery that passes the ham.
72. The three large trunks of the arteries of the legs.
73. The arteries of the foot, with their communicating branch, from their superior to their inferior trunk, as well as their communications at the extremity of each toe, like those of the fingers.

Explanation of the Plate of the Brain.

Fig. 1. Is an interior view of the cerebrum and cerebellum.

A, The transverse septum or tent of the cerebellum. B, the longitudinal sinus of the dura mater, which is divided into two branches at its posterior extremity. C, the right sinus divided into two parts, one of which communicates with the right lateral sinus, and the other with the left. D, vestiges of the falx of the brain. E, E, the large veins of the septum A. F, the insertion of the veins of the cerebrum into the lateral sinus. G, the orifice of the posterior occipital sinus. H, H, the posterior occipital sinuses on the right and left. I, I, the falx of the cerebellum. K, K, the great transverse sinus. L, L, the jugular fossæ. M, M, the sinus petrosi inferior. N, N, the sinus petrosi superior. O, O, the veins of the cerebellum which open into the above sinuses. P, P, the inferior occipital sinuses. Q, Q, the canal by which they discharge themselves, and which joins the ninth pair. R, R, the anterior and superior occipital sinuses. S, S, the communication between the sinus cavernosus and circularis. T, the orifice of the sinus petrosus superior, by which it communicates with the sinus cavernosus. V, V, sinus cavernosi. X, X, the transverse sinus of the pituitary fossa. Y, Y, the circular sinus of Ridley. Z, Z, the insertion of the anterior veins of the cerebrum into the sinus cavernosi. a, a, the principal artery of the dura mater. b, b, the vein which accompanies it. c, the part of the cranium which it there enters by a particular foramen. d, d, the internal carotid arteries in the sinus cavernosus cut off at the place where they enter the cerebrum. e, e, the arterial branches sent to the sinus

of the nerve of the fifth pair. *f, f*, part of the internal carotid produced to the ophthalmick artery. *g, g*, the posterior apophyses clinoides. *h*, the apophysis, called crista galli. *i, i*, the frontal sinuses. *k, k*, branches of the fifth pair, distributed on the dura mater. *l*, the fourth branch of the fifth pair. *m*, the second branch. *n*, the first or ophthalmick branch. *o*, the third part. *q*, the partition which divides the fifth and sixth pair. *r*, the sixth pair. *s*, origin of the intercostal nerve. *t, t*, entrance of the seventh pair into the dura mater. *u, u*, first insertions of the eighth pair. *x, x*, second insertions of the eighth pair. *y, y*, the ninth pair. *z*, the foramen of the medulla spinalis.

In the right Eye, the superior Part of the Orbit taken off.

1, 1, The ophthalmick artery. 2, 2, its exterior branch, which accompanies the nerve of the same name. 3, 3, the interior branch distributed to the nostrils. 4, 4, the sclerotick branches, several of which are distributed to the uvea. 5, 5, vestiges of the levator muscles of the eye-lid and of the eye. 6, the extremity of the levator of the eye-lid. 7, the lacrymal gland. 8, the optick nerve. 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, the same as in the eye of the opposite side.

In the left Eye.

9, The annular cartilage. 10, the great oblique muscle. 11, the levator of the eye. 12, the abductor or internal muscle of the eye. 13, the abductor cut off. 14, the superior branch of the third pair, distributed to the eye and eyelid. 15, the other part of the trunk. 16, branch to the nerve to the obliquus inferior. 17, branch to the right inferior of the eye. 18, branch to the right internal. 19, branch to the ophthalmick ganglion. 20, superior branch of the first branch of the fifth pair. 21, the exterior rope of that branch. 22, interior rope. 23, exterior branch of the first branch of the fifth pair. 24, small branches extended to the face, through the foramina of the ossa malarum. 25, branches to the lacrymal gland. 26, inferior branches of the second branch of the fifth pair. 27, rope of that branch to the ganglion. 28, small filaments to the nostrils. 30, the ophthalmick ganglion. 31, the small ciliary nerves. 7, 8, the same as in the right eye.

Fig. 2. Exhibits the basis of the brain, with part of the medulla oblongata, the blood vessels being injected with wax.

A, A, the fore lobes of the brain.
B, B, the hinder lobes.
C, C, the cerebellum.
D, D, the lateral sinuses.
E, E, the vertebral arteries, as they pass between the first vertebra and the bone of the occiput.
F, the vertebral sinus.
G, G, G, G, G, the dura mater on the right side taken off from the spinal marrow, and remaining on the left.

1, 2, 3, 4, &c. the ten pair of nerves belonging to the brain, with seven of the spinal marrow.

a, the foramen that opens into the pituitary gland from the infundibulum.

b, b, the two white protuberances behind the infundibulum.

c, c, the two trunks of the carotid artery cut off where they began to run betwixt the fore and hinder lobes of the brain.

d, d, the two arteries joining the carotids, with the cervical artery called the communicant branches.

e, e, two large branches of the cervical artery, sometimes seeming as though they came from the communicant branch on each side, from the first of which the plexus choroides hath its original in chief, and from the last the plexus choroides of the fourth ventricle.

f, several little branches arising from the carotid artery.

g, the cervical artery composed of the two trunks of the vertebral artery within the cranium.

h, h, the two trunks of the vertebral artery.

i, i, i, the spinal artery.

k, a small branch of an artery running through the ninth pair.

l, l, the crura of the medulla oblongata.

m, m, the annular protuberance, or pons varolii.

n, that part of the caudex medullaris on the right side, called, by Willis and Vieussenius, corpora pyramidalia.

o, that part on the same side called corpus olivare.

p, the foremost branch of the carotid artery, dividing the fore lobes of the brain, consisting of two branches, one of them only appearing here.

q, q, little branches of arteries helping to make the plexus choroides in the fourth ventricle.

r, r, r, r, branches of arteries dispersed from the cervical artery upon and through the annular protuberance.

s, s, part of the second process or pedunculi of the cerebellum.

t, t, the spinal accessory nerve.



Illustration of the BOTANICAL PLATES.

IN our INTRODUCTION to the Natural History of VEGETABLES, page 296, we observed, that the immense labours, which some late botanists have undergone, to give a list of the names of plants, can contribute little to the discovery of their properties. We should be led to suppose, from the repeated endeavours to systematise this science, that the whole of the student's pursuit was directed to acquire the names of plants. More time has been consumed in making catalogues of this nature, than, if properly applied, would have been sufficient to have enabled the botanist to discover several new properties in the vegetable world, as yet unknown.

For these reasons, the botanical systems of flowers, plants, leaves, mosses, and cups of flowers, were, intentionally, omitted: however, in order to gratify the taste of curious speculators, and that of the learned, we shall here treat the above subjects agreeable to systematical arrangements; particularly those adopted by LYNNÆUS and TOURNEFORT; wherein the several Orders and Genera of flowers and plants will be considered; and for a particular account of the various characters, and Latin appellations, we refer our readers to the numerous plates, under the general head of Botany.

BOTANY.

THE term Botany, says a modern writer, has been understood as expressing the doctrine of plants at large, and in all its various lights; but tracing the origin and progress of the study, we see it at several periods under distinct appearances. These, however, are all reducible to those general heads, which we may distinguish by the terms philosophic, historical, and systematic Botany. Of these the first and noblest has been the least cultivated; it began, and in a manner ended, with Theophrastus; its object is the nature of vegetables as vegetables, independent of all other considerations; to this succeeded the historical branch, gathering the names and numbers of plants, their places of growth, their virtues, and other æconomic uses: this was the object of those, who studied herbs, from Theophrastus to the latter end of the sixteenth century, when Cæsalpinus gave origin to the systematic Botany: till this time plants were arranged, even those who wrote best on them, according to the old and irregular division, into trees, shrubs, and herbs; or according to their virtues, the letters of the alphabet, which began with their names, or by such vague and arbitrary methods. Their increased number now made it necessary they should be better arranged: and this great author has struck out that path, which has since been trod so happily; of examining their parts and deducing thence the characters of classes, arranging in each class all those, which had the peculiar mark which made its distinction. The origin of systematical distribution was the selecting some part of a plant, which was obvious and regular in itself, and establishing a character upon its description, to which all others that had the same mark were referred. Thus were formed the characters of classes first, and then the distinc-

tive mark of the genera. Between these there came naturally some lesser peculiarity, the subdivision of the classes by orders. The original invention was the choice of some one part of the character, and what part that should be was left to discretion. The great inventor chose the seeds, which he arranged according to the situation of the corculum, or heart of the seed, and to its place upon the plant; and upon this basis he founded the first arrangement of plants. Afterwards various parts of plants, and various collections of parts were adopted for the characters of classes. One hundred and three years after Cæsalpinus, Morrifon a Briton, entered successfully into the same path; Ray followed, Knoutius followed Ray, and Herman followed him. Riverius was cotemporary with Knoutius; these both wrote in the year 1690; and after four years more followed Tournefort, the greatest of them all. Thus closed upon the science the seventeenth century, in the last seventeen years of which the long neglected institution of Cæsalpinus was so well revived, that there appeared no less than six distinct systems of plants, and each of very considerable merit. The authors of the four first held the fruits and seed, according to the original practice of Cæsalpinus, to be the properest, at least the most essential parts, on which to found a system. Riverius struck out the design of fixing the characters in the flower, and Tournefort pursued this with the greatest attention, industry and truth. Boerhaave, who wrote in the beginning of the 18th century, continued the system in its original course, making the fruits and seeds of plants his great object in their arrangement. In 1711, Henschler of Wirtenberg appeared with credit, and led a long train; who less regarding the original object of distinction, followed Riverius and Tournefort in the choice of the flower. Seven years after, Ruppilus wrote, adopting the same part as the foundation of his system, and thus continued the established doctrine with Pontedera, Hebenstret, and Hudwig. In the mean time Magnal distinguished himself by a new system, formed upon the construction of the cup; and in the year 1735 Linnæus, too great for praise, published that system of Botany, which characterizes the classes according to the parts of generation or fructification, the filaments, and style; and takes into the general distinction all the flower.

FLOWERS.

THOUGH no part of plants is more different than their flowers; yet the definitions given by different authors of the word are extremely various, and are very necessary to be explained, in order to the understanding their works. Jungius defines it to be the most tender part of a plant, remarkable for its colour or form, or for both, and cohering with the fruit. Yet this author himself acknowledges his definition to be too confined, as he very well knew there were several plants, whose flowers were produced remote from the fruit.

Mr. Ray says, the flower coheres for the most part with the rudiments of the fruit, but such phraseology is by no means to be admitted into definitions

definitions. Tournefort defines it to be a part of a plant very often remarkable for its peculiar colours, for the most part adhering to the young fruit, to which it seems to afford the first nourishment, in order to explicate its most tender parts; but this is a more indeterminate definition than the former, from its loose mode of expression. Pontedera defines it to be a part of a plant, unlike the rest in form and nature. If the flower has a tube, it adheres to, or is fixed very near to the embryo, to the use of which it is subservient; but if the flower has no tube, then its base does not adhere to the embryo. This is scarce intelligible except to the expert botanist, and may be made to take in some parts of plants by no means to be understood by the name of flowers. Jussieu defines it to be composed of chives and a pistillum, and to be of use in the generation of the plant: but this is too imperfect, as there are many plants in which the pistillum is found at a great distance from the chives, and many flowers which have no pistillum, and many others which have no chives.

Valliant, however, has been happier in his definition; he says, that flowers are the organs which constitute the different sexes of plants, which are sometimes found naked and without any covering; and that the petals, which most of them have, are no way essential to their use, but serve and are intended merely as covers for them; but as these coats or coverings are the most conspicuous, and most beautiful part of the flower, these are to be called flowers, be they of whatever form or structure, or colour; and whether they contain only the organs of both sexes in each individual, or only of one, or even but of some part of one, provided that they are not of the same figure and colour with the leaves of the plant. The shortest and most express definition, however, seems to be Martyn's; which is, that flowers are the organs of generation of both sexes, adhering to a common placenta, together with their common covering, or of either sex separately with its proper coverings, if it have any. The structure of the different flowers are very various; but Dr. Grew has observed, that the far greater number of them have the impalement, the foliation, and the attire of chives, &c. Mr. Ray accounts that every perfect flower has the petals, stamina or chives, apices or summits, and the style or pistil, and such as want any of these parts he calls imperfect flowers. The greater number of plants have a flower-cup which is of a firmer structure than their leaves, and serves for their support. The parts of a flower are the ovary or pistil, the corolla or flower-petals, the stamina or chives, the impalement or calyx, and the perianthium, pericarpium, and fruit.

Explanation of the Terms used in BOTANY.

PISTIL, *Pistillum*, denotes the female organ of generation in flowers, and is defined, by Linnæus, as an entrail of the plant, designed for the reception of the farina, or male-dust, wherewith it becomes impregnated; it consists of three parts, viz. the germen, style, and stigma; the germen is the rudiment of the fruit, accompanying the flower, and is of various shapes, but always situated below the style, or stigma, and contains the embryo seeds; the style is the part that serves to elevate the stigma from the germen, and is also of different forms; the stigma, which is of various shapes likewise, is always placed on the top of the style, or, if that be wanting, on the top of the germen; this part is covered with a moisture, for the breaking of the farina into more minute parts.

COROLLA is the most conspicuous part of a flower. It expresses the coloured tender part,

which surrounds the organs of generation. The part it is composed of are called petals; if it consists only of one piece, it is called monopetalous: if of more, it is said to be dipetalous, tripetalous; and so on, as it consists of two, three, four, or more parts.

STAMINA, the male parts of a flower, or its male organs of generation. Linnæus defines the stamina the entrail of the plant, designed for the preparation of the pollen.

Each stamen consists of two parts. 1. The filament or thread, which serves to elevate the anthera or summit, and at the same time connects it with the flower. 2. The anthera, or summit itself, which contains within it the pollen, and when come to maturity, discharges the same.

The stamina being the male part of the flower, the construction and distribution of the sexual system, is principally founded upon, and regulated by them. Such flowers as want the stamina, are called female flowers: such as have the stamina, but want the pistillum, or female part, male flowers; such as have them both, hermaphrodite flowers; and such as have neither, neuter flowers.

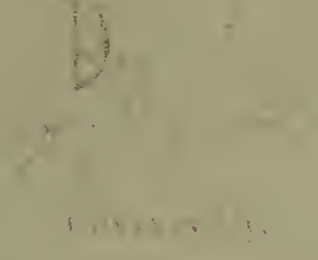
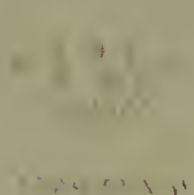
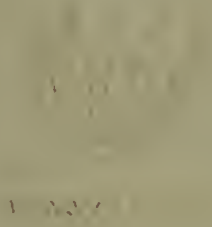
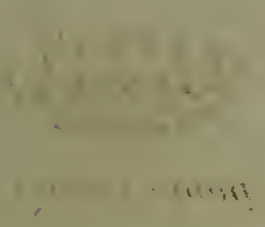
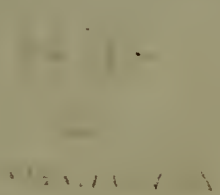
Mr. Tournefort takes the use of the stamina to be, as it were, so many excretory canals for discharging the growing embryo of its redundant juices; and of these excrements of the fruit, he takes that farina, or dust, found in the apices, to be formed. But other writers, as Geoffroy, and Linnæus in particular, assign the stamina a nobler use: these authors, explaining the generation of plants in a manner analogous to that of animals, maintain the use of the stamina to be that of secreting, in their fine capillary canals, a juice, which being collected, hardened, and formed into a farina, or dust, in the tops of the apices, is thence, when the plant arrives at maturity, discharged by the bursting of the apices upon the top of the pistil, whence is a passage for it to descend into the uterus, where being received, it impregnates and fecundifies the plant.

CALYX, or Impalement, among botanists a general term, expressing the cup of flowers, or that part of a plant which surrounds, incloses, or supports the other parts of the flower. The cups of flowers are very various in their structure, and are distinguished by the names of perianthium, involucre, spathe and gluma. Botanists distinguish two sorts of Calices, one external, called the Calyx of the flower: by the ancients perianthium, as encompassing the flower and seed; the other internal, called the Calyx of the fruit: by the ancients pericarpium, as being the capsule which compasses the fruit, and is itself encompassed by the petals. The external Calyx may also be divided into two sorts, one which surrounds the flower, another which sustains it, different from the pedicle; as the latter spreads itself underneath the flower, to give room for the nutritious juice to raise more freely; the cavity of the pedicle enlarged, is reputed part of the Calyx both external and internal.

PERIANTHIUM, a flower-cup situated close to the fructification. It surrounds the lower part of the flower, and consists of several leaves, or of one leaf divided into several segments. If it includes the stamina and not the germen, it is the Perianthium of the flower; if the germen but not the stamina, the Perianthium of the fruit: but if it includes both, it is the Perianthium of the fructification.

PERICARPIUM, a covering or case for the seeds of plants; it is the germen of the pistil enlarged: there are no less than nine species of pericarpia. 1. A Capsule. 2. A Conceptaculum. 3. A Pod. 4. A Ligumen. 5. A Nut. 6. A Drupe. 7. An Apple. 8. A Berry. 9. A Strobilus.

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Linnean System.



MONANDRIA



DIANDRIA



TRIANDRIA



TETRANDRIA



PENTANDRIA



HEXANDRIA



HEPTANDRIA



OCTANDRIA



ENNEANDRIA



DECANDRIA



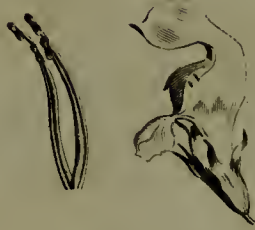
DODECANDRIA



ICOSANDRIA.



POLYANDRIA



DIDYNAMIA



TETRADYNAMIA



MONADELPHIA



DIADELPHIA



POLYADELPHIA



SYNGENESIA



GYNANDRIA



POLYGAMIA



MONOECIA



DIOECIA



CRYPTOGAMIA

Journal of the

expedition to

the North Pole

by the

British

expedition

under the

command

of

Admiral

Bartholomew

Somerville

Esq.

in

the

year

1770

by

John

Linnean Systems

ORDERS of FLOWERS.

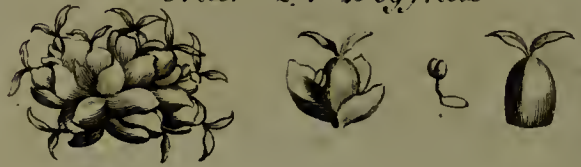
Class I. Monandria. One Stamen on the Hermaphrodite Flower

Order 1. Monogynia



Canna, Indian Flowering Reed

Order 2. Digynia



Blitum, Virgate Strawberry Blite

Class II. Diandria Two Stamens in the Hermaphrodite Flower

Order 1. Monogynia



Monarda, Oswego Tea

Order 2. Digynia



Anthoxanthum, Vernal Grass

Order 3. Trigynia



Piper, Black Pepper

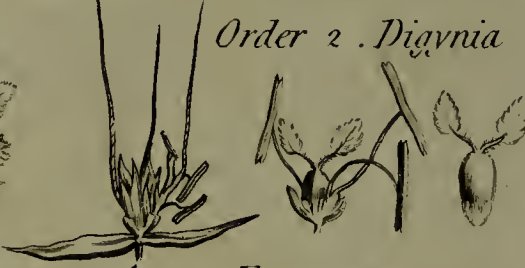
Class III. Triandria. Three Stamens in the Hermaphrodite Flower

Order 1. Monogynia



Crocus, Garden Crocus

Order 2. Digynia



Avena Fatua, Wild Oat

Order 3. Trigynia



Mollugo, (verticillate)

Class IV. Tetrandria. Four Stamens in the Flower with the Fruit

Order 1. Monogynia



Dipsacus, Laciniated Teasel

Order 2. Digynia



Hamamelis, witch Hazel

Order 3. Tetragynia



Potamogeton, Pond weed

Class V. Pentandria. Five Stamens in the Hermaphrodite Flower

Order 1. Monogynia



Nerium, Rose Bay

Order 2. Digynia



Anethum, Common Fennel

Order 3. Trigynia



Turnera

Order 4. Tetragynia



Parnassia, Grass of Parnassus

Order 5. Pentagynia



Crassula, Navelwort

Order 6. Polygynia



Myosurus, Mouse Tail

Class VI. Hexandria. Six Stamens in the Hermaphrodite Flower

Order 1. Monogynia



Amaryllis, Belladonna

Order 2. Digynia



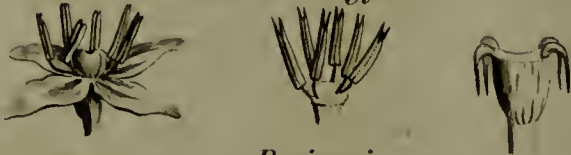
Oryza, Rice

Order 3. Trigynia



Rumex, great curled Dock

Order 4. Tetragynia

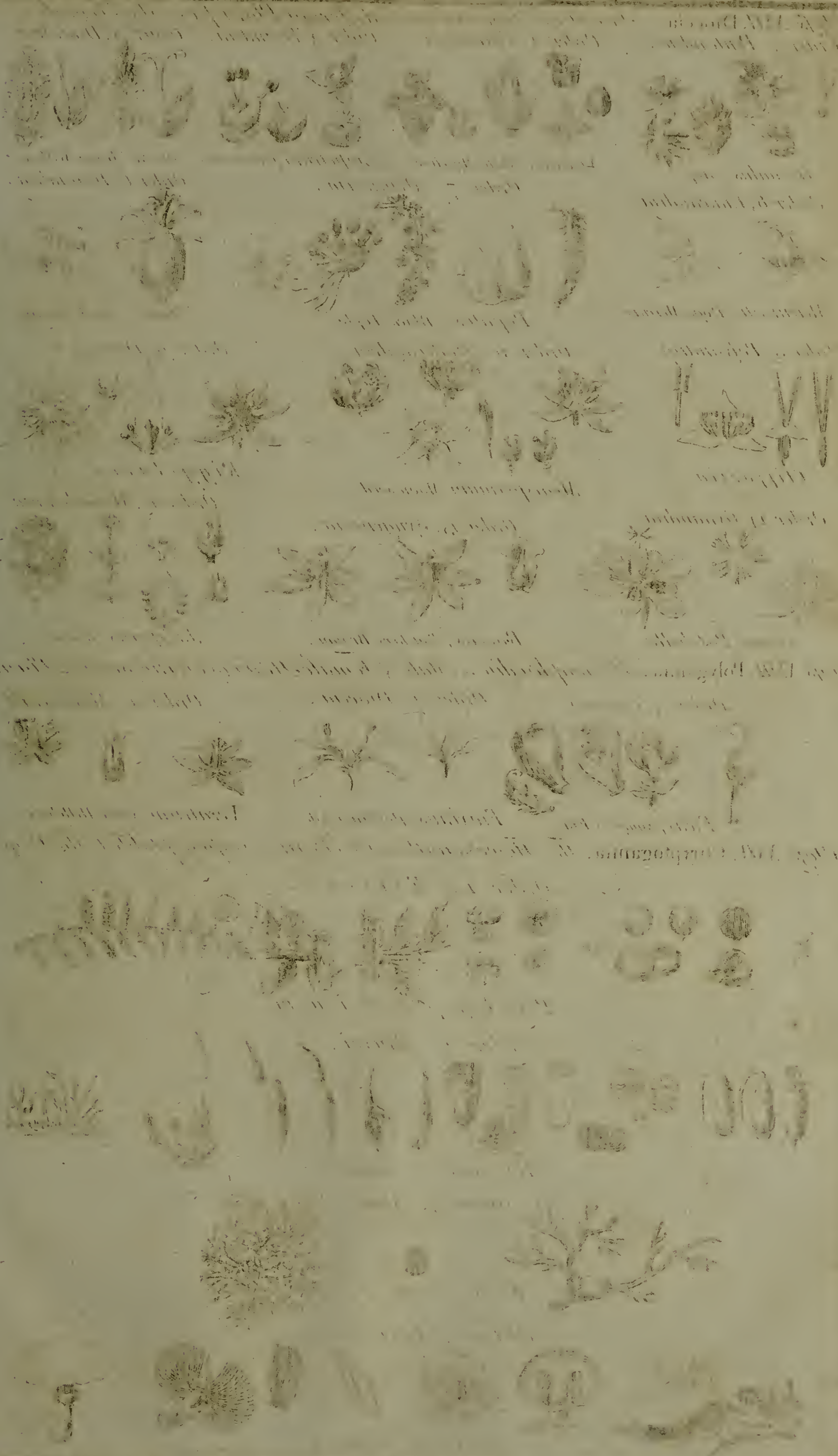


Petiveria

Order 5. Polygynia



Alisma, great water Plantain



BOTANY.

LINNEAN SYSTEM—ORDERS of FLOWERS.

Class XXII. Dioecia. The Male Flowers on a different Plant from the Female.



Humulus, Hop.



Viscum, White Mistletoe

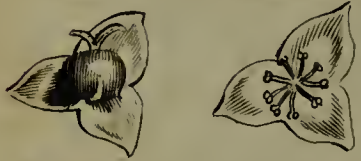


Empetrum, Crow-berries.



Salix, Brown Willow.

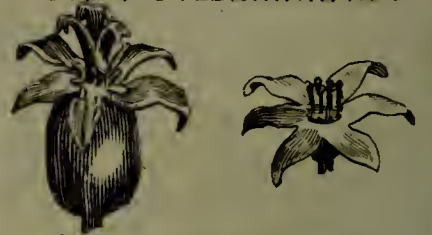
Order 8. Enneandria.



Mercurialis, Dogs Mercury.

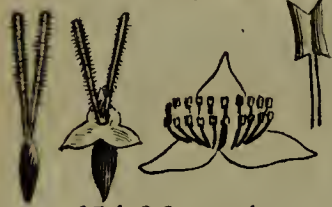


Populus, Black Poplar.



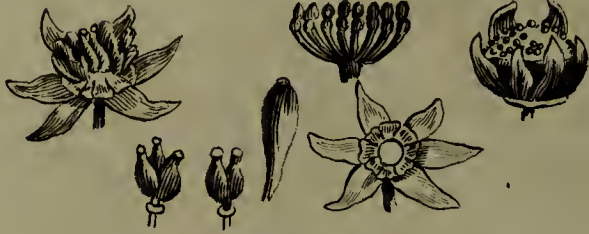
Tamus, Black Bryony.

Order 11. Polyandria.



Cliffortia.

Order 10. Dodecandria.



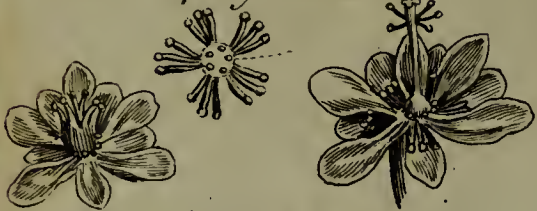
Menispermum, Moon seed.

Order 9. Decandria.



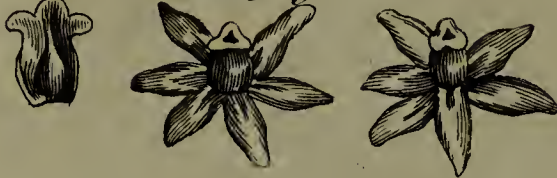
Kiggelaria.

Order 14. Gynandria.



Clitia Pulchella.

Order 13. Syngenesia.



Ruscus, Butchers Broom.

Order 12. Monadelphina.



Juniperus, Juniper.

Class XXIII. Polygamia. Hermaphrodite, or Male & Female Flowers on the same Plant.

Order 3. Trioecia.



Ficus, common Fig.

Order 2. Dioecia.



Fraxinus, flowering Ash.

Order 1. Monoecia.



Veratrum, white Hellebore.

Class XXIV. Chryptogamia. The Flowers within the Fruit or imperceptible to the Eye.

Order 1. Filices.



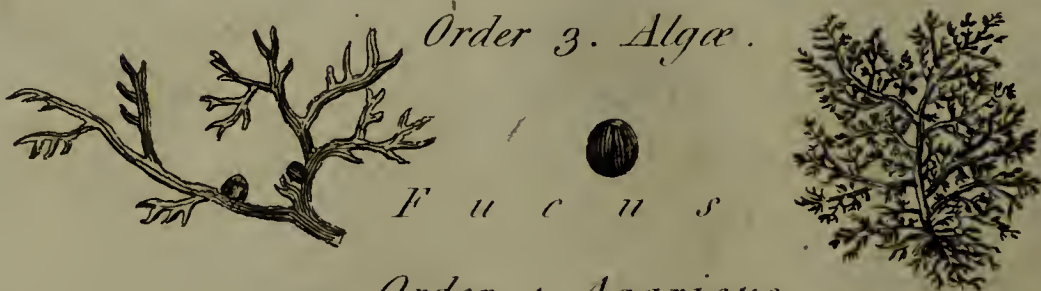
Polypodium

Order 2. Musci.



Bryum. (matted)

Order 3. Algæ.

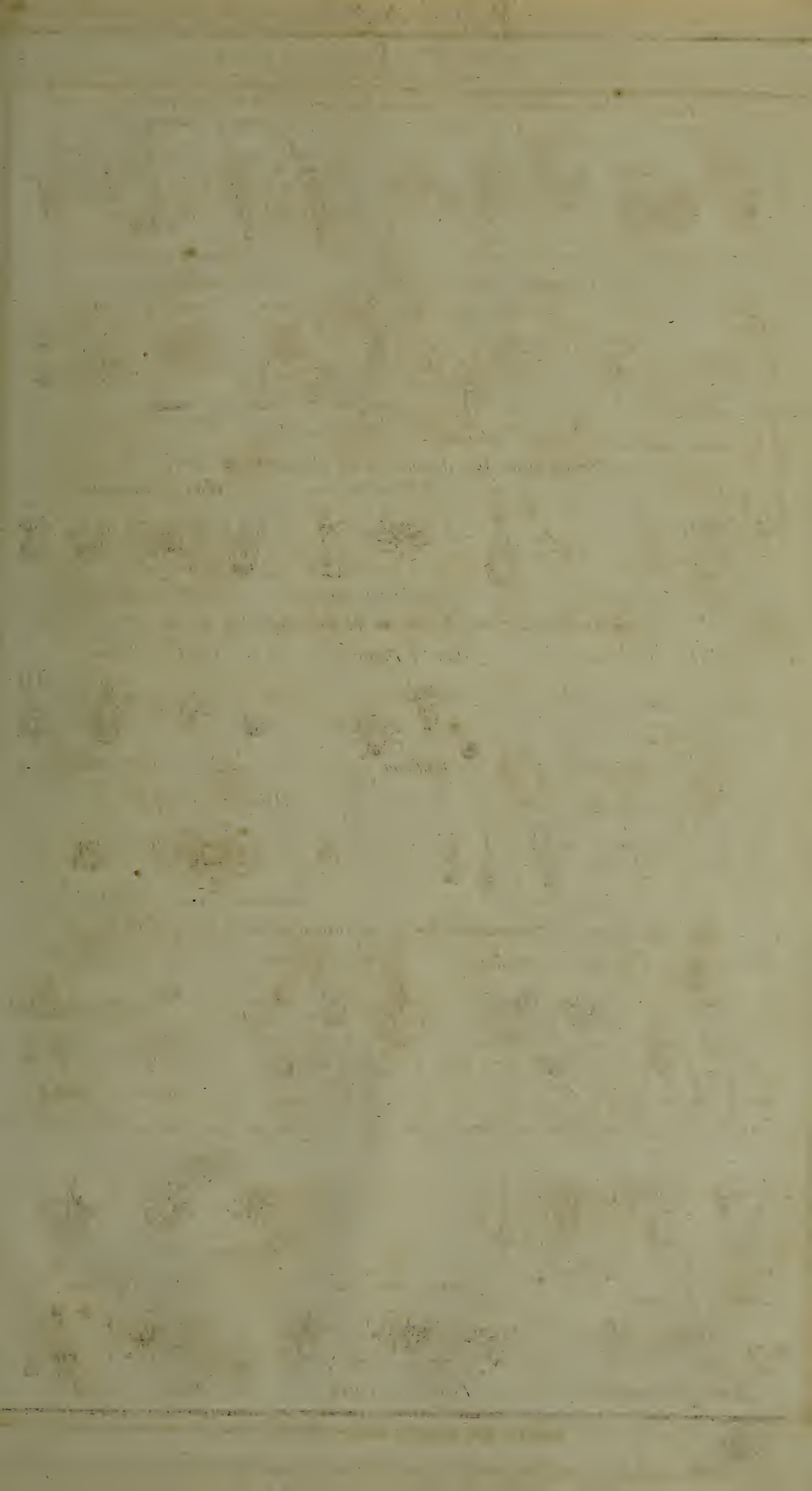


Fucus

Order 4. Agaricus.



Agaric (Field)



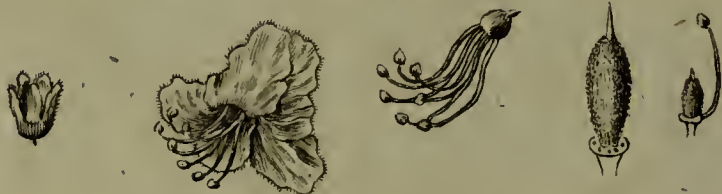
Linnean System.

ORDERS OF FLOWERS.

Class VII. Heptandria. Seven Stamens on the same Flower with the Pistil .

Order 1. Monogynia .

Order 3. Tetragynia .



Æsculus Horse Chestnut



Saururus, Lizards Tail

Class VIII. Octandria. Eight Stamens in the same Flower with the Pistil .

Order 1. Monogynia .

Order 2. Digynia .

Order 3. Trigynia .

Order 4. Tetragynia .



Oenothera Tree Primrose



Galenia



Polygonum, Buck-wheat



Adoxa, Tuberos Moschatel

Class IX. Enneandria. Nine Stamens in the Hermaphrodite Flower .

Order 1. Monogynia .

Order 2. Trigynia

Order 3. Hexagynia



Cuscuta (Berry-bearing)



Rheum, Palmated Rhubarb



Butomus, Flowering Rush

Class X. Decandria. Ten Stamens in the Hermaphrodite Flower .

Order 1. Monogynia .

Order 2. Digynia

Order 3. Trigynia .



Kalmia, (Narrow leaved)



Saxifraga



Stellaria, Greater Stielchwort

Order 4. Pentagynia .

Order 5. Decagynia .



Oxalis Wood Sorrel



Phytolacca, American Nightshade

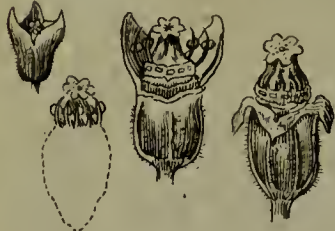
Class XI. Dodecandria. Stamens from twelve to nineteen in the Hermaphrodite Flower .

Order 1. Monogynia .

Order 2. Digynia .

Order 3. Trigynia .

Order 5. Polygynia .



Asarum, Asarabacca



Agrimonia



Euphorbia, (Lathyris)



Seupervivum Houseleek

Class XII. Icosandra. the Stamens inserted (not in the Receptacle but) in the Inside of the Calyx & Commonly Twenty often more.

Order 1. Monogynia

Order 2. Digynia .



Punica, Pomegranate



Cratægus, Bean Tree

Order 3. Trigynia .

Order 4. Pentagynia .

Order 5. Polygynia .



Sorbus, Quicken Tree



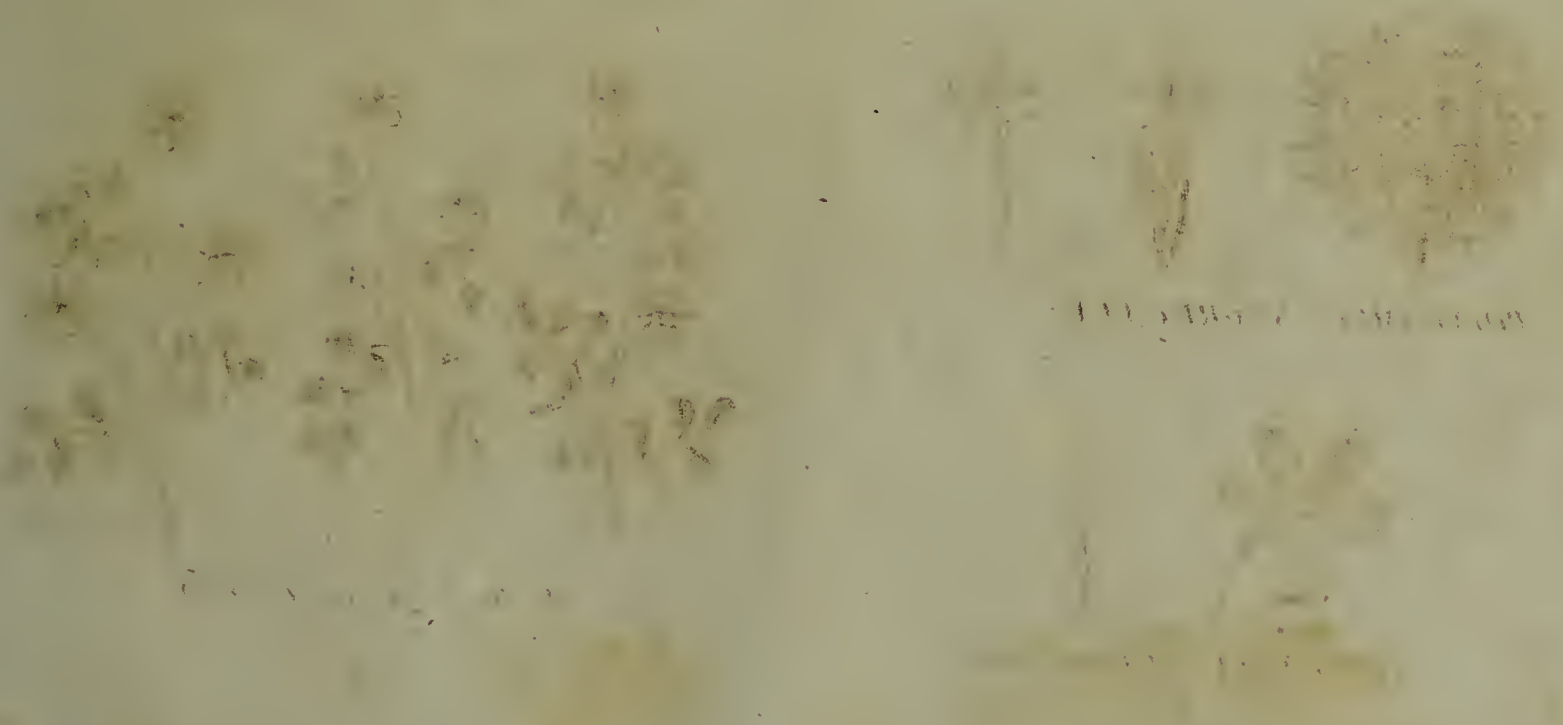
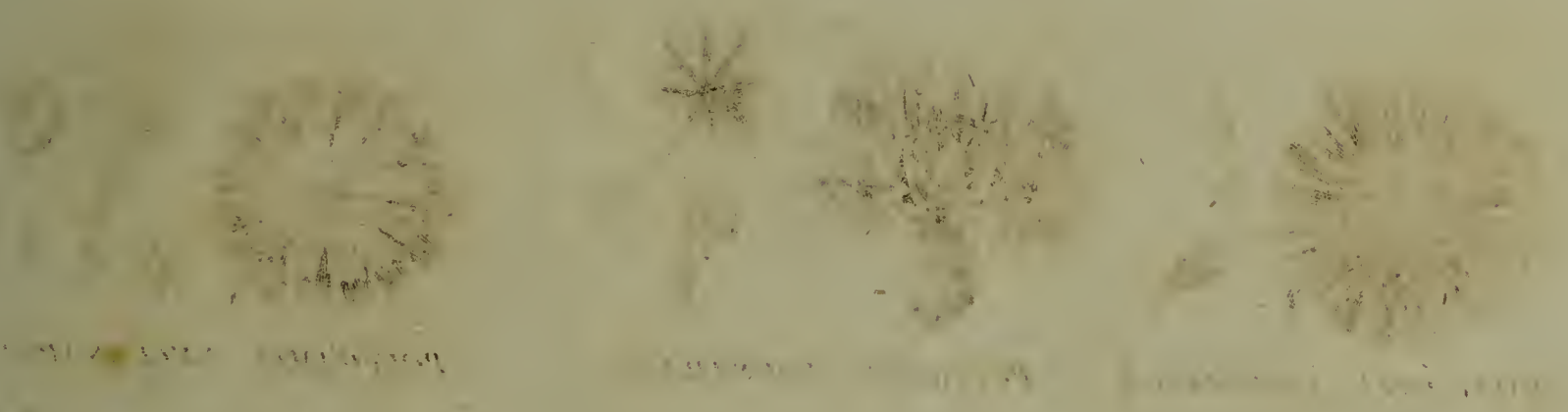
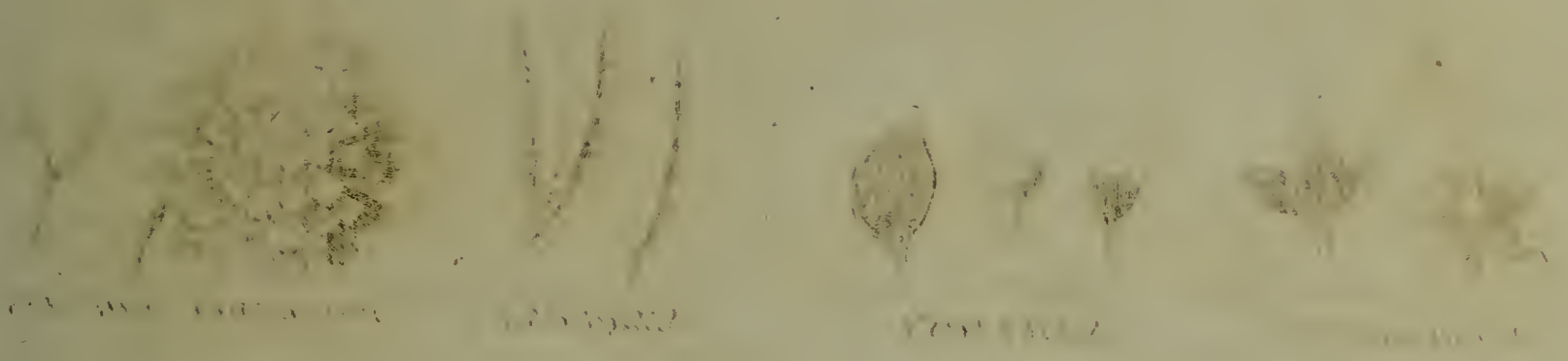
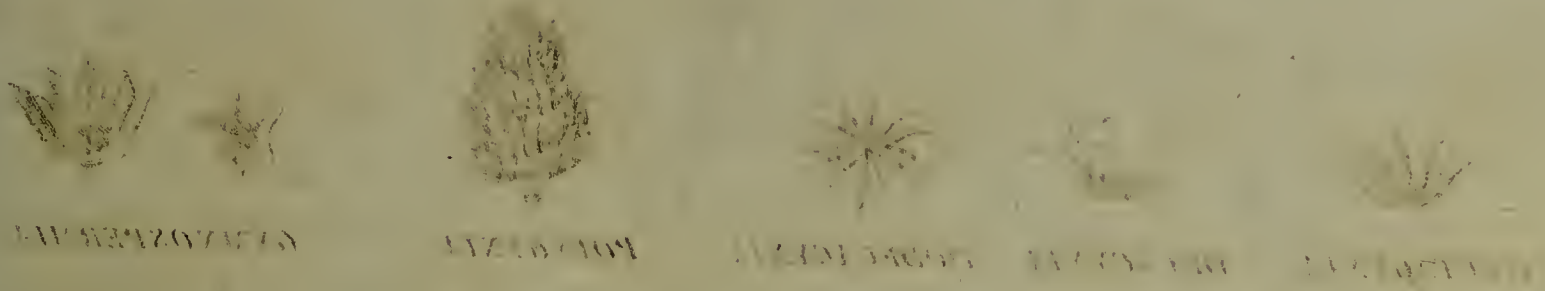
Pyrus, Codlin Apple



Rubus, Bramble

Handwritten title at the top of the page, possibly "Linnæus System".

1. 2. 3. 4. 5. 6.



Linnean System.



MONOGYNIA



DIGYNIA



TRIGYNIA



TETRAGYNIA



PENTAGYNIA



HEXAGYNIA



HEPTAGYNIA



DECAGYNIA



DODECAGYNIA



POLYGYNIA



GYMNOSPERMIA



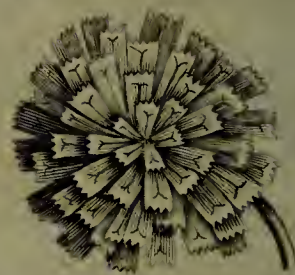
ANGIOSPERMIA



SILICULOSA



SILICUOSA



POLYGAMIA ÆQUALIS



POLYGAMIA SUPERFLUA



POLYGAMIA FRUSTRANEA



POLYGAMIA NECESSARIA



POLYGAMIA SEGREGATA



TRIOECIA



POLYGAMIA MONOGAMIA



FILICES



MUSCI



ALGÆ



FUNGI

Illustration of the ...

PLATE I

Fig. 1. ... Fig. 2. ... Fig. 3. ...

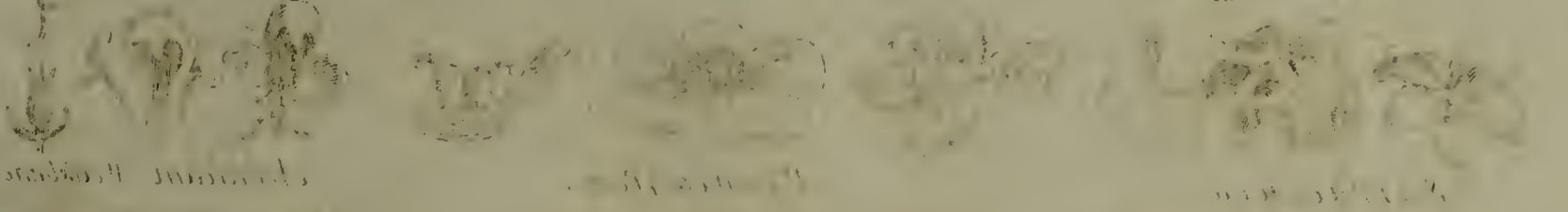


Fig. 4. ... Fig. 5. ... Fig. 6. ...



Fig. 7. ... Fig. 8. ... Fig. 9. ...



Fig. 10. ... Fig. 11. ... Fig. 12. ...



Fig. 13. ... Fig. 14. ... Fig. 15. ...



Fig. 16. ... Fig. 17. ... Fig. 18. ...

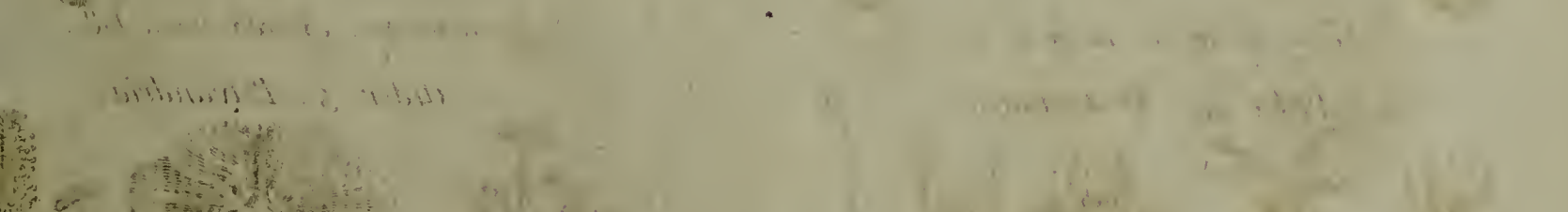


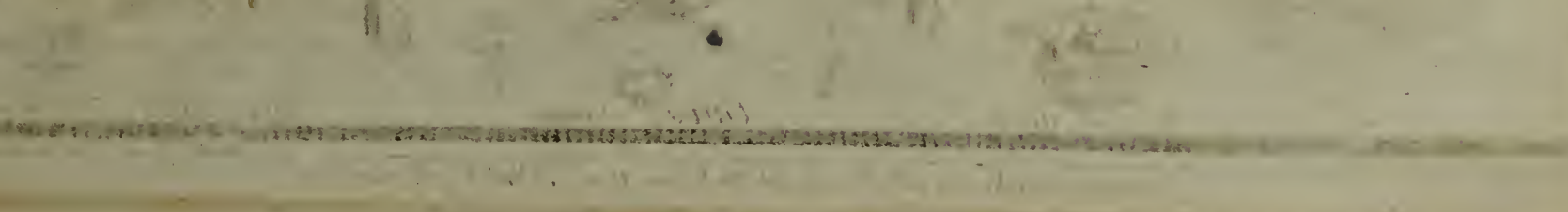
Fig. 19. ... Fig. 20. ... Fig. 21. ...



Fig. 22. ... Fig. 23. ... Fig. 24. ...



Fig. 25. ... Fig. 26. ... Fig. 27. ...



Linnean System

ORDERS of FLOWERS.

Class XIII. Polyandria. The Stamens from Twenty to a Hundred in the same Pistil with the Flower.

Order 1. Monogynia

Order 2. Dyginia

Order 3. Trigynia



Sarracenia



Præonia, Piory.



Aconitum, Wolfsbane.

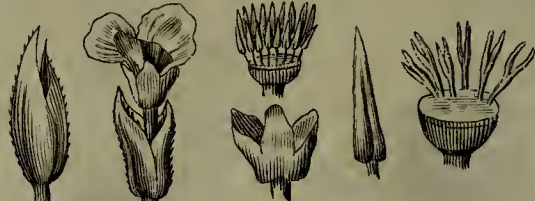
Order 5. Pentagynia

Order 6. Hexagynia

Order 7. Polygynia



Aquilegia, Columbine.



Stratiotes, Water Aloe.

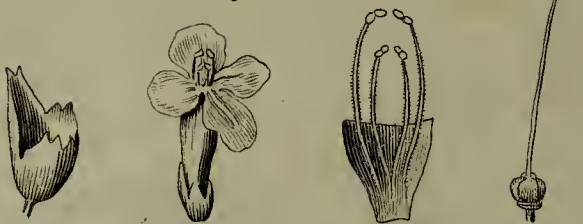


Ranunculus, Crowfoot.

Class XIV. Didynamia. Four Stamens, two are close together and longer.

Order 1. Gymnospermia

Order 2. Angiospermia



Melittis



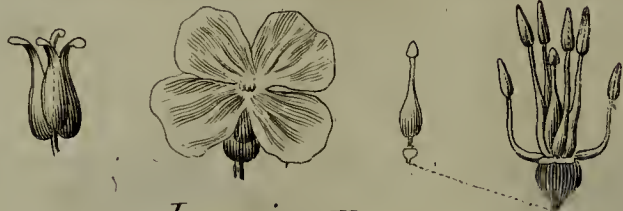
Melianthus, Honey flower.



Class XV. Tetradynamia. Six Stamens, four long, the two opposite short.

Order 1. Siliculosa

Order 2. Siliquosa



Lunaria, Honesty.



Cheiranthus, Stock July flower.

Class XVI. Monadelphica. The Filaments of the Stamens grown together into one Body.

Order 1. Pentandria

Order 2. Decandria



Hermannia



Geranium, African Cranes-bill.

Order 4. Dodecandria

Order 5. Polyandria



Pentapetes, Indian vervain Mallow.



Alcea, Rose-Mallow.

Class XVII. Diadelphica. The Filaments of the Stamens grown together into two Bodies.

Order 2. Hexandria

Order 3. Octandria

Order 4. Decandria



Fumaria, yellow Fumitory.



Polygala, Milkwort.



Lathyrus, everlasting Pea.

Class XVIII. Polyadelphia. The Filaments of the Stamens grown together into 3 or more Bodies.

Order 1. Pentandria

Order 2. Icosandria

Order 3. Polyandria



Theobroma



Citrus, Orange.



Hypericum, S^t John's-wort.

1870

Received of the Hon. Secy of the Interior

for the sum of \$1000

for the purchase of land

in the State of California

for the purpose of

settling the same

for the use of the

Department of the Interior

for the sum of \$1000

for the purchase of land

in the State of California

for the purpose of

settling the same

Linnean System.

ORDERS OF FLOWERS .

*Class XIX. Syngenesia. The Stamens & Anthera's grown together in form of a Cylinder.
(having rarely Filaments.)*

Order 1. *Polygamia Equalis.* Order 2. *Polygamia Superflua.* Order 3. *Polygamia Frustanea.*



Leontodon, Dandelion.



Xeranthemum



Helianthus, Sun-flower.

Order 4. *Polygamia Neccessaria.*



Calendula, Marygold.

Order 5. *Polygamia Segregata.* Order 6. *Monogamia.*



Echinops, Globe Thistle. Lobelia, Cardinal Flower.

Class XX. Gynandria. The Stamens inserted on the Pistil. (not on the Receptacle).

Order 1. *Diandria*



Orchis

Order 2. *Triandria.*



Sisyrinchium, Bermudiana.

Order 4. *Pentandria.*



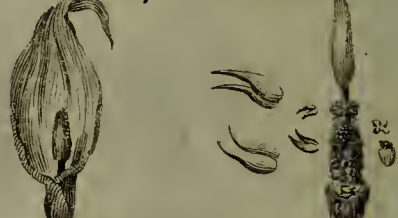
Passiflora, Passion Flower.

Order 5. *Hexandria.*



Aristolochia, Birthwort.

Order 7. *Polyandria.*



Arum, Cuckow Pint.

Class XXI. Monoccia. Male & Female Flowers on the same Plant.

Order 1. *Monandria.*



Zanichellia, Triple-headed Pondweed.

Order 3. *Triandria.*



Tripsacum

Order 4. *Tetrandria.*



Urtica, Roman Nettle.

Order 5. *Pentandria.*



Parthenium

Order 8. *Polyandria.*



Juglans, Walnut.

Order 9. *Monadelphica.*



Pinus, Scotch Fir.

Order 10. *Syngenesia.*



Momordica, Male Balsam Apple.

Order 11. *Gynandria.*



Andrachne, Bastard Orpine.

THE LINNÆAN SYSTEM,

Containing the Various Orders or Classes of Flowers; such are,

I. THOSE that have one stamen on the hermaphrodite flower, as,

The Indian Flowering Reed, or Cane, of which there are three species. 1. Common broad-leaved Flowering Cane. 2. Indian Flowering Cane, with a pale red flower. 3. Indian Cane, with glaucous leaves, and a very large flower — The Virgate Strawberry Blite. 1. Blite with spikes, terminated with little heads, or the common Strawberry Blite, or Strawberry Spinach. 2. Blite with small heads growing scattered from the sides of the stalks.

II. Two stamens in the hermaphrodite flower, as,

Oswego Tea, having headed flowers; the stamina of which are almost in two bodies, and an acute angular stalk — Vernal Grass — Black Pepper.

III. Three stamens in the hermaphrodite flower, as,

The Garden Crocus. 1. That with a spathe of one valve near the root, with a very long tube to the flower, being the cultivated, or true Saffron — 2. The Crocus, with a two leaved spathe, and a short tube to the flower — The wild Oat — and the Molugo (verticillate.)

IV. Four stamens in the flower with the fruit, as,

Lacinated Teasel — Witch Hazel, a genus of plants, of which there is but one species — Pond Weed.

V. Five stamens in the hermaphrodite flower, as,

Rose Bay. 1. Oleander or Nerium, with linear, spear-shaped leaves, three at a joint. 2. Oleander, with spear-shaped, ovated leaves, and divaricated branches. 3. Oleander, with oval, accumulated foot stalks — Common Fennel, a biennial plant — Turnera. 1. With linear, spear-shaped, hairy leaves. 2. With oval, spear-shaped leaves, sawed, and rough — Grass of Parnassus. 1. Common Marsh-grass of Parnassus. 2. Grass of Parnassus, with double flowers — Navelwort. 1. Navelwort with roundish, plane, intire leaves. 2. Navelwort with semiglobular leaves. 3. Navelwort with oval crenated leaves, and a spiked stalk. 4. Navelwort with oblong pointed leaves ending with a spine; and a spiked stalk. 5. Navelwort with hooded leaves sharply indented, and growing alternate, and a branching stalk with erect flowers. 6. Navelwort with cut leaves, and four pointed flowers.

The first and second species are shrubby plants, and natives of the Cape of Good Hope. They flower in the months of July and August, but never ripen seeds in this country.

The third species is a biennial plant, and grows naturally in Crete and Siberia. The fourth is also a native of Siberia.

The fifth species grows upon old walls and other buildings in many parts of England and Portugal, and is seldom cultivated in gardens.

The sixth species is a native of Egypt. It is a shrubby plant, and requires a warm stove to preserve it through the winter in this country; nor should it be exposed abroad in summer, but kept in the stove, or placed in an airy glass case — Mouse-tail.

VI. Six stamens in the hermaphrodite flower, as,

Belladonna — Rice — Great-curved Dock — Petiveria — and Great Water Plantain.

VII. Seven stamens in the same flower, with the pistil, as,

Horse Chesnut — Lizard's Tail.

VIII. Eight stamens in the same flower with the pistil, as,

The Tree Primrose. 1. With oval spear-shaped, plain leaves. 2. With spear-shaped, waved leaves. 3. With spear-shaped leaves, and capsules which have acute angles. The first and third species are natives of Virginia, and the second of Buenos Ayres — Galenia. It grows naturally at the Cape of Good Hope, and in other parts of Africa — Buck-Wheat — Tuberos Moschatel.

IX. Nine Stamens in the hermaphrodite flower, as,

Cassita (Berry-bearing) — Palmated Rhubarb — Flowering Rush.

X. Ten stamens in the hermaphrodite flower, as,

Calmia, narrow leaved — Saxifraga — Greater Stilchwort — Wood Sorrel, of which there are thirteen species, but five of these only are cultivated in gardens; viz. 1. Wood Sorrel, with a foot-stalk supporting one flower, trifoliate leaves, and a bulbous root. 2. Wood Sorrel, with one flower on a foot-stalk, and stalks divided by pairs. 3. Wood Sorrel, with an umbelliferous stalk, and trifoliate leaves, divided into two parts. 4. Wood Sorrel, with a branching, diffused stalk, and umbellated foot-stalks. 5. Wood Sorrel, with a branching, upright stalk, and umbellated foot-stalks.

The first, second, and third species are natives of Africa. The fourth of Italy and Sicily; and the fifth of Virginia — American Nightshade: of which most botanists enumerate a vast number of species, but some writers have reduced them to the twenty-three following. 1. Night-shade, with a shrubby, unarmed stalk, oval, hairy, entire leaves, and compound umbels. 2. Night-shade, with a shrubby, unarmed stalk, oval, entire leaves, and thread-like foot-stalks to the flowers, proceeding from the sides of the branches. 3. Night-shade, with a shrubby, unarmed stalk, spear-shaped leaves, turning inward, and umbels sitting close to the stalks. 4. Night-shade, with a shrubby, unarmed stalk, leaves growing in pairs, one of which is bigger than the other, and cymose flowers. 5. Night-shade, with a shrubby, bended, and unarmed stalk, the upper leaves spear-shaped, and bunches of flowers at the top of the stalk, commonly called Bitter-sweet. 6. Night-shade, with a shrubby, bended, and unarmed stalk, oblong, sinuated leaves. at the sides of the stalk, and bunches of flowers at the top of the stalk. 7. Night-shade, with a shrubby, almost unarmed stalk, and wedge-shaped, sinuated leaves, turning backward. 8. Night-shade, with an herbaceous, unarmed stalk, and entire, winged leaves. 9. Night-shade, with an unarmed, herbaceous stalk, cut, winged leaves, and single bunches of flowers, or Pomum amoris. 10. Night-shade, with an herbaceous, unarmed stalk, cut, winged leaves, bunches of reflexed flowers divided into two parts, and hairy berries. 11. Night-shade, with an herbaceous, unarmed stalk, and heart-shaped leaves, turning inward. 12. Night-shade, with an unarmed, herbaceous stalk, oval, indented, angular leaves, and nodding umbels; or the common Night-shade of the shops, with a black fruit. 13. Night-shade, with an unarmed, herbaceous stalk, oval, hairy, intire leaves, and prickly cups; or the Melongena, Mad-apple, or Egg-plant. 14. Night-

Night-shade, with a prickly, herbaceous stalk, heart-shaped, sinuated leaves, and prickly cups. 15. Night-shade, with a prickly, herbaceous stalk, and heart-shaped leaves with five lobes, hairy, and prickly on both sides, commonly called Batchelor's Pear. 16. Night-shade, with a prickly, herbaceous stalk, winged leaves, sinuated, obtuse segments, and prickly cups. 17. Night-shade, with a prickly, shrubby stalk, angular, woolly, intire leaves, prickly on both sides, and unarmed cups. 18. Night-shade, with a prickly, shrubby stalk, spear-shaped, angular leaves, prickly on both sides, and loose bunches of flowers. 19. Night-shade, with recurved thorns on the stalks, and sinuated leaves, downy on their under-side, prickly on both sides, and the foot-stalks of the flowers prickly. 20. Night-shade, with a prickly, shrubby stalk, leaves turned inside, and prickly cups. 21. Night-shade, with a prickly, shrubby stalk, heart-shaped, hairy leaves, turned in at the brim, and unarmed cups. 22. Night-shade, with a prickly, shrubby stalk, and spear-shaped, angular, indented leaves. 23. Night-shade, with a prickly, shrubby stalk, smooth, obtuse, unarmed leaves, with three lobes.

These plants are natives of Europe, Asia, Africa, and America, but most of them grow naturally in America.

XI. Stamens with twelve, nineteen in the hermaphrodite flower, as,

Afarum, Afarabacca. 1. With kidney-shaped leaves, having two blunt points, or the common Afarabacca. 2. Afarum, with kidney-shaped leaves, ending in a point. 3. Afarum, with blunt, heart-shaped, smooth leaves, with foot stalks. 4. Afarum, with sessile imbricated leaves, and flowers cut into four parts, or the hypocist. These are perennial plants: the first grows in some parts of England, and other countries of Europe. The second is a native of Canada. The third grows naturally in Virginia, Maryland, and Carolina; and the fourth is a native of Spain and Portugal—Agrimonia—Euphorbia (Lathyrus)—Sempervivum, Houseleek: of which are seven species. 1. Houseleek with a smooth, tree-like, branching stalk, or Tree Houseleek. 2. Houseleek with stalks torn by the rudiments of the leaves, and blunt pointed leaves. 3. Houseleek with hairy edged leaves, and spreading off-sets; or the common large Houseleek. 4. Houseleek with hairy edged leaves, and globular off-sets. 5. Houseleek with threads from leaf to leaf, and globular off-sets. 6. Houseleek with entire leaves, and spreading off-sets. 7. Houseleek with leaves, whose borders are indented like a saw, and spreading off-sets.

The first species grows at the Cape of Good Hope, and in Portugal. The second is a native of the Canary Islands. The third is found growing on the tops of houses and walls in England. The fourth is a native of the northern parts of Europe. The fifth grows upon the Alps and Helvetian mountains. The sixth upon the latter: and the seventh is a native of the Cape of Good Hope.

XII. The stamens inserted in the inside of the calyx; and commonly twenty, or more, as,

Pumica, the Pomegranate. There is only one species of this genus with the following varieties. The wild, with single and double flowers. The small flowering with ditto. The Pomegranate with striped flowers; and the Sweet Pomegranate. The Tree is a native of Italy, Spain, and Africa—The Bean-tree — Quicken-tree — Codlin-apple — The Bramble.

XIII. The stamens from twenty to a hundred in the same pistil with the flower, as,

Sarracenia—The Piony—Wolfs-bane—Columbine. 1. With crooked nectaria, called Double Starry. 2. With straight nectaria, shorter than the petals, which are sharp-speared. 3. With straight nectaria, and stamina longer than the flower petals. The first species grows naturally in most countries of Europe. The second is a native of Switzerland, and the third of Virginia and Canada.—Water Aloe, of which there are fourteen species. 1. Aloe, with nodding flowers, growing upon foot-stalks, in form of a cylindrical corymbus, or the common Aloe. 2. Aloe, with nodding, branching, prismatic flowers, growing upon foot-stalks, and spreading equally at the brim, commonly called Partridge-breast Aloe. 3. Aloe, with flowers growing upon foot-stalks, and the foot-stalks oval, cylindrical, and crooked. 4. Aloe, with sessile, horizontal, funnel-shaped, equal flowers, turned back at the brim. 5. Aloe, with sessile, oval, crenated flowers, and the interior segments connivent. 6. Aloe, with sessile, triquetrous, two-lipped flowers, and the upper lip turned back, commonly called Cushion Aloe. 7. Aloe, with sessile, funnel-shaped, two lipped flowers, cut into five revolute segments, erect at the top. 8. Aloe, with sessile, two lipped flowers, the upper lip erect, and the under one spreading, commonly called Large Pearl-Aloe. 9. Aloe, with sessile, reflexed, imbricated, prismatic flowers. 10. The common Barbadoes Aloe. 11. The Socotrine Aloe. 12. The Cobweb Aloe. 13. The Guinea Aloe. 14. The Ceylon Aloe.

Of these species there are a vast variety, particularly of the first sort: they are all perennial plants, and natives of Africa, and the Indies—Crowfoot. In the garden's four kinds of the Ranunculus are particularly attended to, namely, the Double White—Proliferous Mountain—Golden Proliferous—and Oriental Meadow.

XIV. Four stamens; two of which are close together, and longer, as,
Melittis—Honey Flower.

XV. Six stamens, four long, the two opposite short, as,
Honesty—and the Stock July Flower.

XVI. The filaments of the stamens grown together into one body, as,

Hermannia—African Cranes-bill. Of this genus Linnæus distinguishes thirty-nine species; and Tournefort seventy-eight, too great a number to be inserted in this work.—Indian Vervain Mallow. 1. With angulated leaves. 2. With sinuated, hairy, many pointed leaves. 3. With spear-shaped, heart-shaped, undivided, sawed leaves, and a trailing stalk—Rose Mallow, a species of the Hollyhock. 1. With angular sinuated leaves. 2. With palmated leaves.

XVII. The filaments of the stamens grown together into two bodies, as,

Yellow Fumatory, of which there are eleven species. 1. Fumatory, with a naked stalk; or the Cucullaria. 2. Fumatory, with bilobated flowers behind, and a leafy stalk. 3. Fumatory, with a simple stalk, and bractæ as long as the flowers. 4. Fumatory, with narrow pods, growing in panicles, and an erect stalk, called Bastard Fumatory. 5. Fumatory, with narrow, four-cornered pods, and diffused stalks, with acute angles; or the Capnoides. 6. Fumatory, with three trifoliate leaves, and the small leaves heart-shaped. 7. Fumatory, with the seed-vessels growing in a racemus, containing a single seed, and a diffused stalk; or the common Fumatory. 8. Fumatory, with seed-vessels growing

growing in a spike, containing one seed, an upright stalk, and filiform, or thread-like leaves. 9. Fumatory, with seed-vessels growing in a racemus, containing a single seed, and climbing leaves, with short tendrils. 10. Fumatory, with narrow pods, and leaves with clasps. 11. Fumatory, with globular, inflated pods.

The first three species are perennial plants: the first grows naturally in North America, the second in Siberia, and the third in shady and woody places throughout Europe.

The other species of this genus are annual plants. The fourth sort grows naturally in North America, and is a proper plant to grow on the sides of grottos, or rock-work, where by its continuing green all the year, and its long continuance in flower, it has a good effect.

The fifth sort is a native of France, Italy, and Mauritania, and the sixth grows naturally in rocky places in Spain and Sicily; these plants are also proper for the joints of grottos, or any rock-work.

The seventh species is a native of Europe, and particularly of this country; the eighth sort is a native of France, Spain, and Italy.

The ninth species is a native of France and England; and the tenth is also a native of rocky places in England. The eleventh sort grows naturally at the Cape of Good Hope—Milkwort. Linnæus distinguishes no less than twenty-two species of this plant, but the three following only are to be met with in our English gardens. 1. Milkwort, with crested flowers, a moon-shaped keel, and a shrubby stalk, having oblong leaves, which end in obtuse petals. 2. With flowers growing thinly, and without beards; the point of the keel roundish, a shrubby stalk, and spear-shaped leaves. 3. With spiked flowers, without beards, an erect, single, herbaceous stalk, and broad spear-shaped leaves—Everlasting-pea.

XVIII. The filaments of the stamens grown together, into three or more bodies, as,

Theobroma—Orange. 1. The common Seville. 2. The China. 3. The Willow leaved, or Turkey. 4. The Pampelmoes, or Shaddock. 5. The Dwarf or Nutmeg.—St. John's-wort.

XIX. The stamens, and anthera's grown together in form of a cylinder. These have rarely filaments, as,

Dandelion — Xeranthemum — Sun-Flower, of which there are ten species. 1. Sun-flower, with all the leaves heart-shaped, veins uniting behind at the base, but towards the border naked; commonly called Annual Sun-flower. 2. Sun-flower, with the under leaves heart-shaped, veins uniting behind at their base, and the upper leaves oval; commonly called Perennial Sun-flower. 3. Sun-flower, with oval, heart-shaped leaves, with the nerves uniting in the leaf; commonly called Jerusalem Artichoke. 4. Sun-flower, with a stalk smooth on the under-side, heart-spear-shaped leaves, and ten petals in the rays. 5. Sun-flower, with a spindle-shaped root. 6. Sun-flower, with rough, spear-shaped leaves, and a slender stalk, smooth towards the bottom. 7. Sun-flower, with smooth, spear-shaped, sawed leaves. 8. Sun-flower, with narrow leaves. 9. Sun-flower, with oblong, opposite, oval, sessile leaves, three veins, and a dichotomous panicle. 10. Sun-flower, with oval, rough, crenated leaves, with three nerves, the scales of the cup erect, and as long as the disk of the flower.

All these species are natives of different parts of America. The second sort is most proper for large borders in great gardens: it begins flowering in July, and continues till October—The Marigold, of which there are seven species. 1. Marigold

with narrow, spear-shaped leaves, and prickly seeds, or the least Marigold. 2. Marigold, with boat-shaped, prickly seeds in the border, and those in the center bicorned. 3. Marigold, with spear-shaped, indented leaves, and slender foot-stalks. 4. Marigold, with sinuated, indented, spear-shaped leaves, and a naked stalk. 5. Marigold, with indented, spear-shaped leaves, and the upper part of the foot-stalk swelling. 6. Marigold, with narrow, entire leaves, and a naked stalk. 7. Marigold, with obverse, oval leaves, which are indented, and a perennial shrubby stalk.—Globe Thistle. 1. The Greater. 2. The Smaller. 3. With a large head. 4. With a small blue head.

The first species is a native of Italy and Spain; the second of France and Italy; the third of Spain; and the fourth of Greece—Cardinal Flower, a genus of plants, of which there are ten species. 1. Cardinal-Flower, with an erect stalk, spear-shaped, sawed leaves, and a spike of flowers, terminating the stalk, commonly called Scarlet Cardinal-Flower. 2. Cardinal-Flower, with an erect stalk, linear, spear-shaped, entire, acute-pointed leaves, and a spike of flowers terminating the stalk. 3. Cardinal-Flower, with an erect stalk, oval, spear-shaped, crenated leaves, and the sinuses of the implements reflexed, commonly called the Blue Cardinal-Flower. 4. Cardinal-Flower, with an erect stalk, heart-shaped leaves, which are somewhat indented, having foot-stalks, and the longest spike of flowers, which are placed thinly. 5. Cardinal-Flower, with an erect stalk, the lower leaves roundish and crenated; the upper spear-shaped, sawed, and a spike of flowers terminating the stalk. 6. Cardinal-Flower, with an erect stalk, oval leaves, which are somewhat sawed, longer than the foot-stalk, and swelling seed-vessels. 7. Cardinal-Flower, with oval, crenated leaves, which are downy, and flowers growing singly from the sides of the stalk. 8. Cardinal-Flower, with spear-shaped, indented leaves, very short foot-stalks to the flowers, which proceed from the sides of the stalks, and a very long tube to the petal. 9. Cardinal-Flower, with a spreading, branching stalk, spear-shaped leaves, which are somewhat indented, and very long foot-stalks to the flowers. 10. Cardinal-Flower, with trailing stalks, spear-shaped, sawed leaves, and foot-stalks proceeding from their sides.

The varieties are natives, or grow naturally in North America, at Campeachy, Virginia, Jamaica, Blois in France, and at the Cape of Good Hope. The third sort has a perennial fibrous root; the fourth is an annual; the sixth and seventh are biennial plants.

XX. The stamens inserted on the pistil; but not on the receptacle, such as,

Orchis — Sifyrinchium, Bermudiana — Passion-Flower. Of this genus of plants are no less than twenty four species mentioned by Linnæus; a particular description of all which would be needless, as they bear a great resemblance to each other; one, the most beautiful is the Laurel-leaved Passion-Flower, a native of South America.—Birthwort—and Cuckow Pint.

XXI. Male and female flowers on the same plant, such as,

Triple-headed Pond Weed—Tripsicum — Roman Nettle—Parthenium—Walnut—Scotch Fir—Malé Balsam Apple—Bastard Orpine, a native of France.

XXII. The male flowers on a different plant from the female, as,

The Hop — White Miffelto — Crow-berries — Brown Willow—Dogs Mercury—Black Poplar—Bryony

Bryony — Cliffortia — Moon-seed — Kiggelaria — Pulchella — Butcher's Broom — Juniper.

XXIII. Hermaphrodite, or male and female flowers on the same plant, such as,
The Common Fig — Flowering Ash — White Hellebore.

XXIV. Flowers within the fruit, or imperceptible to the eye, as,

Polypodium — Bryum (matted) Fucus — Agaric (field.)

Such is the Linnæan System of the different genera, and orders of flowers; to which we have added two plates, and half a one, under the title of leaves, wherein are distinguished by Linnæus, the cups and other parts of flowers, (as sexes, &c.) ranged under their different orders, as, Monogynia, Digynia, Monandria, Diandria, &c. &c. We proceed now to

TOURNEFORT'S SYSTEM of FLOWERS.

IN this the genera, or different kinds of plants are included in twenty-two classes; to which is prefixed general and classical characters of flowers. It is unnecessary to enter upon the particular plants, trees, shrubs, flowers, &c. enumerated under each class in this system, since most of them have been described either in the former one or in the Natural History of Vegetables, page 296; and to find the latter, the reader has only to consult the Index under the head of Botany. To these we have added a Plate of the Abutilon, with leaves resembling those of a red gooseberry-tree; having a flesh-coloured flower, and fruit of a pentagonal, or five cornered shape, and rough tasted; and the Hairy Abutilon of the shrub kind, with a roundish leaf; a large and spreading flower of a pale colour, and a single cup and calix. We have likewise given another plate of various objects in Natural History, as Feathers, Death Watch, Fibres, Plants, Water Spout, Seed, &c.

L E A V E S.

BOTANISTS consider the leaves with regard to their structure, surface, shape, consistence, edges, situation, and size: with regard to their structure, they are either single, as those of the apple, pear, and plumb-tree, or compound, as those of the strawberry, parsley, &c. a single leaf is one which is either immediately joined to the branch or connected with it by a foot-stalk; a leaf is said to be compound, when there are more than one upon a petiole or foot-stalk: with respect to their surface, they are either flat, as the origany, or in bunches, as the houseleek: with regard to their shape, they are either lanceolated, cordated, acuminate, hastated, &c. and are either thin and fine, as those of the hypericum; or thick and gross, as those of purslane; or fleshy, as those of several kinds of aloes; or woolly, as those of marsh-mallows: with regard to their edges, leaves are cut slightly, as in some species of geums, or deep, as in some of the centaury: with respect to their situation, they are either ranged alternately, as the alaternus; or opposite to each other, as the phillyrea, mint, baum, &c. with regard to their size, they are either very large, as those of the musa; or moderate, as those of the fig and vine; or small, as those of the elm or apple tree; or very small, as those of the heath, phylica, &c. See the Plate of Leaves.

Many sorts of plants, whose roots issue forth from the small end of the seed, put out two small leaves that are very unlike those which the plant

afterwards produceth; for as soon as the root has taken hold of the ground, between these false leaves (commonly called the seed-leaves) there comes forth a shoot which produces leaves like those of the mother plant; of this manner of growth there is an infinite number of plants.

Dr. Grew observes, that the fibres of leaves consist of two general kinds of vessels, viz. for sap and for air: and are ramified out of greater into less, as veins and arteries are in animals.

Mr. Frederick of Augsbourg, a celebrated gardener, took from the tree a leaf of the opuntia or Indian fig-tree; and setting it in the earth, it immediately took root, and produced blossoms and fruit.

The distinction of leaves, made by those who have written on botany, are the following:

A simple leaf is that which is not divided to the middle.

A compound leaf is divided into several parts, each resembling a simple leaf, as in liquorice, &c.

A digitated leaf is a compound leaf, divided into several parts, all of which meet together at the tail, as in the hemp, black hellebore, &c.

A trifoliated leaf is a digitated leaf, consisting of three fingers, as the trefoil; &c.

A quinquefoliated leaf is a digitated leaf, consisting of five fingers, as in the quinquefolium.

A pennated leaf is a compound leaf divided into several parts, each of which is called a lobe, placed along the middle rib, either alternately, or by pairs. When the middle rib is terminated by an odd lobe, it is said to be unequally pennated, as in the goats rue, &c. and equally pennated, when it is not terminated by an odd lobe, as in the cassia; when the lobes are all nearly of the same form and bigness, it is called an uniform pennated leaf, as in the liquorice; when they are not so, it is said to be difform, as in the agrimonia.

A winged leaf is, as it were, divided into several pennated leaves, as in the orobus, &c.

A ramose leaf is that which is still farther divided than the winged leaf, as in the osmund royal, female fern, &c.

An entire leaf or lobe is that which has no division on its edges, as in the apple-tree, &c.

A sinuated leaf is that which is cut about the edges into several long segments, as in common mallows.

A serrated leaf is that which is cut about the edges into several acute segments, resembling the teeth of a saw, as in the nettle, &c.

A crenated leaf is that which is cut about the edges into several obtuse segments, as in the betony, &c.

A lacinated or jagged leaf is that which is cut about the edges into several pretty deep portions, in an irregular manner, as in the horned poppy, &c.

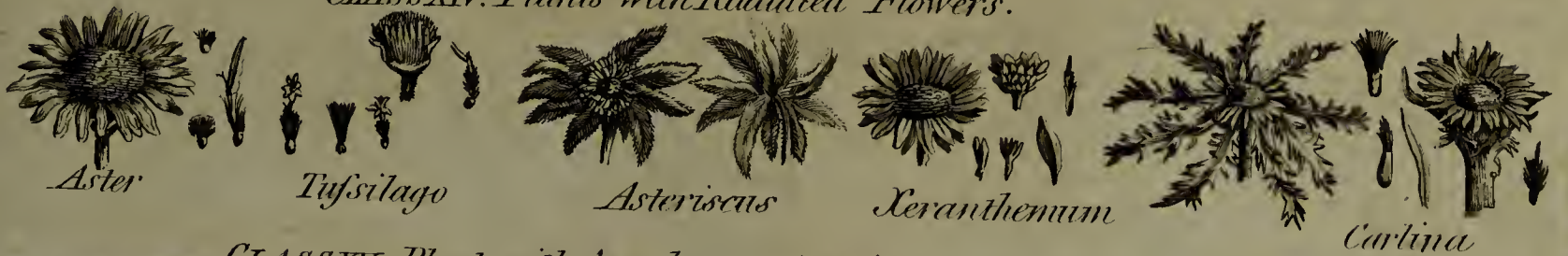
If the surface of the leaves are altered, by reversing the branches of the trees on which they grow, the plants are stopped in their growth, until the foot-stalks are turned, and the leaves recover their former position. This shews how necessary it is to support all those weak shoots of plants, which are naturally disposed for upright growth, which either twine about the neighbouring trees for support, or that put out clasps, by which they take hold of whatever trees or plants grow near them, and are thereby supported; and, on the contrary, how absurd is that practice of tying up the shoots of those plants which are naturally disposed to trail upon the ground, for in both these cases nature is reversed, and consequently the growth of both sorts of plants is greatly retarded.

This is one of the great functions for which the leaves of trees and plants are designed; but, besides this,

BOTANY.

Tournefort's System Genera of Plants.

CLASS XIV. Plants with Radiated Flowers.



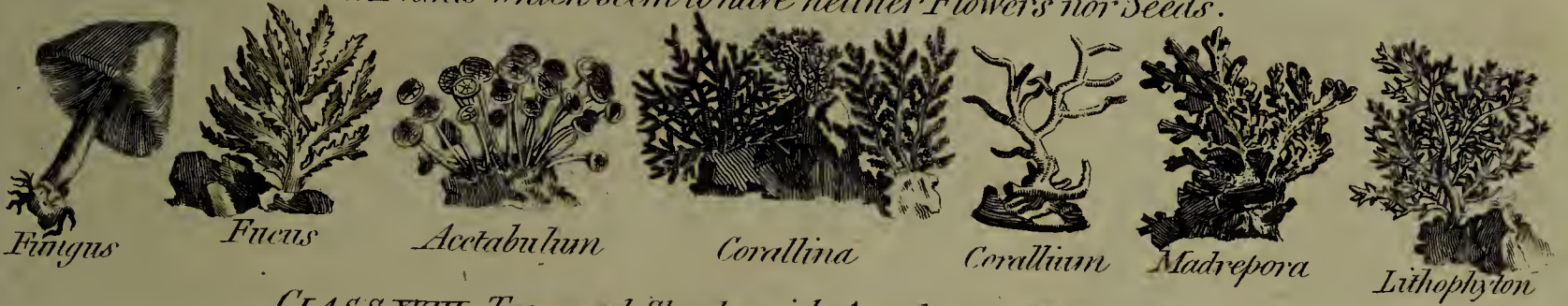
CLASS XV. Plants with Apetalous or Staminate Flowers.



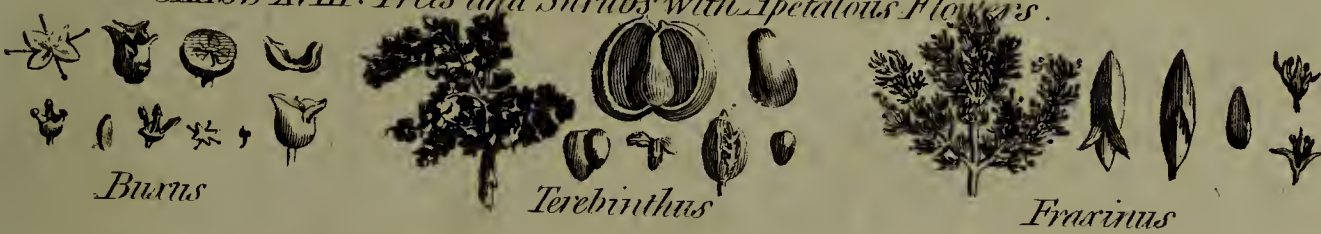
CLASS XVI. Plants which have Seeds but seem to have no Flowers.



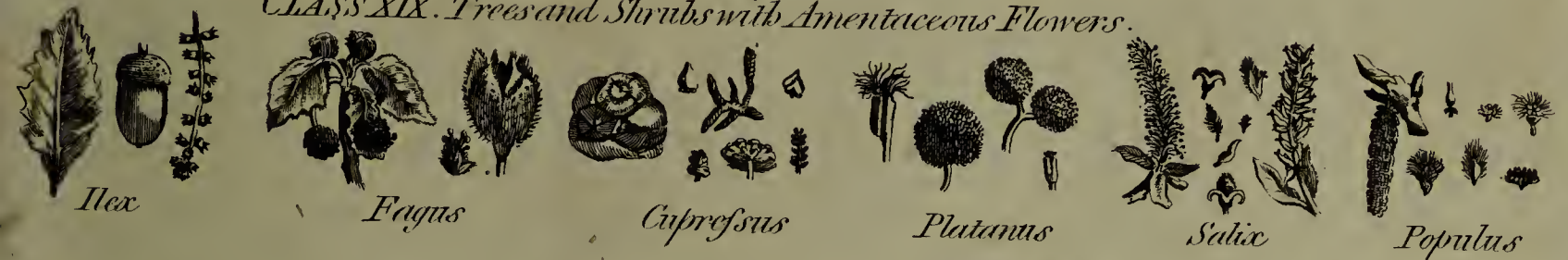
CLASS XVII. Plants which seem to have neither Flowers nor Seeds.



CLASS XVIII. Trees and Shrubs with Apetalous Flowers.



CLASS XIX. Trees and Shrubs with Amentaceous Flowers.



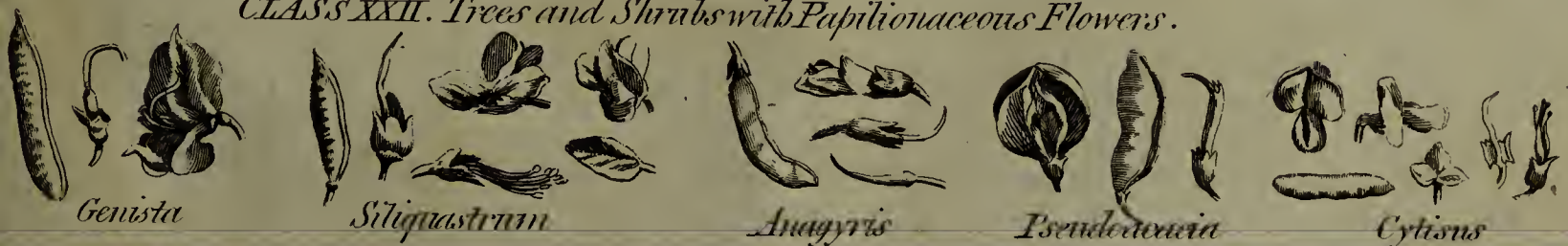
CLASS XX. Trees and Shrubs with Monopetalous Flowers.



CLASS XXI. Trees and Shrubs with Rosaceous Flowers.



CLASS XXII. Trees and Shrubs with Papilionaceous Flowers.



THE HISTORY OF THE

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LEAVES

Duplicatopinnated



Triplicato ternate



Triplicato pinnated without an odd leaf.



Triplicato pinnated with an odd Leaf.



Revolvute



Reclinate

Horizontal

Patent

Erect

Inflex

Floral



Vaginant

Fasciculated

Imbricated

Alternate

Opposite

Quaternate

Stellate

Articulated

Amplexicaute

Decurrent

Sessile

Petiololed

Frondis pinnatus



Frondis articulatus



PARTS of CUPS FLOWERS and FRUITS .



*Involu-
crum*



Spathæ



Spathæ



Gluma



Bractea



Amenta



Nectaria



Pericarpium



Legumen



Strobilium



Tubus

Unguis



Paulum



Limbus



Pappus and Coronated Seeds.



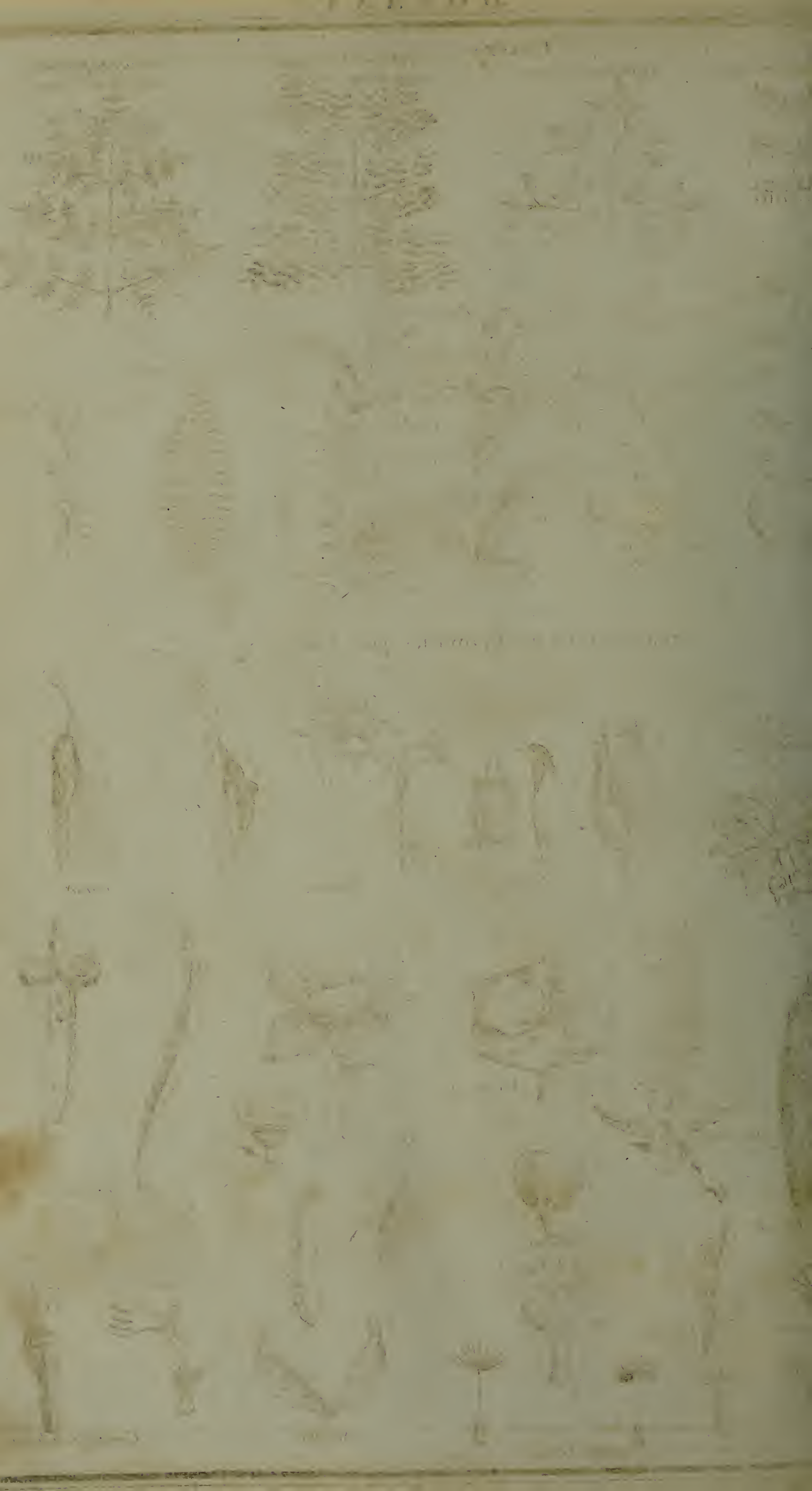
Siliqua

Corollula ligulata



Corollula tubulata







ABUTILON,

*with leaves resembling those of a red goose-
berry-tree, a flesh colour'd flower, & fruit of a
pentagonal or five corner'd shape, & rough tasted.*

*The Hairy ABUTILON of the Shrub kind,
with a roundish leaf, a large and spread-
ing flower of a pale yellow colour, and
a single Cup or Calix.*

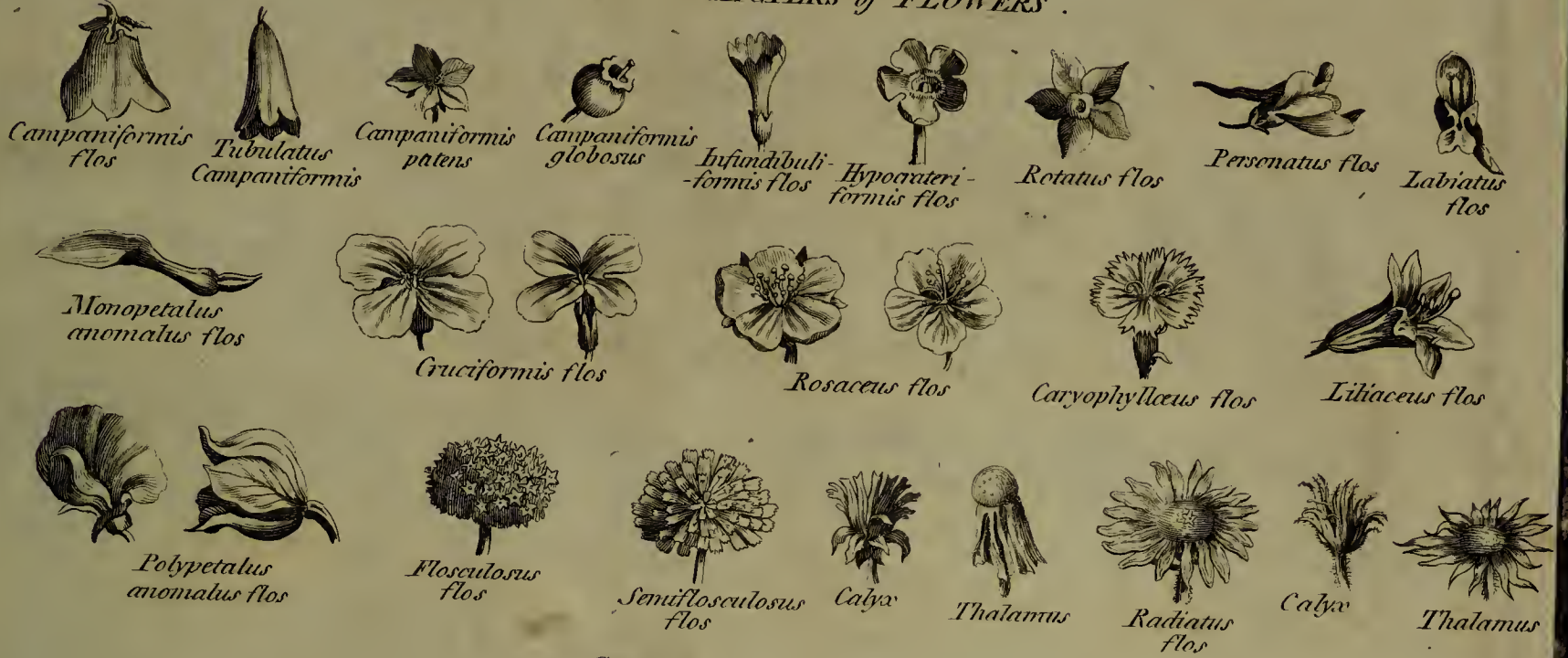
BOTANY.

Tournfort's System.

GENERAL CHARACTERS of FLOWERS.

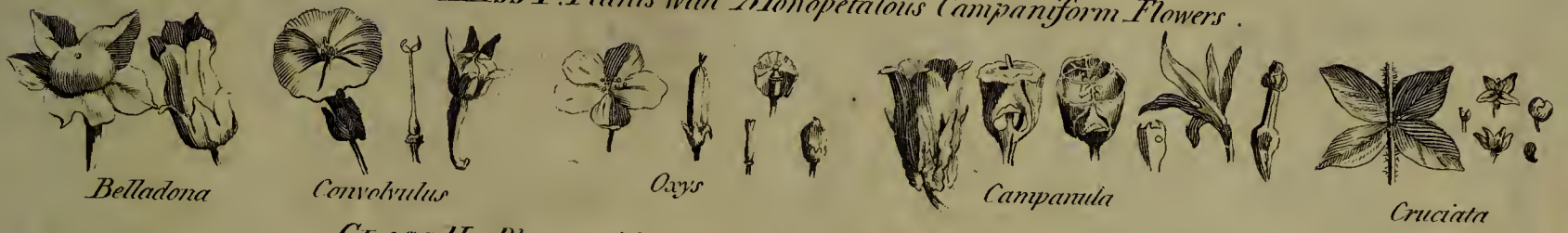


CLASSICAL CHARACTERS of FLOWERS.



GENERA of PLANTS.

CLASS I. Plants with Monopetalous Campaniform Flowers.



CLASS II. Plants with Monopetalous Infundibuliform & Rotated Flowers.



CLASS III. Plants with Monopetalous Anomalous Flowers.

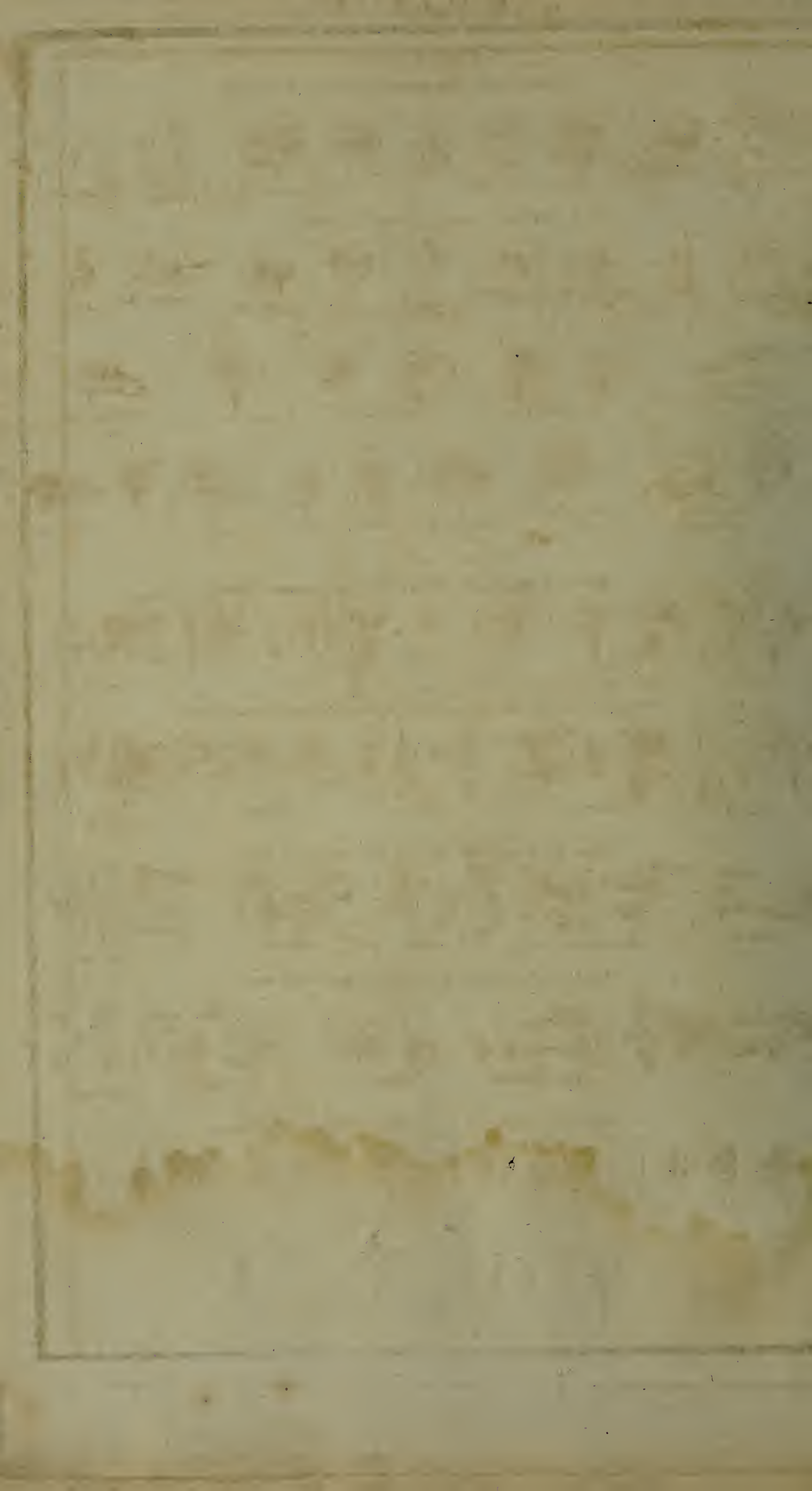


CLASS IV. Plants with Monopetalous Labiated Flowers.



CLASS V. Plants with Cruciform Polypetalous Flowers.





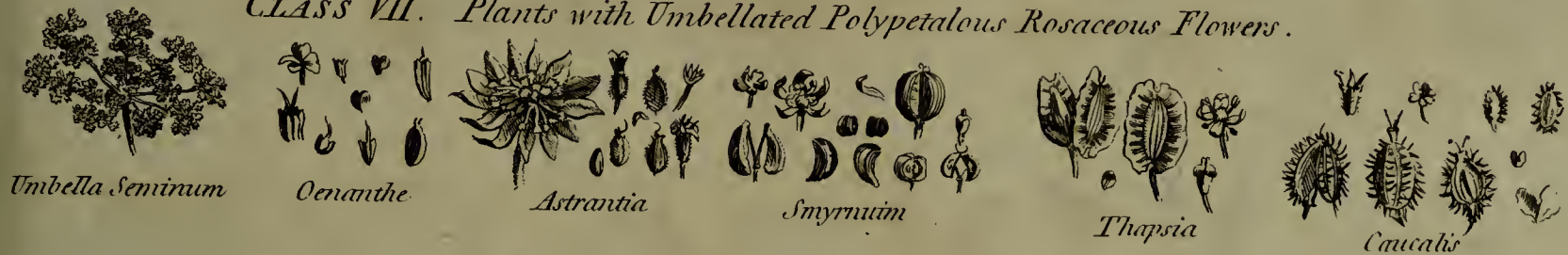
BOTANY.

Tournefort's System
GENERA of PLANTS.

CLASS VI. Plants with Rosaceous Flowers.



CLASS VII. Plants with Umbellated Polypetalous Rosaceous Flowers.



CLASS VIII. Plants with Polypetalous Caryophylleous Flowers.



CLASS IX. Plants with Liliaceous Flowers.



CLASS X. Plants with Polypetalous Papilionaceous Flowers.



CLASS XI. Plants with Polypetalous Anomalous Flowers.



CLASS XII. Plants with Flosculous Flowers.



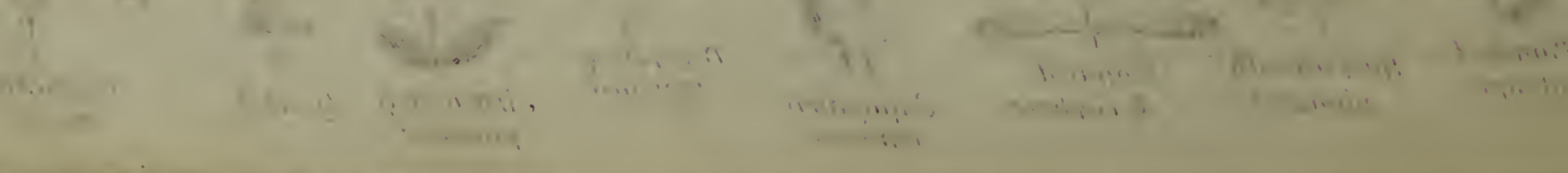
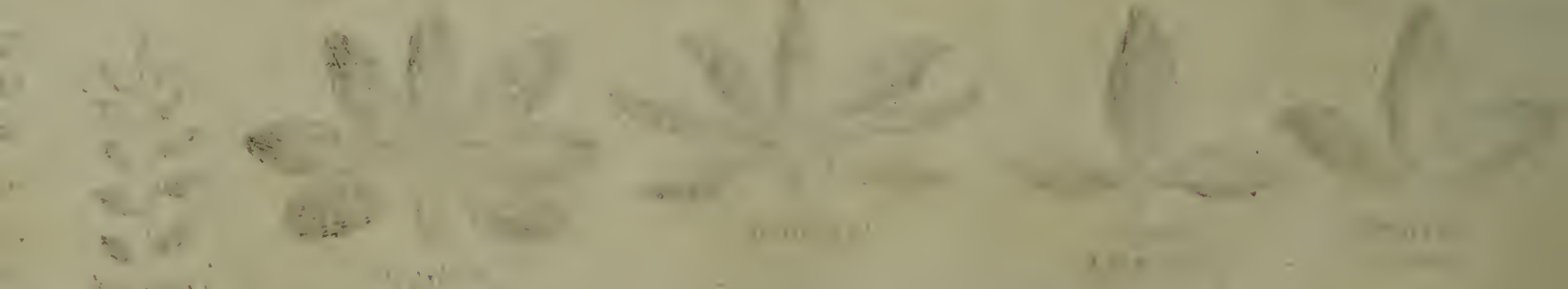
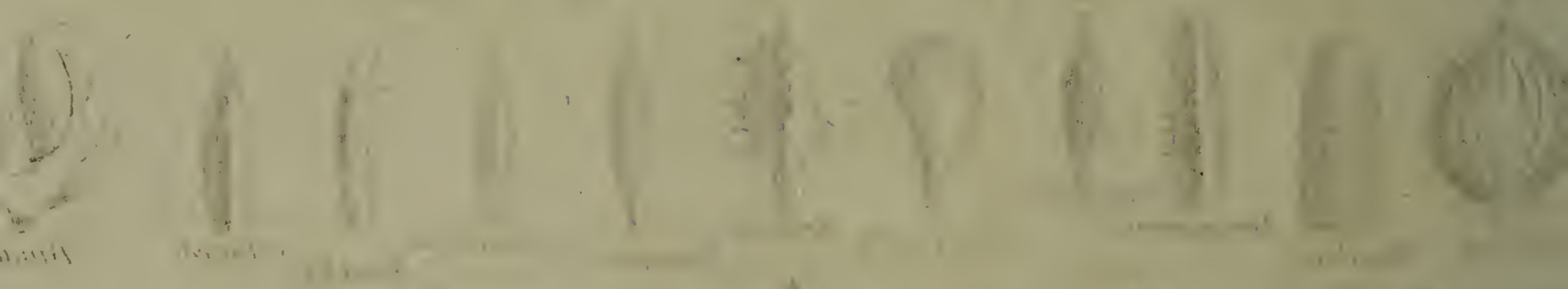
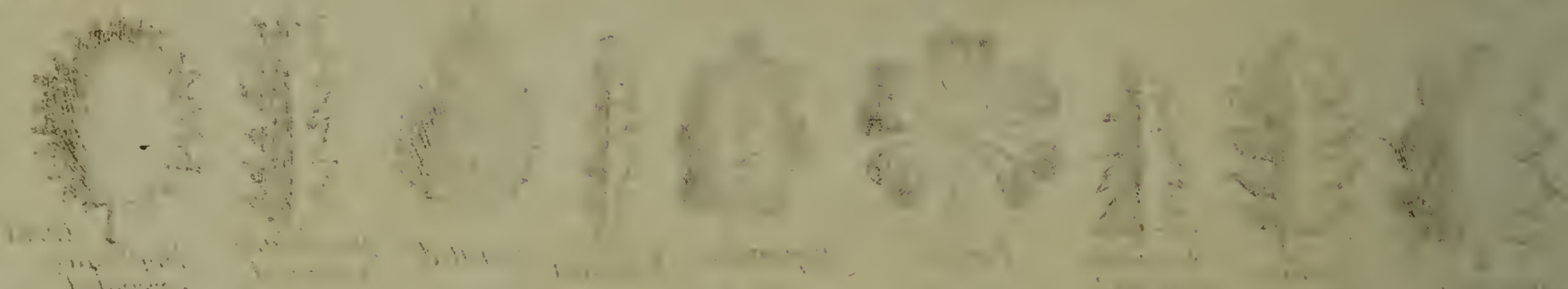
CLASS XIII. Plants with Semiflosculous Flowers.



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L E A V E S .







MICROSCOPICAL OBJECTS

Class I. Animal Subjects.

Circulation of the BLOOD

In the Membrane
of a Frog's Foot.

In the Tail of a
small Fish



CONNAUGHT WORM



FLEA



LOUSE



ITCH ANIMAL



MITE



FLYING CICINDELA



SEA SCOLOPENDRA



Bristle of a Mite



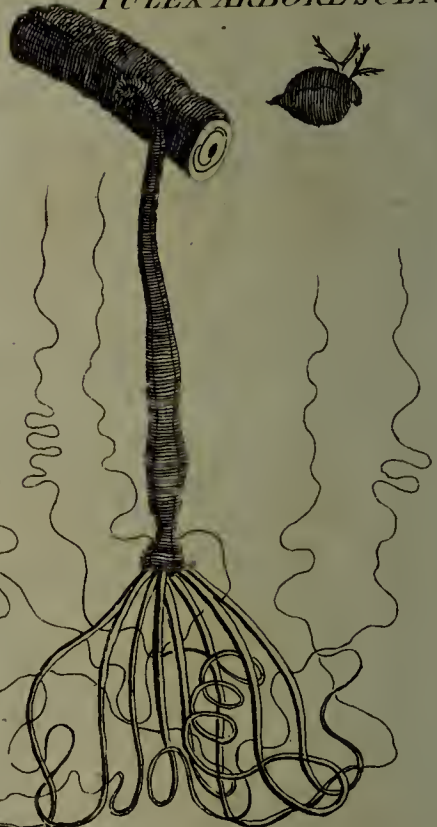
BELL POLYPE



P O L Y P E



PULEX ARBORESCENS



Wheel Animals



Crufted Water Animalcules



Tail of D?



Darts of the Gnat

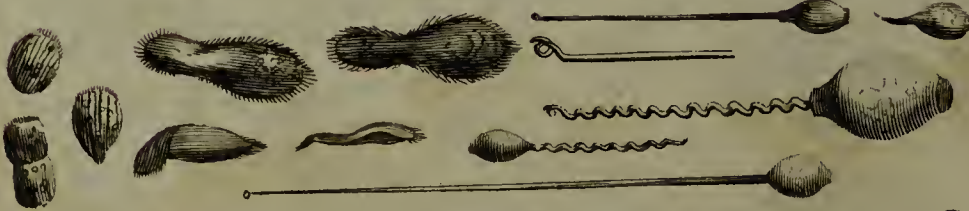


P R O B O S C I S
of the Dog Tick of the little Black Tick



A N I M A L C U L E S

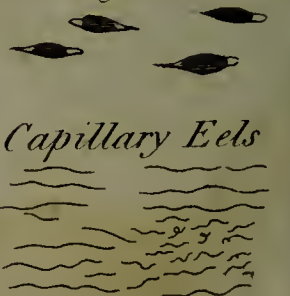
In Pepper-Water



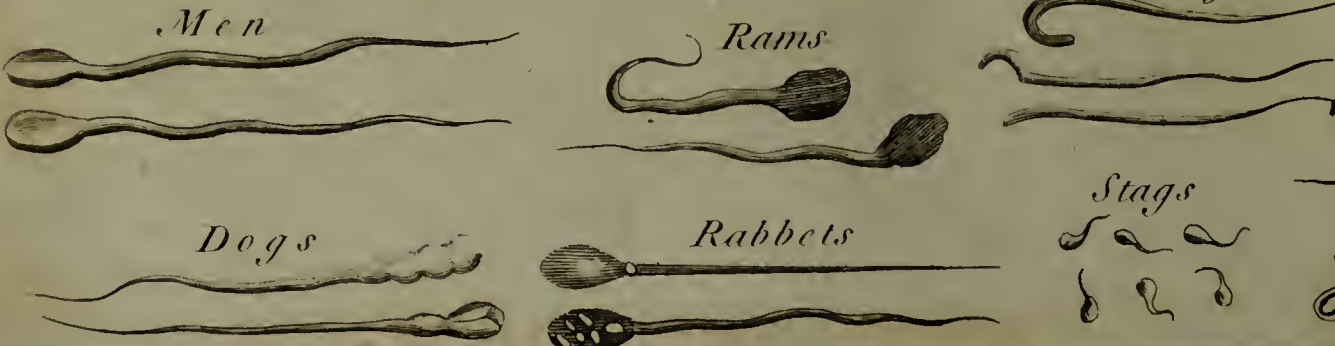
In Hay Water



In Dunghill Water



In Male Seed Frogs



Men

Rams

Dogs

Rabbits

Stags

Cocks

Capillary Eels

CRYSTALLIZATIONS

From the Fixed Salt of Carduus Benedictus



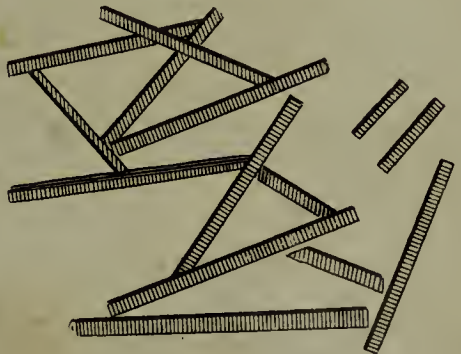
From Salt of Wormwood



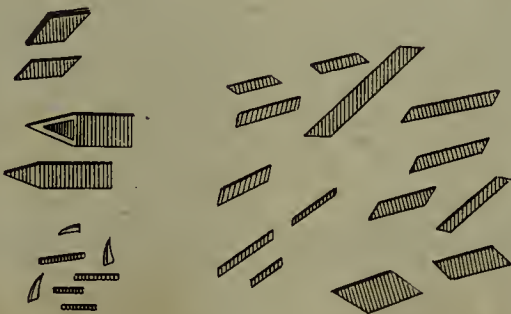
From Allum



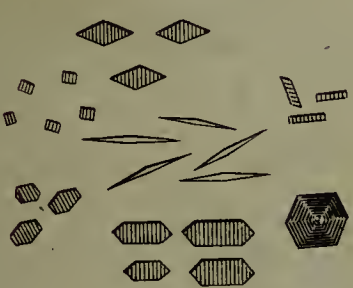
From Nitre



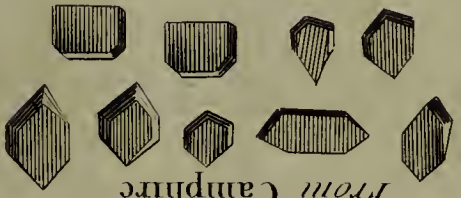
From Blue Vitriol per deliquium



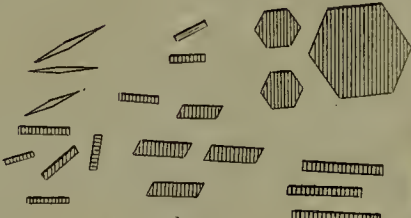
From Potashes



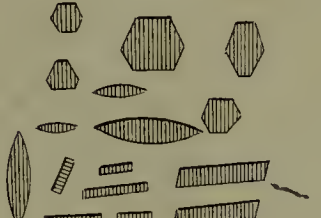
From Camphire



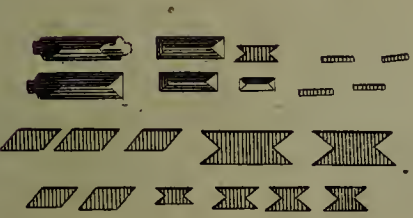
From the Alhes of Foundries of Metals



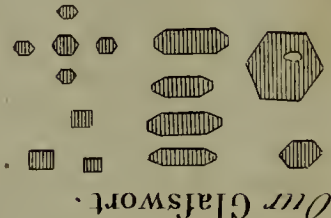
From the Alhes of Lead Furnaces



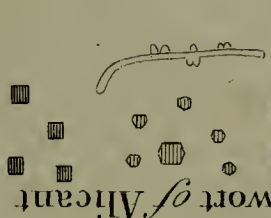
From the Soot of Lead Furnaces



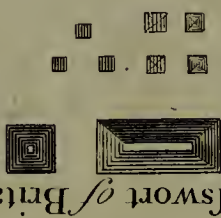
From the Salt of Our Glaswort.



From the Salt of Glaswort of Alicant



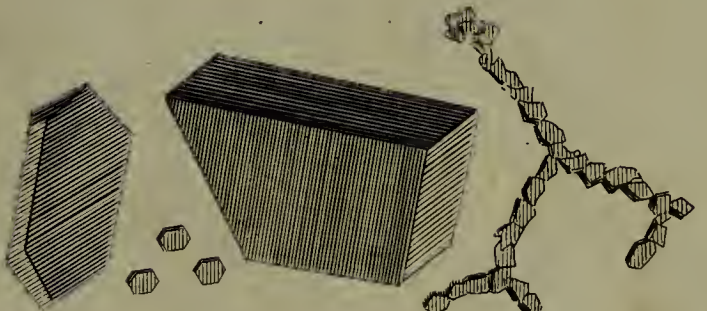
From the Salt of Glaswort of Britany



From Quicklime



From Quicklime made of Shells



From Sal Ammoniac



Constituent SALTS of Plants Marine Nitrous Alkaline Acid



MARINE SALTS of PLANTS

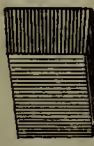
Rosemary



Garden Scuygrats



Fern



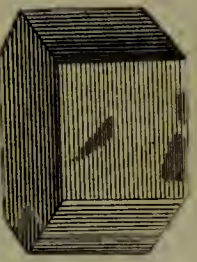
Blackhorn



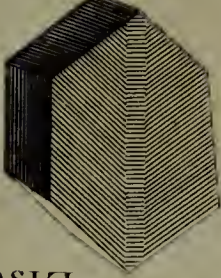
Wormwood



Essential SALTS of PLANTS



From Common Sugar



Rosemary



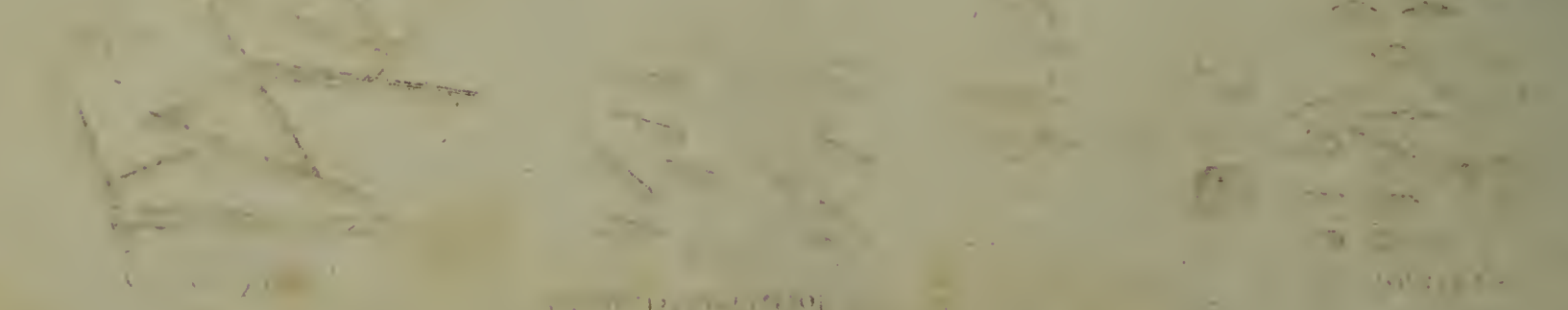
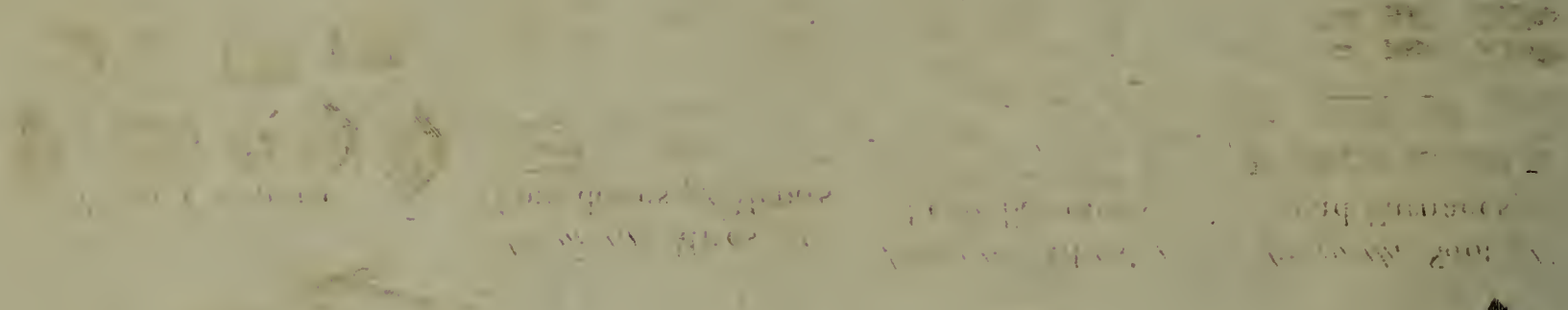
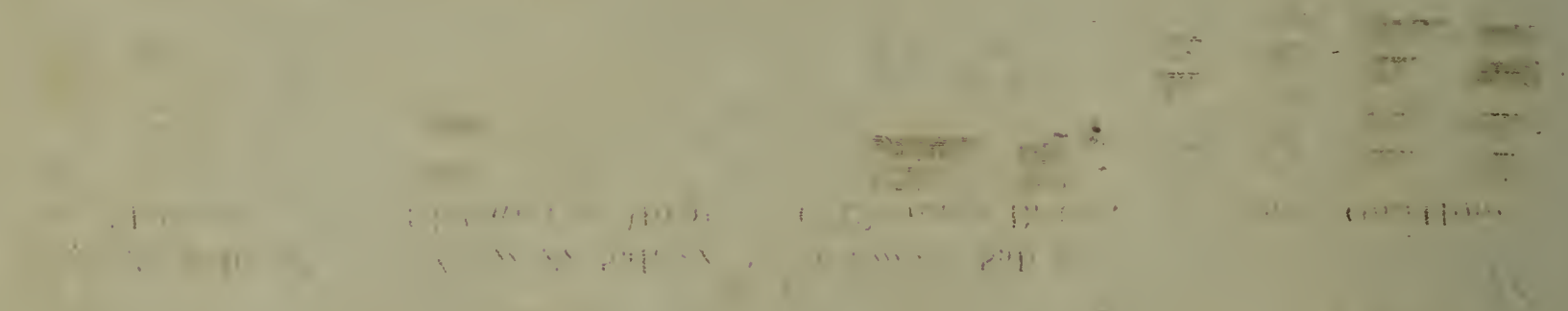
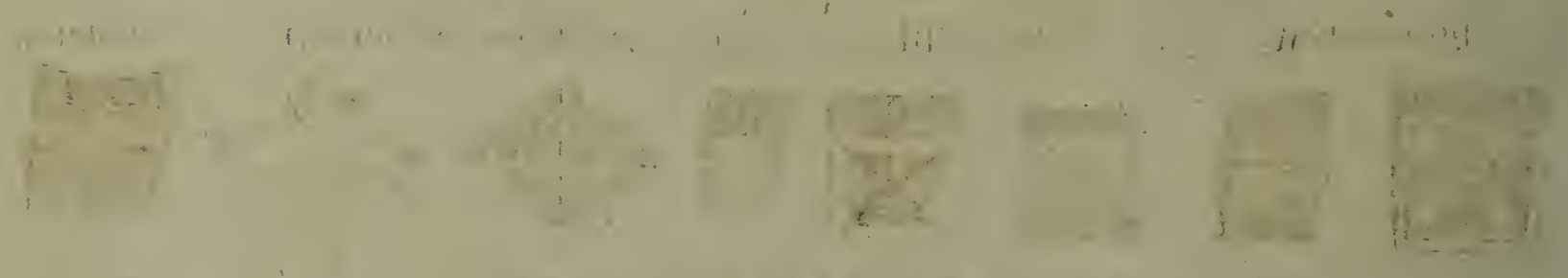
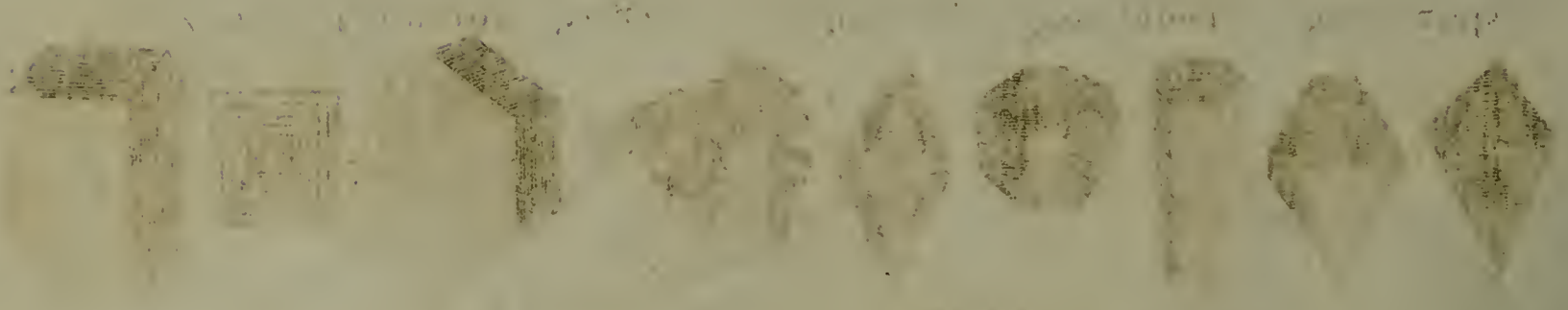
Wormwood



Scuygrats

From SILVER dissolved in Aqua-fortis





Faint text at the bottom of the page, possibly a title or a list of items, which is mostly illegible due to fading.

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FARINÆ of PLANTS



SEEDS of PLANTS



SECTIONS of ROOTS of PLANTS

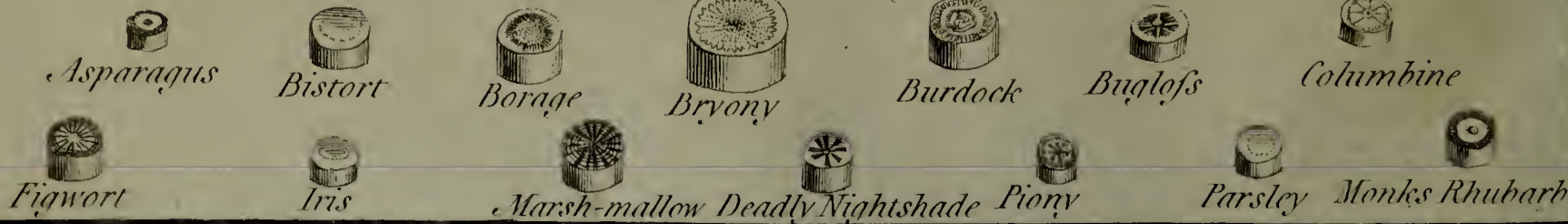


PLATE I

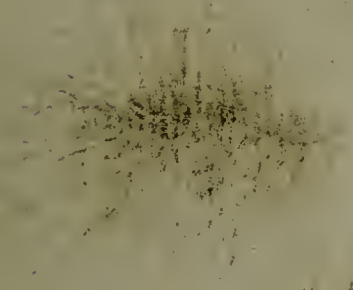
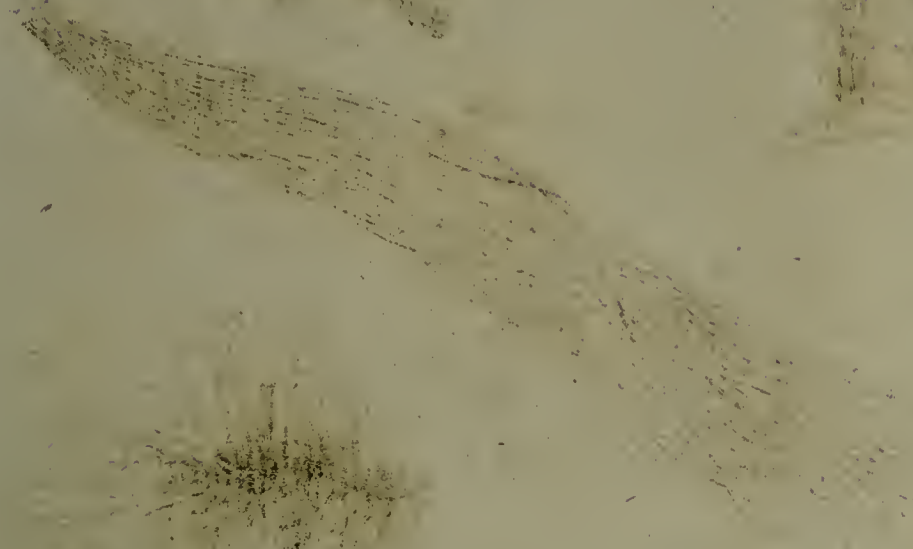
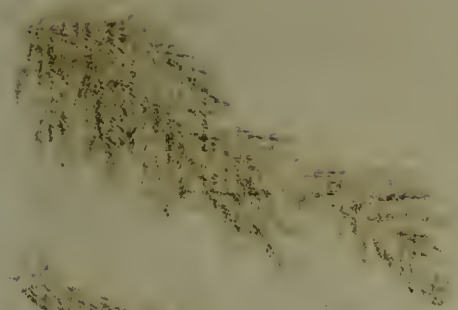


PLATE I

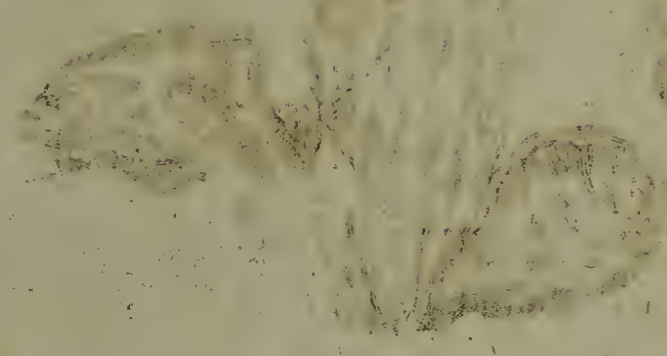
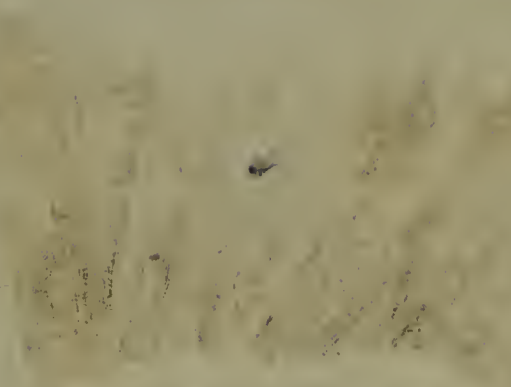


PLATE I



PLATE I

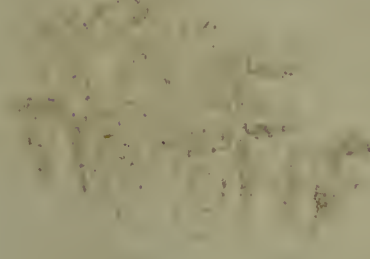


PLATE I



PLATE I

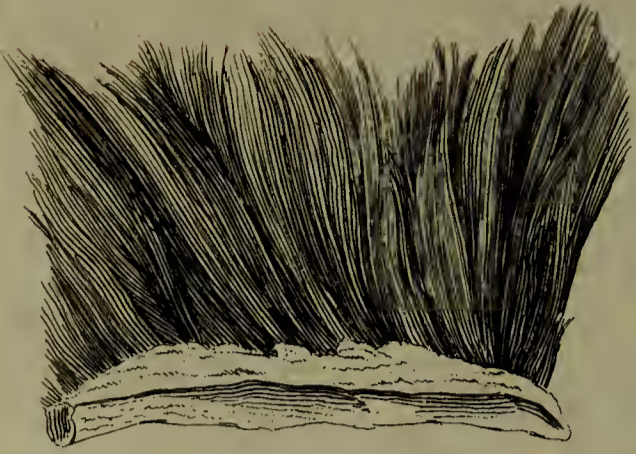


PLATE I



BOTANY

Genera of MOSSES.



BYSSI



CONFERVÆ



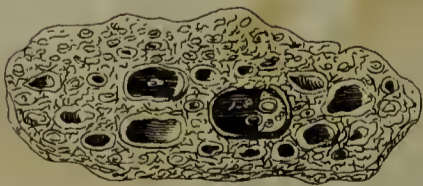
TREMELLÆ



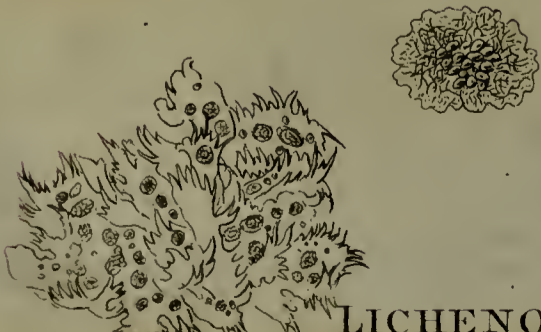
USNEÆ

CORALLOIDES

MNIUM

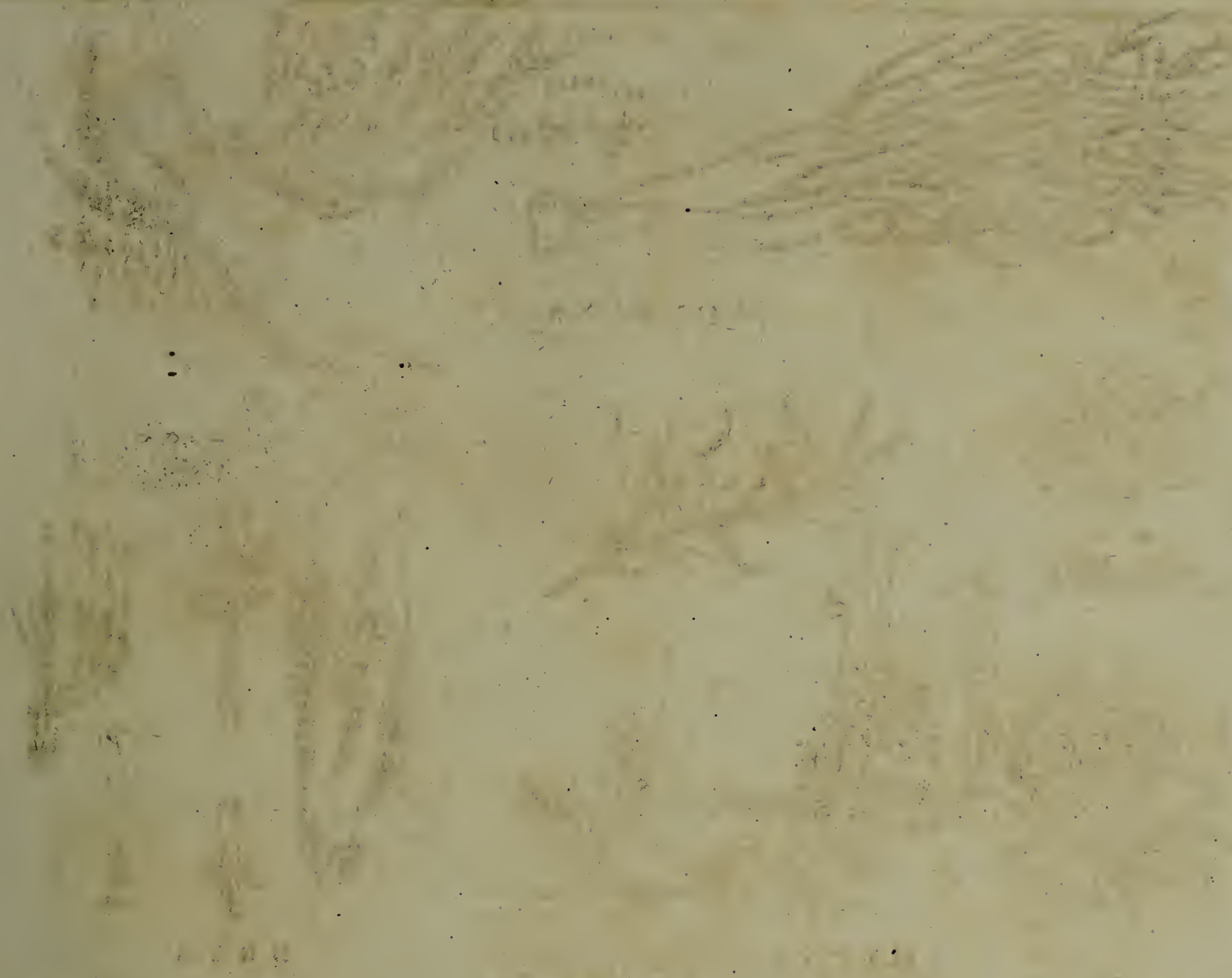


SPIHAGNUM



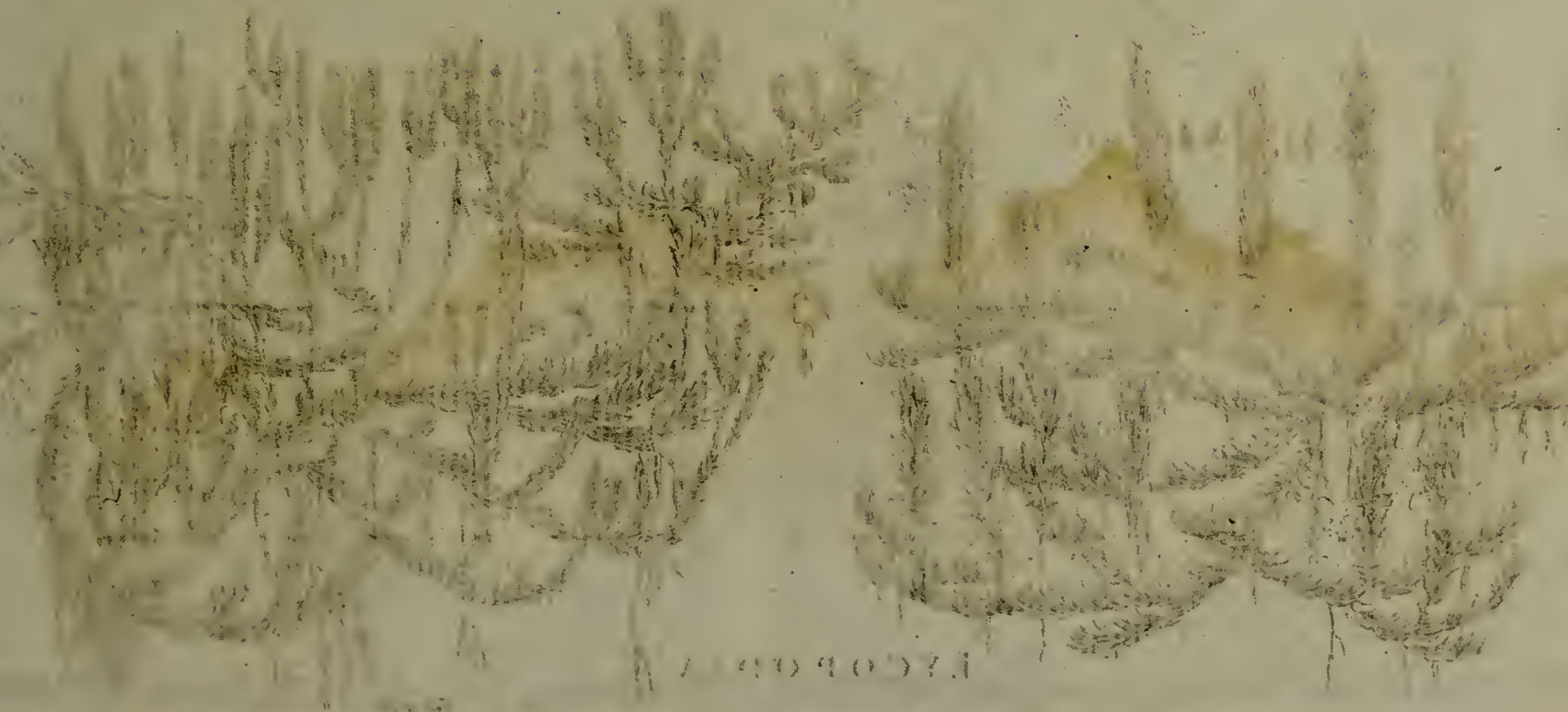
LICHENOIDES

W. M. W.



ST. PAUL

ST. PAUL



ST. PAUL

BOTANY

Genera of *MOSSES.*



FONTINALIS



HYPNA

BRYA



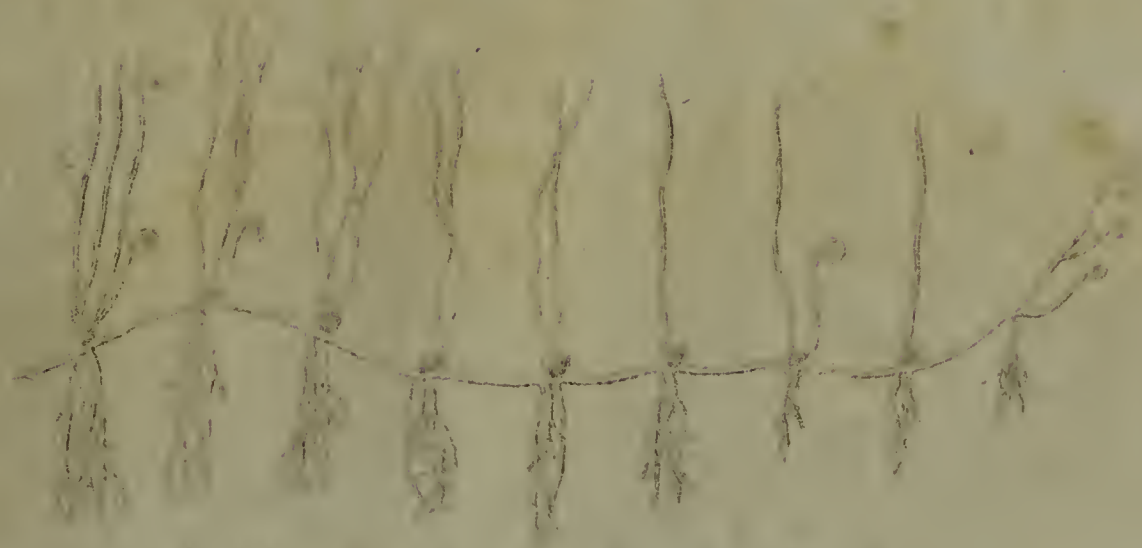
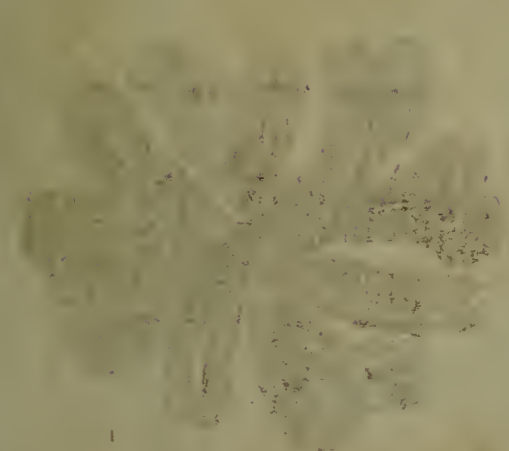
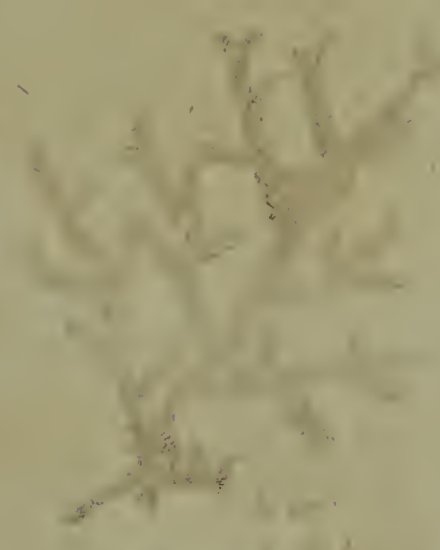
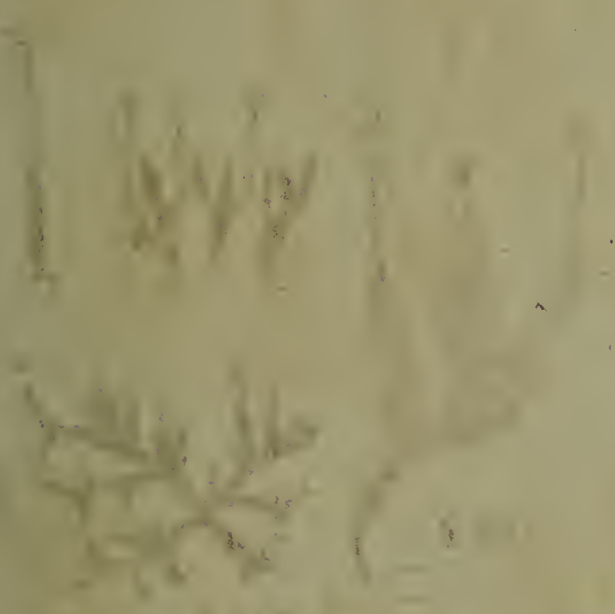
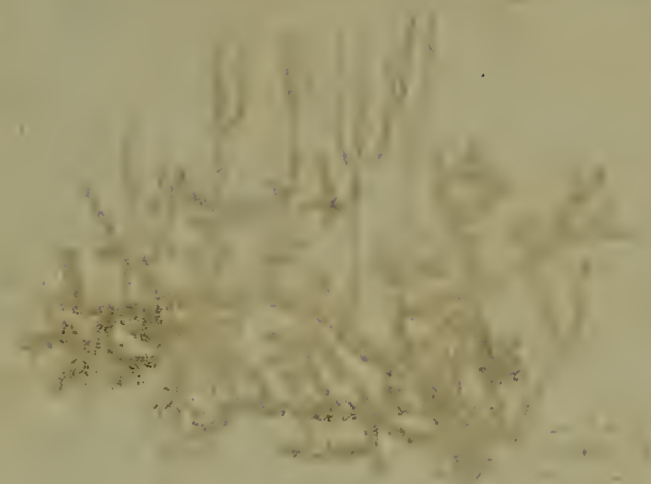
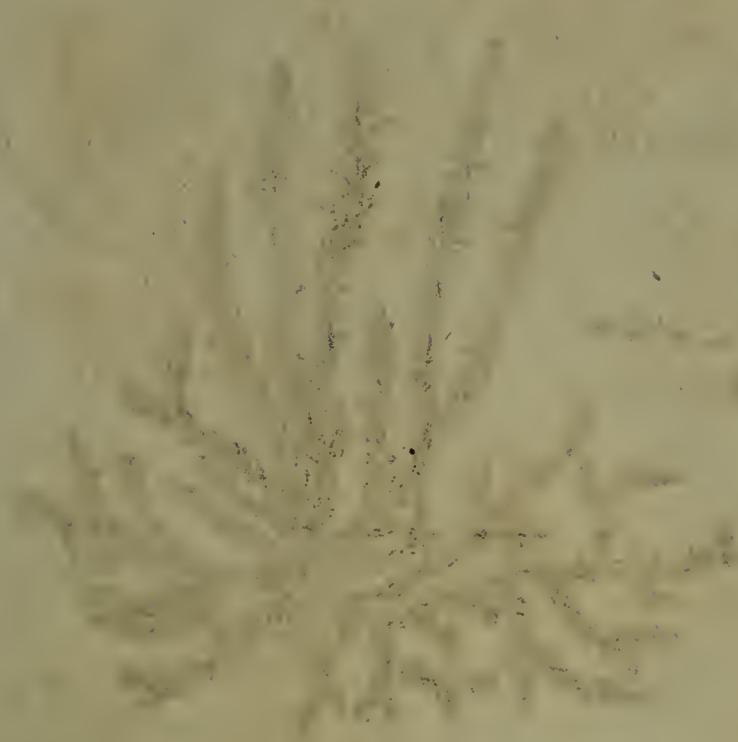
POLYTRICHA

SELAGINES



LYCOPODIA

PLANTAE



PLANTAE

Genera of *MOSESSES*.



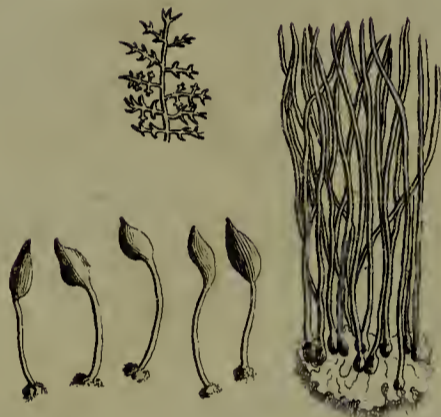
LYCOPODIODES



SELAGINOIDES



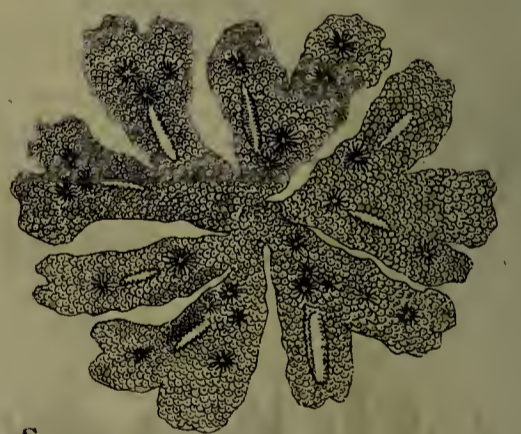
PORELLA



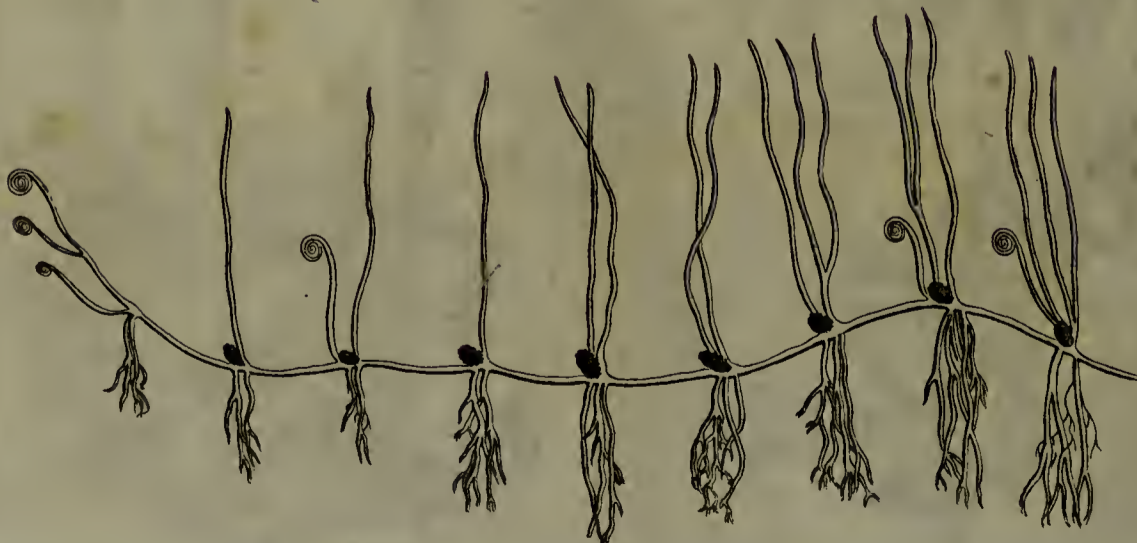
ANTHOCEROS



LICHENASTRA



LICHENES



PILULARIA

ARTICULATED

KERATOPHYTA



E S C H A R A



this, there are others of equal importance to the well-being of plants and fruits; the first is, that of the foot-stalks and leaves nourishing, and preparing the buds of the future shoots, which are always formed at the base of those foot-stalks, and during the continuance of the leaves in perfect health, these buds increase in their magnitude; and, in the deciduous trees, are brought to maturity before the foot-stalks separate from the buds in autumn; but if by accident the leaves are blighted, or if the entire surface of the leaves are cut off, and the foot-stalks are left remaining, the buds will decay for want of that proper nourishment which is conveyed to them from the leaves: so that whenever trees are divested of their leaves, or those leaves are cut, or otherwise impaired, though it may in either case happen when the buds may be nearly formed, yet if it is before the foot-stalks separate naturally from their branches, the future shoots will be weakened in proportion to the time when this is done; therefore from all the experiments which have been made in order to know how serviceable the leaves of trees and plants are to their well-being, it has been found, that when the plants have been divested of their leaves, or their leaves have been eaten or cut, during their growth, the plants have been remarkably weakened thereby. This should teach us not to pull or cut off the leaves of trees, or plants, on any account while they retain their verdure, and are in health; and this shews how absurd that common practice is, of feeding down wheat in the winter and spring with sheep; for by so doing, the stalks are rendered very weak, and the ears are in proportion shorter; nor are the grains of corn so plump and well nourished, as that which is not fed down upon the same ground: this is a fact which we can assert from many years experience. It is very evident, that grass which is often mowed, the blades will be rendered finer in proportion to the frequency of mowing it, yet the species of grass is the same with that on the richest pastures; so that although this may be a desirable thing for lawns, &c. in gardens, yet where regard is had to the produce, this should be avoided.

Another principal use of the leaves, is to throw off by transpiration what is unnecessary to the growth of the plants, answering to the discharge made by sweat in animal bodies; for as plants receive and transpire much more, in equal time, than large animals, so it appears how necessary the leaves are to preserve the plants, in perfect health; for it has been found by the most exact calculation, made from repeated experiments, that a plant of the sun-flower receives and perspires, in twenty-four hours, seventeen times more than a man.

M O S S E S.

THEIR genera, or different kinds, are so distinctly described in the three plates given of them; and these are so accurately and beautifully executed, as would render a scientific account of them here tedious and unnecessary. A mere inspection by any one acquainted with the subject of Botany, will be sufficiently informing, and entirely satisfactory.

Of F O S S I L S.

IN our Natural History of Waters, Earths, Minerals, &c. page 387, we have treated this subject in a copious and comprehensive manner; and our survey of nature, and her treasures has been such, that all, even the illiterate, may learn those truths, the know-

ledge whereof is a concern of the utmost importance: and the learned in scientific truths, may have their taste fully gratified, by consulting the plates we have given under the title of Fossils, Fossil-Shells, and Coralines. Here they will find them distinguished by their proper technical terms, and ranged, particularly Fossils, in systematic order, under ten classes. The first includes Native Fossils. 2. Selenitæ. 3. Chrystals. 4. Siderochitæ. 5. Pyritæ. 6. Extraneous Fossils. 7. Corals. 8. Fishes Teeth. 9. Fossil Shells. 10. Fossil bodies, once parts of animals.

M I C R O S C O P I C A L O B J E C T S.

OF these we have given three exceeding curious plates. The first contains Chrystallizations. —Marine Salts.—Essential Salts of Plants.—Silver dissolved in Aquafortis. In the second and third plates are distinguished, under two classes, Animal and Vegetable subjects. Among other curious objects in the first class, are, the circulation of the blood—a Flea—a Louse—Polipe—Darts of the Gnat, and a number of animalcules. The second class exhibits the Farinæ of plants, also seeds and sections of the same. Their names are well known, and most of them having been described in the body of this work, a further explanation would be superfluous.

S H E L L - F I S H and S H E L L S.

IN treating this subject, having been too concise and short, we must beg leave to introduce here the following addenda:

We observed, page 248, that Shell-Fish are usually divided by naturalists into crustaceous and testaceous animals. Crustaceous fish, such as the Crab and the Lobster, are furnished with a shell that is not of a stoney hardness; whereas testaceous fishes, like the Oyster and the Cockle, are furnished with a shell of a stoney nature, which is brittle and incapable of yielding.

Sea-Locust or Prawn, named in the plate of crustaceous animals, *Locusta Marina Indica*, has two large feelers placed before the eyes.

Elephant-Lobster. This is shaped pretty much like a common lobster, only the fore claws are longer, and the nippers, which are thinner and broader, open wider than in any of this kind.

Cray-Fish (the River) differs only from some Lobsters, in being less.

Shrimp. The common is the smallest of this kind. In the East-Indies is one that grows to be near a span in length, and has a shell like ours.

Crabs. Their varieties are numerous, as will appear from the plate, and the Natural History of them, page 249.

Of T U R B I N A T E D S H E L L - F I S H.

They are somewhat in the shape of a top, and are surrounded with spiral furrows, much like a screw, being wide at the mouth, and terminate by degrees in a point. Within they are all nearly alike with regard to their surface, which is exceeding smooth; of these kinds are—

The Nautilus, or Sailor; one of which is a small sort, and comes out of its shell; but the other keeps to its shell like a snail, or at least seldom comes out of it.

Pearl Shelled Nautilus; so called from having a shell exceeding bright on the inside.

Little Thick Nautilus, is of a roundish form, and rarely exceeds an inch and a half in diameter.

Thin

Thin Eared Nautilus has a very beautiful shell, which grows to ten inches in length, and is exceeding thin.

Paper Nautilus, so called from the thinness of its shell, is often met with twelve inches long, and is compressed on the sides.

Thin Nautilus without Ears, is smaller than the former kind, for it is but five inches long, and three or four deep.

Purpura is of the size of an egg, and sometimes bigger. There are several sorts of them, as—the yellow Long-snouted, with long crooked spines—The variegated Long-snouted, nearly of an oval shape—The Short-snouted, about two inches long, and its diameter, with the spines and thorns, is an inch and a half—and that with three rows of spines is about three inches long, including the spines, and as much in diameter.

Trumpet Shell, called Buccinum, from its imaginary likeness to a trumpet or horn.—One of the island of Goree, which is seldom above half an inch long, and its breadth is less by one half.—Another of Senegal: It is composed of ten turns or spires; which are all smooth, polished, and flattened, except the first; but they are not very distinct from each other.

The Hedge-Hog Murex is three inches and a half long, and about two and a half broad, where thickest.—One with a smooth clavicle, is two inches and a half long, and near two in diameter where broadest.

Ribbed Music Shell. Its body is short, and there are several low ribs at some distance from each other. It is a native of the East Indies.

Gold-mouthed Cochlia or Snail. This is round, and edged on the circumference with a narrow lip. It is common in America.

The Snail has numerous varieties, as the Hedge-Hog—The Smooth Ribband—The Watery—The Smooth Brown—The Three Ribbed—The Toothed—The Banded—The Prickly—The Clouded—The Conical Tuberculated—The French-Horn.

Others of different kinds of Shell-Fish are noticed by authors; the distinct names of them will be found in the plates; to enlarge upon which, by a particular description, would extend this work to a tiresome length, and very far beyond our prescribed limits.

OF TURBINATED SHELLS.

These are of a simple kind, consisting of one piece, and of a long slender make, always terminating in a very long fine point. The mouth is narrowest towards the base, and has a sort of an ear. They are of different shapes, and in general they are called Screw-Shells.

The Thick Turbo, or Screw-Shell, has an oval mouth, and consists of about fourteen turns, of which that next the mouth is the largest, from which they gradually diminish to the end which is pointed.

The Needle, or Slender Screw-Shell. This has roundish spires, and it becomes gradually smaller from the mouth to the other end, where it terminates in a point. It consists of sixteen spiral turns, which are all bellied, rising very high in the middle. It has only a notch, where the ear is placed, and the whole surface is perfectly smooth. The colour is white, variegated with yellow.

The Turbo, or Screw-Shell, with bellied spires and elevated ribs, is an inch and a half in length, and the largest turn a little more than the third of an inch in diameter. The colour is white, and the mouth round and pretty large, with a thick lip. It is common on the shores of Barbadoes.

The Conical Turbo, or Screw-Shell, with plain

streaked and numerous spires, is by some called the Telescope Shell.

The Slender Turbo, or Screw-Shell, with spiral lines on the turns, is four or five inches long, and scarce half an inch thick where thickest. The colour of the shell is yellow, unless it has lain long on the shore. It is found on the shores of the American islands, as well as in the East Indies.

The Turbo, or Screw-Shell, with distant and prominent spires, is about five inches long, and the diameter of the spire next the head, is about three quarters of an inch. The colour is whitish, with a tincture of yellow and red, and it is brought from the East and West Indies.

The Warty Turbo, or Screw-Shell, with a broad depressed mouth, called by some the Caterpillar-Shell, is about two inches and a half long, and near three quarters of an inch in diameter next the mouth. The shell in general is pale, variegated with a darker colour; but the protuberances are blueish. It is brought from China.

The Turbo, or Screw-Shell, with a long wide mouth, is three inches long, and of the thickness of a man's little finger. The colour is brownish, variegated with a deeper brown, and a reddish tawny. The surface is smooth, only there are a few tubercles on the second turn. It is brought from the East Indies.

The Oblong Mouthed Turbo, or Screw-Shell, with spires jagged at the edges, is about two inches long, and the third of an inch thick at the base. The colour is of a faint brown, a little variegated with tawny and reddish, and regular rows of little black dots. It is found in America, and some parts of Europe.

The Thick-Eared Turbo, or Screw-Shell, with turns deeply jagged at the edges, is three inches long, and in diameter, where thickest, an inch.

The Screw Shell of Senegal is like a cone rounded at the base, and grows gradually smaller to the top, where it terminates in a very fine point.

OF WREATHED SHELLS.

The Voluta are of one piece, and of a figure nearly conical, but short, the clavicle being commonly depressed; and the mouth long, perpendicular, and narrow.

The Jamar, is a Voluta of Senegal, very thick, and nearly of a conical shape. A membranous skin of a reddish colour surrounds the whole surface of the shell, and when this is taken off, it appears of a fine polish, and beautifully variegated with different colours. The ground is white, red, yellow, or brown, marbled with spots without any regularity, and sometimes encircled with pointed streaks. This shell is highly valued by the curious, who have given it different names, according to the varieties.

The Admiral Shell, or Voluta, with a broad yellow band, and a pointed line thereon, is an uncommon and very beautiful shell, bearing a great price. It is about two inches long, and near an inch in diameter towards the head, from whence, to the extremity of the mouth, it gradually decreases in size, so as to form a sort of a cone, with an obtuse point. The clavicle also diminishes in diameter, and terminates in a blunt point. The ground colour of the shell is of a beautiful yellow, but so variegated, that it does not take up above one third of the surface. There is a circle or ring of this colour at the head, of about the breadth of a straw, and below it there are three broad belts or rings finely variegated. The lowest of the three are broader than the others, and separated by five yellow lines. Under the belts the fine yellow again

makes

SHELL FISH.



THE RIBB'D MUSICK SHELL



THE CLOUDED OLIVE



THE TULIP SHELL



THE PORPHYRY SHELL



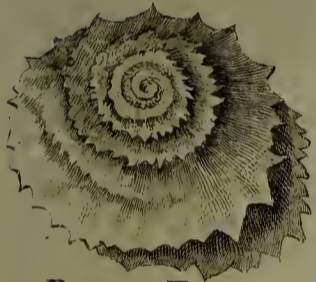
THE HIGHBACK'D SEA EGG



THE TOWER OF BABEL SHELL



THE GLOBE SEA EGG WITH VARIOLATED PAPILLÆ



THE ROUGH TROCHUS



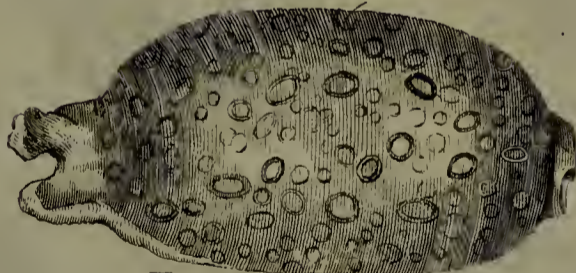
THE GREAT PRICKLY OISTER



THE THIN SCALLOP



THE CONIC MUSCLE



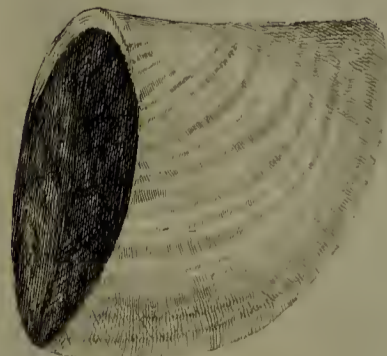
THE ARGUS SHELL



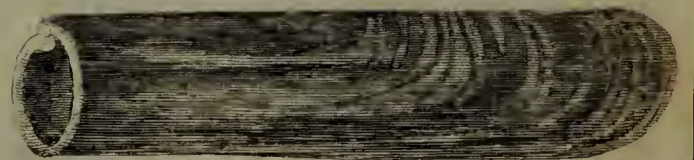
THE CAROLINA MUSCLE



THE LITTLE STRAIT RAZOR SHELL



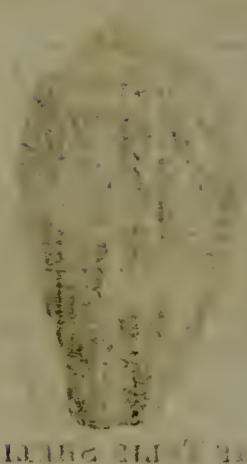
THE SMOOTH EDG'D TRUNCATED CHAMA



THE THICK RAZOR SHELL



THE SCUD SHIMP



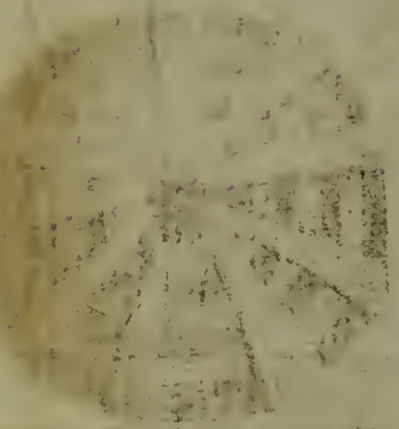
THE SCUD SHIMP



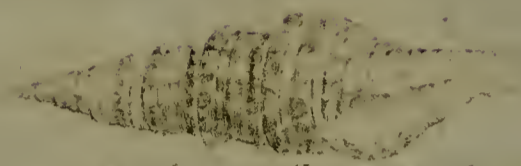
THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP



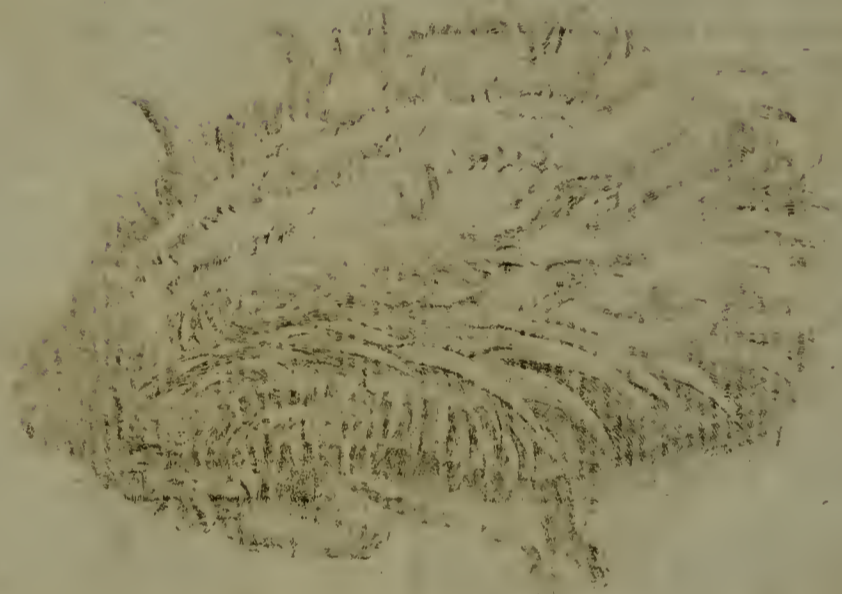
THE SCUD SHIMP



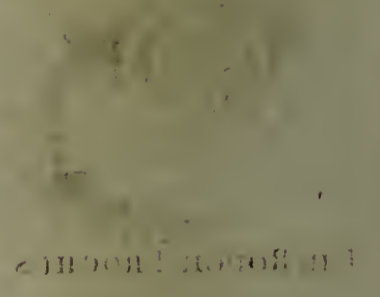
THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP



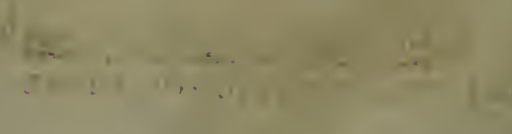
THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP



THE SCUD SHIMP

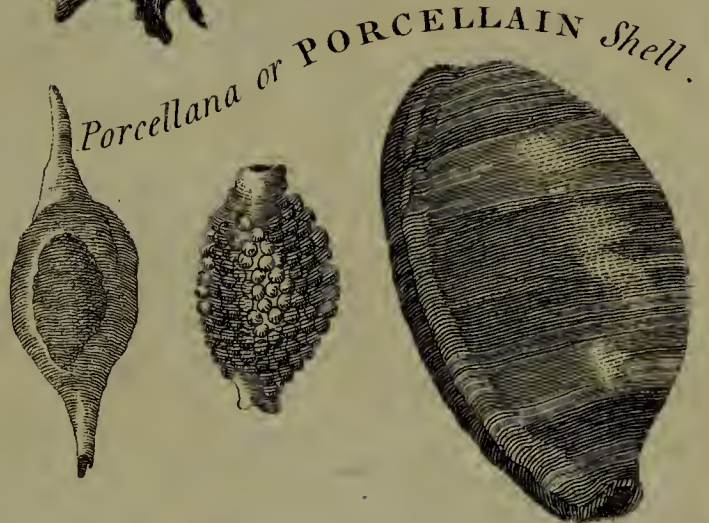
M U R R E X



Purpura or PURPLE Fish

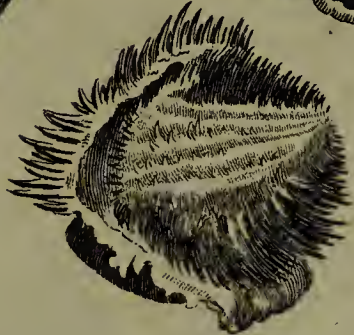


D O L I U M

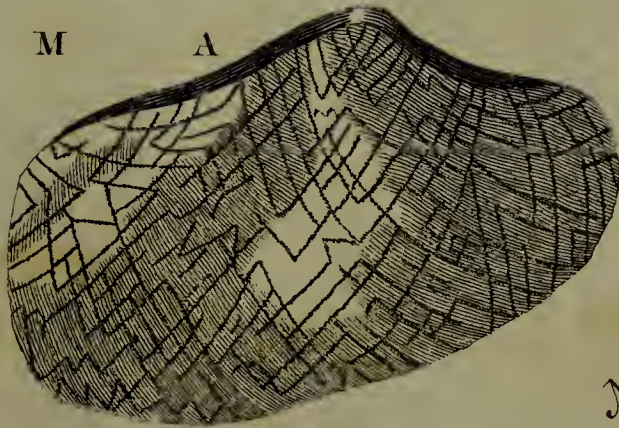
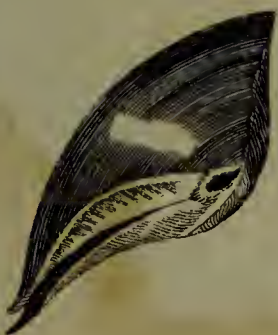


Porcellana or PORCELLAIN Shell.

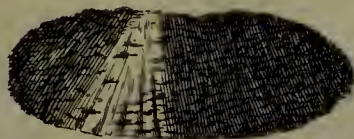
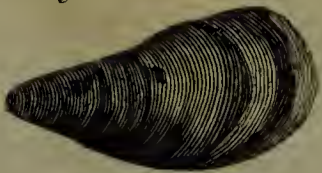
Ostrea or O Y S T E R



C H A M A

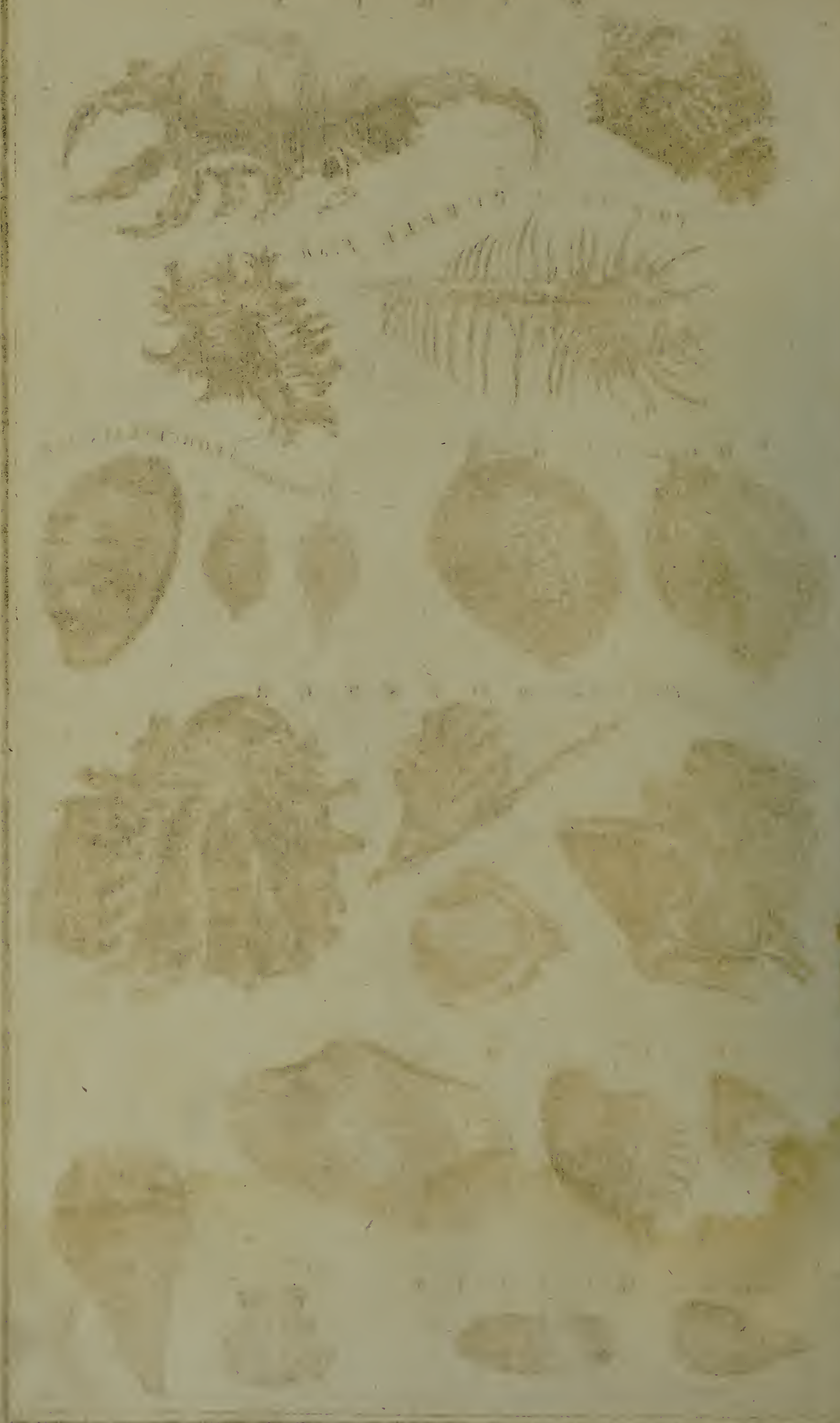


Mytilus or M U S C L E

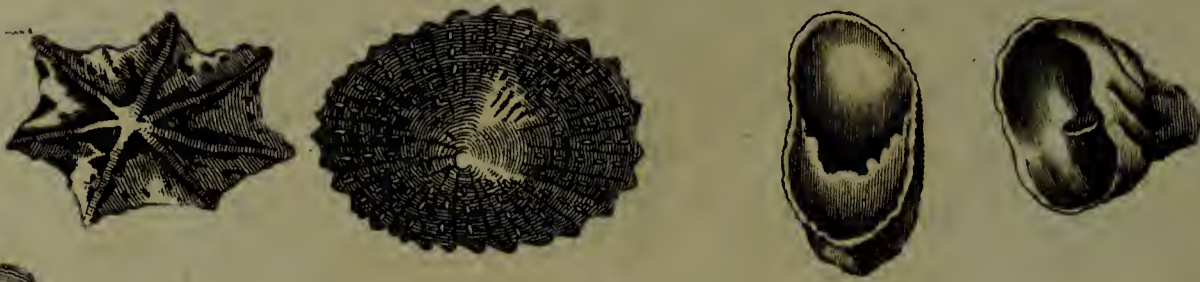


PINNA Marina





PATELLÆ or LIMPETS



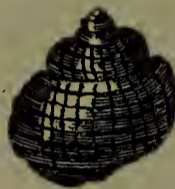
AURES MARINÆ or EAR-SHELLS



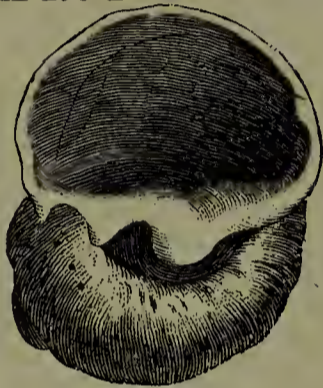
DENTALIA



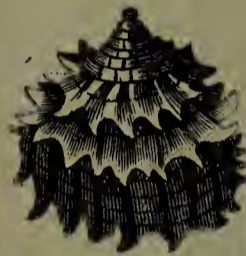
COCHLEÆ ORE ROTUNDO



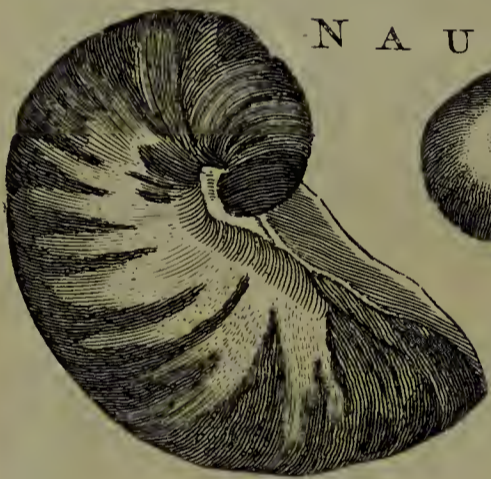
COCHLEÆ ORE SEMI ROTUNDO



COCHLEÆ ORE DEPRESSO



NAUTILUS



BUCCINA or TRUMPET-SHELLS



FLAMBEAU ADMIRAL VICE ADMIRAL BUTTER FLY

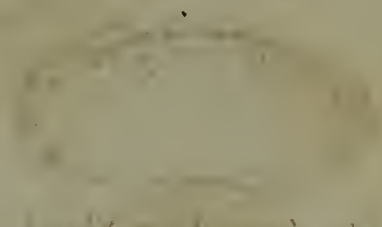


CYLINDRI



TURBINES





Phaseolus vulgaris

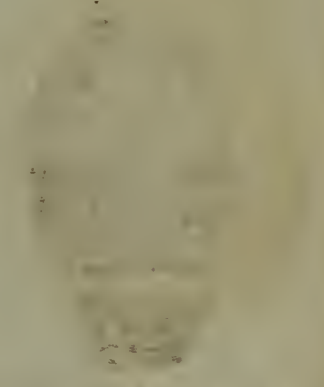
Phaseolus vulgaris



Phaseolus vulgaris

Phaseolus vulgaris

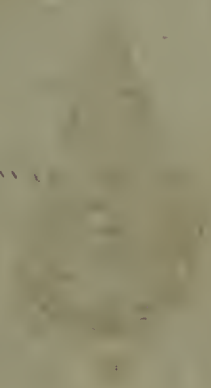
Phaseolus vulgaris



Phaseolus vulgaris

Phaseolus vulgaris

Phaseolus vulgaris



Phaseolus vulgaris



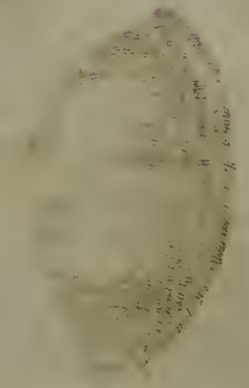
Phaseolus vulgaris

Phaseolus vulgaris

Phaseolus vulgaris

Phaseolus vulgaris

Phaseolus vulgaris

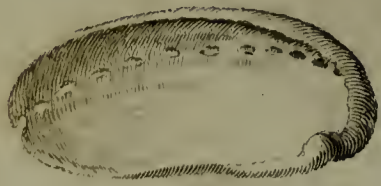


Phaseolus vulgaris

Phaseolus vulgaris

Phaseolus vulgaris

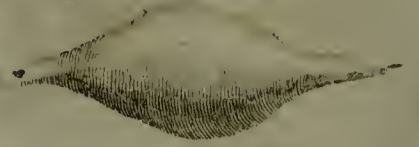
SHELL FISH



The Long Ear Shell



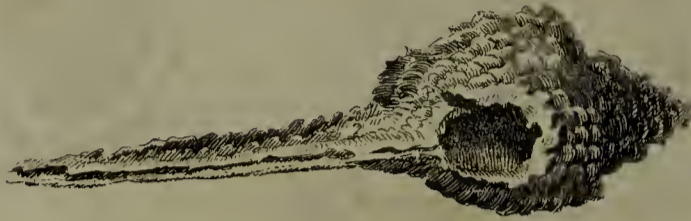
The Narrow Mouth'd Grey Balanus



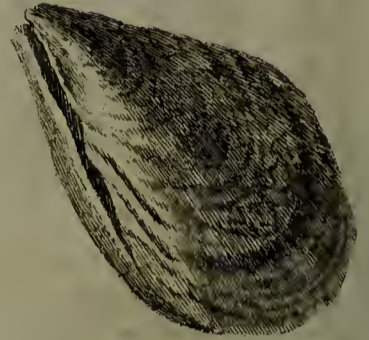
The Boat Porcellane



The Cornu Ammonis Snail



The Common Woodcock Shell



The Magellanick Muscle



The Pointed-headed Porcellane



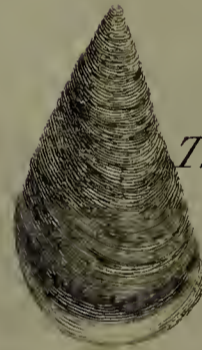
The large Rib'd Scallop



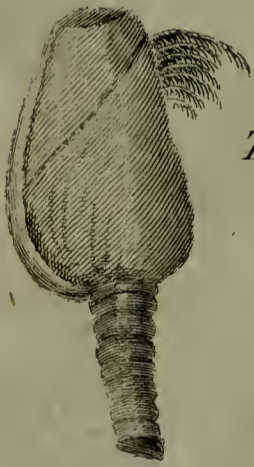
The Pointed Murex



The high Lip'd Dolium



The Agate Muscle



The Goose Shell



The Violet and White Chama



The Thick stem'd Goose Shell



The prickly Snail



Stomatius



The Yellow Zon'd Porcellane



The Exotic Heart Cockle



The Auriculated Paper Nautilus

makes its appearance in the form of a broad belt; and in the center there is a narrow pointed line of the same colours with the other variegations, which is the characteristick of this shell. From the verge of this, to the extremity of the shell, the yellow gold colour prevails again. It is brought from the East Indies.

The Vice-Admiral Shell is nearly as beautiful as the former, and is somewhat more than two inches in length, and about an inch in diameter at the head. The clavicle is a little longer than that of the Admiral, and has about ten turns; the ground is of a bright gold colour, with the same variegations as the former, only they have a greater mixture of white. There is a line of gold colour at the head, of the breadth of a straw, below which there is a circular line of the variegations, much of the same breadth. Under this there is a narrower line of yellow, and under that a very broad belt of the variegations. Below this there is another of yellow, as in the Admiral, but without the pointed line. Next to this there is another broad belt of the variegations, and then comes the point of the shell, which is yellow. The False Admiral is by some taken for the true one, but it is not near so valuable.

The Tiger Shell is scarce, and brought only from the East Indies. Its ground is of a dusky red, sprinkled all over with irregular spots a little whitish; some of these are oblong, others angular, and indented.

The Yellow Tiger Shell is beautifully variegated with white irregular spots of the size of a pea.

The White Voluta is of a faintish white variegated with dusky red spots, that are very large, and of irregular figures disposed without any order.

The Crown Imperial Shell is three inches long, and near an inch and a half in diameter at the top. The clavicle is so depressed, that in a front view of the shell it is not to be seen. The head is surrounded with a very beautiful row of tubercles pointed at the ends, and the ground colour is pale, with two broad beautiful belts running round it, the one near the head, and the other towards the other extremity. They are of a fine yellow, prettily variegated with black and white. It is brought from the East Indies, though few of them are quite perfect.

The Hebrew Letter Shell is smaller than the rest of this kind; for it is rarely above an inch and a quarter in length, and three quarters of an inch in diameter at the top. The body is in the shape of a cone, and the clavicle pretty long, with about five turns, but it is blunt at the extremity. The ground colour is of a pearly white, variegated with large irregular black marks, disposed in about four rows on the body, and there is a single row to each turn of the clavicle. Some have fancied they resemble Hebrew letters. It is brought both from the East and West Indies.

The Whitish Voluta, variegated with brown and purplish blue spots, is more than four inches long, and two in diameter at the head, from whence the body tapers very gradually, and is large and blunt at the end. The clavicle consists of seven or eight turns, and is blunt at the extremity; the ground of the shell is white, variegated with spots of different sizes running in circles round it; these circles are from twenty to thirty in number on the shell, some of which are brown, and others of a purplish blue. It is brought from the coast of Guinea.

The Half Crowned Voluta, with an undulated surface, is more like the Crown Imperial than any other shell of this kind. It is about two inches and a half in length, and near an inch and three quarters at the head. The edge of this is deeply

indented, so as to form a kind of crown. The colour is white, and the variegations of a faint brown. It is brought from the coast of Africa. To which may be added, the Slender Voluta.

The Butterfly Shell has three very beautiful belts round the body, and one narrower near the head, consisting of large spots of a deeper and paler brown, with some white: they resemble the spots, in the form of eyes, on the wings of some butterflies.

Of LIMPET S.

Limpets are simple shells of a conical, or gibbous shape, with a very wide opening at the bottom; of these are the—Streaked—Starry—Oval Smooth—The Great Oblong—and many other sorts, for which we refer our readers to the plates of Shell-Fish and Shells.

SEA-EAR-SHELLS.

The Haliotis or Ear-Shell is a simple one, of a depressed shape, with a large mouth, having somewhat of a spiral form at top: among this kind are reckoned the—Great Ear—The Long Ear—and the Streaked, or Wrinkled Ear-Shell.

DENTALIA, or TOOTH SHELLS.

Of these are distinguished the Streaked—The Ringed—The Dog-Tooth—Conical—Crooked Streaked, and Ringed; and the Great Sea-Pipe.

Of CYLINDRIC SHELLS.

The Brocade Shell is large and beautiful; the colour being as white as silver, variegated with a bright brown, in fine irregular lines, clouds, and spaces.

The Tulip Cylinder. The colour of this shell is white, variegated with clouds and spots of blue and brown. It is very scarce, and is brought from the East-Indies; but seldom in perfection.

The Porphyry Shell is about two inches and a half long, and an inch and quarter in diameter. The shape is nearly like that of a cylinder, with a short blunt clavicle. The colour is of a pale white, with a reddish cast, clouded with a deeper red approaching to purple, which takes up much the greater surface. This colour appears in most places in irregular longitudinal and dentated lines. It is brought from South America.

The Slender Whitish Cylinder Shell, variegated with brown, is three inches and a half long, and near an inch and quarter in diameter. It is shaped nearly like a cylinder, only it is somewhat smaller towards the point than elsewhere. The clavicle has four or five turns, and the body of the shell is cloven at the other extremity, by the continuation of the mouth. The colour is white, with a broad belt near each end, variegated in such a manner that some have imagined there are letters thereon: It is brought from the East Indies and South America.

The Slender ditto, variegated with brown and white, is three inches long, and about an inch and quarter in diameter. Its shape is nearly like that of a cylinder, only it is a very little smaller at both ends than in the middle. The clavicle is blunt, though it has four or five turns, and the whole shell is variegated with a bright white, and a pale tawny brown. They are disposed in denticulated lines, and the surface appears to be finely polished, it being very bright. It is brought from South America.

OF DOLIA, or PIPE SHELLS.

Pipe Shells are so called, from being imagined by some to be like the pipes or casks made to hold wine. However their shapes differ so much that it may be doubted whether this appellation is proper. In this class among others are placed the—Oval Pipe Shell—The Partridge Shell—The Harp Shell—And the Æthiopian Crown. The shape of the last is oblong, and somewhat oval, being smaller at each end than in the middle. The mouth is long and wide, and cleaves the extremity of the shell a little way. The clavicle is short and blunt at the end, and has four turns; that next the body, as well as the upper edge of the body, are deeply dentated, or as some say crowned, and the teeth are formed into regular even conical points. The surface is pretty smooth, only there are impressions of longitudinal lines; and the colour is of a pale brownish yellow. It is brought from Africa and the East Indies. There are some other sorts of this shell, which, for the sake of brevity, we shall omit.

OF PORCELAIN SHELLS.

The porcelain is a simple shell, consisting of one piece gibbous on the back; the mouth is long, narrow, and dentated on each side.

The White Porcelain Shell, yellow within and beaked at each end, is of an oblong shape and very gibbous. The length, including the beaks, is about three inches, and its diameter in the middle nearly two. It is white on the outside, and yellow within; and the mouth is large, having a sort of a snout or beak at each end. It is brought from Africa and the East Indies.

The Argus Shell is about three inches long, two in diameter, and somewhat less in height, though it is gibbous like the former. The mouth is wide, and the lips are continued at each extremity in the form of a broad short beak each way. The general colour is yellowish, only there are three brown bands of a considerable breadth running over it; the whole surface is adorned with a multitude of round spots like eyes, from whence it has its name. It is brought from Africa and the East Indies.

The Map Shell is about two inches and a half long, and nearly as much in diameter, with a gibbous back. At the head there is a short clavicle, placed a little above the extremity of the mouth, consisting of about four imperfect turns. To these may be added, the—Bluish Banded Porcelain—The Oval Porcelain—The White Porcelain—The Small Pox, and the Beetle.

OF BIVALVED SHELLS.

Of these there are six kinds, namely, Oysters, Bastard Cockles, Muscles, Heart Shells, among which Common Cockles are included, Scollops, and Razor Shells.

The Hammer Oyster has one of the most extraordinary shells in the world, it being in shape like a hammer, or rather like a pick-ax, with a very short handle and a long head. The body of the shell, which is taken for the handle, is about four inches long, and three quarters of an inch broad; but the head is five or six inches long, and except where it joins to the body, is little more than half an inch broad. It is of an irregular form, uneven at the edges, and terminates in a narrow blunt point at each end. The hinge or joint is at the lower end of the body; and the shells open all the way from each end to this part, and yet they shut very close. The edges of the body and head have often

great irregularities and protuberances on the surfaces, being deeply furrowed in all directions.

Under this class are included the Pearl Oyster—The Great Prickly—The Conical—The Hedge-Hog, and others; for an account of which see page 250 of the Natural History. Of Cockles are reckoned the Bastard—The Truncated Bastard—The Arabian Shell—The Venus, or Concha Veneris, and the—Oriental Concha Veneris.

OF MUSCLES.

These are composed of two valves or shells, of a longish shape, that shut all the way, and are both convex. Our sea and river Muscles are too well known to need any description.

The Carolina Muscle is four inches long, and an inch and a half broad.

The Ader is a very curious shell, of a fine sky-blue colour, with yellow rays one over another towards the bottom.

The Anpan has a bivalved shell, and is one of the largest that is met with at Senegal.

The Pinna Marina is of an olive brown colour on the outside; but within it is partly of a pearl colour, and partly reddish.

The Prickly Pinna is furnished with a sort of scales, many of which terminate in prickly points.

To which we may add Heart-shells and Cockles, as the—Thin White Heart—The deeply furrowed and Spinous Heart.

Scollop Shells, as the ribbed and variegated—The Red Ribbed and Furrowed—The Ducal Mantle—and the Irish Scollop.

Finger Shell Fish, as the Thick Red Finger—The crooked Finger—The slender, straight Brown and White—and the Violet Purple Finger Shell.

Acorn Shell Fish, as the Great Furrowed—The Bell fashioned—and the Greyish-white, Furrowed, Slender Acorn Shell.

Thumb-footed Shell Fish, as the Blueish Grey—The Reddish—and the White.

File Shell Fish, or the Pholades, as the longish White, Chequered and rough—The White and West Indian Pholas.

OF FRESH WATER SHELL FISH.

The Oval Limpet, with a crooked snout, is very thin, oval and depressed, except in the middle, where it rises into a beak. It is no bigger than a man's finger nail, and is found sticking to stones in the brooks of Northamptonshire.

The roundish Target Limpet is smaller than the former; and, instead of a beak, has a sort of button at the top. It is very thin and delicate, and has a pretty smooth surface, of an olive brown colour. It is found in some of the rivers of Leicestershire.

The Oval Limpet, with a hole at the top, is a quarter of an inch in diameter, and an eighth in height. The shell is very thin, rounded at both ends, and of a dusky brown colour. The hole is small and oblong, and seems to be formed of two round holes broken into each other. This is common near London.

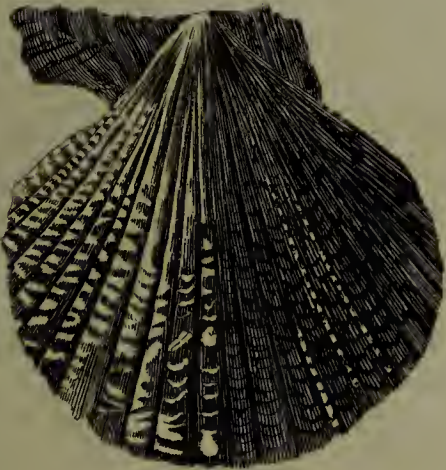
The Spiral Snail Shell, with a clavicle a little elevated, and a round mouth, is three quarters of an inch in diameter, and the shell is firm, solid, and smooth at the surface. It consists of about four turns, and the clavicle at the center is raised above the rest of the surface. The colour is a greyish white, and the large turn has a streak of black running along it, but loses itself before it reaches the next turn. It is found in the lakes in the north of England.

SHELLS

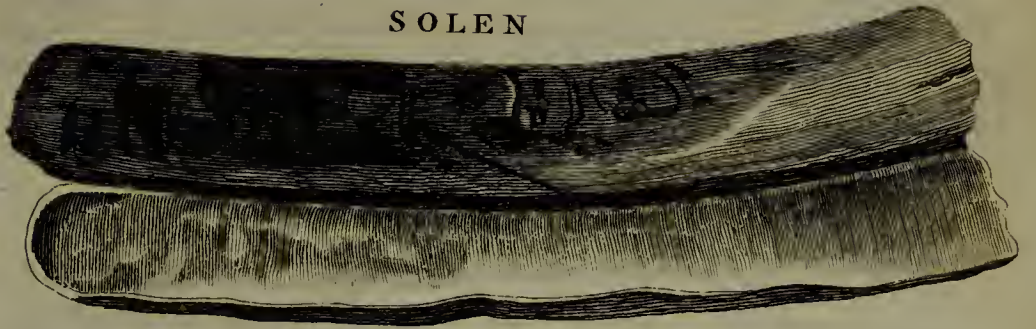
CONCHÆ CORDIFORMES or HEART SHELLS.



PECTEN



SOLEN



ECHINI MARINI



TUBULI MARINI



BALANI



POLLICIPES



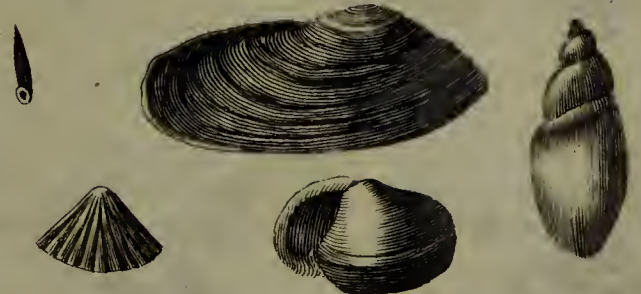
CONCHÆ ANATIFERÆ



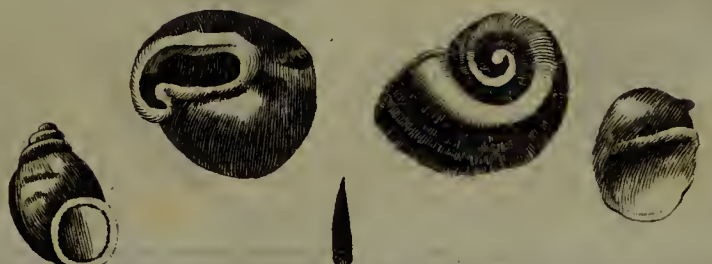
PHOLAS



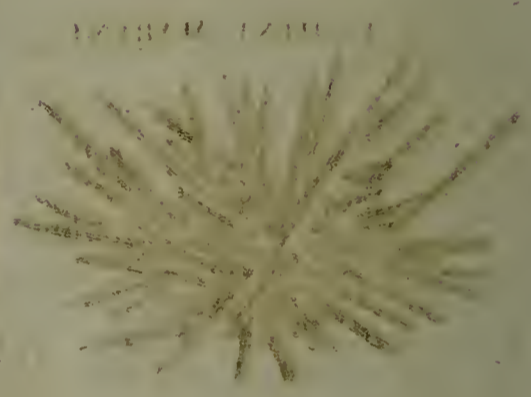
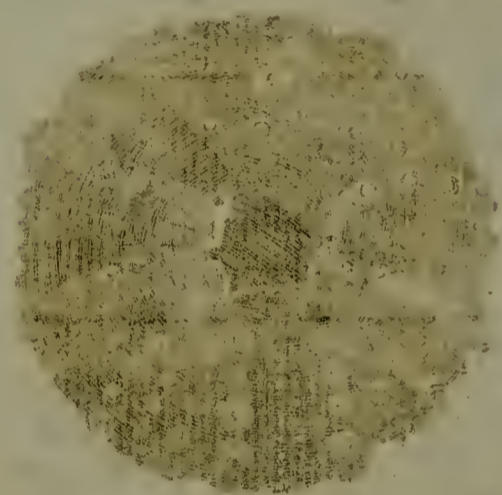
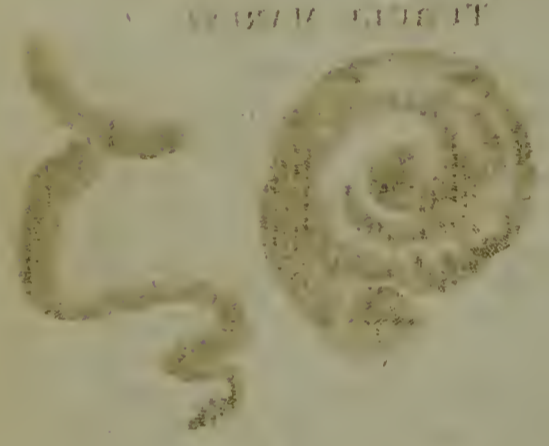
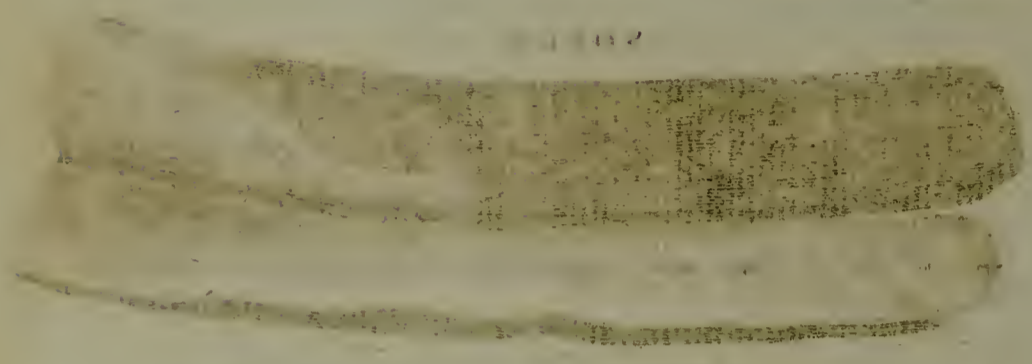
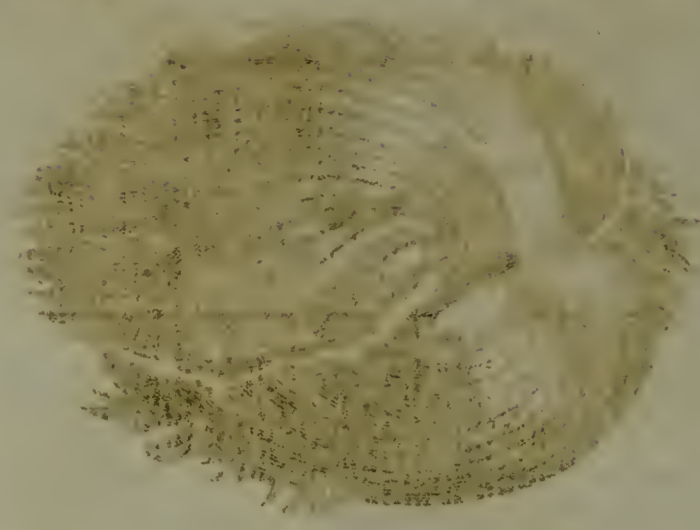
COCHLEÆ FLUVIATILES



COCHLEÆ TERRESTRES



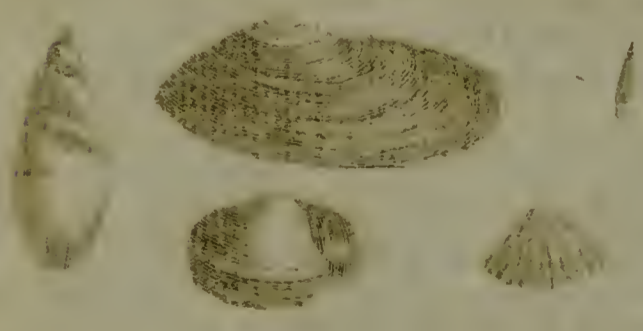
FIGURES ILLUSTRATING THE HISTORY OF THE COCHINEAL



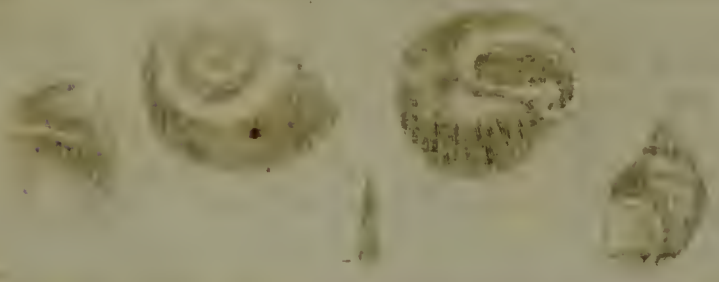
COCHINEAL PLANT

PHOENIX

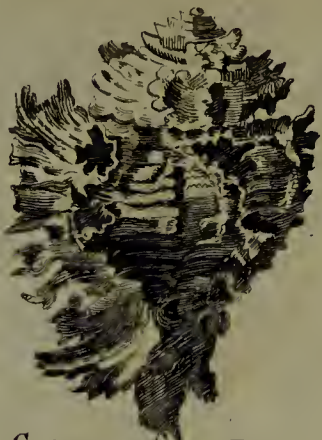
COCHINEAL INFRUIT



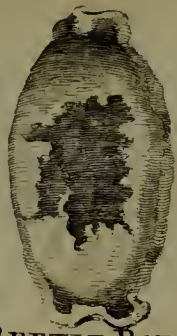
COCHINEAL PLANT



SHELL FISH.



THE CALTROP SHELL



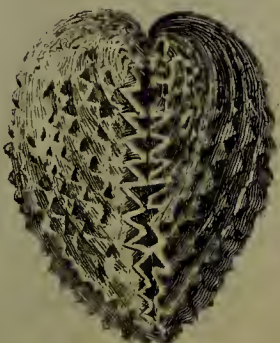
THE BEETLE PORCELLANE



THE YELLOW & WHITE DOLIUM



THE HEART COCKLE



THE ROUGH OXHEART SHELL



THE RIBB'D MUREX



THE BLACK RIBB'D PORCELLANE



THE MUSICK SHELL



THE NEEDLE SHELL



THE OBLONG WHITE PHOLAS



THE CORAL SCALLOP



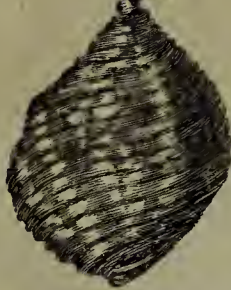
THE SHORT SHELL'D PHOLAS



THE PARTRIDGE SHELL



THE LITTLE YELLOW SCALLOP



THE BELT'D SNAIL



THE PERSIAN SHELL



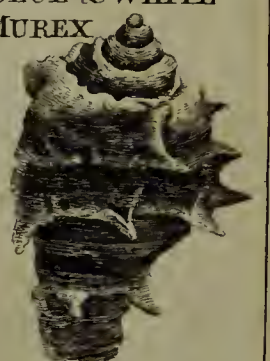
THE DEPRESS'D CORDATED SEA EGG



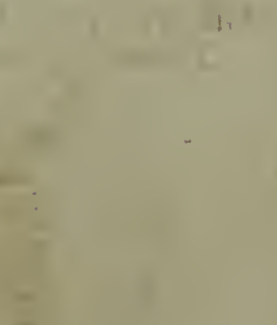
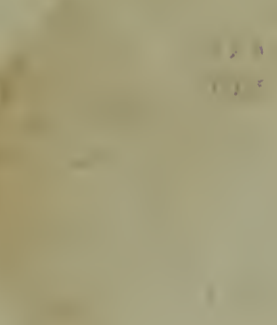
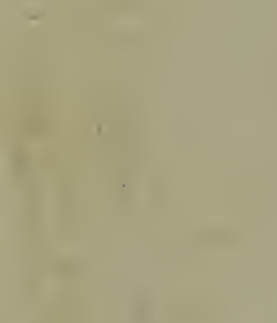
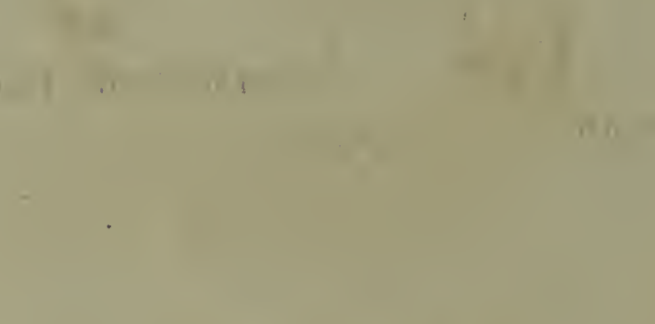
THE HARP SHELL

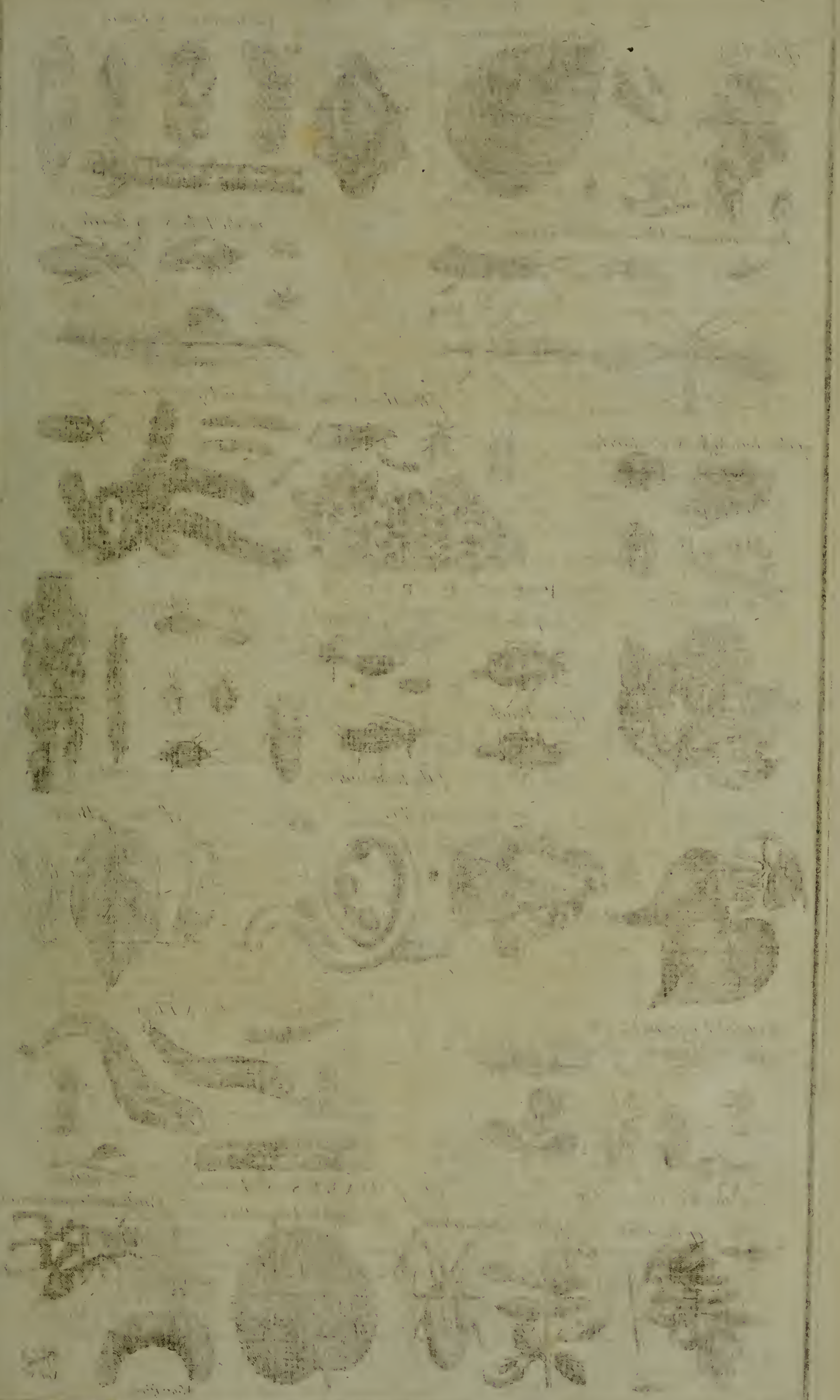


THE TRIANGULAR HEART COCKLE



THE BLUE & WHITE MUREX





T Æ N I Æ

Cadeworms & Cases

of the Oak

of the Hornbeam



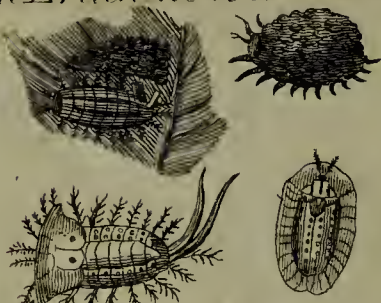
Papilionaceous Flies of Cadeworms

of the Lily & its Beetle



of the Artichoke & its Aurelia

of the Honey comb with their Pipes or Cases



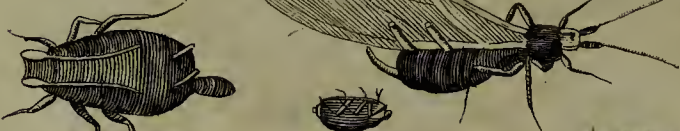
of the Gooseberry

P U C E R O N S

of the Rose

(winged)

of the Elder



of the Peach

of the Rose (naked)

Nat size



of the Lime Tree

of the Beech



Bastard Pucerons & Flies

Puceron-eaters & Flies



of the Fig Tree & Box

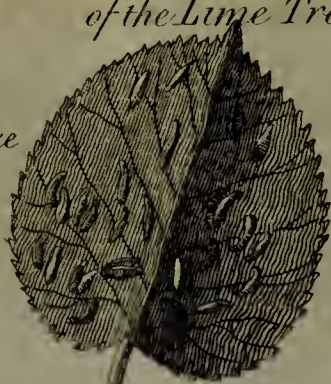
Leaf GALLS & Insects

of the Carduus Hemorrhoidalis

of the Oak

of the Chamædrys

of the Lime Tree



St. Cuthbert's Horn Shell is of the spiral flatted kind, and about half an inch in diameter: It is firm and solid, and of a fine glossy brown, with a tincture of olive colour. It consists of two or three turns, and the clavicle is depressed in the center; the mouth is partly filled up with the next turn of the shell, and the lip is narrow, but thicker, and of a paler colour than the rest of the shell. It is common every where in England.

The taller Snail Shell, with a long clavicle, is one of the most beautiful of this kind, being about an inch high, and three quarters of an inch in diameter. The mouth is half round, and partly filled up by the succeeding turn of the shell: It is surrounded with a thin rim, of a palish yellow colour, and the clavicle has four turns, terminating in a point. The colour is of a dusky yellow, variegated with olive brown. It is sometimes met with in deep rapid rivers.

The variegated oval Snail Shell, with a blunt clavicle, is about three quarters of an inch high, and near half an inch in diameter. The body is large, but pointed at the extremity of the mouth. The clavicle has three turns, and the top is blunt. The colour is of a greyish white, variegated with belts of a deep brown. It is found in large rivers.

The large-mouthed brown Snail Shell, with a sharp clavicle, is about half an inch high, and the same in diameter. The body is oval, and the clavicle long and pointed at the top. The shell is of a dusky brown, and the mouth is remarkably large, and edged with a thin rim or lip. It is common in brooks.

The chequered fresh-water Nerite, or Snail Shell, is about half an inch in length, and nearly as much in diameter, being almost of an oval shape. The clavicle has but two turns, and the mouth is narrow, with a lip on each side. The surface has furrows lengthways, and others transverse. The colour is almost white, variegated with blackish clouds or spots. It is met with in the trout streams about Uxbridge and other places.

The red fresh-water Nerite, or Snail Shell, is about half an inch long, and above a third in diameter. The colour is of a pale red, but a little dusky, and the shell is more firm and thick than most others of this kind. The surface is pretty smooth, the mouth narrow, and the lips of a pale red. The clavicle is short, and has two turns near one edge, at the smaller end of the shell. It is found in plenty in the rivers of Northamptonshire.

The great conical Snail Shell, with a depressed mouth, is about a third of an inch high, and its diameter is near as much at the base, where it terminates in a blunt little button. The colour is of a pale grey, and the substance is very thin and tender. The mouth is partly filled up with the succeeding turn of the shell.

The long-mouthed Screw Shell. It consists of about thirteen turns, and has a long narrow mouth, edged with a furrowed lip.

The brown Pipe Shell, with a large mouth. Its surface is smooth, and very thin, and the colour is of a dusky brown, in others it is white, and in some yellow.

The large mouthed Ammons Horn Shell. The surface is undulated transversely, and the colour is of a pale grey.

Bastard Cockle. The white smooth depressed, and the gibbous whitish variegated.

The reddish round streaked Cockle is about an inch and a half in diameter, and as much from the joint to the opposite edge. They are lightly streaked with a pale brownish red colour on the outside, and are of a fine pearl colour within.

The blueish oval Bastard Cockle is about half an

inch long from the joint to the opposite edge, which is broad and rounded; but at the top it runs up smaller, terminating bluntly. It is finely streaked longways, and the colour is of a pale blueish grey.

The extremely thin greenish Muscle is near an inch from the joint to the opposite edge, the surface is lightly streaked, and the colour is of a pale fine green.

The whitish variegated streaked Muscle is an inch long, and half an inch broad. The colour is whitish variegated with brown, and the shells are both pretty hollow.

The narrow brown angular Muscle is near an inch long, but not half an inch broad, and the shells are both very deep. The substance is pretty thick and strong, and the colour is a pale brown, with a tincture of olive.

The blueish rounded Heart Shell, when viewed sideways, looks like a heart painted on cards, and is about an inch long, and as much broad; as also but very little less in thickness. The surface is elegantly, but not deeply furrowed, and the colour is a dusky blue.

The reddish streaked Heart Shell is about half an inch long, and nearly as much broad; both the shells are very deep, and of a pretty firm, solid substance, lightly streaked; but the intermediate surface is smooth and polished, and the colour is white with a tincture of red.

To the account already given in this Work of REPTILES, SERPENTS, and INSECTS, we must beg leave to make the following additions.

SACERTA, or LIZARD:

BESIDES the Watry, the Brown, the Green or Viridis, and the Tarantula, our most eminent Naturalists mention the—Cameleon—The Leo, or Lion Lizard—Squamosa, or Scaly—The Seps—and the Brazilian Lizard.

COLUBER or SNAKE.

The Conchris—of Esculapii—Cæcilia—Natrix, or ringed Snake—The Siren—Slow-worm, or Blind-worm—Hæmorrhous, or Blood Snake.

ARANEA, or SPIDER.

There are several kinds of this insect, differing slightly from each other in habits or conformation, but varying considerably in size, as may be seen in the plate, under the head of Insects without Wings.

SCORPIONS.

The Barbary Italian—and Black African, are remarkable for their malignity; but in Europe they are neither so large, nor so venomous.

C R A B S.

In the plate, under the title of Insects without Wings, are various and exact representations of the Great—Wart—Little Squall—Little Woolly—Frog—Long Clawed—Long-armed Dutch—and the Hermit Crab.

I N S E C T S.

1. Cicada, or Cricket Dragon Fly, &c.
2. Papilio, or Butterfly kind.
3. Aurelia, and Leaf Insects.
4. Tæniæ, Cafes, Worms and Flies.
5. Ephemeræ, Butterflies, Moths, and Bees. See the plates of winged insects.
6. Flies,

6. Flies, Beetles, Locusts, and Gnats.
7. Gall Insects and Water Worms.
8. Naked Insects, as the Amber—Snail—Medusa—Cuttle Fish, &c.
9. Tæniæ of the Oak—Of the Horn-bean—Of the Lilly—Of the Rose—Of the Elder—Of the Lime-tree—Of the Fig-tree, and Box, &c. &c. These are all accurately described in the plates, and may be known by mere inspection; but a particular description of each could scarcely be contained in a folio volume; and by the generality of Readers would be considered only as a disgusting prolixity.

B I R D S.

The S C O P S

IS an extremely elegant little species; it is of the bigness of a fieldfare, but has all the characters of the owl-kind in the strongest manner about it: the head is large, short, rounded, and very thickly covered with feathers; they are short, but very downy, and are of a dusky blackish-grey, or what we properly express by the term lead colour: the ears or horns, as they are called, are short, but very erect; they consist each only of a single feather, but that is very well plumed, and makes an extremely pretty appearance: the back and sides, and the covering feathers of the wings, are of a colour approaching to that of the head, but not exactly the same; they are paler, and are of a simple grey, without that admixture of the blue tinge, which gives the other what we call the lead colour. This, however, is not the sole simple colour, every feather has on it a number of elegant, round, white spots, and the whole back of the bird is by these variegated in an extremely beautiful manner: the larger feathers of the wings and tail are of the same grey with those of the back, only paler; and they are variegated with almost innumerable little white spots, disposed in several transverse series, and there is beside a long black line on each: the shoulders and upper part of the wings, in the male birds, have a beautiful cast of reddish-brown in the grey, which gives the white a yet greater advantage: on the belly the feathers are paler than any where else, and towards its lower part they are, indeed, whitish; but in these, as in all the others, the roots are black.

The eyes of this species are very large, and remarkably bright; their iris is of a flame colour: the beak is short, black, and crooked; the legs are not very robust, but they are feathered down to the toes, which makes them look thick; the plumage upon them is grey, with a tinge of reddish-brown: the toes are small and slender, they are of a greyish or lead colour; the feathering does not reach over

them, but they are squammose. It is frequent in Italy, but is not so common in any other part of Europe: it lives in woods, and sometimes about old buildings, and comes abroad only in the night, then making a loud hooting noise.

The H O O P O E or U P U P A

Is an extremely singular bird; its weight is about three ounces, but it is so thick covered with feathers, that it appears large, in proportion to that weight: the head is large, and is ornamented with an elegant crest: the eyes are small, but very bright and piercing: the beak is of a very singular figure; it is an inch and a half long, somewhat bent into the form of a bow, pointed at the end, very slender, and all over of a black colour: the nostrils are large and oval, and stand toward the base, and there runs on each side, all the way down, a longitudinal furrow: the tongue is short, and lies deep in the mouth; it is broad at the base, and pointed at the extremity, and is, upon the whole, of a figure approaching to triangular: the figure of the whole bird approaches to that of the plover.

The crest on the top of the head is extremely elegant; it is composed of a double series of feathers, two fingers breadth high, and continued from the base of the beak toward the extremity of the tail: the wings are moderately large, when expanded; they measure about sixteen inches from tip to tip, and, when closed, they reach nearly to the tip of the tail: the long feathers in each are eighteen; the ten first of these are black, with a white area on each; the succeeding ones have also a white area on them, and the tips and edges of some of the last are reddish.

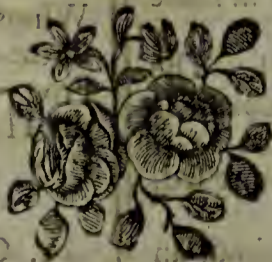
The back is very elegantly variegated with black and white, in little alternate spaces on every feather: the legs are short, and not very robust; the toes are moderately long: the outer toe is connected to the middle one, some part of the way down, without the help of a membrane; the claws are moderately long and sharp.

This bird is a native of the northern parts of Europe, but is no where very plentiful. It had been long known in Germany and Sweden, before it was supposed to be a native of England, and several of our old writers declare it not to be such.

Q U A D R U P E D E.

Z E R D A.

THIS animal, according to M. Buffon, is found to the south of the Palus Tritonides, in Libia. It has something of the nature of the Hare, and something of the Squirrel. It lives on the palm-trees, and feeds on the fruits.



I N S E C T S

G A L L I N S E C T S

Of the Oak



Kermes



Of the Peach Tree
Nat. Size



Nymph & Case

Shell Gall of the Elm



Flies



Of the Vine



Boat Gall, Nymph & Case



Swallow's nest Fly



Nat. Size

P. R O G A L I N S E C T S O f t h e E l m



with & without the Cotton

Nat. Size

FORMICA LEO



Nat. Size

C o c h i n e a l



W A T E R W O R M S



Red



Shining Canada

Pencil-tail'd

Rat-tail'd & Flies



Hexapode of the Libella



Brown jointed & Flies



Nat. Size

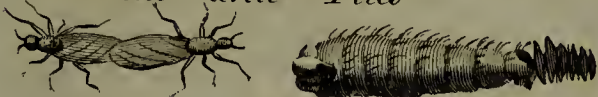
Bastard Caterpillar of the Bramble



T I P U L A a n d N Y M P H



Aurelias and Flies



Prickly Caterpillars

Nat. Size

Nat. Size

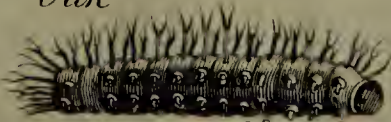
Bastard Caterpillar of the Rose & Flies



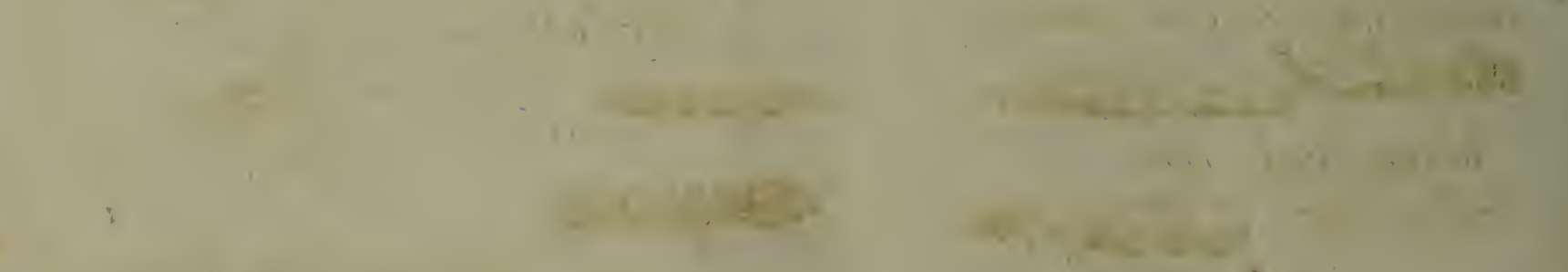
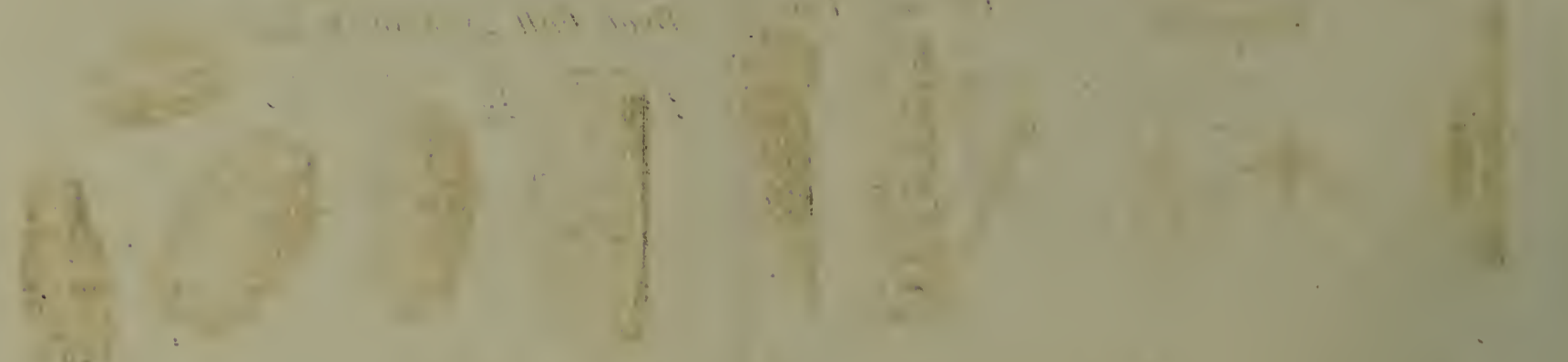
Plumb Tree



Oak



Smith sculp.



I N D E X.

Q U A D R U P E D S.

ANIMALS, FOUR-FOOTED, OR QUADRUPEDS,
history and description of them - Page 5

A.

A I, or sloth, described	93
Aguti, the West Indian and Brazilian rabbit	81
Animals, with an undivided hoof	8
— of the ruminating kind	18
— of the beeve kind	ib.
— of the sheep and goat kind	25
— of the deer kind	36
— of the hog kind	46
— of the monkey or ape kind	51
— of the camel kind	59
— of the dog kind	61
— of the cat kind	67
— of the weasel kind	74
Angra, or wild afs	17
Angola, or Guinea sheep	28
Ant-eater, or ant-bear	96
— the little—and lesser	ib.
Antelope, with its numerous varieties	31
— the common, the blue, the guiba, the algzal, and the Indostan	32
— the white-footed, the swift, the striped, the Chinese, the Scythian, and the Se- negal	33
— the bubalus, the African, the Indian, the kevel, or flat-horned, the white- faced, the springing, and the trage- laphus, or Siberian goat	34
— the chevrotin, little Guinea deer, or royal, and the pazan, or bezoar	35
Ape, the pigmy kind described	52
— the long-armed, the magot, or Barbary, the tufted, and the simia porcaria	52
— the sea ape described	101
Armadillo, an animal armed with a shell	94
Afs (the) its Natural History	15
Axis, a kind of deer	39

B.

Baboon, and its varieties	53
— the little, pig-tailed	ib.
Barbary-cow, or zebu, described	23
Badger, its Natural History	73
Barbastelle, of the bat kind	104
Bat, and its numerous varieties, the long-eared, the great bat of Madagascar, and the vam- pire, or South American	103
— the javelin, the leaf, the cordated, the Peruvian, the bull-dog, the Senegal, the bearded, the striped, the horse-shoe, and the noctule	104
Beeve kind of animals	18
Beeve-hog described	23
Bezoar, a concretion or stone found in the intes- tines of the bezoar-antelope	35
Beagle, species of the hound	62
Bear, its Natural History	72
— the brown, the black, the great, Greenland, or white	72

No. 59.

Beaver, its description	Page 81
— the musk, and long-nosed	82
Betunga, of the seal kind	102
Bison, a beeve with the-horns turned upwards, and a bunched back	22
Boar, its Natural History	46
— wild one described	47
Bonafus, a particular kind of beeve	22
Bofs-Indicus, an ox of India	21
Bubulus, by some called the buffalo; others place it among the gazelle kind. See Buffalo, Ga- zelle, and Antelope.	
Buffalo, with its varieties	23
Bull, its Natural History	19
Broad-tailed sheep	23
Brazilian Guariba, of the monkey kind	55

C.

Cagui, or little lion-monkey	56
Callitrix, or green-monkey	55
Camelo-Pardalis, generated between a camel, and a leopard	46
Camel kind of animals	59
Camel, the Turkman and Arabian, described	ib.
— the bactrian, the Chinese, and the sheep	ib.
Carcajou, of the cat kind	72
Cavy, the Guinea, or Indian pig	78
— the rock, the spotted, the long-nosed, the cape, and the musk	79

CAT kind of ANIMALS, as the

Cat, its Natural History	67
— the wild	ib.
— the angora	71
Catus Pardus, or Cat-a-Mountain	72
— the flying or sailing squirrel	87
Cayopolin, of the opposum kind	58
Civet, of the weasel kind	77
— the perfume so called	ib.
Citille of the rat kind. See Rat.	
Coaite, or four fingered monkey	55
Conepate, or stifling-weasel	77
Coquallin, or Brazilian squirrel	86
Couando, or Brazilian porcupine	83
Coagar, or red tyger	71
Cow, its Natural History	20
Chamois, or shammy goat	30

D.

Deer kind of animals	36
Deer (red) an account of them	38
— spotted axis	39
— fallow	40
— moose	41
— rein	42
— the Virginian	44
— the porcine, the Mexican, the grey, and the hippelaphus, a kind of elk	45
Douc, or large monkey of Cochin-China	55
Dog kind of animals	61
Dog, Natural History of its numerous varieties	ib.
— the shepherd's, setting, and lap	62

7 N

Dog,

Dog, the Danish, mastiff, bull, rabbit, lap, small
 Danish, harlequin, cur, and shock Page 63
 — the Turkish and lion - - 64
 Dormouse described - - 86
 Dromedary, its Natural History - - 59
 Dugon, or morse - - 97

E.

Elk, an animal of the buck kind, its Natural History - - 41
 Elephant, its description - - 50
 Ermine, or stoat, account of it - - 75
 Encoubert, or the Armadillo - - 95

F.

Ferrit, its description - - 75
 Feuille, or leaf-bat - - 104
 Finder, or water-spaniel - - 62
 Fizzler, of the weasel kind - - 77
 Fiber, the beaver - - 81
 Fourmillier, or ant-eater. See Anteater.
 Fox, its Natural History - - 65
 — the greyhound, the mastiff, the cur, the brant, and the grey - - ib.

G.

Gazelle, or antelope, its Natural History - - 31
 Genet, of the weasel kind - - 77
 Gerbua, Egyptian or Pharaoh's rat, of the monkey kind - - 57
 Gibbon, or long-armed ape - - 52
 Goat, and its numerous varieties - - 29
 — of Natolia, long-eared Syrian, American, the blue, the Indian, or whidaw, &c. &c. 29
 Guanacoes, or camel sheep - - 60
 Gulo, or glutton. See Glutton.
 Guinea, or Angolan sheep - - 28
 — pig, or cavy - - 78
 Giraffe, or camelo pardalis. See Camelo Pardalis.
 Glutton, its description - - 73
 Greyhound, English, Spanish, Oriental and Irish 63

H.

Hare, its Natural History - - 79
 Harrier, species of the dog kind - - 62
 Hartshorn, its nature and uses - - 39
 Hedge-hog, its description - - 92
 — the tendrac, or Asiatic; the tanrec, and Gujana - - 93
 Hippelaphus, a kind of elk - - 45
 Hog kind of animals - - 46
 Hog, descriptive account of it - - ib.
 — the Guinea, the Chinese, the Peccary, or Mexican, the Ethiopian, babyrouessa or Indian, the cabiai or capibera - - 48
 Hog-Rabbit, or spotted cavy - - 79
 Hog-Cow, or beeve-hog - - 23
 Hound, of the dog kind - - 62
 — the gaze, and blood - - 63
 Horfe, its Natural History - - 8
 — the sea - - 49
 Hippopotame, or sea-horse - - ib.
 Hyæna, of the wolf kind - - 66

I.

Jackall, or lion's provider - - 66
 Jaguara, the panther - - 70
 Jerboa, or oriental mouse. See Mouse.
 Ibex, a kind of wild goat - - 30
 Ichneumon, or the rat of Pharaoh - - 76
 Indian-pig, or cavy - - 78
 Ifatis, of the dog or fox kind - - 66

K.

Kangaroo, see the plate

L.

Lacktach, or great Kamptschatkan seal Page 99
 Llamas, or camel sheep - - 60
 Laplanders, their manner of life - - 44
 Leopard, its Natural History - - 70
 Leymer, of the dog kind - - 63
 Lion, its Natural History - - 68
 Loris, or tail-less macauco - - 57
 Le Loir, or the fat squirrel - - 86
 Le Petit Gris, or the grey squirrel - - ib.
 Lynx, its Natural History - - 71

M.

Maimon, or pig-tailed baboon - - 53
 Macauco, its Natural History - - 56
 — the woolley, the black, the tail-less, the yellow, the flying - - 57
 Manati, of the seal kind - - 100
 Manis, the phatagin, or scaly lizard - - 95
 — the short-tail or pangolin - - ib.
 Mandrill, of the baboon kind - - 53
 Mantegar, or tyger. See Tyger.
 Many-horned sheep - - 28
 Mangabey, or white eye-lid monkey - - 55
 Marapute, or ferval, of the cat kind - - 72
 Marikin, or filky monkey - - 56
 Marmose, of the opposum kind - - 58
 Martin, its description - - 76
 Marmotte, its Natural History - - 83
 — the Maryland, Quebec, German, casan, Lapland, and earless - - 84
 — the minor, podolian, and Circassian 85
 Mexican ounce, or tyger-cat - - 71
 Mastiff dog described - - 63
 Mico, of the monkey kind - - 56
 Mole, its Natural History - - 91
 — the Siberian, radiated, brown, and red 92
 — methods used to take and destroy this animal - - ib.
 Mongooze, or woolley macauco - - 57
 Monkey, or ape kind of animals - - 51
 — its Natural History - - 53
 — the dog-faced, lion-tailed, hare-lipped, spotted, green, white eye-lid, talapoin, negroe, Chinese, varied, large of Cochinchina, tawny, winking, goat, and the four-fingered - - 55
 — the weeper, the orange, horned, Antigua, fox-tailed, great eared, marikina or filken, little lion or cagui, red-tailed, and the mico - - 56
 Morfe, or wolrus, of the seal kind - - 97
 — the Indian - - ib.
 Moose-deer - - 41
 Moufflon, a species of sheep - - 28
 Mouse, the common described - - 89
 — the long-tailed field, short-tailed field, harvest, oriental, gregarious, shrew, water-shrew, minute-shrew, murine-shrew, brasilian, and Mexican-shrew - - 90
 Moschifferum, or musk. See Musk.

N.

Nuna, or varied monkey described - - 55

Ocelot,

O.

Ocelot, or tyger-cat - 71

Onager, or wild afs - ib.

Oppoffum, and its varieties - 57

Otter, its Natural History - 78

— the leffer, fea - ib.

Ounce, a descriptive account of it - 71

Ourang-Outang, or wild man of the woods - 52

Ox, Natural Hiftory of this animal - 20

P.

Pacos, or camel sheep - 60

Pangolin, or fhort-tailed manis - 95

Panther, its Natural History - 70

Pica, or paca, the brasilian rabbit - 81

Pipiftrille, of the bat kind - 104

Pinche, the little lion monkey - 56

Pole-cat, its description - 75

Porcupine described - 82

— the long-tailed, Brasilian, Canada, and crested - 83

Potto, a fpecies of the floth - 94

Pointer, of the dog kind - 62

Phalanger, of the oppoffum kind - 58

Phatagin, or manis - 95

Puma, or red tyger - 71

Q.

Quickhatch, or the glutton - 73

R.

Rabbit, its Natural History - 80

— the Angora and Ruffian - ib.

— the Brasilian, baikal, and Cape - 81

Racoon, its Natural History - 73

Ram described - 25

Rat, the common or black - 87

— the Norway - 88

— the Water - 89

— methods used in destroying this pernicious animal - 88

— of Surinam, of the oppoffum kind - 58

— of Pharaoh, or the Ichneumon - 76

Rein-Deer, its Natural History - 42

— its formidable enemies - ib.

— particular ufes - 43

Rhinoceros, and the unicorn ditto, its description - 49

Renard Argente, or silver fox - 66

Roebuck, its description - 40

Roufette, or the great bat of Madagafcar - 103

Ruminating animals - 118

S.

Sai, or weeper monkey - 56

Sajou, of the monkey kind - ib.

Sable, an account of thefe animals and their furs - 76

Sheep, Natural History of its varieties - 25

— the weather and ewe - ib.

— the broad-tailed, many horned, Angolan, or Guinea, moufflon, and ftrepficheros - 28

Shammoy goat - 30

Sheep kind of animals, and the goat - 25

— how to be treated, and when to be fheered - 26

Samiri, or orange monkey - 56

Saki, or fox tailed ditto - ib.

Sapajou, or horned ditto - ib.

Sloth, its Natural History - 93

Spaniel, of the dog kind - 62

Squirrel, its Natural History - Page 85

— the Ceylon, Bombay, the grey, black, varied, Brasilian, ground, fat, garden - 86

— failing and flying - 87

Shunk, of the weafel kind - 77

Squafh, ditto - ib.

Stoat, or ermine - 75

Stag, or Hart, its Natural History - 36

— manner of hunting this animal, or the nature of the chace - 38

Stags of different countries described - 39

— their horns, to what ufes applied - ib.

Seal, and its varieties - 97

— the great, or fea calf, hooded, harp, little, and the urline, or fea bear - 99

Sea horfe, or fea lion - 100

Sea ape described - 101

Serotine of the bat kind - 104

Serval, a ferocious animal of the cat kind - 72

Simia Porcuria, a fpecies of the ape - 52

Siagufh, of the cat kind - 71

Sow described - 49

Suber, or bifon - 22

T.

Tajacu, the Mofchifferum. See Musk.

Talapoin, of the monkey kind - 55

Talgoi, the ant bear - 96

Tapiir, of the hog kind - 50

Tatoa, or Armidillo - 94

Tatu Apará ditto - 95

Tatuette ditto - ib.

Taupedoree, or the golden mole - 92

Terrier, of the hound kind - 63

Tucan, or Mexican fhrew moufe - 90

Turpier, of the oppoffum kind - 58

Tyger - 69

U.

Urfon, or Canada porcupine - 83

Unan, or floth - 93

V.

Vari, or black macauco - 57

Vacuna, or camel sheep - 60

W.

Walrus, or morfe, of the feal kind - 97

Wanderow, a fmall baboon - 53

Warine, of the monkey kind - 55

Weafel kind of animals - 74

Weafel, its description - ib.

— the Guinea - 76

— the ftiffing - 77

Weather sheep - 25

Wild man of the woods - 52

Wifent, or bifon - 22

Wiftiti, of the monkey kind - 56

Wolf, its Natural History - 64

Wolverene, or glutton - 73

Z.

Zebu, or Barbary cow - 23

Zebra of the Cape of Good Hope, a descriptive account of this animal - 23

Zorilla, of the weafel kind - 77

Zibet, or civet ditto - ib.

Zerda - 600

B I R D S.

BIRDS, A NEW and COMPLETE HISTORY of them - Page 110

A.

A UK, of the Penguin kind - 187
 Albatross, its Natural History - 185
 Anas Circa, or summer teal - 194
 Arracanga, or great macaw - 148
 Aracari, of the woodpecker kind. See Woodpecker:
 Asio, or lesser horn owl. See Owl.
 Atinga, of the starling kind. See Starling.
 Avosetta, or scooper - 181
 Aquila Pombina, or the leaden eagle - 115

B.

Barnacle, of the goose kind - 190
 Bee eater described - 197
 — of Bengal - ib.
 Beccafigo, or petty chaps - 165
 Black game - 134
 Blackbird, its Natural History - 156
 Black cap, of the swallow kind - 165
 Blue bird described - 156
 Brambling, its Natural History - 170
 Bittern, its description - 178
 — the North American, small and little - ib.
 Bird of Paradise, its Natural History - 143
 — the king, greater, and golden - ib.
 — the pied, and Ceylon - 144
 Birds of the hawk kind - 110
 — of the poultry ditto - 127
 — of the pie ditto - 137
 — of the sparrow ditto - 154
 — of the crane ditto - 174
 — of the water fowl ditto - 183
 — of the penguin ditto - 186
 Bunting described - 171
 Bustard (the little) described - 134
 Butcher bird (the greater) - 123
 — the lesser, and red backed - 124
 Buzzard (the common) described - 122
 — the honey, Turkey, and Moor - ib.

C.

Calao, or horned Indian raven - 139
 Chatterer described - 140
 Chaffinch - 170
 Canary bird, its Natural History - 162
 — directions for choosing a songster - ib.
 — ditto for breeding this kind of birds, - ib.
 Crane, its description - 174
 — the balearic - 175
 — the Numidian, or buffoon, hooping, jabiru, guacu, and the anhima - 176
 Cross bill described - 199
 Crow, its Natural History - 138
 — Royston - 139
 Cockatoo, its Natural History - 149
 Cocolzin, the Indian turtle - 153
 Cormorant described - 185
 Cole mouse, of the titmouse kind. See Titmouse.

Coot, its Natural History - Page 182
 — footed tringa - 194
 Cock, and its varieties - 128
 — the Bantam, the Hamburgh, and pea, of the wood, black, and the moor - 134
 Condor, or Condour, of South America, its description - 116
 Cuckoo, its Natural History - 144
 Curlew described - 181
 Caracias, or caracara. See Caracara.
 Caracara, of the hawk kind. See Hawk.
 Corvus Aquaticus, the sea crow. See Crow.
 Charadrius, the green plover. See Plover.

D.

Daker hen, of the quail kind. See Quail.
 Demoiselle, of the crane kind. See Crane.
 Diver, great northern - 187
 — grey speckled - ib.
 Didapper, of the diver kind. See Diver.
 Dobchick, or didapper. See Diver.
 Dodo, its description - 113
 Drake (the shell). See Duck.
 Duck, its Natural History - 190
 — tame, male or drake, mallard, eider, wild, sea, pond, and foreign - 191
 — decoy, velvet, tufted, scaup, pintail, grey headed, white bellied of Jamaica, and Barbary - 192
 — the Madagascar, and Bahama - 193
 Dunbird, or pochard, of the duck kind - ib.
 Dundiver, female of the goofander - ib.
 Dunlin, of the crane kind - 182

E.

Eagle (the golden) described - 113
 — bald, ring tail, sea, and the black - 115
 — crowned, common, white, rough footed; Jean le Blanc, Brazilian, Oroonoko, and of Pondicherry - 116
 Emigration of water fowl - 197
 — of British birds - 198
 Emu, its Natural History - 112

F.

Falcon, its Natural History - 119
 — the gyr, peregrine, facre, mountain, grey, and gentle - 120
 — white, Tunis, or Barbary, and the lanner - 121
 Falconry, or hawking, observations thereon - 119
 Fieldfare, its description - 156
 Finch, the green, described - 169
 — the gold, the chaf - 170
 Flamingo, its Natural History - 179
 Fly catcher (the) of the swallow kind - 165
 — the blue - ib.
 Fulmar, its description - 195

G.

Gadwall, of the duck kind - 194
 Game laws, remarks on them - 135
 Gannet

Gannet, its description	-	Page 186
Garganey, of the duck kind	-	194
Goatsucker, or swallow with an undivided tail	-	165
Godwit, its description	-	181
—— red, lesser, great American, and the white North American	-	ib.
Golden eye, of the duck kind	-	193
Goldfinch described	-	169
Goosander	-	193
Goose hawk	-	121
Goose, its Natural History	-	186
—— wild, tame, green	-	ib.
—— Spanish, and white footed	-	189
—— brent or brand, Canada, North American, Muscovy, blue winged, barnacle, mountain, and water	-	190
—— swan	-	188
Grebe, its description	-	183
—— white, dusky, and the little	-	ib.
Greenfinch	-	169
Greenshank, spotted and red	-	182
Grouse, its Natural History	-	134
Grosbeak (the)	-	199
Guillemot, of the penguin kind	-	187
Gull, its Natural History	-	186
Grus (the crane) described	-	176
Grus Balearica	-	175
Guinea hen. See Hen.		

H.

Hazel hen. See Hen.		
Halcyon, or king fisher	-	195
Heath cock, and black game	-	134
Hawk (the sparrow) &c.	-	123
Hedge-sparrow, its description	-	165
Hen, female of the cock	-	128
Hen harrier, the male buzzard	-	122
—— Guinea	-	133
Heron, its Natural History	-	177
—— the crested, egret, or great white, lesser white, little white, and yellow and green	-	178
Himantopus, of the plover kind. See Hen.		
Hobby, of the hawk kind	-	123
Hoopoe. See the Appendix	-	600
Humming-bird, and its varieties	-	173
—— larger, long tailed, black capped, lesser, little, black bill, green, and ash coloured	-	ib.

I.

Jacupema, or the pheasant	-	132
Jackdaw	-	139
Jay, its Natural History	-	140
—— the blue, and Bengal	-	ib.

K.

Kestrel, of the hawk kind	-	123
King fisher, its Natural History	-	195
—— American, little green and orange coloured	-	196
—— of Catesby, of the River Gambia, Smyrna, Bengal, Small of ditto, and querbatos	-	197
Kite, its description	-	121
Knot, of the crane kind	-	182

L.

Lagopus Greenland pigeon. See Pigeon.		
Elamysden, the merlin hawk	-	123
Lapwing, of the crane kind	-	182
Lark (the) and its varieties	-	160
—— sky, and wood	-	ib.
—— white, tit, crested, lesser crested, lesser field, red, black, grasshopper, willow, and petit, or, little	-	161

Linnet, its Natural History	-	Page 171
—— red-pole, or greater, and red-headed	-	ib.
—— lesser red-headed, and twite, or mountain	-	ib.
Loon (the greatest) of the diver kind. See Diver.		
Lory, of the parrot kind	-	148

M.

Maccaw, its Natural History	-	148
—— blue, yellow, great and Brasilian	-	ib.
Magpie described	-	139
Martin, its description	-	164
Mavis, or song thrush	-	157
Merganser, of the dobchick kind. See Dobchick.		
Merops, the bee-eater. See Bee-eater.		
Merlin, of the hawk kind	-	123
Merula, or red start	-	159
Migration of British birds	-	198
—— of water fowl	-	197
Mitu Porangu, of the pheasant kind. See Pheasant.		
Mock bird, the American	-	158
—— nightingale, or black cap swallow	-	165
Moor cock, its Natural History	-	134

N.

Nauseous bird, a name given by the Dutch to the dodo	-	113
Nazareth (bird of) or the dodo	-	ib.
Nightingale, its Natural History	-	158
Nuthatch described	-	198

O.

Oriolus, of the thrush kind. See Thrush.		
Osprey, its Natural History	-	110
Ostrich	-	115
Ouzel, its description	-	158
—— water, Indian, and the Brasilian	-	ib.
Owl, its Natural History	-	125
—— great, horned or eagle, lesser horned, white, brown, and the little	-	126
Ox-eye, or great titmouse	-	172

P.

Parrot, its Natural History	-	145
—— the white crested, and white headed	-	146
—— green, bluish green or black billed, red, blue, scarlet, oriental, ash coloured, red and white, blue faced green, green and red	-	147
—— hawk headed, and the diminutive green	-	ib.
—— dusky, and white breasted	-	148
—— Paragua, and tarabe	-	149
—— black capped lory, and long-tail scarlet lory	-	148
—— little, of Bontius	-	149
Paradisæa, or bird of paradise	-	143
Parroquet, or toe lory	-	149
—— red breasted, long tailed green, golden crowned, rose headed green, and the little red headed	-	ib.
—— little green and blue	-	150
Partridge, its Natural History	-	135
—— red, Hudson's Bay, mountain of Jamaica, of Hernandez, of Damascus, and the red of Aldrovandus	-	136
Passer Indicus, or Indian sparrow	-	169
Peacock, its Natural History	-	130
Pea-hen	-	ib.
Pettychaps described	-	165
Penguin	-	186
—— the Magellanic	-	ib.

F I S H E S,

NEW NATURAL HISTORY and DESCRIPTION of FISHES	Page	Page
	200	
A.		
A NCHOVY, its Natural History	243	
the golden	ib.	
Angel fish described	212	
Angler, his qualifications	287	
his rods, lines, and other sorts of tackle	ib.	
some particulars not generally known	295	
rules and cautions for a young angler	ib.	
Angling, directions for and containing the whole art of float and fly fishing, the best rules for the choice of tackle, with a description of natural and artificial baits	287	
Ape (the sea) described	213	
Argentine, its Natural History	240	
B.		
Baits (natural and artificial for angling)	289	
Barbel, its description	244	
instructions to angle for them	ib.	
Bass, its description	230	
Bib, or blind	223	
Blanny (the crested)	224	
the smooth, spotted, and viviparous	225	
Bleak, its Natural History	248	
manner of whipping for it	ib.	
Blind, or bib, described	223	
Bream, its Natural History	245	
method of angling for it	ib.	
(the sea)	228	
Bret, or turbot	227	
Bull-head, its description	225	
Burbot, or eel pout	224	
C.		
Cachalot, its Natural History	204	
the great headed, round headed, and high finned	205	
Carp, its description	243	
the pond and river	ib.	
methods of angling for them	ib.	
Charr, its Natural History	237	
the gelt, or barren	ib.	
Caviare, of the sturgeon kind	214	
Chub, its description	247	
how taken by dibbing	ib.	
Cockles described	252	
Cod fish, its Natural History	221	
manner of salting them	ib.	
principal fisheries	ib.	
Coal fish, described	223	
Cook (the)	229	
Cock paddle, or lump fish	216	
Conger eel, its description	219	
Crab fish, its Natural History	249	
the violet, and soldier	250	
the white, sea, square, South American, Indian, land, &c.	ib.	
Craw fish, described	249	
Crustaceous fish	248	
D.		
Dab, its Natural History	226	
Dab, the smeare	226	
Dace, or dare	247	
how to angle for them	247	
Doree, or gilt fish	225	
Dog fish, or canis charcarias	212	
Dolphin, its description	205	
Dragon fish described	220	
the small	ib.	
E.		
Eel, its Natural History	218	
the electrical, bed, silver, common, torporific, conger, sand	219	
launce	220	
pout, or burbot	224	
F.		
Father lasher, or sea scorpion	224	
Fire flare, or sting ray	211	
Fishes of the cetaceous kind	202	
of the cartilaginous ditto	207	
of the spinous ditto	216	
of the oyster ditto	252	
Flounder, its Natural History	226	
Flying fish	241	
Float and fly fishing, the art of	289	
Fly fishing	291	
Fork tails, of the salmon kind	232	
Fox (the sea)	213	
Frog fish, or fishing frog	212	
G.		
Gilt fish, or doree	225	
Gilt head, or gilt poll	228	
Gold fish described	248	
Grampus, its Natural History	205	
Grayling, or umbrae	237	
Grey, a species of salmon	234	
Grigs, or gluts (silver eels)	219	
Groundling, or tub fish	232	
Gudgeon, its description	245	
manner of angling for them	ib.	
Gudgeon (the sea)	225	
Guiniard described	238	
Gurach, or the old woman	229	
Gurnard, the grey	231	
the red	ib.	
Gymnotus (electric) of the torpedo kind	209	
H.		
Haddock, its Natural History	222	
Hake, its Natural History	223	
the lesser	224	
Herring, and its varieties	241	
the flat, meat, night, pluck, shotten, cop- shen, and the pickled herring	242	
fishery	241	
Huso germanorum, of the sturgeon kind	214	
Hollibut (the) described	226	
I.		
Jaculator, or launce fish	220	
Introduction to spinous fishes	216	
Isinglass, of the salmon kind	215	
Lamprey,		

Wraffe, or old wife - Page 228
 — the painted, black, striped, and variegated 229
 — the lesser green - ib.

N. B. Besides the above, there are several other fishes: but many of them being the same with those we have described, only under different

names, or imaginary ones, or minute distinctions of a particular species, we must refer our Reader to the plates, where they will see them accurately portrayed. To give a particular account of these might, perhaps, gratify the taste of over curious speculators, but it would be foreign to our design, and extend this Work far beyond its prescribed limits.

R E P T I L E S and I N S E C T S.

The NATURAL HISTORY of REPTILES and INSECTS - Page 254

A.

AMMODITES of Ceylon, an account of them - 265
 Amphibæna - 266
 Ant-lion described - 276
 Asp, its Natural History - 267
 Aurelia. See Silkworm:

B.

Bee, its Natural History - 277
 — generation, polity, and labour of this insect 278
 — usual method of uniting swarms of bees - ib.
 — how to get their honey without destroying them - 279
 Blind worm described - 267
 Boiguacu, its Natural History - 266
 Bug described - 274
 Butterfly, its Natural History - 276

C.

Cameleon, its Natural History - 258
 Caterpillar described - 276
 Centipede, or gally-worm - 275
 Cobradi Capello, or hooded-serpent, described - 267
 Cobra de Veado, or boiguacu - 266
 Coral serpent - 267
 Coralines, and plants, at the bottom of the sea - 286
 Cricket, its Natural History - 276
 — mole ditto - ib.
 Crocodile, its Natural History - 258
 Cuckow-spit, of the worm kind - 283
 Cuttle fish, of ditto - ib.

D.

Double-headed serpent - 266
 Dragon-fly described - 275

E.

Earwig described - 276
 Ephemera - ib.

F.

Flea, its Natural History - 269
 — water ditto - 275
 Fly (the common) - 276
 — the Ichneumon - 280
 — the dragon - 275
 Frog, its Natural History - 254
 Froth insect - 276

G.

Gally-worm, or Centipede - 275
 No. 60.

Gerenda described - Page 265
 Giboya, the Brasilian serpent - ib.
 Gnat, its description - 280
 — different species of them - 281
 — its extraordinary propagation, and circumstances of life - ib.
 Grafshopper, its description - 276

H.

Hooded serpent described - 267
 Hornet, its Natural History - 280

I.

Jaculus, of the serpent kind - 267
 Ichneumon fly - 280
 Iguana, its Natural History - 262
 Insects, their Natural History, describing their different orders, and a suitable introduction - 267

L.

Leach, its Natural History - 275
 — the common, horse, snail, and broad-tailed - ib.
 Libella, or dragon fly - 275
 Lion (the ant) - 276
 Lizards, a general account of them - 257
 — the crocodile, iguana, and the viviparous - 258
 — the scaly, watry, green, and brown - 261
 — tarantala, taraquina, or Brasilian - 262
 Louse, its description - 269
 — wood ditto - 274

M.

Monoculus, or water flea - 275
 Moth, its description - 277

N.

Natter Jack described - 257

O.

Old Wife, its Natural History - 228
 Opah described - ib.
 Owl (the sea) - 216
 Oyster, and its various species - 252

P.

Pipal, or Surinam toad - 257
 Polypus, of the worm kind - 280
 — its different kinds - 284
 — properties of the polypi, and their surprising manner of propagation - 285

R.

Rattlesnake, its Natural History - 266
 Salamander,

S.

Salamander, its Natural History	Page 260
Scolopendra described	275
Scorpion, its Natural History	ib.
—— the water	276
Seps, of the serpent kind	267
Silk-worm, its Natural History	277
Snake, its description	267
Spider, its Natural History	268
Sponges and plants at the bottom of the sea	286
Star fish, &c. of the worm kind	283

T.

Tarantula, its description	268
Tipula, the water	276
—— the long-legged	280
Toad, its Natural History	255
—— Surinam	257

V.

Viper, its Natural History	263
—— antidotes against its bite	264

Viper, a particular remedy for ditto	Page 265
—— of Javan and Ceylon	ib.

W.

Wasp, its Natural History	279
Whip-snake described	267
Worms, their Natural History	281
—— sea and water	282
—— earth, small red headed, white water, &c.	ib.

Z.

Zoophites (the first class of worms)	281
--------------------------------------	-----

N. B. It is impossible to enumerate in the compass of this Index, calculated more to instruct and please the lovers of public utility, than the amateurs of useless curiosity, all the infinite orders and species of insects.—Of the Butterfly alone, Linnæus has reckoned above *Seven Hundred and Sixty*; and Mr. Ellis *Fifty* different kinds of Polypi: Therefore, to complete our Catalogue, under this head of Reptiles and Insects, we refer the more curious Readers to the Plates illustrating this Work.

B O T A N Y.

Containing the NATURAL HISTORY of VEGE-TABLES, as well foreign as indigenous: their roots, barks, woods, leaves, flowers, fruits, seeds; resins, gums, and concreted juices; with an account of their virtues, and medicinal uses: also the method of cultivating those planted in gardens; including likewise observations on hot-beds, and watering of plants 296
See also the Appendix for the Natural History of FLOWERS, according to the Linnæan system, &c. 591

A.

Absinthium vulgare, common wormwood	319
—— maritimum, sea ditto	ib.
—— Romanum, Roman ditto	ib.
Abutilon. See the Appendix, under the head of Botany.	
Acacia vera, true acacia	317
Acajous, or cajous, the cashew nut	310
Aconitum, monk's-hood	299
Acorus verus, sweet smelling flag	ib.
—— Indian	ib.
Acanthus, brank urfine	319
Acestofa, common sorrel	ib.
Adiantum verum, the true or French maiden-hair	ib.
Agallochum, aloes wood	305
Agaricus, agaric	318
Agnus castus, the chaste tree	320
Agrimonia, agrimony	ib.
Agrimony (hemp)	338
Alcea, vervein mallows	320
Alchimilia, ladies mantle	ib.
Allium, garlick	ib.
Alnus, the alder tree	ib.
Althæa, marsh mallows	ib.
Aloes, the succotrine, hepatic, and caballine	316
—— wood	305
Allspice, or pimenta	309
Amygdalus, the almond tree	321
—— amara, the bitter ditto	ib.
Amber (liquid)	312
Amomum verum, the true amomum	309
Ammoniacum, gum ammoniac	316

Anagallis mas, male pimpernel	321
Anethum, dill	ib.
Anemone (wood)	366
Anime, vel-animum	313
—— American gum anime	ib.
Angelica	299
Anisum vulgare, anise	321
—— Indicum stellatum	312
Anonis, five onnis, rest harrow	321
Apararine, goose-grass, or clivers	ib.
Apium montanum, or mountain parsley	356
Appium palustre, smallage	322
Apple tree	347
—— its varieties	348
Apricot tree, and its various kinds	322
Apple (the bitter)	308
Aquilegia, columbines	322
Arrach	323
Arbor Judæ, Judas's tree	373
Arbotanum, southernwood	318
Arbutus, the strawberry tree	382
Argentina, silver weed, or tansey	322
Aristolecha rotunda, round birthwort, and various other kinds	300
Armeniaca malus, the apricot-tree	322
Artemisia, mugwort	ib.
Artimoak	ib.
Arun, cuckow pint, or white robin	ib.
—— the many leaved, or dragons	336
Asa foetida, a kind of gum resin	ib.
Asrabacca	323
Aarum	ib.
Aselepias, swallow wort	ib.
Asparagus, called sparrow-grass	ib.
Atriplex foetida, arrach	ib.
Auricula Judæ, Jews-ear	318
Aurantia malus, the orange tree, and its numerous varieties	323

B.

Balm	351
—— of Gilead	312
Balanus myrepica	310
Balsamine, five noli metangere	355
Balsamum	

Balsamum Peruvianum, balsam of Peru, and other varieties	Page 312	Carrot (the candy)	Page 336
Barberry tree	324	Carlina, or chamælion albus	300
Bardana, bardock	ib.	Casumunar, or Indian root	ib.
Barks, their Natural History	304	Cassia lignea, woody cassia	304
Bdellium, a gum resin	316	— caryophyllata, the bark of a tree, called clove berry tree	ib.
Bay tree	345	Cascarilla, the grey Peruvian bark	305
Balaustia, balaustines	348	Carica, dried figs	308
Beans, Windsor and other sorts	338	Cassia fistularis, the pudding pipe tree	ib.
— buck	350	Cardemomum, cardemum	309
Beccabunga, brook lime	324	— the middle sized, of Matthiolus, and the greater of Bontius	ib.
Bella donna, deadly nightshade	ib.	Caryophilli, aromatic cloves	310
Bellis major, the greater, or ox-eye daisy	ib.	Caranna	314
— minor, the common daisy, with its varieties	ib.	Castanea, the chefnut	330
Behen, red and white	300	Catechu, Japan earth	317
Benzonium, Benjamin	313	Cauliflower	326
Berula, water parsnip	324	Centaurium majus, the greater centaury	330
Beta, beet	325	— the lesser	ib.
— white, red, and turnep rooted	ib.	Cepa, the onion	ib.
Betonica, betony	ib.	Carthamus, bastard saffron	311
Betony (water)	373	Chamæcy parissus, lavender cotton	318
Bilberry, or wertle	380	Chamædris, ground oak	331
Bindweed (greater)	374	Chamælion albus of the shops	300
— small ditto	375	Chamæmelum, camomile	331
Birthwort, and its varieties	300	Chamæpitys, ground pine	ib.
Bird's foot	357	— moschata, musk ditto	ib.
Bistorta, snake weed	325	Cherry-tree, and its different kinds	330
Blackberry	369	Cherry, the winter	320
Bluebottle	335	Chaste tree	ib.
Bonus Henricus, the English herb mercury	325	Chefnut tree	330
Boletus Cervinum, deer's balls	318	Cheiri, the wall flower	33
Borrago, burrage	325	Chelidonium, celandine	it
Box tree, and its varieties	327	— minus, pile wort	ib.
Brassica, cabbages, and their varieties	325	Cheese rennet	34
— cauli flora, the cauliflower	326	Christ's thorn	35
— fimbriata, broccoli	ib.	China tree	300
Broom	340	— the American	ib.
— butcher's	370	Chocolate nut	310
Broccoli	326	Ciboule, or cepula	ib.
Brooklime	324	Cicily (sweet)	353
Bryonia alba, white bryony	326	Cichorium, wild succory	332
Bramble (common)	369	Cicuta, hemlock	ib.
Buckthorn (purging)	367	Cinnamomum, cinnamon, the second bark of a tree called canella zeylanica	304
Bugula, bugle or confound	327	Cinara hortensis, the artichoak	332
Buglossum, garden bugloss	ib.	Citreum, the citron tree	333
Burdock	324	Cliyers	321
Burnet, or pimpernel parsley	360	Cloves	310
Burfa pastora, shepherd's pouch	326	Cocao, or coco	ib.
Butter bur	359	Cochlearia hortensis, scurvy grass	333
Butter wort	ib.	Coffee	311
Butua, or pareira brava	300	Colchicum, meadow saffron	334
Buxus, the box tree	327	Columbines	322
		Colocynthis, coloquintida, or bitter apple	308
		Confound-(middle)	327
Cabbages, and their varieties	325	Consolida major, the greater comfrey	334
Calamus Aromaticus, sweet smelling flag	299	Corn fallad, or lamb's lettuce	379
Calambac, aloes wood	305	Cork tree	375
Caltha vulgaris, marigold	328	Coriandrum, coriander	334
Calamintha, calamint	327	Contrayerva	300
Calendula, the marigold	328	Cortex winteranus verus, true winter's bark	304
Camella alba, winter's bark, or wild cinnamon	304	Cortex Peruvianus, Peruvian or Jesuit's bark	ib.
Camel's hay	306	Cortex Elutheriæ, by some called the grey Peruvian bark	305
Camomile	331	Costos (the sweet)	300
Camphora, camphire	313	Cotonea malus, the quince tree	334
Cannabis fativa, manured hemp	328	Crassus, the cherry tree	380
Caper, its several sorts	ib.	Cranes (bloody)	340
Caprifolium, woodbind	ib.	Cræffes (garden and water)	353
Capficum, Guiney pepper	360	— common	374
Capparis, the caper bush	328	— sciatica	342
Camphorata, stinking ground pink	ib.	Clara	ib.
Cardica, mother wort	329	Cromwell	346
Carduus Benedictus, the blessed thistle	ib.	Crow-foot (bulbous)	360
Caryophilus, clove July flowers, or carnations	ib.	—	366
Carnations	ib.	Cubebæ of the shops	309
Caruus, carraway, and its various sorts	ib.		
Cardones, the spiny artichoak	332		

Cuckow pint	Page 322
Cucumis sativis vulgaris, the cucumber	334
—— the wild, &c.	ib.
Cupressus, the cypress tree	335
Cucurbita, the gourd	ib.
Currants, their various kinds	368
—— use in medicine	ib.
Curcuma, fermeric	300
Cyperus longa, long cyperus	ib.
—— round ditto	301
Cyprinum, Rhodium weed	305
Crocus saffron	307
Cyanus, the blue bottle	335
Cyclamen, sow bread	ib.

D.

Dactyle, dates	307
Daisy (the greater) or ox eye	324
—— the common	ib.
Daucus creticus, the candy carrot	336
Dandelion	ib.
Dens leonis ditto	ib.
Deers balls	318
Dictamnus creticus, dittany of Crete	301
—— the leaf ditto	306
Digitalis, fox glove	336
Dittander (common broad)	345
Dittany of Crete	301
—— white, a sort of flaxinella	ib.
Dock (great water)	344
Dill (the)	320
Dragon's blood	314
Draganthum, gum dragacanth	315
Dracontium	336
Dracunculus, and its varieties	ib.
Doronicum Romanum, Roman wolf's bane	301
Drop wort	338

E.

Ebulus, dwarf elder	336
Elemi (gum)	314
—— American	ib.
Elecampane	337
Elder tree	371
—— dwarf	336
—— marsh	356
Elm tree, and its varieties	381
Endivia, endive, and its three sorts	337
Enula campana, elecampane	ib.
Eruca, rocket	ib.
Erysimum, hedge mustard	ib.
Esula minor, the lesser spurge	338
Eupatorium cannabinum, hemp agrimony	ib.
Euphrasia, eye bright	ib.
Euphorbium	316
Eye bright	338

F.

Faba major hortensis, Windsor beans	338
Fennel flower (Roman)	355
Feverfew	350
Figs (dried)	308
Filipendula, drop wort	338
Flag, sweet smelling	299
—— stinking	380
Flax (common)	346
Florentine orris, or the common	302
Flower de luce	ib.
Flowers, their Natural History	306
—— for their orders and genera, according to the Linnæan system, see the Appendix	Page 591
Feniculum vulgare, common fennel	338
—— dulce, sweet ditto	ib.

Fænum Græcum, fænugreek	Page 339
Fox gloves	336
Fragaria, the strawberry plant	339
Fruits, their Natural History	307
Fungus sambucinus, Jews ear	318
—— laricis, ditto	ib.
—— campestris esculentus vulgarissimus, the common esculent mushroom	339

G.

Galega, goat's rue	340
Galeopsis, dead nettle	ib.
—— angustifolia foetida	ib.
Galanga minor, the lesser galangal	301
Galbanum	316
Gallium luteum, ladies bed straw, or cheese rennet	340
Garlick	320
Gelder rose	356
Gentiana, gentian	301
Genista, broom	340
Geranium sanguineum, bloody cranes	ib.
Germander, or ground oak	331
Ginger	303
Glycyrriza, liquorice	301
Gold of pleasure	353
Gonzing	302
Guaicum, or wood guaiac	305
Goose grass	321
Gooseberry (common, and other sorts)	340
Grounel (common)	373
Grossularia, the gooseberry	340
Gums, their Natural History	315
Gum resins	316
Gummi arabicum, gum arabic	315
—— fenica, gum feneca	ib.
Gum anime	313
—— elemi	314
—— sandrich	ib.
—— tragacantha	315
—— ammoniac	316
Gumboge	317
Gutta galbanum	316

H.

Hawthorn, or white thorn	352
Hellebore (white)	379
Helleborus albus et niger, white and black hellebore	301
Helianthemum tuberosum, five indicum tuberosum	341
Henbane, black and white	342
Hedera terrestris, ground ivy	341
—— arborica, common	ib.
Hemlock	332
Hemp (manured)	328
Herniaria glabra, rupture wort	341
—— herfuta, hairy ditto	ib.
Hoar hound	350
—— base ditto	375
Honeysuckle	328
Hermodactylus, hermodactyl	301
Hop plant	347
Horminum, clary	342
House leek	371
Hot-beds, observations on them	380
Hyoscyamus niger vulgaris, black hanbane	342
—— albus, white ditto	ib.
Hypericum, St. John's wort	ib.
Hyssopus, hyssop	ib.

I.

Jalapa, jalap	301
Jasminum, the jessamine	342

Iberis sciatica, cresses	Page 342	Mistletoe	Page 380
Jesuits, or Peruvian bark	304	Money wort	355
Jew's ear	329	Moufe ear (common)	360
Imperatoria, master wort	301	Mother wort	329
Indian leaf	306	Mosses their Natural History	595
Indibus, endive	336	Mullein (white and female)	380
Ipecacuanha, the Peruvian and Brasilian	301	Mushroom (the common esculent)	339
Iris florentina, orris	302	Mug wort	322
Juglans, the walnut	243	Mustard (hedge) and its varieties	337, 373
Juniperis, the juniper	ib.	Myagrum, gold of pleasure	353
Juices extracted from plants	316	Myrris, sweet cicily	ib.
Ivy, common and ground	340	Myrtus minor vulgaris, box leaved myrtle	ib.
July flowers; carnations	329	Myrobolans, and its varieties	308
	K.	Myrrha, myrrh	316
Kidney-bean plant	360		N.
	L.	Nacotiana major latifolia, tobacco, its kinds	354
Lactuca fativa non capitata, common lettuce	343	Narcissa lucocum, the snow drop	353
Ladies bed straw	340	Nardus celtica, celtic nard	302
—— mantle	320	Nasturtium aquaticum, water cresses	353
—— finger, or kidney vetch	383	Navel wort	382
Lapathum rotundifolium, bastard monk's rhubarb	344	Nepeta, nep, or cat mint	354
Lavandula angustifolia, narrow leaved lavender	345	Nepthritic wood	305
—— latifolia, greater or broad ditto	344	Nettle (common and other kinds)	382
Laurus vulgaris, the bay tree	345	Nigella Romana, Roman fennel flower	355
Laurel (Alexandrian)	360	Nettle (deadly)	340
Laureola mas, spurge laurel	345	Nectarine tree, its varieties	349
Laudanum, vel labdamen	314	Ninzin	302
Leaves, their Natural History	306, 594	Nightshade (deadly) and its varieties	324
Leek (common)	360	Nose-bleed, or yarrow	353
Lemon tree	333	Nummularia, money wort	355
Lepidium latifolium, common broad dittander	345	Nutmeg	301
Levisticum, lovage	ib.	Nux Moschata, or myresteca, the nutmeg	ib.
Ligustrum, privet	ib.	Nux vomica, the vomit nut	311
Lignum aloes, aloes wood	305	Nymphoea alba, et lutea major, the white water and great yellow water lilly	355
Logwood	ib.		O.
Liquorice	301	Oak, (ground, fern, and tree)	331, 360, 366
Lillium albinum, white lily	346, 350	Occidental Anacardium, cashew nut	310
Lime, or lindel-tree	377	Olea major, the olive tree	355
Linum vulgare, common flax	346	Olibanum	314
Linnæan system of flowers	591	Onion, and its various sorts	330
Liquidum amberum, liquid amber	312	Onobrichis, sain-foin, and its different kinds	356
Lovage	345	Opium	317
Lung wort	360	Opopanax	316
Luzula, wood forrel	346	Opopobalsamum, balm of Gilead	312
Lupinus flora albo, white lupine	347	Orach (stinking)	323
Lupulus, the hop plant	ib.	Orange tree and peel	323, 324
	M.	Orchis, five sambucus aquatica	356
Mace	311	Orielle d'homme, or man's ear	323
Madder (Dyers)	369	Organum vulgare, wild marjorum	357
Maiden-hair (the true or French)	319	Oriza, rice	ib.
Malabrathrum, the Indian leaf	306	Ornithopodium majus; greater bird's foot	ib.
Mallows (vervein)	320		P.
Malus Medica, the citron tree	333	Paliurus, Christ's thorn	357
—— limonia et fativa, lemon and apple trees	ib.	Palieteria, pellitory of the wall	358
—— granata five punica, the pomegranate	348	Pareira brava, or Brasilian plant	300
Malva vulgaris, mallows	347	Parfnip (water)	324
Manna calabria, &c.	315	—— common and wild	358
Mandrakes	350	Parsley (pimpernel and milky)	360, 376
Marum verum, five cortufe	ib.	Papave Cornutum, yellow horned poppy	358
Marrubium, hoarhound	ib.	Pastinaca, the garden	ib.
Mandragora mas, seu candida	349	Pasque flower	364
Marygold (garden)	328	Pea, and its various sorts	361
Master wort	301	Pears, their different kinds	364, 376
Mastich, and its different sorts	350	Peach tree, and its numerous varieties	349
Matricaria, feverfew	ib.	Pellitory of Spain	302
Mechoacanna, mechoacan	302	Penny royal	363
Melilotus, melilot	351	Pæonia mas, male peony	357
Melissa, balm	ib.	Peripolca, Virginian silk	359
Melo vulgaris (common musk)	ib.	Perlicaria mitis, dead arse smart	ib.
Melon, and its various kinds	ib.	Pepper wort	345
Mentha vulgaris, mint and its different kinds	352	Petasites, butter bur	359
Mercurialis, male and female mercury	ib.	Petroselinum, parsley	ib.
Meum athamanticum, spignel	302	Phillyrea, mock privet	360
Mercury, the English	325	Phitollaca, American nightshade	ib.
Majorana, marjorum	347	Pile wort	332
Millium, miller	353	Pilocella, common mouse ear	360
Millefolium vulgare, yarrow	ib.		
No. 60.		7 Q	Pimpinella,

Pimpinella, pimperel or burnet	-	Page 360	Santalum rubens, red Sanders	-	Page 305
Pimenta, Jamaica pepper, or allspice	-	309	Santonium semen, worm-feed	-	312
Pinci Nuclei, pine apple nuts	-	311	Santolina, lavender cotton	-	318
Pine (ground)	-	332	Sanicula, fanicle	-	371
Pipe tree (the pudding)	-	308	Sarfaparilla	-	303
Piper, pepper, black, white, &c.	-	309, 360	Sarcocolla	-	316
Pimpernel (male)	-	201	Saffrafas	-	306
Pink (stinking ground)	-	328	Saturia, favory	-	372
Pinguicula, butter wort	-	360	Saxafraga, saxifrage	-	ib.
Pistacia, pistachio nuts	-	311	Scallion (the)	-	330
Pisum, the pea plant	-	361	Scammonium, scammony	-	317
Pistilochia, slender birth wort	-	300	Schoenanthus, camel's hay	-	306
Plants, herbs, shrubs, and trees, their Natural History	-	318, 589	Scapularia aquatica, water-betony	-	373
Plantago, the plantain	-	361	Scorfonera, viper's grafs	-	372
Plumb, and its numerous kinds	-	363	Sebestein	-	307
Polygomatum, Solomon's seal	-	361	Sedum majus vulgare, common house leek	-	373
Polypodium, polypody	-	ib.	Seeds, their Natural History	-	307
Populus, the poplar tree, and its varieties	-	362	Seneca of the polyala virginia	-	303
Porrum commune capitatum, the common leek	-	ib.	Senna, or fena	-	306
Portulaca, purslane	-	ib.	Septfoil, or tormentile	-	378
Pomegranate, and its rind	-	348	Serpentaria Virginia, Virginian snakeroot	-	303
Primula veris, the primrose	-	362	Sea moss	-	306
Prunus, the plumb tree	-	ib.	Scurvy grafs	-	333
Pulegium, penny-royal	-	363	Sainfoin, or cocks	-	356
Pulmonaria, lungwort, or sage of Jerufalem	-	364	Silver weed	-	322
Pulfatilla, pasque flower	-	ib.	Sium, water parsnip	-	324
Purslane	-	362	Sifarum germanorum, or skirret	-	374
Pyrethrum, pellitory of Spain	-	302	Sorrel (common)	-	319
Pyrola, winter green	-	364	Smallage	-	322
Q.			Snake weed	-	325
Quince tree, and its several kinds	-	334	Sorrel wood	-	346
Quercus vulgaris, the common oak	-	366	Solomon's seal	-	361
Quinque folium, cinque foil	-	ib.	Soldanella, Scots scurvy grafs	-	375
R.			Sonchus asper, prickly sow bread	-	335
Race mosa, black bryony	-	227	Sow thistle	-	375
Radishes, garden and horse	-	367, 314	Southernwood	-	318
Ranunculus bulbosus, bulbous crow foot	-	366	Speedwell (common male)	-	380
Raisins, their various sorts	-	307	Spignel	-	302
Rapa, the turnip	-	366	Spikenard (Indian)	-	ib.
Raphanus, garden radish	-	367	Spunk	-	318
Raspberry bush	-	370	Sparrow grafs, asparagus	-	323
Rattle snake	-	303	Spurge, the lesser	-	338, 377
Refeda vulgaris, common rocket	-	367	Spinage, and its various sorts	-	344
Refina Hederæ, gum of the ivy tree	-	314	Spina alba, hawthorn	-	352
Resins (liquid, &c.) their Natural History	-	312	Squill, common, red and white	-	372
Rest harrow	-	321	Statice, thrift, or sea pink	-	375
Rhabarbarum verum, true rhubarb	-	302	Stoechas arabica, French lavender	-	370
Rhapontic, rhubarb of discorides, English rhubarb	-	303	Storax, liquid, &c.	-	312, 314
Rhodium wood	-	305	Strawberry tree	-	380
Rhubarb, monks and bastard	-	344	Suber, the cork tree	-	375
Rice, monk's	-	357	Succus, aloes	-	316
Rhamnus Catharticus, purging buckthorn	-	367	Succory (wild)	-	332
Rhus folio ulmi, common sumach	-	368	Sumach (common, &c.)	-	368
Ribes vulgares, the common red currant bush	-	ib.	Sun dew	-	369
Robin white	-	322	Shepherd's pouch	-	327
Rocket (common bastard and water)	-	337, 374	Swallow wort	-	323
Rosa, the rose, and its numerous varieties	-	368	T.		
Ros folis, sun dew	-	369	Tacamahaca, tacamahac	-	315
Rosmarinus, rosemary, and its different sorts	-	ib.	Tamarindi, tamarinds	-	308
Roots, their Natural History	-	299	Tame poison	-	323
Rubia tinctorum fativa, dyer's madder	-	369	Tamariscus, tamarisk tree, and its varieties	-	375
Rubus vulgaris fructu nigro, common bramble	-	ib.	Tartarus (tartar)	-	317
Ruta fylvestris major, greater wild rue	-	370, 376	Tanfey (wild)	-	322, 376
Rue (goats)	-	339	Tea, or thea, its various sorts	-	306
Rupture wort, smooth and hairy	-	341	Terebinthina, turpentine, and its varieties	-	313
S.			Thyme (mother of)	-	373
Sabine (sabina mas,) common, &c.	-	370	Time, the true of the antients	-	377
Saccharum, sugar	-	317	Thistle, the blessed	-	329
Saffron	-	307, 311, 334	Thrift, or sea pink	-	375
Sagapenum	-	316	Tilia, the lime, or linden tree	-	377
Sage, and its different kinds	-	363, 371	Tinctorius flos, dyer's weed	-	ib.
Salicaria, willow herb	-	371	Tithimalis, spurge	-	378
Salix, the willow tree	-	ib.	Thaseolus, kidney bean	-	359
Salvia major, greater sage	-	ib.	Tobacco, and its numerous sorts	-	354
Sambucus (common eder)	-	356, 371	Tormentila filivstris, wild tormentile	-	378
Sandaracha, gum sandarach	-	314	Touchwood, or spunk	-	318
Sanguis draconis, dragon's blood	-	ib.	Trifolium (trefoil)	-	ib.
			Throat wort	-	383

Tournefort's system of flowers	- Page 594	Vitis, the vine tree	- Page 381
Tubera fungi, cervina, &c.	- 318	Viper's grafs	- 372
Tulipa, the tulip	- 379	Vomit nut	- 311
Turmeric	- 300	Vulneraria rufica, kidney-vetch	- 383
Turpethium, turbeth	- 303	W.	
Turnips, their various uses	- 367	Wallflower (the)	- 332
Turpentine, its different sorts	- 313	Walnut tree, and its varieties	- 343
Tussilago, colt's foot	- 379	Wall pepper, or stone cramp	- 373
U. V.		Watering of plants, observations thereon	- 380
Ulmaria, meadow sweet	- 381	Weed, dyers or yellow	- 377
Ulmus, the elm tree	- ib.	Woods, their Natural History	- 305
Umbilicus veneris, navel wort	- 382	Woodbind	- 328
Urtica, the common nettle	- ib.	Worm feed	- 312
Uvularia major, throat wort	- ib.	Wormwood (common)	- 319
Uvæ passæ, raisins	- 307	Willow tree	- 364, 371
Valeriana, valerian	- 379	Wolf's bane (Roman)	- 299, 301
Valerianella, corn fallad, or lamb's lettuce	- ib.	Wortle, or bilberry	- 380
Vegetables (foreign) their Natural History	- 299	Wort (St. John's)	- 341
Veratrum, white hellebore	- 379	X.	
Verbascum, white mullein	- 380	Xyris, five iris foetida, stinking gladden or flag	- 383
Veronica mas, male speedwell	- ib.	Y.	
Vetch	- 383	Yarrow, or nose bleed	- 253
Viola, violet, and its varieties	- 380	Z.	
Vine, and its grapes, and wild	- 326, 381	Zedoary	- 303
Vincetorixicum, tame poison	- 323	Zerumbeth	- ib.
Viscum, misletoe	- 380	Zingiber, ginger	- ib.

WATERS, EARTHS, FOSSILS, and MINERALS.

The Natural History of WATERS, EARTHS, FOSSILS, and MINERALS, with a copious Introduction	- 387	Chrystals, their varieties	- Page 412 to 415
A.		Cinnabar	- 423
A BESTOS, and its various sorts	- 410	Clays, their different kinds	- 401
Acton, its mineral waters	- 394	Codfall, its mineral waters	- 398
Agate, its difference from jasper	- 431	Cobalt	- 420
Alabaster-stone	- 436, 442	Coal pit, and its mines	- 211
Alford, its mineral waters	- 397	Colurian, its mineral waters	- 391
Allum	- 418	Conchites, or petrified shells	- 469
Ambergrease and amber	- 420	Cornelian, or fardius	- 431
Amethyst, a transparent gem	- 429	Cornu Ammonis, or Ammon's horn	- 470
Amianthus, and other sorts of foffile substances	- 410	Copper, the vitrious ore, &c.	- 426
Antimony	- 421	D.	
Anthropocardites	- 472	Diamond, a transparent gem	- 427
Apyri (talcs)	- 407	Diorchites (petrifactions)	- 472
Armenian stone (the)	- 434	Dog and duck, its mineral waters	- 399
Arsenick	- 420	Dulwich, its mineral ditto	- 393
Asteria, a kind of opal	- 431	E.	
Asteriæ, or star-stones	- 473	Earths, their various sorts, as cimolian, &c.	- 401
Astroites (petrifactions)	- ib.	Eagle stone (the)	- 435
Auriculares ditto	- 472	Emerald, a transparent gem	- 430
B.		Enhydrus, a stone of the eagle sort	- 436
Bath waters, an account of them	- 390, 397	Emery, or smiris	- ib.
Belemites (petrifactions)	- 471	Enorchus, a kind of eagle stone	- 435
Berill, a bluish green gem	- 430	Entrochi (petrifactions)	- 472
Bitumen, or pitch	- 420	Euny-well, in Cornwall	- 391
Bismuth	- 422	F.	
Barnet East (its mineral waters)	- 393	Foffile substances that are not elastic, &c.	- 410
Boles, their various kinds	- 406	Fire stone	- 464
Borax	- 419	Foffile salt	- 417
Brimstone, or sulphur	- ib.	Fungites (petrifactions)	- 471
Brontia (petrifactions)	- 471	G.	
Bristol, its mineral waters	- 397	Garnets, or carbuncles	- 429
Buxton well	- 392	Geodes, a kind of eagle stone	- 435
C.		Gems of all kinds described	- 427
Carlton, its mineral waters	- 393	Gold, and gold mines	- ib.
Carbuncle (the)	- 428	Granite, red, and pale whitish	- 443
Cats eye, a particular gem	- 430	Grits, and their varieties	- 461
Cerufs, or white lead	- 424	Gypsums, a particular kind of foffils	- 410
Chalcedony, a gem	- 431	H.	
Cheltenham, its mineral waters	- 398	Hampfstead, its mineral waters	- 399
Chippenham, its mineral ditto	- 399	Harrowgate, its ditto ditto	- 392
Chryfolite, a gem, the topaz of the ancients	- 430	Hartlepool, its ditto ditto	- ib.
		Hæmatites, or blood stone	- 425, 436
		Hyacynth, a gem	- 429
		Iron	-

I.					
Jasper, and its varieties	-	-	Page 433	Petroleum	- - - Page 420
Iron, and its mines	-	-	425	Pit coals, and their mines	- - - 421
Isinglass, and its varieties	-	-	407	Pitch, or bitumen	- - - 420
				Porphyry, and its varieties	- - - 443
K.				Prassius, or prassite, a gem	- - - 430
King's-futton, its waters	-	-	395	Pumice stone	- - - 436
Knareborough, its dropping well	-	-	400	Pyriiformes (petrifications)	- - - 471
				Pyrites, flat, round, &c.	- - - 464
L.					Q.
Lachnis, and its varieties	-	-	409	Quicksilver, or mercury	- - - 423
Llandrided, its mineral waters	-	-	396		R.
Lapis lazuli, an opaque stone of a sapphire colour	-	-	434	Rock stones, their various sorts	- - - 436
Lapis Judaicus, or Jew's stone	-	-	474	Realgar, or zarnick	- - - 419
Lead, and its mines	-	-	424	Rotten stone, a sort of Tripoli	- - - 407
Lemington, its mineral waters	-	-	399	Ruby, a transparent gem	- - - 428
Loams found in beds, as the brownish white, &c.	-	-	403		S.
Loadstone, or magnet	-	-	436	Salts, their several kinds	- - - 417
Litharge	-	-	424	Sal ammoniac	- - - 419
Lythopites of Linnæus	-	-	479	Sapphire, a hard gem	- - - 429
				Sardonix, a semi-transparent stone	- - - 431
M.				Sardius, or cornelian	- - - ib.
Magnet, or loadstone	-	-	436	Sands, fine shining white, &c.	- - - 455
Marchasites, silver, gold-coloured, &c.	-	-	464	Sand stones described	- - - 436
Mardepore, of the coral kind	-	-	475	Scarborough, its mineral waters	- - - 400
Marble stone, its various kinds	-	-	440	Selenites described	- - - 411
Marles, their varieties, as samian, &c.	-	-	403	Silver, and the vitrean silver ore	- - - 426
Mercury, or quicksilver	-	-	423	Shadwell, its mineral waters	- - - 394
Metals, and semi-metals	-	-	421	Slates, and their varieties	- - - 439
Mica aurea, gold-coloured talc	-	-	408	Smiris, or emery	- - - 436
Mineral waters, the different kinds, &c.	-	-	387	Slate stone (the)	- - - 438
Mundick	-	-	425	Spars of various figures and shapes	- - - 415
Muscovy, or isinglass	-	-	407	Star stone, or astroites	- - - 434
				Stones (of the more ignoble kind)	- - - 435
N.				—— (common, circumscribed, &c.)	- - - 443
Naptha	-	-	420	Sulphurs	- - - 419
Nephritic stone (the white)	-	-	433	Sydenham Wells, its waters	- - - 393
Nevil Holt, its mineral waters	-	-	394		T.
New Malton, its ditto ditto	-	-	400	Talc, Venetian, shining black, &c.	- - - 408
New Tunbridge Wells, ditto ditto	-	-	395	Teeth, and other monstrous productions	- - - 472
Nitre	-	-	418	Tilbury waters	- - - 392
Northall, its mineral waters	-	-	393	Tin, and its mines	- - - 424
				Toad stone (the)	- - - 435
O.				Trochites (petrifications)	- - - 472
Ochres, their different kinds	-	-	404	Tripolies, yellow, reddish, white, &c.	- - - 407
Ombria (petrifications)	-	-	471	Tuberoides (petrifications)	- - - 471
Onyx stone, its different kinds	-	-	431	Tunbridge Wells, its waters	- - - 393
Opal, a beautiful gem	-	-	429	Turquoise, or Turkey stone	- - - 434
Orpiment, red, or zarnick	-	-	419		V.
Orfton, its mineral waters	-	-	395	Vitriol	- - - 418
Orites (petrifications)	-	-	472		W.
Orphomorthites (petrified stones)	-	-	471	Waters (mineral). See Mineral Waters.	
				Westwood, its mineral waters	- - - 392
P.					
Pancras, its mineral waters	-	-	394		
Pebble chrystal stones	-	-	450		
Pebble stones (the common, &c.)	-	-	452		
Petrified bodies, and the causes of petrifications	-	-	466		

THEORY of the EARTH in general.

THEORY of the EARTH in general	-	476	Earthquakes, to what causes ascribed	-	493
A.			Elden Hole, in Derbyshire	-	486
AIR, its mechanical properties, &c.	-	525	Evaporation, its nature and effects	-	537
Air-pump, its mechanism and use	-	526		F.	
Alps and Andes, a description of those mountains	-	500	Fossil shells, and other extraneous fossils	-	482
Atmosphere, its nature, causes, and effects	-	527		G.	
Aurora Borealis	-	539	Globe, an astronomical and geographical survey of it	-	477
B.			Gulph of Pluto, Ælian's description of it	-	482
Barometer, its mechanism and use	-	526		H.	
C.			Halos, or luminous circles round the moon	-	539
Chasms in the earth, &c.	-	485	Hurricanes, and rainy seasons	-	535
Cataracts, or falls of water	-	512	Hydrostatics, and other discoveries relative to water	-	
Caverns (subterraneous)	-	487		I.	
Currents in rivers	-	509	Ice, its formation, &c.	-	516
—— in the sea	-	516	Illusions of the meteor kind	-	540
E.			Inundations, and their effects	-	511, 521
Earth, a survey of its surface, &c.	-	478 to 520	Islands (new) the appearance of some	-	496
					Lakes

L.	
Lakes (salt and fresh water) -	Page 514
Luminous appearances -	516
Lunar rainbow -	539
M.	
Meteors, their Natural History -	536
—— a remarkable beautiful one -	539
Mines, an account of them -	488
Monsoons described -	533
Mountains, their formation and uses -	498
O.	
Ocean, its saltness, &c. -	513
P.	
Pen-park-hole, in Gloucestershire -	487
Pike of Teneriffe, an account of it -	501
Plague, its rise, progress, and history -	530
R.	
Rivers, their origin, &c. -	507
—— the largest in Europe, Asia, Africa, and America -	510
—— the length, breadth, and depth of ditto -	511
S.	
Sand-storms, or tempests -	535
Sea, the formation of new lands by it -	521

Sea shores -	Page 520
—— its dreadful inundations -	521
Solar rainbow -	539
Suns (mock) -	ib.
Storms, instances of remarkable ones -	537
T.	
Tides, and motion of the sea -	516
—— the greatest where found -	518
Tracts of land, the appearance of some -	496
Typhons, or land spouts -	541
V.	
Vapours, an account of them -	489
Volcanoes, their Natural History -	490
Universe, a general sketch thereof -	476
W.	
Water, its nature, properties, &c. -	503
—— manner in which it forms clouds -	536
Water-spout, account of this phenomenon -	540
Whirlpools -	519
Wind-gun, its construction and use -	526
Winds, regular and irregular -	531
—— variable and trade -	532
Z.	
Zodiack, an explanation of its twelve signs -	585

The NATURAL HISTORY of M A N.

The NATURAL HISTORY of MAN, with a copious introductory discourse - Page 543

A.	
A BSTINENCE, the benefits arising from it -	559
Age (old) and the causes of decay -	569
Americans described -	575
Arabians -	ib.
Arteries, the plate of them explained -	586
Asiatics (southern) described -	574
B.	
Beauty, ideas of it in different countries -	550
Blood; proved to circulate through the bones -	569
Brain, the plate of it explained -	587
C.	
Caffres, of the Cape of Good Hope -	574
Chinese, their Natural History -	573
Complexion, its varieties -	575
D.	
Deformity, to what causes owing -	577
Deafness, its causes -	566
Death, and the causes of decay -	571
Distance, our ideas of it how attained -	563
Dreams, the theories of them -	560
Dwarf, a complete history of one -	579
E.	
Ear, its construction and use -	566
Europeans, their Natural History -	575
Education of children -	548
Embalming, how performed -	581
Eunuchs, an account of them -	549
Eyes, their formation, use, &c. -	561
—— how objects are seen by them -	562
F.	
Feeling, the most useful of all the senses -	568
Funerals (hasty) cautions against them -	572
G.	
Greenlanders, their Natural History -	573
Growth of the human body -	547
Giants, their Natural History -	580
H.	
Hearing, remarks on that sense -	564
Human strength and agility -	555
Human race, its varieties -	572
Hunger, its nature, &c. -	557

I.	
Infancy of man -	Page 546
Japanese, their Natural History -	574
Indians, or Southern Asiatics -	ib.
L.	
Longevity, remarkable instances thereof -	570
Laplanders (Danish and Swedish) -	572
M.	
Man, his internal properties, &c. -	544
Mankind, their varieties and differences -	572
Manhood described -	550
Materiality and immateriality -	544
Monsters of the human species -	577
Mummies, a particular account of them -	581
Muscles, a front and back view of them -	586
Music, and musical sounds -	565
N.	
Negroes of Africa, their Natural History -	574
Near-sighted persons; how such see objects -	563
P.	
Passions, how expressed -	551
Portuguese, resemble the negroes -	575
Puberty, or youth -	544
S.	
Seeing, nature and effects of that sense -	561
Sensuality, its refinements -	550
Sensations (internal) not in matter -	545
Seraglio, an account of it -	549
Sight, a boy restored thereto -	563
Senses, one corrected by another -	ib.
Sleep -	557, 560
Smelling, its nature, properties, and use -	567
Soul of man, its nature, &c. -	544
Sounds, how produced -	564
Stature of men, its varieties in different countries -	576
Strength and agility in man -	555
Structure of man -	546
T.	
Tasting, the nature of that sense -	567
Tartars, their natural history -	573
Tone, a collection of successive sounds -	564
V.	
Vision, its errors how corrected -	561
W.	
Women, of their symmetry -	550

7 R

F I N I S.

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Lastly, Attend carefully to the placing of the Cuts, according to the following Directions:

No.		No.	Page.
1	THE Frontispiece. To face the Title Page.	26	Naked Insects; the Amber Snail, Star-Fish, Cuttle-Fish, &c. - 283
2	Quadrupeds; the Elk, Fourmillier, &c. 41	27	Plants; Abutilon, &c. - 594
	Birds; the Flamingo, Soland Goose, &c. 179		Fishes; the Sea Eagle, Dog-Fish, &c. 212
	Fishes; the Lupus Marinus, &c. - 220	28	Serpents, Lizards, and Tortoises; the Amphibœna, &c. - 266
3	Birds; the Eagle, Guinea Hen, &c. - 113	29	Testaceous Animals; Echinodermata or Sea Urchins, &c. - 253
	Shells; Pattellæ, or Limpets, &c. - 597		Botany; Linnæan System, Orders of Flowers, Class VII. to XII. - 591
4	Quadrupeds; the Cat a Mountain, Rhinoceros, &c. - 72	30	Fossils; Class VI. VII. and VIII. of Extraneous Fossils, - 409
	Corallines; Articulated; Keratophyta, &c. 595	31	Birds; the Rose coloured Ouzel, &c. 158
5	Quadrupeds; the Dromedary, Elephant, &c. 59	32	Corallines; Vesciculated, &c. - 286
6	Natural History of Men; the Hottentot, American, &c. - 572	33	Shell-Fish; the Ribbed Musick Shell, &c. 596
	Fishes; the Needle Fish, Carp, &c. - 243	34	Botany; Tournefort's System, General Characters of Flowers, Petalodes flos, &c. 594
7	Winged Insects, Flies, Beetles, &c. 276	35	Shells; the Murex, &c. - 596
	Botany; Tournefort's Plants, Class XIV. to XXII. - 594	36	Botany; Linnæan System, the Monogynia, &c. 591
8	Birds; the Humming Bird, Jay, &c. 173	37	Fishes; the Great Square Fish, Charr, &c. 237
	Botany; Linnæan System, Monandria, &c. 591	38	Botany; Linnæan System, Orders of Flowers, Class XIII. to XVIII. 591
9	Birds; the Grey Owl, Afo, &c. - 126	39	Fishes; the Peseë Pectine, Turbot, Hake, &c. 227
	Fossils; Shells, Class IX. and X. - 483	40	Botany; Genera of Mosses, Fontinallis, &c. 595
10	Quadrupeds; the Manis called the Scaly Lizard, &c. - 95	41	Natural History of Man; the Passions, De-fire, &c. - 557
	Various Objects in Natural History; the Death Watch, Water Spout, &c. 540	42	Botany; Genera of Mosses, Lycopodioides, &c. - 595
11	Birds; the great Didapper, Dobchick, &c. 187	43	Fishes; Pogge, Porcupine, &c. - 225
	Botany; Linnæan System, orders of Flowers, Class I. to VI. - 591	44	Botany; Tournefort's System, Genera of Plants, Class VI. to XIII. - 594
12	Insects without Wings; Worms, Spiders, &c. 281	45	Botany; Linnæan System, Orders of Flowers, Class XIX. to XXI. - 591
	Microscopical Objects, Class I. Polipe, &c. 595		Quadrupeds; the Zebra, American Buffalo, &c. - 23
13	Birds; the Black Stork, &c. - 176	46	The Human Muscles; - 586
	Shells; Conchæ Cordiformes, or Heart Shells, 598	47	Quadrupeds; the Broad Tailed Sheep, &c. 28
14	Birds; the Spoon Bill, Vulture, &c. 178	48	Botany; Leaves, Orbiculated, &c. 594
	Botany; Leaves Duplicato pinnated, &c. 594	49	Serpents; Americana, or Brazilian Lizard, &c. 262
15	Shell-Fish; the Long Ear Shell, &c. 597	50	Insects; Tæniæ of the Oak, &c. 599
	Botany; Linnæan System, Orders of Flowers, Class XXII. to XXIV. - 591		The Human Muscles, - 585
16	Birds; the Carrion Crow, &c. - 138	51	Brain, - 587
	Microscopical Objects; Crystallizations, 595	52	The Pearl Fishery, - 252
17	Fishes; Gymnotus, Electricus, &c. 209	53	Zodiac, the Aries, &c. - 585
	Microscopical Objects, Class II. Vegetable Subjects, Farinæ of Plants, 595	54	Insects; Dragon Fly, Lanthorn Fly, &c. 275
18	Birds; the Oxeye, Creeper, &c. - 172	55	Whale Fishery in Greenland, 204
	Shell-Fish; the Conic Prickly Oyster, &c. 252		The Human Arteries, - 586
19	Fishes; the Gattorugine; Sword-Fish, &c. 220	56	The Human Skeleton - 585
	Botany; Genera of Mosses, - 595	57	Birds; Toucan, Spoon-Bill, Soco, &c. 141
20	Quadrupeds; the Jaquara, &c. - 70	58	Quadrupeds; Nyl-ghacé, Ocelot, &c. 71
21	Natural History of Man; the Malabar, &c. 575	59	Fishes; the Doree, Torpedo, Abacatuia, &c. 208
	Fossils; Class I. to V. of Native Fossils, 410	60	Quadrupeds; the Sea Lion, Sea Otter, &c. 78
22	Winged Insects; the common Italian Cicada, Butterflies, &c. - 276		
23	Quadrupeds; the Rat, &c. - 187		
	Insects; Gall Insects, &c. - 600		
24	Birds; the Nuthatch, &c. - 198		
25	Shell Fish; the Caltrop Shell, &c. - 598		
	Crustaceous Animals; Locustia Marina Indica, &c. - 248		

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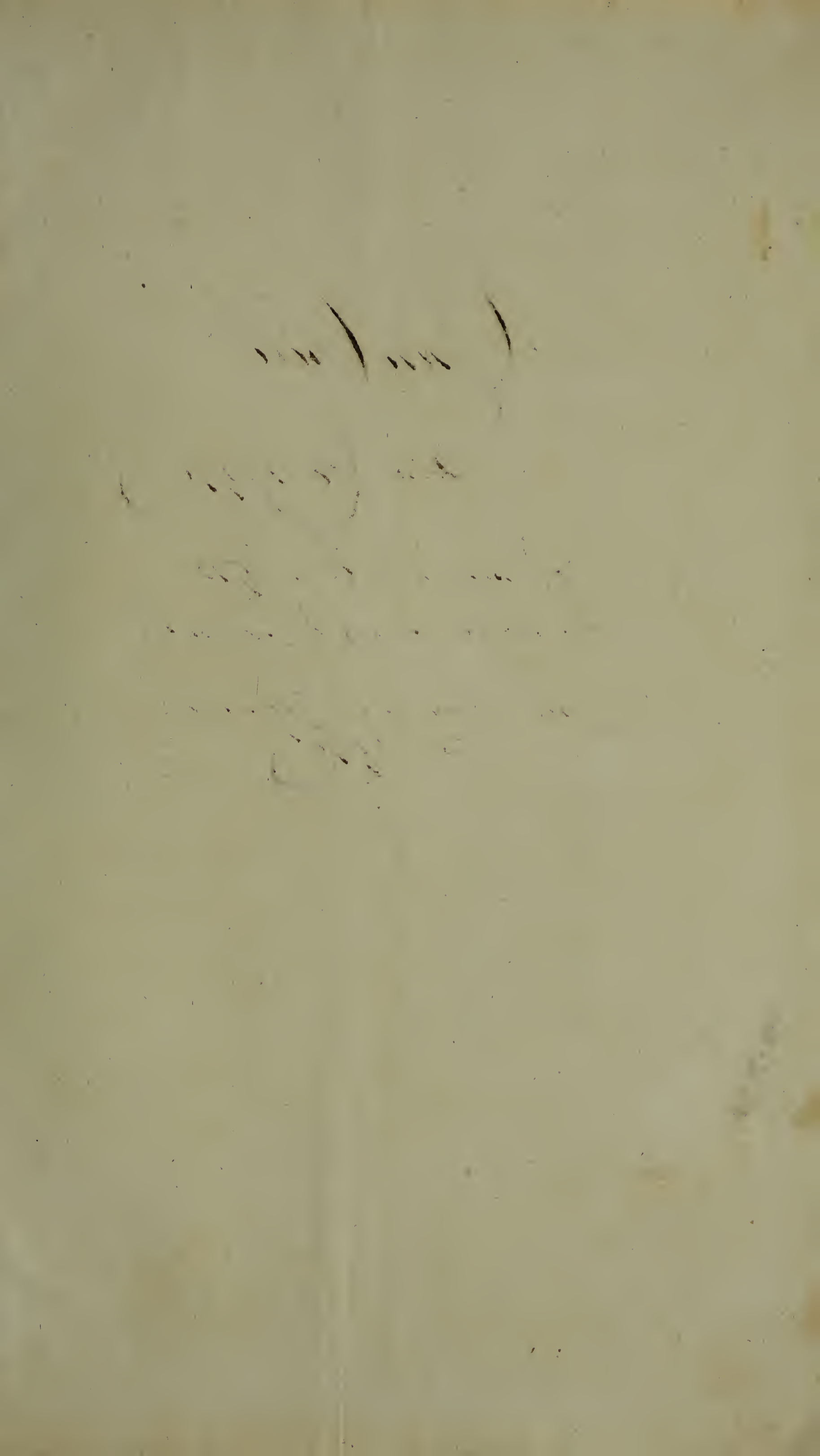
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