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OF

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A

NATURAL HISTORY

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Author of "A View of the World"—"Letters on Universal History," &c.

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NATURAL HISTORY OF BIRDS.

CHAPTER I.

. . . . . " Ye birds,
That singing up to heaven-gate ascend,
Bear on your wings, and in your notes, His praise.
MILTON.

IN giving a description of the volatile race, there is opened an extensive field for observation and amusement, in which, as in every other part of the creation, we see displayed the same creative energy of Nature, or to speak with greater precision, of the God of Nature, whose plastic hand has embellished them with so great a variety of colours, given them such a diversity of instincts, suitable to their modes of life; and furnished them in so admirable a manner, with a conformation of body perfectly corresponding with their habits and dispositions.

Quadrupeds, living on the earth like man, and in a great measure on the same kinds of food, bear a considerable resemblance to him in their general conformation; but the structure of birds is totally different from both.

Instead of those characteristics of strength observable in the formation of the generality of quadrupeds, the volatile tribes seem peculiarly calculated for escape, and every part of their organization, anatomically considered, proves the completeness of their mechanism. Their whole frame is wisely calculated to facilitate their motion through the yielding air. Every part is formed for lightness and buoyancy. The position of their feathers, all lying one way, and generally pointing backwards, and folding over one another in exact and regular order, not only causes them to glide easily through the air, but, together with the soft down next their bodies, protects them from the piercing cold of the atmosphere, to which they would, without this defence, be more than any other creatures exposed.

Their wings are constructed in the most wonderful manner, and, although made of the lightest materials, are furnished with such a degree of power as to impel their bodies forward with astonishing rapidity. In some birds the strength of wing is almost inconceivable, and, were it not verified by observation and experiment, would appear incredible. The swan with a flap of his wing is able to break a man's leg, and it is said that a similar stroke from an eagle has been known to kill a man instanta-

neously. The method which Nature has provided for the preservation of this curious texture of feathers with which the volatile part of the creation is clothed, will merit our attention.

Lest they should be damaged by their violent attrition against the air, or by imbibing the moisture of the atmosphere, birds are furnished with a gland situated on the rump, containing an oil which they can press out with their bill, and with which they anoint their feathers. In water-fowls this oil is so plentiful, that by it their plumage is rendered completely water-proof.

In all birds the eye is peculiarly calculated for distant vision, and the ear for accurate and quick perception; and their sense of smelling is exceedingly acute. Their legs and feet are admirably adapted to the different purposes for which they are designed, being light, compact, and long. In water-fowl the toes are joined by a ligament of tough skin, to facilitate their swimming, and render them fit for the element in which Nature has destined them chiefly to live, while in others they are constructed for their security in perching upon trees.

The internal structure of birds is, not less than their external conformation, wisely adapted to the peculiar circumstances of their existence; all their bones being light and thin, as well as all the muscles, except those which are appropriated to the purpose of moving the wings. The lungs are extended over almost the whole cavity of the body, and peculiarly calculated for the reception and retention of air; a great quantity of which entering in by the windpipe, is conveyed into a number of membranous cells, which are placed upon the sides of the pericardium, and communicate with those of the sternum. In some of the volatile tribes these cells are continued down the wings, and extend even to the pinions and thigh bones, which the bird can, by the inhalation of the lungs, fill and distend with air at its pleasure.

One of the most remarkable circumstances discoverable in the formation of birds, is this general and copious diffusion of air, calculated most probably, as Mr. Hunter supposes, for the purpose of rendering their body more buoyant; for as that ingenious gentleman observes, this circumstance appertains in a more eminent degree to eagles and other birds of the lightest and longest flight. In regard to the ostrich, although it does not fly, the extreme velocity with which it runs, renders a similar supply of air equally necessary. Were it possible that a man should move with the velocity of a swallow or several other birds, the resistance of the air would soon produce suffocation, for want of those internal reservoirs which in birds are of incalculable use, in preventing the stoppage of respiration, by the rapidity of their mo-

tion through a resisting medium, as well as in supporting them during their long and laborious flights.

Birds as well as quadrupeds may be distinguished into two classes, carnivorous and granivorous; and some may be considered as holding a middle rank, and partaking of both. The carnivorous kinds are distinguished by the length of their wings and the strength of the muscles by which they are moved; their strong hooked bills, and their formidable claws; all admirably adapted to the purpose of procuring their food. Their heads are larger, and their necks shorter, than those of other birds: their thighs are strong and brawny, and their sight is so acute, as to enable them to discover their prey from immense elevations in the air, upon which they dart with an astonishing velocity and undeviating aim.

Carnivorous birds, like carnivorous beasts, have but one stomach, and their intestines are much shorter than those of such as are granivorous. The latter have, in addition to the crop, or stomach where their food is moistened, a second stomach, called the gizzard, in which the digestion is completed. This is composed of two hard and strong muscular substances, and its extraordinary powers in comminuting the food would exceed the bounds of credibility, were they not attested by incontrovertible facts, the result of experiments made by Spalauzani, who proved that the stomachs of turkeys and common poultry, had the power of breaking to pieces and digesting glass, tin, and iron. Some of the experiments of this naturalist, however, seem to be of too cruel a nature to be proposed for imitation; and it does not appear consistent with the will of the Great Author of Nature, that we should indulge our curiosity, or acquire at the best a useless knowledge, by tortures inflicted on any of his creatures; especially as without such means, the multifarious variety displayed both in the physical and moral world, is sufficient to exercise the greatest genius, and the most indefatigable research.

It is remarkable that birds of the granivorous kind frequently swallow a number of small stones, which are often found in their stomachs, and which assist digestion by grinding down the grain and separating its parts.

Between carnivorous birds and carnivorous quadrupeds, there seems to be a visible analogy both in their structure and disposition. Both are provided with weapons of rapine and destruction: their manners are fierce and unsocial, and they seldom herd together like those of the granivorous class. Rapacious birds retire to the tops of sequestered rocks, or the depths of extensive deserts, where, like the predaceous quadrupeds, they conceal themselves in gloomy solitude. The granivorous tribes,

on the contrary, like those quadrupeds which feed on herbage, are gentle, inoffensive, and social; and may for the most part be easily domesticated. Man has in consequence availed himself of this tractable disposition, and judiciously selected from the numbers which on every side surround him, such as were likely to be the most useful; among which the hen, the goose, the turkey, the duck, and the pigeon, are the principal, and furnish us with a store of nutritious and palatable food.

To enter into a minute history of the feathered part of the creation, is incompatible with our present purpose: one particular circumstance, however, has been so long the subject of remark and investigation, that it cannot be suffered to pass unnoticed.

The annual migrations of those, which from that circumstance are denominated birds of passage, have exercised the speculation of all ornithologists, and given rise to a variety of conjectures among writers on that subject. Most birds are in some measure birds of passage; for although they do not migrate to distant regions, the greatest part of them make frequent removals from one neighbouring district to another, or from the interior of the country to the sea-coast. The causes of these migrations, although enveloped in obscurity, appear, according to the most probable conjectures, to arise from the failure of their accustomed food, or the change of the seasons.

The manner of performing the long flights, which many of those birds take across immense tracts of water before they arrive at any place of rest, throws formidable difficulties in the way of investigation: but we ought to consider, that being accustomed to measure distance, with relation to time, by the speed of those animals with which we are well acquainted, we are apt to overlook the superior velocity of birds, and the ease with which they continue their exertions.

Our swiftest horses are supposed to go at the rate of half a mile in somewhat less than one minute; but such a degree of exertion soon produces debility, and cannot be long continued. With birds, the case is very different; their motions are not impeded by similar causes. They glide through the air with a velocity superior to that of the fleetest quadruped, and can for a great length of time continue their motion. If we suppose a bird to proceed at the rate of no more than a mile in two minutes for the space of twenty-four hours, it will in that time have passed over an extent of more than seven hundred miles; and, if aided by a favourable current of air, there is reason to suppose that the same may be performed in a much shorter space of time.

If it be asked how they know the time when to commence

their migrations, and in what manner to direct their course, it may with great propriety be answered, that the same all-ruling Power which bestowed reason on us has given instinct to them: the change in the atmosphere may indicate the proper time of removal; and it is also to be observed, that their course is determined rather by the weather, than the situation of countries; and that they remove from a colder to a warmer climate, or the reverse, as the state of the air and their own feelings give the impulse and direction.

The migrations of the swallow and the cuckoo have been particularly noticed by every writer on ornithology; and various opinions have been formed respecting their disappearance, and the state in which they subsist during that interval. Some naturalists have imagined that these birds do not migrate at the end of autumn, but that they lie in a torpid state, concealed in banks, in the hollows of decayed trees, among the ruins of old buildings, and other sequestered places, until the return of summer. Some have, upon vague information, asserted that they cling together by the feet, and thus great numbers being conglomerated in a mass, they sink themselves to the bottoms of rivers or pools, where they lie concealed under the water. It requires, however, no great depth of reasoning to prove the physical impossibility of this hypothesis. On the one hand, it is certain that swallows have been found in winter in a torpid state; but these instances seldom occur, and consequently will not support the inference, that if any individuals survive the winter in that state, the whole species is preserved in the same manner. Several instances of cuckoos having been found in a similar state, might be adduced; as well as of swallows, house-martins, &c. having been seen flying about, long after the general migration had taken place; all which circumstances leave no room to doubt that several young birds which have been late hatched, not finding themselves strong enough to undertake a long voyage, remain behind, and lie concealed in hiding-places until the return of spring, and that the cold of winter benumbs and renders them torpid. On the other hand, the actual migration of the swallow tribe has been proved by a number of well-authenticated facts, taken from the observations of navigators, who have been eye witnesses of their flights, and who inform us that the rigging of their ships has often been covered with the weary travellers. These accounts, indeed, we find so frequently occurring in the narratives of voyages, that we cannot doubt of their authenticity, nor of the reality of these migrations. However, after all the inquiries of naturalists into this mysterious branch of animal economy, the subject remains involved in no small degree of obscurity; and after all our researches, we are not yet certain into

what regions of the globe these birds emigrate. It will not, therefore, be amiss to close the subject with these beautiful lines of the poet:—

> "Amusive birds, say where your hid retreat,
> When the frost rages and the tempests beat;
> Whence your return, by such nice instinct led,
> When Spring, sweet season! lifts her bloomy head?
> Such baffled searches mock man's prying pride;
> The God of Nature is your secret guide."

CHAPTER II.

"Gavest thou the goodly wings with the peacock, or wings and feathers with the ostrich?"—Job.

In proceeding to give a sketch of some of the most remarkable of the winged inhabitants of the air, which, by the vivacity of their motions, the beauty of their plumage, or the melody of their notes, enliven the general picture of Nature; we shall, for the sake of methodical arrangement, endeavour to follow the divisions which most naturalists have adopted, and class them under the following heads, viz. the *rapacious kind*, the *poultry kind*, the *pie kind*, the *sparrow kind*, the *crane kind*, and the *aquatic kind;* but not, perhaps, without indulging in some practical deviations.

We shall, in the first place, make another division, which some ornithologists have adopted, and others neglected; and consider in a distinct view a few of the feathered tribes which do not seem properly to come under any of the above-mentioned denominations.

Among volatiles, each genus is not only distinguished by its appropriate characteristics of size, colour, and conformation, but also by the difference of their notes, and the various modes of flight, which, to a practical ornithologist, afford, at a distance, the surest means of discrimination. From the bold and lofty soaring of the eagle, to the short and sudden flittings of the wren, there is an ample field for the curious investigator of Nature, in which the mind may expatiate with delight, in contemplating the various movements of the winged nations, soaring or fluttering around on every side. A certain class, however, does not possess the faculty of flying; and, like the bat among quadrupeds, these seem to form one of the connecting links in the great chain of animal life.

As the bat seems, in the class of quadrupeds, to make the nearest approach to that of volatile, so the ostrich, the emu, the

cassowary, and the dodo, appear the least removed from the former, and may be considered as constituting the first gradation of the latter class.

THE OSTRICH

Has been noticed from the remotest antiquity, for we find it included by Moses among the birds which were accounted unclean: that it was well known to the Israelites and Egyptians at so early a period, is not indeed surprising, as it inhabits scarcely any other countries than the sandy deserts bordering on Egypt and Palestine. It appears, indeed, perfectly adapted to those arid regions, where eternal sterility reigns. It delights to range in the immense solitudes, where, if Nature, parched with almost perpetual drought, produce but few vegetables, and still less water, its appetite requires but little selection to gratify it; and its powers of digestion are inconceivable. Its voracity is such, that it feeds not only on every thing that is edible, but voraciously devours leather, glass, iron, and stones. When an ostrich is killed, its stomach is found crammed with such an assemblage of incongruous substances, as appears astonishing; and were not the fact well known, would be absolutely incredible. It is asserted, that this bird never drinks; and the aridity of the deserts which it inhabits, gives a sanction to this opinion.

The ostrich, in its general figure, resembles the camel, and might at a distance be mistaken for that animal. It is undoubtedly the largest of all birds, being nearly as high as a man on horseback. It measures seven feet from the top of the head to the feet, but from the back only four; its neck is consequently three feet long. When the neck is stretched out, it measures six feet from the head to the rump. Each wing with the feathers is about three feet in length, and about half as long without them.

The plumage is that which causes the ostrich to be the most highly esteemed. It is almost every where considered as an elegant article of personal decoration. In most of the species its colour is a mixture of black and white, but in some it is said to be grey. The feathers of the tail and the wings are held in such high estimation, as to constitute, in some countries, no inconsiderable article of commerce; and the bird is hunted merely for their sake. All the other parts of its body and thighs are bare; the latter are extremely large and fleshy: the legs are covered with large scales: the end of the foot is cloven, and has two very large toes—one measuring nearly seven, and the other about four inches in length.

This bird has been erroneously represented as devoid of natural affection; but, far from leaving its eggs to be hatched

by the sun, as has often been asserted, it never remains long absent from them; and in a country where the heat is so intense, constant incubation is unnecessary. The young ones, for some days after they are hatched, can neither walk nor stand; and during that period of helplessness, the old ones attend them with the most anxious solicitude. The eggs of this bird generally weigh from twelve to fifteen pounds.

The flesh of the ostrich is far from being palatable food; but it seems that its brains were, among the Romans, considered as an exquisite morsel; and when an inordinate luxury had superseded their former simplicity of manners, this dish was often served up at the tables of the grandees of Rome; but whether on account of its delicacy, or its rarity, is uncertain. History informs us, that Heliogabalus had the brains of a hundred ostriches made up into one dish. The fat of this bird is of great use in medicine; and as an emollient, has performed wonderful cures. The bones also, when pulverized, are said to have produced extraordinary effects. Thus we observe, that by a wonderful adaptation, the Author of Nature has rendered this inhabitant of the solitary desert conducive to the comfort of man, not only in the decoration of his person, but in the more substantial blessing of renovated health.

The inhabitants of Lybia are said to breed whole flocks of these birds, which they tame and convert to domestic purposes; and Adamson asserts, that he saw at the factory of Podore, an ostrich with two negroes on its back, which ran faster than the fleetest race-horse he had ever seen. This fact, it must be confessed, seems scarcely credible; but it is certain that the Arabs train up their fleetest horses for the purpose of hunting the ostrich, which, although a very laborious, is esteemed a very entertaining amusement. Of all creatures, the ostrich is certainly that which runs with the greatest speed; its wings, as well as its legs, keeping in motion, serve as oars to waft it along; and did it press forward in a direct line, instead of a circular course, it would undoubtedly bid defiance to every mode of pursuit. In order to take them with less trouble, another method has sometimes been used, which is both singular and curious. A person having clothed himself with the skin of an ostrich, and putting one of his arms through the neck, has imitated all the motions of that bird, so as to approach a flock of these creatures, and catch some of them without difficulty.

Although the ostrich inhabits the most solitary deserts, it does not seem an unsocial creature. In these horrid regions, large flocks of them are seen together, which, at a distance, appear like a regiment of cavalry; and being mistaken for a troop of

plundering Arabs, have, on some occasions, given the alarm to a whole caravan that was crossing the deserts.

We have expatiated somewhat largely on the ostrich, as it has been noticed from time immemorial, and is often mentioned by authors both sacred and profane. In regard to the other birds of the struthious order, we shall endeavour to describe them in a manner more concise.

THE CASSOWARY

Is a bird not far inferior in size to the ostrich, being about five feet and a half in height; and although its neck be shorter, its body is as bulky as that of the former; its neck and legs also, being thicker and stronger in proportion, this conformation gives it an air of strength and compactness; while the fierceness and singularity of its aspect conspire to give it a formidable appearance.

The head of the cassowary, although small, like that of the ostrich, seems calculated to inspire some degree of terror, being destitute of feathers, and almost wholly covered with a helmet of a horny substance. To the peculiar singularity of this natural armour, may be added the colour of the eye of this bird, which is of a bright fiery yellow, and the globe being above an inch and a half in diameter, gives it an air equally fierce and extraordinary. The skin which covers the breast is callous, and without feathers; the thighs and legs are feathered, and exceedingly strong and thick.

This bird has been said to have the head of a warrior, the eye of a lion, the armour of a porcupine, and the fleetness of a horse. It seems, indeed, so perfectly formed for a life of hostility, both offensive and defensive, for terrifying others, and protecting itself, that the cassowary might, from its external appearance, be thought one of the fiercest and most terrible beings of the creation: but although Nature has given it so terrific an aspect, and such formidable weapons, its disposition is timid to excess. It never attacks, and when assaulted, depends on its fleetness more than its strength; and it runs with such amazing velocity, that the swiftest race-horse would soon be left far behind.

The same voraciousness which distinguishes the ostrich, prevails equally in the cassowary. The eggs also of the latter, although not so large as those of the former, are of a prodigious size, measuring fifteen inches round the longest, and twelve the shortest way: they are of an ash-colour, inclining to green The Molucca islands, with those of Java, Sumatra, and Banda, and the opposite parts of the continent, are the native country of the cassowary; nor has it ever yet been found in any other part of the globe.

THE DODO

Is a native of the Isle of France. Unwieldy in form, and deficient in strength, its body is massive, and almost round; and its legs resemble two thick clumsy pillars. We shall give no further description of its conformation or habits, than merely observing, that it seems to be among birds what the sloth is among quadrupeds. We are too little acquainted with it to know its instincts, its sensations, or its utility in the general system. Of this only we are certain, that the Omnipotent and Allwise Creator has made nothing but for some beneficial purpose; and that every thing has its place assigned, and its use determined, in the universal plan.

CHAPTER III.

THE RAPACIOUS KIND.

"High from the summit of a craggy cliff,
Hung o'er the deep,—such as amazing frowns
On utmost Kilda's shore, whose lonely race
Resign the setting sun to Indian worlds,—
The royal Eagle draws his vigorous young,
Strong-pounc'd, and ardent with paternal fire;
Now, fit to raise a kingdom of their own,
He drives them from his fort, the towering seat,
For ages, of his empire."—THOMSON.

We now proceed to a view of the rapacious tribe of birds which reign masters of the airy regions, in the same manner as the beasts of prey among quadrupeds domineer over the other animals that inhabit the forest; and shall first contemplate the powers and properties of the Eagle, which, under the denomination of the bird of Jove, has so frequently been introduced by poets for the illustration or the embellishment of their subjects.

THE GOLDEN EAGLE

Is the largest and noblest of all the feathered tyrants of this race; and has obtained among birds the same pre-eminence which the lion is allowed to possess among the quadruped tribes. From the point of the bill to the extremity of the tail, it measures more than three feet; and about eight feet in breadth, when its wings are extended. The weight of the female is from sixteen to eighteen pounds; but the male is smaller, and does not commonly exceed twelve pounds in weight. The eagle pos-

sesses in an eminent degree the faculty of vision: its eye is remarkably keen and penetrating, although deep sunk and covered by a projecting brow; and the iris, being of a fine bright yellow, shines with extraordinary lustre. Its general colour is a deep brown, mixed with tawny on the head and neck. The tail is black, and spotted with ash colour: the legs are yellow, and feathered down to the toes; and the claws are remarkably large, the middle one being two inches in length.

Eagles are seldom found but in mountainous and thinly peopled countries, where they breed among the loftiest cliffs, and in the places which are most remote from man.

Of all the feathered race, the eagle soars to the greatest height, and for this reason has obtained among the ancients the appellation of the bird of Jupiter. As he has not much suppleness in the joints of his legs, he rises slowly from the ground; but his strength of wing is so great, that he is able to carry off geese, hares, lambs, kids, and even infants themselves have fallen victims to his rapacity; a circumstance which might possibly give rise to the fable of Ganymede. An instance is recorded of two children in Scotland having been carried off by two eagles, which being discovered and pursued, had only time to lodge them in their nest before they were overtaken; and by that means, the two little innocents were restored to their terrified parents without having received any harm.

Smith, in his History of the County of Kerry, relates, that during a summer when the scarcity of provisions amounted almost to a famine, a poor man got a comfortable subsistence for his family out of an eagle's nest, by regularly robbing the young eagles of part of the food provided for them by the old ones; having luckily hit on the expedient of protracting their assiduity beyond the usual time, by clipping the wings, and thus retarding the flight of the young, and having perhaps still more luckily escaped being surprised by the old ones in committing those depredations on their premises. How fatal the consequences of such a surprise might have been, may be easily conjectured, from a circumstance which happened some years ago in the same county. A peasant resolved to rob the nest of an eagle that had built in a small island in the beautiful lake of Killarney. He therefore stripped and swam to the island, while the old ones were absent. Having robbed the nest of its young, he was preparing to swim back with the eaglets tied in a string; but when he was up to his chin in the water, the old eagles returned, fell upon the plunderer, and in spite of his resistance, never desisted until they despatched him with their beaks and their claws.

The eagle is certainly at all times a formidable neighbour, but particularly when bringing up its young. It is then that

both the male and the female exert all their force and industry for the supply of their offspring. Their nest is commonly built in the most inaccessible cliff of the rock, and often shielded from the weather by some projecting crag which overhangs it.

This noble bird is found in various parts of Europe; but it abounds chiefly in the warmer regions. It commonly breeds in the mountainous parts of Ireland. It lays three, and sometimes four eggs, of which it seldom happens that more than two are prolific. Mr. Pennant says, that there are instances, though rare, of their having bred in Snowden hills, in Wales. Mr. Wallis, in his Natural History of Northumberland, says, "It formerly had its aerie in the highest and steepest part of Cheviot." In the month of January, 1735, a very large eagle was shot near Warkworth, which measured from point to point of its wings eleven feet and a quarter.

This formidable tribe of birds admits of many varieties. In the rear of that which is here described, follow the ring-tailed eagle, the common eagle, the bald eagle, the white eagle, the rough-footed eagle, the black eagle, the ospray, the sea eagle, and the crowned eagle. These, and divers others, form different shades in this ferocious family; but a particular description of them is unnecessary, as they have all the same general form, the same rapacity, the same habits, and are all remarked for their longevity. The eagle has often been known to live a hundred years; it is said that it does not even then die of old age or debility, but from the beak's turning inwards on the under mandible, which prevents it from taking any food. Its longevity is not, however, more remarkable than its power of supporting long abstinence. An eagle, in the possession of Mr. O. Holland, remained, through the carelessness of servants, the space of twenty-one days without any kind of sustenance. But even this is less extraordinary than an instance related by M. Buffon, who was assured, by a person of veracity, that one of these birds being caught in a fox-trap, lived five weeks without any kind of aliment. It showed no symptoms of languor till the last eight days; and it was at last killed, in order to terminate its sufferings. When circumstances of this kind happen accidentally, they are worthy of remark; but to ascertain by experiment how much any animal is able to suffer, would be shocking to humanity.

We have been a little particular in describing the habits and propensities of this chief of the feathered nations; but shall endeavour to compensate for our prolixity on this interesting subject, by consulting brevity in some of less importance. However, we think we have not erred in giving a just delineation of a bird which has furnished poets and moralists with so many

and so beautiful allusions, and which so strikingly shows what powers the Great Creator can bestow on different orders of animal existence.

THE CONDOR OF AMERICA

Is universally allowed to be the largest of all the birds that are endowed with the power of flight, and it also possesses in the highest degree all the qualities that can render it formidable. The wings, when extended, reach eighteen feet from one extremity to the other. Its beak is so strong as to pierce the hide of any horned cattle; and it is said, that two of these birds are able to devour an ox. When stimulated by hunger, the condor does not hesitate to attack mankind; but, fortunately, there are not many of this species: if they were numerous, their depredations would be dreadful. The Indians assert, that this rapacious bird will carry off a deer or a calf, as an eagle does a hare or a lamb. M. de Condamine says, he has frequently seen them in the mountainous parts of Quito, hovering over a flock of sheep; and he imagines that they would have attempted to carry some of them off, had they not been prevented by the shepherds. This bird is of a brown colour, with a white ruff round the neck, and on the head a brown comb, but not indented like that of a cock. Some naturalists have classed it among the vultures, because its neck and head are bare of feathers; but in fierceness and courage, as well as in all its habits and disposition, it seems rather to resemble the eagle. The condor, requiring a wide space for the expansion of its wings, seldom frequents the forests, but chiefly resides in the mountains, whence it occasionally descends into the plains near the sea-shore, in search of supplies.

Whether this bird be peculiar to America, appears somewhat problematical. Some naturalists suppose that the great bird called the *roc*, described by Arabian writers, and so much exaggerated by fable, is a species of the condor. The great bird of Tarnopar, in the East-Indies, and the vulture of Senegal, which carries off children, are also thought to belong to this tribe.

The valley of Pachomar, where this ferocious bird chiefly resides, is seldom frequented by travellers. It cannot indeed be expected that any one, unless compelled by urgent business, would venture to range those desolate wastes. It can scarcely be supposed, indeed, that mere curiosity would carry any persons into those dreary regions, where broken precipices, forests swarming with panthers, and resounding with the hissing of serpents, and frowning mountains rendered more terrible by the condor, inspire a secret horror, and at every step seem to threaten destruction.

THE VULTURE,

As well as the condor, is allowed to hold only the second rank in the class of rapacious birds, and is placed after the eagle, not from any inferiority in size and strength, but from being less generous and bold. The vulture may be easily distinguished from all birds of the eagle kind, by the nakedness of its head and neck, which are covered only with a very slight down and a few scattered hairs. Its eyes are more prominent than those of the eagle: its claws are short, and less hooked; its attitude less upright, and its flight more heavy.

If, however, the vulture be thus distinguished from the eagle by its conformation, it differs still more from that noble bird in its habits and disposition. The eagle, unless violently pressed by hunger, never stoops to carrion, nor devours any thing but what is obtained by its own pursuits; the vulture, on the contrary, is indelicately and indiscriminately voracious. It seldom attacks living animals, when it can obtain a supply from those that are dead; and seems to delight in carrion and putridity. It is frequently known to root up newly-made graves, and devour the dead carcasses they contain. The sense of smelling is in these birds exceedingly acute; and they can scent carrion at a very great distance.

Of the vulture, as well as of the eagle, there are many varieties. The golden vulture measures four feet and a half in length. The neck, belly, and breast, are red: but towards the tail, the colour becomes more faint; the back is black, and the wings are of a yellowish brown. This species, together with the brown and ash-coloured, are natives of Europe. The spotted and the black are the most common in Egypt; but the bearded, the Brazilian, and the king of the vultures, are peculiar to America. Many other varieties might be added, which it would be unnecessary to describe, and even tedious to enumerate. Nature is infinitely diversified in all her works; and in no part of the creation is that diversity more visible and striking, than in taking a view of the volatile race.

Of all living creatures, no two are more at enmity than the vulture of Brazil and the crocodile. This terrible amphibious animal, which in the rivers of South America grows to the monstrous size of twenty-seven feet in length, lays its eggs to the number of a hundred, or two hundred, in the sands on the side of a river, where they are hatched by the heat of the climate, and at the same time takes every precaution to hide from all other animals the place where she deposits her burden. In the meanwhile, numbers of vultures sit silent and unseen in some neighbouring forest, and view the operations of the crocodile, in

the pleasing expectation of plunder. They patiently wait till she has laid the whole number of her eggs, and, after having covered them with sand, is retired to a convenient distance. Then, encouraging one another with ferocious cries, they pour down altogether, hook up the ground in a moment, lay the eggs bare, and devour the whole breed.

To the eye of superficial observation, the vulture would appear one of the most noxious and disgusting animals in nature; but a close inspection will discover its great utility, and add to the number of proofs that creative wisdom has made nothing without an appropriate design.

This bird, although totally unknown in England, abounds in many countries of Asia and Africa, especially in Arabia and Egypt. In these countries, particularly the last, they are of great public benefit; and numerous flocks of them are always hovering in the neighbourhood of Grand Cairo, where it is not permitted to destroy them. The service which they render to the inhabitants, consists in devouring all the carrion and filth of that great city, which in that sultry climate, would otherwise soon putrefy and corrupt the air. In all countries, indeed, which they frequent, they are of singular service, not only in devouring all the carrion, but also in destroying an incalculable number of crocodiles, serpents, and other noxious reptiles, that in hot climates are extremely prolific. The inside down of the vulture's wing is also exceedingly fine, and is converted into a warm and comfortable kind of fur, which is often sold in the Asiatic markets. Thus we may observe that this bird, which is so rapacious and indelicate fills a station of great utility in the created system.

THE FALCON,

So little noticed at the present day, was, among our ancestors, held in so high estimation, that in old paintings it is the criterion of nobility, and a person of rank seldom stirred out without his hawk in his hand. So lately as the reign of James I. Sir Thomas Allenson is said to have given a thousand pounds for a cast of hawks; and such was in general their value, that in the reign of Edward III. it was felony to steal a hawk. To take its eggs even in a person's own ground, was imprisonment for a year and a day, together with a fine at the king's pleasure. The expense which attended the sport of hawking was very great, and every thing relating to it was considered of great importance. Among the old Welch princes, the king's falconer was the fourth great officer in the state; but, notwithstanding his honours and emoluments, he was forbidden to take more than three draughts of beer from his horn, lest intoxication should cause a neglect of his duty.

Of the different kinds of hawks used for this diversion, we now know little more than their names ; but

THE GREY FALCON

Was that which in elegance and size excelled all the rest. Its throat is of a delicate white, and the ground colour of its whole plumage is the same, but variegated with dusky hues, spots, and bars. This elegant bird is an inhabitant of the northern districts of Scotland, and when falconry was fashionable, it was held in high estimation. In this, as well as the other tribes of animated nature, a number of varieties exist, of which we shall not give a particular description; but will proceed to give a glance at the kite and the buzzard.

THE KITE

Is a bird of the rapacious kind, for which the good housewives and breeders of poultry have an implacable dislike. He flies round and round to reconnoitre a breed of chickens, and then on a sudden darts like lightning on one of the unresisting little creatures, and in a moment carries it off, in spite of the cries of the hen, which has not a power of wing sufficient to enable her to mount into the air and pursue the plunderer. The kite may be easily distinguished from all other birds of prey, by his forked tail, as well as by his slow and equable motion on the wing. Its length is about twenty-seven inches, and the expansion of its wings nearly five feet. It usually builds its nests in woods, especially in mountainous countries. The high soaring of the kites is considered as a prognostic of dry weather, and Lord Bacon's authority sanctions the opinion.

THE BUZZARD,

In its habits and disposition, resembles the kite, and is not much inferior in size; its length being about twenty-two inches, and the full expansion of its wings about five feet. This bird is sluggish and inactive. It feeds on birds, rabbits, moles, and mice. In summer he lives chiefly by robbing the nests of other birds and sucking their eggs; and the indolence of his disposition causes him, in general, to prefer acquisitions that are easily made, before what must be carried by laborious pursuit.

That the buzzard is capable of domestication, will appear from the following account originally given by M. Fontaine, and inserted in Buffon's Natural History:

"In 1763, says the narrator, a buzzard was brought to me that had been taken in a snare. It was at first extremely wild and unpromising; but I undertook to tame it, and succeeded,

by leaving it to fast, and then constraining it to come and eat out of my hand. By this plan I brought it to be very familiar; and after having shut it up about six weeks, I began to allow it a little liberty, taking the precaution, however, to tie both pinions of its wings. In this condition it walked out into my garden, and returned when I called it to feed. After some time I removed the ligatures, and fastened a small bell above its talons, and also attached on its breast a bit of copper with my name engraven on it. I then gave it entire liberty, which it soon abused; for it took wing, and flew as far as the forest of Delemere. I gave it up for lost: but some hours after I saw it rush into my hall, pursued by five other buzzards, who had constrained it to seek again its asylum.

"After this adventure, it ever preserved its fidelity to me, coming every night to sleep on my window, and growing so familiar, as to seem to take singular pleasure in my company. It attended constantly at dinner, sat on a corner of the table, and very often caressed me with its head and bill. It one day followed me when I was on horseback, more than two leagues, flying above my head.

"It had an aversion both to dogs and cats, and had often tough battles with them, but always came off victorious. I had four very strong cats, which I collected into my garden with my buzzard: I threw to them a bit of raw flesh; the nimblest cat seized it, and the rest pursued, but the bird darted upon her body, bit her ears with his bill, and squeezed her sides with his talons so forcibly, that she was often obliged to relinquish her prize. Often another cat snatched it the moment it dropped; but she suffered the same treatment; till the buzzard had got entire possession of the plunder.

"This buzzard would not suffer a red cap on the head of any of the peasants; and so alert was he in whipping it off, that they found their heads bare without knowing what was become of their caps. He also snatched wigs, without doing any injury, and carried them to the tallest tree in a neighbouring park, which was the ordinary depot of his booty.

"He did no mischief in my court-yard; and the poultry, which at first dreaded him, grew insensibly reconciled to him. But what is singular, he was not gentle to my neighbour's poultry; and I was often obliged to publish that I would pay for the damages he might occasion. However, he was frequently fired at, and, at different times, received fifteen musket-shots, without suffering any fracture. But once, hovering over the skirts of a forest, he dared to attack a fox, and the keeper, seeing him on the shoulders of the fox, fired two shots at him: the fox was killed, and the buzzard had his wing broken; yet, notwithstand-

ing his fracture, he escaped from the keeper, and was lost seven days.

"I had been used to call him every evening with a whistle, which he did not answer for six days; but on the seventh, I heard a feeble cry at a distance, which I judged to be that of my buzzard: I repeated the whistle, and heard the same cry. I went to the place whence the sound came, and at last found my poor buzzard with his wing broken, who had travelled more than half a league on foot to gain his asylum. Though extremely reduced, he gave me many caresses. It was six weeks before he was recruited, and his wounds were healed; after which he began to fly as before, and follow his old habits for about a year: he then disappeared for ever. I am convinced that he was killed by accident, and that he would not have forsaken me from choice."

Of the buzzard, kite, and hawk kind, above seventy species, more or less diffused in different countries, have been enumerated by naturalists; but their general propensities being nearly the same, preclude the necessity of a particular delineation; and we have mentioned the great number of varieties, merely as an additional instance of the endless diversity of Nature's works.

We shall now give a concise description of a different kind of rapacious birds, which, although of propensities similar to those of the last described class, have different habits and a different mode of living. These are the owl kind, a sort of nocturnal robbers that are scarcely ever seen in the day, but prowl about in the night, and take their prey by surprise during the hours of rest and seeming security.

All birds of the owl kind have one common mark by which they are distinguished from all others. Their eyes, like those of tigers, cats, and the rest of that kind of quadrupeds, are formed for nocturnal vision. Their sight is dazzled by the glare of day; but they do not see best when it is totally dark, as some have imagined. The dusk of the evening, or the mild glimmering of moonshine, afford them the greatest facility of distinguishing their prey, and such are the seasons when they make the most successful depredations.

Naturalists commonly distinguish birds of the owl kind, by disposing them into two grand divisions, those with horns, and those without. These horns are nothing more than a few feathers standing upright on each side of the head: among these,

THE GREAT HORNED OWL

Is entitled to the pre-eminence. It appears at first view scarcely inferior to the eagle in size, but on a closer inspection is found to be much less. Indeed, all sorts of owls are enveloped

in so great a mass of feathers, as to appear much larger than they are. The eyes of the great horned owl are large and transparent, and encircled with an orange-coloured iris: its ears are large and open: its plumage is of a reddish brown, marked on the back with black and yellow spots, and with yellow ones alone on the belly. This bird has sometimes been seen in Scotland, and also in Yorkshire; but it is not common in any part of England. It inhabits inaccessible rocks and deserted places, such as ruinous castles and unfrequented caverns; and preys upon hares, rabbits, and all kinds of feathered game.

Next in size is the common horned owl, which, like the former, appears much larger than it is, on account of the fulness of its plumage. When its wings are expanded, their extent from one extremity to the other is about three feet, and its horns are composed of six feathers on each side, of about an inch in length. Its colour is a reddish brown, with a mixture of white, and their legs are feathered down to the toes. These birds seldom take the trouble of making a nest, but generally take possession of some deserted one, which has been occupied by the magpie, or the buzzard. They lay four or five eggs. The young are at first quite white, but come to their colour in about fifteen days. This kind of owl is common in France and England. There are several other varieties of the horned owl, which we shall omit, and briefly mention two or three of the tribe which are without horns.

THE WHITE, OR COMMON BARN OWL,

Is the most generally known of any of this kind, as it may be said to be almost domesticated. It seldom hoots, but often screams tremendously. It generally haunts barns and granaries, where it renders great services to mankind, by clearing those places of the mice, and other vermin which resort thither, and are so destructive among grain.

THE IVY, OR SCREECH OWL,

Is that to which the gloomy apprehensions of mankind have attributed the power of presaging death or calamity; and the writers of poetry and romances, in order to render their scenery more impressive, have, in conformity to popular superstition, frequently introduced it into their descriptive representations, when some melancholy scene was to be displayed. The circumstance which has caused this bird to be accounted ominous, appears to be that of its screaming in a tremendous manner; together with its natural propensity of approaching toward a window, where it sees a light at a late hour. As lights are generally kept continually burning in the chambers of the sick, and the

screech owl prowls about in the dead time of the night, it is no wonder, that in places where they are numerous, they may sometimes have been attracted by the light, and have approached the house or the windows, and uttered those screams which are natural to it, in consequence of fright or surprise. Such a circumstance would be very apt to terrify a timid invalid, or an ignorant nurse, and from this source might easily be derived all the absurd notions which have prevailed concerning the ominous nature of the screech owl.

Mr. Pennant, in his Arctic Zoology, observes, that the Mogul and Kalmuc Tartars pay almost divine honours to this bird; as attributing to it the preservation of Jenghis Khan, the founder of the empire. This prince having been surprised and put to flight by his enemies, was compelled to shelter himself in a coppice; and a screech owl settled on the bush under which he was hidden. His pursuers, judging that a bird of that species would not perch where a man was concealed, passed the spot, and thus suffered the prince to escape. His countrymen thenceforth held the owl sacred; and to the present day, the Kalmucks adorn their heads with a plume of its feathers on all solemn festivals.

This bird, which is nearly of the same size as the white, or common barn owl, is distinguished from the latter species, by scarcely any other mark than the colour of its plumage, which is a kind of mixture of iron grey and tawny; and the principal reason for introducing it to notice, was, that it might serve as an inducement to observe and despise the absurd ideas of weak and ignorant minds. Indeed, we are certain, that the screech owl is a very harmless bird: it preys solely on small birds, mice or reptiles, and never either procured or foretold the death or disaster of any human being, whatever nurses and gossips may think of the matter.

CHAPTER IV.

THE POULTRY KIND.

. . . . . "The careful hen
Calls all her chirping family around,
Fed and defended by the fearless cock;
Whose breast with ardour flames, as on he walks
Graceful, and crows defiance."

Our attention is now called to a subject of great importance in the economy of civilized life, in presenting to view a class of objects in the animal system equally curious and useful.

From the most rapacious class of birds, we are now making a transition to those which are the tamest, and which not only contribute to the delicacies of the table, but furnish articles of commerce, and are consequently of great advantage to human society.

It is obvious that birds of the

GALLINACEOUS, OR POULTRY KIND,

Exhibit a complete contrast to those which we have been hitherto occupied in contemplating.

Amidst the immensity of Nature's works, and the endless varieties displayed in the world of life, there is not, perhaps, a more evident proof of design, or a more conspicuous display of infinite Wisdom, in the adaptation of means to ends, and of animal mechanism to a specific purpose, than is exhibited in the internal and external conformation of the last described class of birds, and of those whom we are now about to survey. In order to raise our minds to the admiration of the great Creator, whose works are the index of his attributes, let us for a moment indulge a laudable curiosity in the examination of this interesting subject.

In our general remarks on the volatile race, we have already observed the wonderful coincidence between their conformation and the mode of life to which they are destined. In birds of the rapacious kind, we have seen that the form and strength of their beaks and claws, their fierceness of disposition, and all their ferocious propensities, evidently pointed out their destination; and in the gallinaceous, or poultry kind, we shall discover the same exhibition of an all-wise design. These are without the hooked bills and formidable talons of the bird of prey, and their internal conformation admits of a still more curious and important distinction. In the rapacious kind, digestion is carried on by means

of a liquid in the stomach, which dissolves the aliment. In those which feed on grain, the gizzard is the principal instrument that grinds and reduces it to pulp. The wings of the poultry kind are short, and not calculated for a long flight, which prevents them from wandering, and impels them to seek for happiness at home. Their bills, which are incapable of annoyance or destruction, are perfectly adapted to their manner of feeding. Their toes are made for scratching up seeds or grain, but not for tearing to pieces animal food. As the predaceous tribes are formed for war and depredation, these are equally fitted for peace; accordingly their contentions are trivial, and, excepting the cock, we seldom find them engaged in violent contests. They are also without that unconquerable propensity to liberty, which in birds is so general. The poultry kind, if well fed, seldom desire to range; and from the first moment of their confinement, seem satisfied if their supply of food be plentiful. Their increased plumpness in such situations, shows their contentment; while the wilder species, if cooped up in cages, unless inured to it when very young, fall into languor, and sometimes pine to death amidst the greatest profusion of the most delicate food. These circumstances evidently display the infinite wisdom of the Author of Nature, in adapting every creature to its particular destination.

THE COCK

Perhaps exhibits a greater number of varieties than any other animal of the feathered race; for scarcely any two birds of this tribe exactly resemble each other in plumage and shape. This may probably proceed from the effects of domestication, as of all the different kinds of birds the cock seems to be that which was first reclaimed from the forest, and taken to supply the luxuries of the table.

The time when the cock was first domesticated in Europe is not ascertained; but he is supposed to have been introduced from Persia. In the island of Tinian, and many others of the Indian Ocean, this bird is found in his native state. In those islands, and in the woods of Malabar, his plumage was black and yellow, and his comb and wattles are yellow and purple. In those of the Indian woods, there is also another peculiarity—their bones when boiled are as black as ebony; those of the European cock, on the contrary, are white.

No animal whatever displays greater courage than the cock; and in every part of the world, from which it is not yet banished by refinement and polished manners, cock-fighting constitutes one of the most popular diversions. In China, India, and the Philippine islands, it is one of the principal amusements of the

great; and in all parts of the East, the highest ranks participate in an enjoyment which casts upon humanity an indelible stain. In this country it was once a favourite pastime; but to the credit of the present age, it is very much on the decline; and it is to be hoped that the period is not far distant when it will be exploded even among the vulgar.

By the ancients the cock was consecrated to Minerva, as the symbols of vigilance, to intimate that genuine wisdom is ever on its guard; and under the Druidical system, it was forbidden to be eaten by the ancient Britons. The game cock of Great Britain has long been imagined superior in courage to that of any other country; but, according to late observations, it is equalled, or even excelled, by the Chinese breed.

The hen, if well supplied with food and water, is said to lay about two hundred eggs in a year, which shows the importance of this bird in domestic economy. As a parent she excites admiration; for her affection towards her offspring, divests her of her natural timidity, and gives her both courage and strength. For the protection of her chicken, she will venture to attack the horse, the hog, or the mastiff, and will not hesitate to fly at the fox.

It is a curious circumstance in the history of this bird, that at Grand Cairo they have a method of hatching eggs by an artificial heat, and thus produce six or seven thousand at a time. Being brought forth in a mild spring, which is warmer than our summer, the chickens thrive very well. It does not however appear that this could be carried into effect with success in our cold and variable climate, where, although the little animals might be hatched without much difficulty, the greatest part of them would, in all probability, perish soon after their exclusion from the shell.

THE TURKEY

Is one of the most remarkable birds in the poultry-yard, on account of the singular appearance of its head, as well as of some habits almost peculiar to itself. Some suppose this bird to be a native of the East, while others have ascribed its origin to the western continent. It is difficult to determine the natal place of any animal of which the species is generally diffused: but the weight of testimony favours the opinion that the turkey is originally a native of the new continent; as among all the descriptions of eastern birds that are extant, no mention of this can be found; whereas, it is universally known, that in America numbers of them run wild in the woods. It is by some positively asserted that the turkey was first introduced into England and France in the cotemporary reigns of Henry VIII. and Francis I.,

and it is pretty generally agreed that it was never known in Europe till after the discovery of America. All these circumstances combined, afford, if not a convincing proof, at least a strong conviction that it is indigenous only in the new continent.

In England, the turkey when young is exceedingly tender, and is reared with great difficulty; yet in its wild state it abounds in the forests of Canada, where the ground is covered with snow almost three parts of the year. In their native woods they are also much larger, as well as more hardy, than in a state of domestication.

In beauty also they far excel the European breed. Their feathers, which are of a dark grey, and bordered at the edge with a bright gold colour, are woven by the savages of the country into cloaks for the ornament of their persons. They also fashion them into fans and umbrellas; but never think of domesticating those creatures, of which the woods furnish a sufficient supply; for man in a savage state extends not his views beyond precarious possession. The hunting of the turkey is one of the principal diversions of the natives, and the flesh furnishes them with a frequent supply of delicate food. When the hunter has discovered the retreat of a flock of turkeys, he takes his dog and sends him among them. The turkeys no sooner perceive their enemy than they set off, running at full speed, and with such swiftness as to leave the dog far behind. As they cannot, however, keep up their speed for any great length of time, they at last take shelter in a tree, where they sit, quite spent and fatigued until the hunter comes up, and with a long pole knocks them down one after another.

Turkeys do not seem to possess, either in their wild or domesticated state, any very great degree of instinct. In the former we do not find them use any cunning to elude the pursuit of the hunter, and in the latter they seem heavy and stupid; and, although furious among themselves, are remarkably timid among animals of a different species. They may, however, be ranked among the most useful fowls of the farm-yard; for, notwithstanding the tenderness of their constitution when young, they are hardy when grown up, and feed themselves with little trouble or expense to the farmer. Some of them weigh from twenty to thirty pounds, and constitute an excellent article of food.

The following singular instance of a deviation from instinct in a creature of this species, as related in the "New Transactions of the Academy of Sciences at Stockholm," is particularly worthy of attention. In the month of May, 1728, a female turkey was sitting upon eggs, and as the cock began to appear dejected in her absence, he was put into the place with her. He immediately sat down by her side, and soon afterwards took some

eggs from under her, which he carefully covered. This induced the owner to have another nest made, and several eggs put into it for the cock; who appeared highly gratified with this mark of confidence, and performed the task of incubation, with such unremitting patience and care, as scarcely to afford himself time to take his necessary food. At the usual time a numerous brood of young ones was produced: it was, however, deemed hazardous to entrust the raising of them to the cock; they were therefore taken away, and brought up by other means.

In different countries, especially on the new continent, there are several varieties of this bird, differing in size and the colour of their plumage, but not in any important characteristic.

THE PINTADA, OR GUINEA HEN,

Is now pretty well known, and therefore we shall be concise in its description, and shall only observe that it is nearly the size of a common hen, although the length of its legs makes it appear larger. It has a round back, with the tail turned downwards, and its whole plumage is black, or dark grey, curiously speckled with white, and its flesh is excellent food. Its eggs, which, like its body, are speckled, have a peculiar richness, and although it lays only five or six in a season in cold climates, it is far more prolific in its own sultry regions. It is now common in most parts of Europe, and abounds in America, where it runs wild; from which circumstance many have supposed it to be a native of that continent. This, however, appears to be a mistake. Africa is its original country, and there is scarcely a doubt of its having been first introduced into England from Guinea, a circumstance which indeed is implied by its name.

Having described the Guinea hen with the greatest possible brevity, we shall now exhibit the most beautiful object of the animal creation.

THE PEACOCK,

When its tail is expanded, exhibits a spectacle of which no description can possibly give a just idea; to form an accurate conception of the beauty of its appearance, the living object must be contemplated. However, although the form of this bird be completely elegant, and its plumage adorned with the most brilliant colours, as well as diversified with an endless variety of tints and shades, its voice is extremely harsh and disagreeable. Its insatiable gluttony also serves to counterbalance the only merit it can claim, its incomparable beauty; and it is actuated more than any other of the gallinaceous species by a spirit of depredation.

Like the rest of the poultry kind, the peacock feeds chiefly on

grain, and has a strong predilection for barley. It eagerly seeks for insects and tender plants, and if it does not find a sufficient supply of its favourite food, it will lay waste the labours of the gardener, and destroy, in one day, the work of many months.

The peacock, or the peahen, has in some countries been esteemed as an article of luxury for the table; and although its flesh be not at this time considered as a delicacy, it is certainly far from being disagreeable, and is said to resist putrefaction longer than that of any other animal. In the time of Francis I. king of France, it was a custom to serve up a peacock at the tables of the great, not for food but for ornament. The skin was first carefully stripped off, and the body, being prepared with the hottest spices, was again covered with it; thus retaining all its plumage in full display, uninjured by the preparation. The bird thus prepared was often preserved for several years without putrefaction, and served to add splendour to successive entertainments.

The peacock is a native of India and the other oriental countries of Asia, where it is yet found in its natural state; and numerous flocks of them are still to be seen wild, in the islands of Java and Ceylon. So beautiful a bird was not, however, suffered long to remain concealed in its native retreats; and we find that so early as the time of Solomon it was made an article of commerce, and is numbered among those which were imported by his fleets. That prince was probably the first who introduced the peacock into Judea; and the Tyrians, his partners in trade, undoubtedly imported it into their country; but it is probable that it had been already brought to Tyre, and no doubt to Egypt also, previous to that period. The Greeks also showed a strong predilection for this bird; and we are told that the first exhibition of a peacock at Athens, induced many persons to travel from Lacedemon to that city, to gratify their curiosity with the sight of so beautiful an object. Indeed, such a curiosity was laudable; for so magnificent a display of the work of the Creator, especially when accompanied with the surprise of novelty, certainly merited the contemplation of a philosopher.

The peacock is said to live about twenty years. It plumage does not acquire the perfection of its beauty, until it has attained its third year. The peahen is much less beautiful than the peacock. In the climate of England, she lays only five or six eggs, but in warmer regions she is more prolific. The time of incubation is to her a time of solicitude, as she is obliged to conceal her retreat from the peacock, lest he should disturb her or break her eggs, to which unnatural act he has a strong propensity.

In an elegant publication entitled " Rural Sports, by the Rev.

H. B. Daniel," the following extraordinary instance is related respecting a change in the plumage of a female of this species. Lady Tynte had a favourite pied peahen, which at eight several times produced chicks. Having moulted when about eleven years old, her ladyship and the family were astonished, by the creatures displaying feathers peculiar to the other sex, and appearing like a pied peacock. In this process, the tail, which resembled that of the cock, first appeared. In the following year she moulted again, and produced similar feathers. In the third year she did the same, and then had also spurs like those of the cock; but it is remarked that she never bred after this change of her plumage. She is now preserved in the Leverian Museum.

Of this curious bird there are several varieties, but the peacock of Tibet is universally allowed to be the most beautiful of all the feathered race. Its colours are blue, yellow, red, and green; all blended with the most artificial exactness, and forming the most pleasing combinations, in which Nature seems to have exerted all her skill, and exhibited all her beauties.

THE PHEASANT,

Next to the peacock, holds the second rank in the gradation of beauty, among the feathered tribes. To make a minute comparison between the most beautiful of each species, the admirer of Nature's works would be puzzled to determine which of the two has the greatest claim to pre-eminence. Nothing, indeed, can satisfy the eye with a greater variety and richness of ornament than the plumage of the pheasant, whether we regard the dazzling brilliancy of its colours, or their elegant mixture. It far surpasses all the efforts of the pencil, to exhibit tints so glossy and so bright, or points so finely blended.

Every scholar is acquainted with the story of Solon the Greek philosopher, and Crœsus, king of Lydia. We are told that the monarch, being seated on his throne, adorned with all the appendages of terrestrial grandeur, asked Solon if he had ever seen so magnificent a spectacle? The philosopher, nothing moved by the pomp and pageantry with which he was surrounded, coolly answered, that, " after having seen the plumage of the pheasant, he could not be astonished at the sight of any other finery." This answer of the Grecian sage is worthy of being recorded: it was well calculated to remind that powerful and opulent monarch of the inferiority of all artificial ornaments, when compared with the magnificence of Nature, and of the insignificancy of all human greatness and splendour before the Creator and Sovereign of the universe. It will be remembered also, that a far greater personage than the Greek philosopher, has taught us the

same important lesson, in saying that all the magnificence of Solomon was not equal to the splendour of the lilies.

The beautiful bird which thus displays the energies of Nature, merits a particular description. Its eyes are surrounded with a ring of scarlet, sprinkled with small specks of black, and the iris is yellow. The fore part of the head is clothed with blackish feathers, mixed with a shining purple; the top of the head and the upper part of the neck are tinged with a darkish green, which bears a silky gloss. In some, the top of the head is of a shining blue; and the upper part of the neck appears sometimes blue and sometimes green, as it is differently placed to the eye of the spectator. The feathers of the breast, the shoulders, the middle of the back, and the sides under the wings, have a blackish ground, and their edges are tinged with a colour exquisitely beautiful, which appears sometimes black and sometimes purple, according to the different reflections of the light: under the purple, there is a transverse streak of gold colour. The tail is about eighteen inches long. The legs, feet, and toes, are of the colour of horn, and two of the toes are connected with a membrane: the legs are furnished with spurs of a black colour, and shorter than those of the cock. The male is far more beautiful than the female.

The beauty of the pheasant is not its only excellency. Its flesh is one of the greatest dainties, and its wholesomeness is equal to its delicacy. When full grown, it seems to feed indiscriminately on every thing that falls in its way, and such is its voracity that it is said to devour insects and reptiles, as well as seeds and grain. In the woods, the hen lays eighteen or twenty eggs in a season, but not above ten in a domestic state.

Of this bird, as of most others, there are many varieties; but among all these, the golden pheasant of China excels in beauty. It is somewhat less than the common pheasant, being not more than two feet nine inches in length. The general colour of its plumage is crimson, and its head is adorned with a splendid yellow crest, the feathers of which have the appearance of glossy silk. The back and rump are of a fine gold colour; the scapulars are blue, and the quills brown, marked with yellow. The tail is twenty-three inches long, and its colour chesnut speckled with black. The hen is far inferior in beauty, the general colour of her plumage being brown. It appears to be a hardy bird, and will live and propagate in the climate of Great Britain.

The Argus pheasant is also a magnificent bird. It derives its name from its quills being ornamented with eyes resembling those of the peacock's train. This bird, as well as the former, and also the superb pheasant, the predominant colour of which is a beautiful green, are all natives of China.

There is another beautiful bird, a native of South America, which some naturalists class with the pheasant.—It is called the trumpeter. The individuals of this species vary in colour. It is very familiar, and will follow a person about like a spaniel. It feeds on bread, fish, or flesh, and is reckoned as delicious food as the common pheasant.

The curassow, which comprehends five or six varieties, bears a strong resemblance to the pheasant, although most naturalists agree in considering it a distinct genus. In Peru and Mexico, this kind is very numerous, both in a wild and domestic state.

The pheasant was originally brought into Europe from the banks of the Phasis, a river in Colchis, in Asia Minor; and thence has derived its name. Though removed from its natal soil, it thrives well in the climate of Great Britain, where, still retaining its attachment to freedom, it lives wild in the forests and parks, of which it constitutes an enlivening ornament. It labours, however, under one disadvantage, which prevents its multiplication in such a degree as might otherwise be expected. The slowness of its rising from the ground, caused in a great measure by the length of its tail, renders it extremely liable to be destroyed by the weasel, the foumart, and other animals of that kind.

THE BUSTARD

Is the largest land bird that is a native of Great Britain, or even of Europe. Its weight varies considerably: some have been found of not more than ten pounds; others weigh from twenty to thirty. This species appears to have been pretty generally diffused; for according to Plutarch, it is found in Lybia, in the environs of Alexandria, in Syria, in Greece, and in Spain. It also abounds in some parts of France. In England, their principal places of rendezvous are Salisbury plain, the heaths of Sussex and Cambridgeshire, and the Dorsetshire uplands. In those extensive plains, where there are neither woods nor hedges to skreen the sportsman, the bustards enjoy security, and are often seen in flocks of fifty or more together. Their food consists principally of berries that grow among the heath, and earth-worms, which, before sunrise in the summer season, appear in great numbers on the downs. It is in vain that the fowler creeps along to surprise them; they have always sentinels stationed in proper places, to warn them of the first appearance of danger. But although they can seldom be shot, they are sometimes hunted and taken by dogs, when they are grown so fat as to be unable to fly without great preparation. This bird was once far more plentiful than at present. The increased cultivation of the country, and the deliciousness of its flesh, have greatly

contributed to thin the species; and it would, perhaps, have been long since extirpated, had it not derived so great a degree of security from inhabiting only the most extensive plains, where its food is abundant, and where every enemy may be discovered at a distance.

The bustard appears much larger than a turkey; but its wings are not adapted to a perfect flight, their expansion not reaching above four feet; and though it can elevate itself in the air, it flies with some difficulty. Its head and neck are ash-coloured; the back is transversely barred with black ferruginous stripes; the belly is white, and the tail marked with broad bars of red and black. The female is not more than half as large as the male. The top of her head is of a deep orange colour, crossed with black lines.

THE GROUSE

Comprehends about seventeen species, of all which the characteristic mark that distinguishes them from the rest of the poultry kind, is a scarlet skin above the eye. The firry forests and the barren heath are their favourite retreats; and since cultivation is so much improved and extended, they are, in Great Britain, only to be found on the moors of Yorkshire and Westmoreland, the highlands of Scotland, and other extensive wastes.

THE COCK OF THE WOOD

Is in size and importance the first of this tribe: it is nearly as large as a turkey, and frequently weighs above fourteen pounds; but the female is much smaller. The head and neck are ash-coloured, and crossed with black lines: the body and wings are of a chesnut colour, and the breast is of a blackish glossy green. The female is different in colour, being red about the throat, with the head, neck, and back, crossed with red and black bars: the belly is striped crosswise with orange and black, and the tips of the feathers are white. The black cock is about the size of a common hen, and when full grown weighs about four pounds. The moor fowl or red game, which is peculiar to the British islands, weighs about nineteen ounces. All birds of the grouse kind, among which the white game, or ptermagan, must be included, delight in the most barren heaths, the highest hills, or the thickest forests. Their food is mountain berries and the tops of the heath plants; and their flesh is exquisitely delicate.

THE PARTRIDGE

Is a bird that is every where well known, being common in every climate and in every country; in the hyperborean regions,

as in the torrid zone. It seems to adapt itself to each climate where it resides. In the countries within the arctic circle, it is brown in summer, but in winter changes its colour to white; and it acquires a new covering of soft warm down, which at that season grows underneath its feathers. The wisdom and goodness of the Author of Nature are exceedingly conspicuous in this particular,—that in the polar regions all animals acquire a covering perfectly adapted to the rigours of the climate,—a circumstance which shows that the providential care of the Creator extends to all his creatures, in every situation. The habits of these birds resemble in general those of the rest of the poultry kind; but they seem to possess a superiority of cunning and instinct. Being accustomed to hostile aggression, they learn from necessity and habit the arts of evasion and the means of safety. The partridge commonly produces a covey of ten or fifteen young. It is said that this bird lives twenty years; but it is seldom suffered to die of old age.

The affection of partridges for their young, and the artifices they occasionally employ for their protection, are equally singular and interesting. "A partridge," says Mr. White, in his Natural History, "came out of a ditch, and ran along, shivering with her wings, and crying out, as if wounded and unable to get from us: but while the dam feigned this distress, a boy who attended me saw the brood, which was small and unable to fly, run for shelter into an old fox's hole under the bank." Mr. Markwick also relates, that as he was once hunting with a young pointer, the dog ran on a brood of very small partridges. The dam immediately cried, fluttered, and ran trembling along before the dog's nose, till she had drawn him to a considerable distance; when she took wing, and flew farther off, but not out of the field. The pointer then returned nearly to the place where the young ones lay concealed; upon which the old bird flew back again, and repeated her artifice of rolling and tumbling about before the dog's nose, till she succeeded in diverting his attention, and thus preserved her helpless progeny.

Of partridges, there are more than twenty species; all of which may, however, be arranged in two grand divisions, the red and the grey: the former is the largest, and often perches on trees; the latter, which in England is the most common, always sits on the ground. To give any description of a bird so generally known, would be superfluous; and no one is ignorant of the excellency of the food which its flesh affords.

THE QUAIL

Is much smaller than any other of the gallinaceous tribes, being not more than half so large as the partridge, although

much resembling it in shape. Its head is black, with a mixture of dusky brown; the breast is of a pale yellow, with a reddish cast, and spotted with black; and the back is marked with lines of pale yellow.

Quails are exceedingly quarrelsome, and often have obstinate contests among themselves. Quail-fighting was once a favourite diversion among the Athenians; and we cannot but lament that so cruel a pastime was encouraged among so polished a people. Its flesh, however, was by them esteemed unwholesome, and consequently not used for food; but they reared great numbers of them for the pleasure of seeing them fight. Modern manners have in this respect entirely reversed the sentiments of mankind. The courage of the quail is now disregarded, while its flesh is esteemed an exquisite delicacy; and it is to be hoped, it may indeed be confidently expected, that refinement of manners and mental improvement will, in a short time, condemn to the same fate that quail-fighting has experienced, and obliterate every vestige of, amusements which are equally unimproving to the mind and shocking to sensibility.

The quail is universally known to be a bird of passage, although, from its heaviness of flight, and scarcity of plumage in proportion to its corpulency, it may seem but ill adapted for remote migration. But, whether it removes into distant regions in search of a more temperate climate, or only migrates from one province to another for fresh supplies of food, has not yet been ascertained. Of this, as of almost all other birds, there are several varieties; but all of them agree in general characteristics.

Having finished the pleasing survey of a class of the feathered creation, that enlivens our forests and heaths, or embellishes the farm-yard, it must be confessed that the view is delightful; but when we consider the exquisite food with which they furnish our tables, our gratitude is excited towards the Author of Nature, for his parental goodness and indulgent munificence.

CHAPTER V.

THE PIE KIND.

"Hark! 'tis the raven's dismal croak,
My boding breast is fill'd with fear;
Yet once beneath that spreading oak,
The bird of woe I smil'd to hear."—Miss Robinson.

"Oft have I lov'd to mark the rook's slow course,
And hear his hollow croak."—Southey.

We shall now proceed to review a class of volatiles, different from each of the former, but partaking in some degree of the nature of both.

THE PIE KIND

Is that race of birds which are generally considered as the least beneficial to man. Few of them, except the pigeon, contribute to furnish us with food, while numbers make free with the fruits of our industry. We cannot, however, see through the vast and complicated plan of Divine Wisdom; and perhaps we are more indebted to this noisy, restless, chattering tribe, than we imagine, and derive from them benefits of which we are ignorant.

THE RAVEN, THE ROOK, AND THE CARRION CROW,

Are so generally known, that any description of them would be superfluous, and tend rather to obscure than improve our ideas. The raven is the largest of the three, and is distinguished from both the others by his bill being more hooked. As for the rook and the carrion crow, they so nearly resemble each other as not to be easily discriminated. The principal and most obvious distinction is in the colour of their plumage, which in the rook is more glossy, with something of a purple cast, while that of the carrion crow is of a more dingy black. Their resemblance, however, is so great that the rook often suffers on that account, and is frequently destroyed instead of the other, to which he is, in size and colour, so nearly similar.

The raven is a strong, hardy, and active bird, uninfluenced by any change of weather, and capable of supporting the rigours of every climate. He is not oppressed by the sultry heats of the torrid zone, nor benumbed by the intense cold of the polar regions; although, like many other animals in those parts, he changes his colour and acquires a white plumage. That a bird which is so little affected by any inconveniencies of climate,

should be universally diffused, is nothing wonderful; and accordingly, we find the raven an inhabitant of every region of the globe. The sagacity of this bird is equal to his strength and vigour; and when tamed, he is capable of receiving instruction in a wonderful manner, and of performing things almost incredible. He may be trained to fowling like a hawk, taught to fetch and carry like a dog, to speak like a parrot, and, what is still more extraordinary, to imitate any vocal music. A modern author of great repute says, he has heard a raven sing a song with great distinctness, truth, and humour.

The raven, when entertained as a domestic, has indeed many amusing qualities. Being inquisitive and impudent, he visits every corner, affronts the dogs, drives the cats from one place to another, plays his pranks among the poultry, teazes every animal around him, and is a constant attendant on the cook-maid. She indeed is his principal favourite, and to her his attachment is unalterable; although he does not hesitate to incur her displeasure, by snatching from her a delicate morsel. When wild, the raven is a voracious plunderer; when domesticated, he is by nature a glutton, and by habit a thief; he purloins every thing to gratify his appetite, and even hoards what he cannot convert to any use; for tea-spoons, rings, and pieces of money, are often found in his secret treasury.

The longevity of the raven is equal to that of any of the feathered race, or perhaps of any other animal; for birds are in general supposed to live longer than quadrupeds: the raven has been known to live more than a hundred years; and, indeed, as it is endowed with a robust constitution, a good appetite, and great activity, it seems to possess all the qualities conducive to long life.

From the remotest antiquity, a number of superstitious notions respecting this bird have prevailed, which, notwithstanding the general improvement of the human mind and the diffusion of knowledge, are yet to be found among the ignorant populace of most countries. Some suppose that the respect paid to it in Sweden, where it is held sacred, and no one offers to molest it, is founded on the circumstance of its being selected for the purpose of feeding the prophet Elijah.

The Romans, however, who paid no regard to our scriptures, had also their prejudices in regard to the raven, as they accounted it ominous, and merely from motives of fear held it in the greatest veneration. The origin of these absurdities is wholly unknown; for it is impossible to trace the progress of superstition, and the eccentricities of its operations on weak and uncultivated minds.

Of the carrion crow and the rook we shall say but little, as they

are both universally known; and shall only observe, that the former lives on carrion, but the latter on seeds and grain.

The rook delights to be near the habitations of men, and their bustle and cawing enliven the rural scene, for which reason many country gentlemen would not wish to banish them from the vicinity of their habitations.

THE MAGPIE

Is, in England, universally known, and it would only be a waste of time to describe a bird with which every school-boy and every milk-maid is perfectly acquainted. It will therefore be sufficient to remark a few of its most general propensities.

In all its habits, it discovers a degree of instinct superior to most other birds; and even the globular construction of its nest displays extraordinary sagacity. The magpie is noisy, cunning, mischievous, and insolent: it preys upon animals which are unable to make resistance, and teazes such as are larger and stronger than itself. It is extremely voracious, and particularly addicted to the devouring of eggs. Those of the domestic fowl, and of small birds which build in the hedges, very frequently fall a prey to this cunning depredator. In its domestic state it preserves its natural character without any alteration, and the same propensities attend it in the cage that distinguish it in the woods. Being one of the most cunning, it is also one of the most docile of birds. Those who teach it to speak have a custom of slitting its tongue, which is equally cruel and absurd, as it causes the poor creature to suffer pain without in the least improving its speech. It sometimes learns to speak very distinctly, but its sounds are too shrill to be an exact imitation of the human voice, which the raven and the parrot can more perfectly counterfeit.

THE JAY

May be reckoned among the most beautiful birds of the British isles. Its forehead is white streaked with black, and its head is covered with long feathers, which it can at its pleasure erect into a crest. The whole neck, back, belly, and breast, are of a faint purple dashed with grey. The wings are most elegantly barred with blue, black, and white; and the tail is generally quite black. Like the magpie, it feeds on small birds or fruits, is extremely docile, and learns to speak with facility.

Mr. Bewick informs us, that a jay kept by a person in the north of England, had been taught at the approach of cattle, to set a cur dog upon them, by whistling and calling him by name. One winter, during a severe frost, he excited the dog to attack a cow which was big with calf, when the poor animal fell on the

ice, and was much hurt. In consequence of this accident, the jay was complained of as a nuisance, and its owner was compelled to destroy it.

This bird, as well as the magpie, being extensively diffused, admits of a number of varieties. The Chinese jay is of two different species, one of which is distinguished by its red bill, the other by its blue tail; and both of them are very beautiful. The Peruvian jay is of a light green, which, by insensible shades, assumes a bluish cast in different parts of its body. To these might be added the Canadian and the Siberian jay, and the yellow-billed jay of Cayenne: the roller also may, without impropriety, be included in this class. This last may also be divided into the Garrulous, the Chinese, the Cayenne, and the Abyssinian roller; all of them distinguished by the brilliancy of their plumage. Several others might be added which naturalists have enumerated, and perhaps still more with which they are unacquainted. It is impossible to follow Nature through all her varieties, which in every species of animal life, proclaims the plastic hand of Nature's God.

THE KINGFISHER, OR HALCYON,

Is well known in England, and is one of the most beautiful birds of these northern climates. It is not much larger than a swallow: its legs are, according to our superficial notions of elegance, too small, and its beak too long, in proportion to its body; but both are perfectly adapted to its mode of living and procuring its food. The brilliant colours of its plumage, however, are sufficient, even in our partial estimation, to atone for whatever caprice may deem inelegant in its form. The crown of the head, and the outside of the wings, are of a deep blackish green, with bright azure spots; the back and the tail are of the most resplendent azure: the under part of the body is orange-coloured; and a broad mark of the same, passing from the bill, reaches beyond the eyes. In viewing the beautiful plumage, the slender legs, and diminutive size of this bird, it would scarcely be supposed to be one of the most rapacious little creatures that Nature produces. This, however, is in reality the case. It is almost continually on the wing, hovering over the rivers and lakes, where it catches small fishes in surprising quantities, by darting down upon them with inevitable certainty. While it remains suspended in the air in a sunshiny day, its plumage exhibits a beautiful variety of the most dazzling colours.

The ancient naturalists have related a number of fables concerning the kingfisher, and so do the modern vulgar; none of which are worth repeating. Of this bird, there are not less than thirty-six varieties.

THE CUCKOO

Is one of the most noted of the feathered race; and, although it cannot boast any great variety or beauty of plumage, is remarkable for the elegance of its form and the peculiarity of its habits. It is somewhat smaller than a pigeon, but in its form resembles a hawk, and its colour is a greyish blue. Its note is universally known; and as it announces the approach of summer, is always listened to with pleasure: but the particulars of its history are involved in obscurity, and the country to which it migrates is yet unknown.

The cuckoo appears to be a bird of the rapacious kind: Reaumur, who brought up several, found them to be carnivorous; for flesh and insects constituted their favourite aliment, and they would not feed either on bread or corn. The voracity of the cuckoo is not, indeed, to be wondered at, when we consider the capaciousness of its stomach, which is enormous, and reaches from the breast-bone to the vent.

The female cuckoo makes no nest of her own, but, invading that of some other bird, very often of the wagtail or the sparrow, destroys the eggs, and substitutes her own in the place. She seldom lays more than one, which is speckled, and similar to that of the black-bird in size. The bird, on its return, not discovering the cheat, nurtures the egg of her insidious invader with the same assiduity as if it were her own; and when the changeling is excluded from the shell, continues to feed it with parental tenderness, ignorant that she is nursing an enemy to her race, and a destroyer of her future progeny.

When the young cuckoo is fledged, it quits its supposititious parent, and follows its native propensities. What becomes of this tribe in the winter season, is wholly unknown. Some assert that it takes refuge in the clefts of rocks, hollow trees, and other similar retreats, where it remains in a torpid state until the return of spring. Willoughby relates a curious story of some logs of willow being laid on the fire, when a cuckoo, being revived by the sensation of heat, began to utter its notes, to the astonishment of all who were present. A number of similar stories have been related, and, as is frequently the case, the same tale has been often travestied, exaggerated, and multiplied into a number, through the love of the marvellous, or for the support of a favourite opinion. The most general, however, as well as the most probable supposition, is, that on the approach of winter, the cuckoo, as well as the swallow, migrates to warmer climates.

THE WOODPECKER

Exhibits the most irrefragable proof of an all-wise design in the adaptation of means to ends, and of animal construction to particular purposes, which is indeed visible in every part of the created system. Being destined to live chiefly on the insects which lodge in the trunks of trees, Nature has furnished this bird with a bill of extraordinary hardness, sharpness, and strength. Its tongue also being of great length, and terminating in a sharp, stiff, and bony point, dentated on each side, is peculiarly fitted for striking ants and insects, when forced from their cells. Its legs, being short and strong, are exceedingly well adapted to the purposes of climbing; and the toes, standing two forward and two backward, are equally serviceable in holding fast to the upright trunks of trees. This bird, being destined to feed solely on insects, wants that intestine which anatomists call the cœcum, a circumstance peculiar to the woodpecker tribe.

When this bird discovers a tree that is likely to contain its favourite food, or appears fit for a habitation wherein to lay its eggs and nurture its young, it immediately begins to make a round hole in the trunk, of about two inches in diameter. This is not performed by boring with its beak as with a gimblet, as some have asserted, but by constant and laborious picking, of which every one may be convinced who frequents the woods and forests where it resides, and sees its operations, or hears the noise which it makes in battering the trees. This bird very frequently attacks the ant-hill, and devours the industrious little insects which have there formed a colony, and are far from apprehending so formidable an invasion.

Of this kind, naturalists have enumerated more than fifty different species, each of them admitting of a number of varieties, greatly differing in size, colour, and appearance, but agreeing in the characteristic marks already mentioned, and in the habits resulting from so peculiar a conformation. Any description, or even enumeration, of so endless a variety, would be tedious, as well as unnecessary: it may suffice, therefore, to say, that the woodpecker, which is the most common in England, is about the size of a magpie: its throat, breast, and belly, are of a pale green; and the back, wings, and tail, are of a deeper green, and mottled with a variety of colours.

The woodpecker kind is extensively diffused, and contributes to people the forests in every part of the world. Those of Brazil, Guinea, and some other warm countries, exhibit an astonishing instinct and matchless art in suspending their nests from the outermost branches of trees, in order to secure their eggs and their young from the depredations of monkeys and

snakes, with which these sultry regions abound. In those countries where such invasions are less to be dreaded, they build in the cavities of trees.

THE TOUCAN

Is found only in the warm climates of South America. It admits of many varieties, but the description of one is sufficient to give a general idea of the singularity of its conformation. It is only about the size of a jackdaw, but is furnished with a bill seven inches in length; and its head, although disproportioned to the magnitude of the body, is perfectly conformable to that of the beak.

The toucan, although armed with so formidable a bill, is perfectly harmless, and easily tamed. It is held in great estimation for the delicacy of its flesh, as well as the beauty of its plumage, which, on the back, wings, and tail, is black; but on the throat, belly, and breast, of the most delicate white. The feathers of the breast form an elegant article of Indian dress. This part of the skin the Indians take off, and glue to their cheeks, which they consider as an irresistible addition to their beauty; and the women in particular are extravagantly fond of this singular decoration.

CHAPTER VI.

"The parrot learns to emulate our speech."
"Hark! the hoarse pigeon tunes his notes to love."
ANON.

THE objects we are now going to present to view, are some of the most curious which the feathered part of the creation affords. They are such as irresistibly attract attention, and excite to admiration of the splendour of Nature's works.

THE PARROT

Is, of all foreign birds, the best known in this country; and has always been held in estimation by the curious, as it possesses the singular advantage of uniting transcendant beauty with superiority of instinct and astonishing docility.

The facility with which this bird learns not only to speak, but to retain and repeat a great number of words, is surprising. We are assured that a parrot has been taught to rehearse a whole sonnet from Petrarch.

Many wonderful stories have been related of this creature's sagacity and loquaciousness; from which we shall select one,

which appears so singular, that it would never have obtained credit, had it not been sanctioned by respectable authority.

Willoughby tells us, that a parrot belonging to King Henry the Seventh, who then resided in his palace at Westminster, had learned many words and phrases from the passengers who took the water near that place. Sporting one day on his perch, the poor bird had the misfortune to fall into the Thames. He immediately called out as loud as he was able, "A boat, twenty pounds for a boat!" A waterman, hearing the parrot's liberal offer, made to the place where he was floating, and took him up. The man, knowing the bird to be a favourite, insisted on the full reward it had promised, and agreed that the matter should be left to its decision; which the parrot hearing, cried out, "Give the knave a groat."

Linnæus makes forty-seven, and Latham near a hundred and fifty species of this beautiful and sagacious bird; but probably no naturalist has enumerated one-half of its varieties. The distinguishing characteristics, however, of the whole tribe, are, that the beak is hooked, and the upper, as well as the lower mandible, moveable; the nostrils placed at the bottom of the beak; the tongue fleshy and obtuse; and the feet furnished with two toes before, and two behind, calculated for the purpose of climbing and clinging to trees.

Notwithstanding the endless varieties found in this numerous tribe of birds, they are generally divided into four classes; the macaw, which is considerably the largest, and nearly equal to the raven in size; the parrot, properly so called; the lories, which are less than the parrot; and, lastly, the parroquet, which is the least of all, and of which some varieties are not larger than the common sparrow. Between these species the difference is rather in size than conformation, and they have all the same general habits.

The parrot, although very commonly domesticated in Europe, will not breed in this quarter of the globe, by reason of the coldness of the climate; and although it can, when arrived at maturity, bear our winters, without being materially injured, it appears sensible of their severity, and loses its spirit and loquacious vivacity during the rigorous part of the season.

In the tropical climates, they are exceedingly numerous. The forests swarm with their different varieties; and the vivid colours of their plumage are an additional ornament to the luxuriance of vegetation under those genial skies, and give an air of vivacity to the scene. Nothing in Nature, indeed, can have a more beautiful appearance, than forests of lofty trees, clothed with the most luxuriant foliage, of an endless variety of forms and

colours, swarming with parrots, and glittering with the brilliancy of their plumage.

THE BIRD OF PARADISE,

Which has undoubtedly derived its name from its beauty, is a native of the Molucca islands, and, being confined to those remote regions of the East, has been very imperfectly known to the best European ornithologists, until Sonnerat, in his voyage to New Guinea, somewhat elucidated the subject. Of this bird, there are eight different species; but that which is best known, is the greater bird of paradise. This beautiful volatile, from the fulness of its plumage, appears to the eye nearly the size of a pigeon, although its body is not in reality much larger than that of a thrush. Its body and its tail are each about six inches long; and the wings are large in proportion to its other dimensions. The head, the throat, and the neck, are of a pale gold colour. The base of the bill, as also the head, is covered with fine black feathers, soft and glossy as velvet, and varying in colour with the different shades of light. The hind part of the head is of a shining green, mixed with gold colour. The body and wings are covered with beautiful brown, purple and gold-coloured feathers. The upper part of the tail is a pale yellow, and the undermost feathers are white, and longer than those above; but the appendage which chiefly excites curiosity, consists of two long naked feathers, which spring from the upper part of the rump, above the tail, and are generally about two feet in length. These are bearded only at the beginning and the end, the whole shaft for above one foot nine inches, being of a deep black; while the feathered extremity is of a colour which changes with the various reflections of the light.

In the Oriental islands which they inhabit, these birds are seen in large flocks fluttering through the aromatic groves. They are sometimes called the swallows of Ternate, from the rapidity of their flight, and their being constantly on the wing, in pursuit of flies and insects, which are their usual food.

The beauty and rarity of this bird have given rise to a number of fictitious tales, and a mass of fabulous description. The natives of the countries where they are found, observing the avidity with which Europeans purchased these birds when stuffed, having adopted the custom of cutting off their legs, asserted, that Nature had not furnished them with those members, as they were inhabitants solely of the air, and nourished entirely by the dew of heaven. And, what is astonishing, all these absurdities were for a long time believed.

The Malayans, who make a trade of killing, stuffing, and selling these birds to the curious Europeans, generally conceal

themselves in the trees where they resort, and shoot them with arrows made of reeds, in order to damage as little as possible their beautiful plumage. When they have killed a number of these birds, they take out every part of their entrails, and run a hot iron up their bodies, which dries up the juices. They then stuff them with salts and aromatic spices, and offer them for sale.

The inhabitants of the Molucca islands pretend that each flock of these birds is headed by its king, who, as they say, is distinguished from his subjects by the superior beauty of his plumage, and the voluntary homage which he receives. They also assert, that if they have the good fortune to shoot the king, the greatest part of the flock becomes an easy and certain prey. It is, however, highly probable, that this, like the other stories above mentioned, has been invented by the Malayans to excite the curiosity of the Europeans, and render them the dupes of their credulity.

These birds are supposed to migrate into other regions at the time of the monsoons; as during the periodical storms of thunder and rain which prevail at those seasons, they are scarcely ever seen; a circumstance which renders the opinion, if not certain, at least extremely probable.

Among the many different species of this bird, that called the king-bird of paradise, is difficult to recognise in the variety of description, and the confusion of names. Buffon distinguishes two species, by the appellations of the king-bird, and the magnificent bird of paradise; but, as they are both described of the size of a black-bird, it is probable that they are the same, and that the difference is only nominal or imaginary. The description, accompanied with a coloured plate, given in "The Young Gentleman and Lady's Magazine, for March 1799," represents the greatest part of the plumage of the king-bird of paradise, as being of a beautiful and vivid carmine, all his colours of a soft and silky appearance, having the gloss of polished metal. The two shafts proceeding from the rump, are blackish, and not bearded, and extend very far below the tail and wings. Near the extremities, these singular appendages become bearded, and by an elegant convolution, form a pretty large circle, of a bright emerald colour, varying according to the shade in which it is viewed.

We have endeavoured to give, from the best authorities, as accurate a delineation as possible of this singular bird, which has so long excited the curiosity of this part of the world, and produced a puzzling enigma to European ornithologists. Having exhibited to view the most striking display of the beauties of Nature in the pie tribe, we shall close our description of that

class, by describing a species, in which utility is joined to elegance of form and plumage, and which is therefore adapted to excite our admiration of the created system, and our gratitude towards the all-wise and bountiful Creator.

THE PIGEON

Is so universally known, that a particular description of it would be a waste of time both to the writer and the reader; and indeed, the variety of plumage which the tame kind displays, is so great, that it would exhaust the labours of the pen or pencil.

All the beautiful varieties of the pigeon are said to derive their origin from the stock dove, or wood pigeon, which is invariably of a beautiful ash colour, and the breast dashed with a fine changeable green and purple. These are the colours of the pigeon in its natural state; and from these simple but beautiful tints, the effects of domestication have produced a variety that words cannot describe, nor even fancy itself suggest.

The most distinguished varieties of the pigeon tribe, are the stock dove, the colours of which are already described, and which in size considerably exceeds the tame pigeon; and the ring dove, which is still larger, and receives its appellation from a beautiful white circle around the neck, above and below which, the contiguous parts are delightfully variegated with changeable colours. These almost always fly in large flocks, and are so wild that all attempts to reclaim them have been ineffectual.

The turtle dove is the most celebrated of the whole race: it is considerably smaller than the common pigeon, and its amiable inoffensiveness, and inviolable fidelity to its mate, have furnished sentimental writers with the most beautiful allusions.

One of the most remarkable traits in the history of this kind of birds, is the custom which has sometimes prevailed, of employing the pigeon in carrying letters from place to place, in time of war, and in case of sieges, when all means of communication were intercepted by the enemy. This was performed by a timely interchange of the birds, which, being let fly, immediately returned to their former abode. We find in history several instances of this communication by carrier pigeons, which, however, are now rendered useless through the general adoption of fire-arms. They are, however, the most expeditious carriers in the world, and have been known to perform a journey of forty miles in an hour and a half. They are still used in the East; and Thevenot says, that they commonly travel from Aleppo to Alexandria, in Syria, in six hours, which is a distance of eighty-eight miles. The letters are generally fastened under their wings.

In order to ascertain, with some degree of accuracy, the speed of these curious birds, a gentleman, some years ago, sent a carrier pigeon from London to a friend at Bury St. Edmund's, and along with it a letter, requesting that the pigeon, two days after its arrival, might be thrown up precisely at nine o'clock in the morning. This was attended to; and the pigeon returned to the Bull Inn, Bishopsgate-street, at half past eleven o'clock of the same morning; having travelled seventy-two miles in two hours and a half.

So great is the fecundity of this bird in its domestic state, that from a single pair, nearly fifteen thousand may be produced in the space of four years; a circumstance which, joined to the excellency of its flesh, shows its importance to man, and how well it repays his care and attention.

CHAPTER VII.

. . . . . "The thrush,
And wood-lark, o'er the kind contending throng,
Superior heard, run thro' the sweetest length
Of notes; when list'ning Philomela deigns
To let them joy, and purposes in thought
Elate, to make her night excel their day.
The black-bird whistles from the thorny brake;
The mellow bullfinch answers from the grove."

THOMSON.

THE class of the feathered creation to which our attention will now be given, is one of which the different species are innumerable, and distinguished with endless variety. Of these, some appear formed to delight us with the beauty of their plumage, others with the melody of their notes, and all contribute to enliven the rural scene and exhilarate the mind.

Amidst so unbounded a variety of objects, all pleasing, all interesting, the mind might expatiate with ceaseless activity, unwearied in the contemplation of the works of Him at whose almighty fiat, Creation, with all its various forms, burst into existence.

In order, however, to direct the attention to some fixed points in the boundless immensity of the prospect before us, we shall endeavour to make a selection of some of the most striking objects, and describe a few of the most famed of these winged inhabitants of the woods, the groves, and the fields, which enliven the face of Nature.

THE THRUSH

Is extensively diffused, and admits of not less than one hundred and thirty different species; of which the most remarkable, at least in England, are the missel-thrush, the throstle, or song-thrush, the fieldfare, the red-wing, and the black-bird.

The missel and the throstle differ chiefly in size. The former, indeed, is the largest of the genus; being about eleven inches in length, and of the weight of nearly five ounces. The latter is considerably less, and the speckles on its breast are of smaller dimensions, and more intimately blended.

The thrush is of a dusky brown on the body and wings, and the speckled plumage of its throat is a mixture of brown and yellow. It is one of the sweetest songsters of the groves; and its deep-toned notes are equally remarkable for their variety, long continuance, and melodious inflection. It pours its delightful strains from the top of some high tree; but descends to the lowly bush, or the hawthorn hedge, to construct its nest.

THE FIELDFARE

Is said to be one of the musical race in some countries: in England, however, it does not exhibit much of its melody; but its flesh affords a delicious article for the table. It is larger than the common thrush, but less than the missel: they fly in numerous flocks, and afford much diversion during the winter season. The fieldfare is a migrating bird, spending the summer season in the northern countries of Europe, and returning to Great Britain in the autumn.

THE RED-WING

Is somewhat smaller than the common thrush, from which it is distinguished by a white streak over the eye, and the reddish colour of the under part of its wings; but pretty much resembles it in the rest of its plumage. This, like the fieldfare, is migratory; and both of them appear and depart at the same time. It is said, that in Sweden the red-wing sings delightfully, but we cannot bear witness to its performances in this respect. Its flesh is less esteemed than that of the fieldfare.

THE BLACK-BIRD

Is universally known in England for its deep-toned melody and the variety of its sonorous inflections. This bird, indeed when heard at a proper distance, excels, perhaps, any of the inhabitants of the groves, unless the nightingale be admitted as an exception. The black-bird may be taught to whistle any tune, and even to imitate the human voice.

THE BULLFINCH,

Although small, is a beautiful object. In the male, the head, wings, and tail, are principally black; the throat and breast, a deep crimson. The colours of the female are much fainter, and she is considerably inferior in beauty. This bird is common in most parts of the European continent, but is somewhat scarce in England. In the countries where it abounds, it frequents orchards and gardens, for the sake of the insects which feed upon the foliage of trees and plants, and thereby renders an essential service to the proprietors.

The bullfinch is not remarkable for the agreeableness or the variety of its natural notes, but when tamed is wonderfully docile, and possesses so eminent a talent for imitation, that it may be taught to whistle any tune with the greatest exactness.

"I know a curious person," says the author of the Ædonologie, "who having whistled some airs quite plain to a bullfinch, was surprised to hear the bird add such graceful tones, that the master could scarcely recognise his own music, and acknowledged that the scholar excelled him."

THE ORTOLAN

Is a bird which has acquired an extraordinary degree of celebrity, from the delicacy of its flesh. The plumage, on the upper part, is of a chesnut colour mixed with black; the under parts are of a dusky white. These birds are common in France and Italy, and are found in most countries of Europe, but not in Great Britain. In their migrations from one country to another, numbers are caught, and fattened for the table. When thoroughly fed, it weighs sometimes three ounces, and is accounted the most delicious morsel which the culinary art can prepare; but it would not perhaps be equally agreeable to every one's taste, as it is little else than an entire lump of fat.

The birds commonly distinguished by the appellation of the finch kind, are divided into above a hundred well-known species, and undoubtedly there are many others unknown to our ornithologists. Of these, the goldfinch is one of the most beautiful, the most docile, and the most harmonious. This charming little songster is too well known to require any description. The species is widely diffused; for we find it an inhabitant of almost every quarter of the old continent, although it abounds principally in Europe.

The finch genus comprehends a great variety of foreign birds, some of which are remarkable for the beauty of their plumage, and others for their harmony. Among these, the canary-bird is universally known and esteemed. Its name indicates its ori-

gin, which is from the Canary islands, although we have them now from Germany, where they are bred up tame in great numbers, and sold into different parts of Europe. In a wild state, it cannot bear the severity of a cold climate; but kept in a cage, it will live ten or fifteen years.

In its native islands, which are rendered delightful by the beauty of their landscapes, and the harmony of their groves, the canary-bird is of a dusky grey colour, and so different from those seen in Europe, that some have doubted whether it be of the same species—so conspicuous are the effects of domestication and change of climate, in this bird, as well as in many other animals, both quadrupeds and volatiles. The canary-bird, in its tame as well as in its natural state, is highly valued for the harmony of its song and the great variety of its long and piercing notes.

CHAPTER VIII.

. . . . . "Up springs the lark,
Shrill-voic'd and loud, the messenger of morn."

We shall now recommend to notice a bird which contributes in an eminent degree to enliven the rural scenery of the country; for instead of retiring to the recesses of the forest, or the solitary retreats of sequestered groves, it hovers over the meadows and the fields, and accompanies the ploughman and the reaper; and by its melodious strains, gladdens the heart of the peasant, and sweetens his toil.

THE LARK

Is, in England and most countries of Europe, universally known; and being considered as the harbinger of spring, and the herald of the morn, it may be said to lead the general chorus among "the tuneful nations." With the singing of the lark so many delectable ideas are indeed associated, that of all the winged songsters, no one contributes more to the pleasure of the human species.

The lark genus includes twenty-eight different species. Of these, the sky-lark, and next to that the wood-lark, are the most common in England; but the tit-lark and the field-lark are also British birds. All the lark genus is musical; but to enjoy their music in perfection, we must leave them in possession of their native liberty. The song of any bird in captivity produces unpleasant sensations in a feeling heart. It is the landscape, the grove, the golden-eyed morn, the fluttering from branch to

branch, the soaring in the air, the answering of the young, that give true relish to the enrapturing strain. These united improve each other, and exhilarate the mind that is endowed with sensibility and refinement. The whole scenery of Nature scarcely affords any thing more pleasing than to see the lark warbling on the wing, and hear it raising its notes as it soars aloft, and by degrees becomes invisible: it seems, indeed, to excite in the mind an idea of something celestial, when the most melodious strains continue to charm the ear, while the musician is lost in the immense heights above.

The warmth of maternal attachment often discovers itself in the female sky-lark, at a very early period, and sometimes before she is capable of becoming a mother. "A young hen bird," says M. de Buffon, "was brought to me in the month of May, which was not able to feed without assistance: I caused her to be educated; and she was hardly fledged, when I received from another place a nest of three or four unfledged sky-larks. She took a strong liking to these new-comers, which were scarcely younger than herself: she tended them night and day, cherished them beneath her wings, and fed them with her bill. Nothing could interrupt her tender offices; if the young were torn from her, she flew back to them as soon as she was liberated, and would not think of effecting her own escape, which she might have done a hundred times. Her affection grew upon her; she neglected food and drink; she now required the same support as her adopted offspring, and expired at last, consumed with maternal anxiety."

The sky-lark and the wood-lark are larger than the sparrow, but not so large as the thrush. They have nothing particularly ornamental in their plumage, the colour of which is a sort of unvarying dappled grey. Their delightful music, however, entitles them to the second if not to the first rank among the feathered choristers. Two species of larks are remarked as the only birds that chaunt while on the wing.

THE NIGHTINGALE

Is the most famous of all the songsters of the groves, and has so long been celebrated for the charms of its music, that the idea of harmony seems to be associated with its name. This charming bird was so admired by the ancients, that every allusion to it was considered as an embellishment to poetical description. The melody of the nightingale cannot be better described than in the words of the ingenious author of L'Histoire des Oiseaux:

"The leader of the vernal chorus begins with a low and timid voice, and prepares the hymn to Nature, by essaying his

powers and attuning his organs; by degrees the sound opens and swells, it bursts with loud and vivid flashes, it flows with volubility, it faints and murmurs, it shakes with rapid and violent articulations; the soft breathings of love and joy are poured from his inmost soul, and every heart beats in unison and melts with delicious languor. But this continued richness might satiate the ear. The strains are at times relieved by pauses which bestow dignity and elevation. The mild silence of evening heightens the general effect; and not a rival interrupts the solemn scene."

Nothing can be added to this animated description of the nightingale's song. It is however much to be lamented, that the delightfulness or the fame of its music has too often been an inducement to abridge the musician of its liberty, in order to secure the enjoyment of its harmony. To estimate the absurdity and inhumanity of this procedure, we shall refer to the reflections just made on the subject of the lark, and which may with equal propriety be applied to all similar cases. In regard to the nightingale, its song in a state of captivity is far less fascinating than when it is in perfect freedom, and is destitute of those nice and varied modulations by which it is distinguished when poured out from the grove. The organs of this, as well as of all other songsters of the forests and the fields, are

. . . . . "Too delicately formed
To brook the harsh confinement of the cage."

Perhaps it is a fortunate circumstance for Philomel, that its external beauty does not correspond with the sweetness of its music, and that it charms the most when unseen. Possessing in so eminent a degree the powers of melody, it has no need of the brilliant plumage of the pheasant, the bird of paradise, or the humming-bird, to render it more captivating; and perhaps such additional attractions would subject it still more to the tyranny of man.

Its head and back are of a pale tawny colour, dashed with olive; the throat, breast, and upper part of the belly, are of a light glossy ash colour, and the lower part of the belly is almost white. The outside webs of the quills are of a reddish brown; the tail is of a deep tawny red, and the eyes are remarkably large and animated.

This most famous of the feathered tribe visits England in the beginning of April, and leaves it in the beginning of August. It is found in some of the southern parts of that island, but is totally unknown in Scotland, Ireland, and North Wales. It frequents thick hedges and low coppices, and generally lurks in the middle of the bush, so that it is rarely seen. The night

ingale begins its song in the evening, and often continues it during the whole night. Its attachment to a particular place is remarkable. During several weeks together, it will, if undisturbed, perch on the same tree, and from thence every evening pour its fascinating melody.

THE REDBREAST

Is a little bird, which is celebrated for its affection to mankind, rather than for its song. This bird, however, has the sweetest note of any in England, and makes every hedge vocal The notes of other birds are louder and their inflections more sonorous; but the redbreast's voice is soft, tender, and melodious. The confidence which this little bird appears to place in man, together with its inoffensive disposition, claims and obtains his pity and protection. Such indeed is the universal prejudice in its favour, from whatever cause it may originate, that scarcely any one will offer it an injury: happy and beneficial prejudice, that excites benevolence and prevents the abuse of any of God's creatures!

THE SWALLOW

With its varieties is too well known to require any description, and the same may be said of the swallow tribe. It will be recollected that in our general observations some remarks were made concerning the migrations of these and other birds of passage. Little more can be added on that subject, for it appears that this important part of their history will yet for a long time remain enveloped in obscurity.

The different species of this class of birds, which constitute the subject of this and the preceding chapter, are so numerous, and each of these subdivided into so many varieties, that it would be an endless task to range, with the minuteness of a nomenclator, through all their ramifications. We shall therefore finish this survey of so beautiful and so curious a department of Nature, by the exhibition of two more of these creatures, which are singular and striking objects in a view of the animal creation, and have always attracted the curiosity of those who delight to contemplate the God of Nature in his works.

THE AMERICAN MOCK-BIRD,

Without any exterior attraction, possesses faculties which render it one of the greatest objects of curiosity and admiration among the feathered tribes. It is about the size of a thrush, of a uniform grey colour, with a reddish bill. Its natural notes are musical and solemn; but it likewise possesses the singular power of assuming the tone of every other animal, whether quadruped

or volatile, from the wolf to the raven and the wren. It seems to divert itself with alternately alluring or terrifying other birds, and to sport with their hopes and their fears. Sometimes it entices them with the call of their mates, and on their approach, terrifies them with the screams of the eagle or some other bird of prey. It frequents the habitations of mankind, and is easily domesticated. It builds its nest in the fruit trees, near the houses of the planters; and sitting, sometimes most of the night, on the tops of their chimneys, assumes its own native melody, and pours forth the sweetest and most various strains.

THE HUMMING-BIRD,

From its diminutive size, and the resplendency of its colours, is not less an object of curiosity than is the mock-bird from the endless variety of its notes. This beautiful little creature admits of six or seven varieties, distinguished by successive gradations, from the size of the wren to that of the humblebee. It is, however, furnished with a bill, with wings, and all the ordinary appendages of the larger species.

The smallest of this species is not larger than a hazel-nut. Its wings and tail are black; but the feathers under the wings are of a greenish brown, with a fine red cast, and bear a gloss which no silk or velvet can equal. On its head it has a small golden crest, which sparkles in the sun with all the brilliancy of a star: the bill is straight and slender, and about the length of a small-sized pin. The large humming-bird is not half so big as our wren. It is not adorned with a gilded crest; but from the throat half-way down the belly, its crimson-coloured feathers are beautiful beyond conception, and vary according to the reflections of the light. The head of the humming-bird is exceedingly small, and its round eyes are as black as ebony.

Imagination can scarcely conceive how much the numerous tribes of this diminutive species enliven and embellish an American landscape. As soon as the sun appears above the horizon, humming-birds of different kinds and various sizes are seen, fluttering incessantly about the flowers which the country produces in abundance. The rapid motion of their wings renders it impossible to distinguish their colours, which seem blended in one general effulgence, and produce a kind of humming sound, from which their name is derived. Their sole food appears to be the honey which they extract from the flowers; and for the purpose of procuring this kind of aliment, Nature has provided them with forked tongues, completely formed for entering the cups, and drawing forth the nectareous juices.

The nests of these birds are, like themselves, a natural curiosity. They are curiously suspended from the very point of a

twig, and are thus secure from the assaults of the monkey or the snake. They are formed of the fine fibres of vegetables carefully combined with cotton and moss, and in shape and size resemble half a hen's egg. The eggs of the humming-bird are of a clear white, with a few yellow specks, and of the size of a small pea. The male and the female alternately perform the office of incubation. The young when first hatched are entirely naked, but in a few days a fine down appears, which is gradually converted into that beautiful clothing which renders this bird an object of admiration.

The humming-bird was formerly in high esteem among the Indians, for the ornament which its plumage added to their dress The mode of taking these birds is chiefly by bird-lime daubed in the places where they haunt; and they are now caught chiefly for the purpose of selling them to Europeans as curiosities.

Mr. Latham, in his Synopsis, informs us, that his friend, Captain Davies, kept some of these birds alive for four months, by the following expedient. "He made an exact representation of some of the tubular flowers, with paper fastened round a tobacco-pipe, and painted them with the proper colours: these were placed, in the order of nature, in the cage in which the little creatures were confined: the bottoms of the tubes were filled with a mixture of brown sugar and water, as often as emptied; and he had the pleasure of seeing them perform every action; for they soon grew familiar, and took this nourishment in the same manner as when ranging at large."

We have now exhibited to view a selection of the most curious objects that are found among this smaller race of volatiles, of which the distinctions are too numerous for the examination of the most accurate and indefatigable ornithologist. From contemplating the musical powers of the nightingale, the lark, and the thrush, and the beautiful plumage of the goldfinch, the bullfinch, and the humming-bird, besides the wonders displayed in an endless variety of others; the mind becomes deeply impressed with a sense of the diversifying energy of Nature, communicated to it by its Divine Author.

CHAPTER IX.

WATER-FOWL.

. . . . . " So steers the prudent crane
Her annual voyage, borne on winds."
. . . . . " Scarce
The bittern knows his time, with bill ingulph'd
To shake the sounding marsh."—THOMSON.

WE are now about to take a glance at a species of birds different from the preceding, both in formation and habits, which are destined by the Author of Nature to a different mode of living, and furnished with such qualifications as are suitable to their wants and propensities.

WATER-FOWL

May, with propriety, be divided into two different classes:—the cloven-footed, and those which are web-footed. The first of these are denominated the crane kind. These, like the rest of the animals which Nature produces with endless diversity, admit of too many distinctions to be brought forward with enumerative exactness. We shall therefore select a few out of the immense variety presented to our view.

THE CRANE KIND,

Being destined to live and procure their food among waters, but not to swim, Creative Wisdom is here, as every where else, displayed in their peculiar formation. The legs are of an extraordinary length, by which they are enabled to wade to a considerable depth. The bill is also calculated with the same adaptation to its particular use, being in general much longer than that of other birds,—a circumstance that enables them to fetch up their food from the bottom of muddy quagmires and shallow waters.

THE COMMON CRANE

Is a tall slender bird; its body is about the size of the hen turkey, usually weighing about ten pounds, measuring about three feet and a quarter in length, and three feet in height, with a neck proportioned to the length of its legs. Its head is covered with a black bristly crest; and the back part, which is without feathers, and appears of a red colour, distinguishes it from the stork, to which it bears, in other respects, a considerable resemblance. The plumage is in general ash-coloured; and from the

pinion of each wing grow two large tufts of feathers, which the bird can at pleasure erect and depress, and which, in ancient times, were often set in gold, and worn as ornaments on the heads of persons of distinction.

Ancient writers have let loose the reins of fancy in their descriptions of the crane, and their exaggerations have immortalized its fame. It has by them been exhibited as a pattern not only of parental affection and connubial attachment, but also of social economy and civil polity. These highly-finished pictures must be ascribed to a poetical imagination, predominant in early ages, when the poet and historian were generally combined. The crane, however, is a very social bird; and its well-known attachment to its mate, and affection to its offspring, might certainly furnish agreeable allusions to the poet, and useful lessons to mankind.

The arctic regions are the favourite abode of these birds; for although they are found in every other country of Europe except Great Britain, they may be considered as visitants rather than inhabitants, as they migrate from one part to another, and seem to follow the seasons. They still continue to be held in a kind of veneration by the vulgar of every country, and the ancient prejudices appear to operate fortunately in their favour.

Of this bird there are several varieties, of which the principal seems to be the Numidian crane, remarkable for the singularity of its habits and gestures. By the French it is called the damoiselle, from the supposed elegance and gracefulness of its motions. Sometimes it stoops, then rises, lifts up first one wing and then the other, sails forward and returns, and incessantly exhibits a variety of gesticulations. This is a very scarce bird. Its plumage is mostly of a leaden grey colour; but from the back of the head spring beautiful white feathers, which bend downwards, and are about four inches in length; while the fore part of the neck is adorned with black feathers, composed of very fine filaments, which fall down on the breast, and give an air of elegance to its appearance.

THE HERON

Is remarkable for the two opposite qualities which are blended in its character, excessive timidity, and extreme rapacity. This bird is remarkably light in proportion to its size, seldom weighing more than three pounds and a half, although it expands a breadth of wing of not less than five feet: and although other animals mostly grow fat by a plentiful supply of food, this continues constantly lean, notwithstanding its insatiate voracity. Its bill is not less than five inches long from the base to the point; and its claws are long, sharp, and formidable: but, although it ap-

pears thus completely armed, not only for defensive but offensive war, it flies at the approach of the sparrow-hawk. Of all birds, however, this commits the greatest depredations in fresh water; and there is scarcely a fish, how large soever it may be, that it will not strike at and wound, although unable to carry it away; but it subsists chiefly on the smaller fry. The heron wades into the water as far as it can, and then carefully watches for its victims, and will, it is said, destroy more fish in a week than an otter will do in three months.

"I have seen," says Willoughby, "a heron shot that had seventeen carps in his belly, all which he is able to digest in six or seven hours. I have also seen," continues the same author, "a carp of nine inches and a half long, taken out of the belly of a heron." Several gentlemen who kept tame herons, to try what quantity one of them could eat in a day, have put small roach and dace into a tub, and they have found one heron 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.

After this relation, we are not to wonder that the heron is considered as so terrible a depredator in fish-ponds. It is now generally destroyed as a nuisance, although it was once killed for its flesh, which was formerly considered as a delicacy, and is indeed very good food, although not at present held in any great estimation.

If we might be permitted to judge of the inscrutable designs of the Creator in forming this insatiable bird, existence seems to be given it for the purpose of counterbalancing by its voracity the superabundant fecundity of some species of fishes, and preventing their excessive multiplication.

The heron is said to be a very long-lived bird. Mr. Keyster asserts, that it lives to the age of sixty years; and a recent instance which occurred in Holland, confirms this account of its longevity. A heron was taken in that country which had a silver plate fastened to its leg, with an inscription, importing that it had been struck by the Elector of Cologne's hawk, thirty-five years before.

THE BITTERN

Is a bird of the heron kind, distinguished by the dismal hollow sound which it emits, and which resembles the interrupted bellowings of a bull, but is much louder, and heard at a greater distance. It is indeed impossible that words should give an adequate idea of the terrific solemnity of the bittern's note. The bird, however, from which it proceeds, is less than the heron, and neither so voracious nor destructive; on the contrary, it is perfectly inoffensive, and instead of plundering the fish-ponds, lives

in solitude, concealing itself among reeds in marshy places, where it lives on frogs, insects, and vegetables.

The bittern is of a pale yellow colour, spotted and barred with black. It lays seven or eight eggs of an ash-green colour, and in three days after hatching leads its young ones out to their food. The flesh of this bird is esteemed a great dainty.

THE STORK

Bears so great a resemblance to the crane, that it is no wonder that one should often be mistaken for the other. Their conformation, indeed, appears to be exactly the same; the difference consists in the colour, disposition, and habits. The colours of the crane are cinerous and black, those of the stork white and brown. The voice of the former is loud and piercing, while the latter is always silent. The former prefers grain to every other aliment; the latter lives wholly on frogs, serpents, small birds, and fish: and while the crane delights to conceal itself far from the habitations of men, the stork generally fixes its residence near the most populous places.

Storks, like cranes, are migratory; but, as they always travel by night, their flight is concealed. When they leave Europe, they all assemble on a certain day, and not one of the party is ever left behind. They generally make their appearance in that part of the globe about the middle of March, and build their nests on the tops of chimneys, or of high towers, pinnacles of lofty buildings, and sometimes on the tops of high trees. The stork lays from two to four eggs, resembling in colour and size those of a goose. The time of incubation is one month; and after the exclusion of the young, the parent bird is extremely solicitous for their safety, which, however, is seldom endangered, being universally protected by popular prejudice, which indeed is seldom so well founded as in relation to this bird; for as it destroys great numbers of noxious reptiles, it is almost every where held in esteem. Some nations have even carried their regard to this beneficial bird to a superstitious veneration.

The Egyptians in particular, whose regard for beneficial animals was carried to such excess, were so sensible of the services rendered by the ibis, that they ranked it among their divinities. This was a species of stork, which devoured in great numbers those noxious reptiles which the annual inundations of the river, with the heat of the climate, abundantly produces in that country. The Dutch to this day are extremely solicitous for the preservation of the stork, which takes refuge in their towns, builds its nests on the tops of their houses, and even rests familiarly in the streets, without molestation. Some assert that it is under the protection of the laws; whether

this be the case or not, it is certainly protected by public opinion.

There are, indeed, few towns on the continent, at least where the situation is low and marshy, that have not the stork as an inmate, and every where it is a favourite of the people. There is certainly something amiable in prejudices which inspire the breast with sentiments of humanity.

The immense variety of kinds and species of this numerous race, precludes the possibility of bringing them forward to distinct inspections, within the limits of a work like this. We might, indeed, describe the curlew, the snipe, the ruff, the various species of plover, and innumerable others, well known to sportsmen, as well as to naturalists, most of them affording excellent food, and all of them curious in their conformation, all perfectly adapted to their destination, and proclaiming the power, the wisdom, and the goodness of the God of Nature.

As it is not, however, our intention to burden the memory with a mere nomenclature of Nature's works, but rather to amuse and inform the mind, by directing the attention to some of the most striking objects of the creation, we shall proceed to the second class, into which we have, according to general custom, divided the prodigious variety of aquatic birds which frequent the shores of the ocean, and those of rivers and lakes, or enliven the dreary solitude of bogs and morasses.

CHAPTER X.

"From man retir'd, amid the lonely marsh,
Flamingoes build and tend their curious nests."

We shall now select for entertainment and instruction, the most remarkable of those water-fowl, which are commonly denominated the goose kind, and of which the distinguishing characteristic is a membranous web, connecting the toes, which greatly facilitates their swimming. Here we cannot but observe the curious adaptation of their mechanism to the mode of life for which they are designed. Their toes, thus joined, serve them as oars; and their legs, being short, are not less judiciously constructed for striking with facility in the water, and assisting their progress in that element, for which they would be wholly unfit, were they as long as those of most of the kind last described. It is impossible to examine the conformation of these two kinds of aquatic fowl, of which one is destined to wade, and the other to swim, without discovering unequivocal proofs of an all-wise design: the same may be observed of their plumage which is

peculiarly warm, thick-set, and unguentous, and every way calculated to resist the attrition of the water, and prevent its penetrating to their skins.

Before we proceed in our survey of this numerous and useful class, it may not be amiss to observe, that there are two or three species, among which may be reckoned the coot, and the water-hen birds, too well known to need a particular description, and which have neither the long legs of the crane kind, nor the web-foot of the duck kind; but are distinguished by their pinnated or finned feet, which are furnished with jagged membranes, in order to assist them in swimming, although not so perfectly adapted to that purpose as the web-foot of the goose or the duck. These appear to be an intermediate race between the long-legged and the web-footed classes.

Nature, in the immense variety of her works, proceeds by regular gradations; thereby producing that infinite diversity of forms and colours which variegate her scenery, and excite our admiration.

THE FLAMINGO

Is one of the most remarkable of all water-fowl: it is one of the tallest and most beautiful. Its body, which is about the size of that of the swan, is covered with a plumage of the most brilliant scarlet colour. Its legs and neck are of so extraordinary a length, that when it stands erect, it is between six and seven feet high. Its wings, when expanded, reach about five feet and a half: the bill, which is formed like a bow, is partly red and partly black, and not less than seven inches in length. The legs and thighs, which are not much thicker than a man's finger, are about two feet and three quarters long, and its neck more than three feet; and the toes are united with a web like those of a goose.

This extraordinary fowl, although once well known in Europe, is now found only on the African and American coasts. Its beauty, its size, and the peculiar delicacy of its flesh and tongue, have been such temptations to its destruction or capture, that it has long since deserted the shores frequented by men, and taken refuge in those that yet are but thinly peopled.

The tongue of this bird was once thought the greatest of delicacies. The Romans considered it as the most elegant dish; and history informs us, that one of their emperors had fifteen hundred of them served up at one of his feasts.

When the Europeans first visited America and the southern coasts of Africa, they found the flamingoes on the shores of each continent, perfectly gentle, and not in the least distrustful of mankind. When the fowler discharged his piece among them,

they were seized with a kind of stupor, which rendered them incapable of flight. They regarded the fall of their companions with a fixed astonishment; and when shot after shot was discharged, the whole flock was sometimes levelled before one of them began to think of escaping Misfortune, however, teaches precaution to every creature; and the disasters which the flamingo has experienced from the fatal effects of fire-arms, has rendered it not only one of the scarcest, but one of the shyest birds in the world; and to approach it, is almost impossible; for it always keeps near the salt-water lakes and swampy islands, on the most inhospitable and unfrequented shores. When seen in the day, these birds always appear in a flock of two or three hundred together, drawn up in a close line; and Dampier says, that when thus viewed at a distance, they present to the eye the exact representation of a long brick wall. When they break their ranks to search for food, one of them is always appointed as a watch; and as soon as the trusty sentinel perceives the remotest appearance of danger, he gives a scream as loud and as shrill as the sound of a trumpet, and in a moment the whole flock is on the wing.

The flamingo builds its nest in extensive marshes, where there is no danger of surprise; and the fabric is as great a curiosity as the architect. It is raised about a foot and a half above the surface of the pool, and is formed of mud which is hardened in the sun. It resembles the frustrum of a cone, or one of those pots which are commonly placed upon chimneys On the top, it is hollowed out to the shape of the bird, and in that cavity the female deposits her eggs, which never exceed two in number. The young ones are a long time before they can fly; but they run with amazing speed. When taken young, they are tractable and easily tamed.

THE PELICAN OF AFRICA

Is a bird which merits, and has indeed in all ages attracted the attention of the naturalist. It is frequently mentioned in the allusions of eastern writers, and often introduced in the sacred writings, as the emblem of solitude, of silence, and sorrow. In colour and shape it resembles the swan, but far exceeds it in size. The singularity which peculiarly distinguishes this bird, consists in the great pouch under its bill, which merits a particular description, especially as it has given rise to a variety of fables.

The enormous bill of the pelican is fifteen inches long, from the point to the opening of the mouth, which is a good way behind the eyes; its base is greenish, but it varies towards the end, which is of a reddish blue. At the lower edge of the under

chap hangs the pouch, or bag, which is capable of containing fifteen quarts of water, and reaches the whole length of the bill as far as the neck. The bird has the power of wrinkling up this bag into the hollow of the under-jaw: it is not covered with feathers, but with a very smooth and soft down, and when empty, is scarcely perceptible; and Tertre assures us, that when filled, it is capable of containing as much fish as would suffice sixty men for dinner. Such is the wonderful conformation of this extraordinary bird.

The pelican was once known all over Europe, although it now seems to have deserted the coasts. In the island of Manilla, the bird is of a rose colour; but in America, ash-coloured; and in Africa, white. They are all torpid and inactive. It is only from the impulse of hunger, that they are excited to action; and without that irresistible stimulus, they would always continue in fixed repose. Fabulous writers have asserted, that the pelican fed its young with its own blood, and that its bag served as a reservoir for water when it flew over the deserts. The first story is absurd, and the latter is equally untrue; for the pouch is not used for water, but for fish.

As this bird is not only in itself a curiosity, but rendered still more interesting by the frequent allusions both of sacred and profane writers, we shall enlarge a little on its subject, and subjoin the description of it by Father Labat, who had accurately studied its manners.

"The pelican," says that judicious observer, "has strong wings furnished with a thick plumage of ash colour: (this is the colour of the pelican of America; that of Africa, as already observed, being white,) and the feathers on the rest of the body being exactly the same. The eyes are small, compared to the size of its head; and there is something in the countenance very melancholy and sad.

"They are torpid and inactive to the greatest degree, so that nothing can exceed their indolence but their gluttony; and it is only by hunger that they are excited to move, or they would continually remain in a stupid kind of sleep. When they have, with exertion, raised themselves about forty feet from the surface of the sea, they turn their head with one eye downwards, and in that position continue their flight. As soon as they perceive a fish sufficiently near the surface, with the swiftness of an arrow they suddenly dart down, surprise the victim before it can escape them, and carefully preserve it in their pouch: again they rise, and continue hovering over the stream until their bag is completely filled, when they retire to land, and greedily devour the produce of their morning toil. As evening approaches, they feel another hungry call, and again pursue their flight towards the rivers, where they remain till their bag is filled; when they

take up their abode on some high tree, for the night, and would remain in a state of torpid stupidity during the greater part of the succeeding day, were they not roused by that voracious appetite which seems with reluctance to compel them away."

This habit of indolence attends the pelican in every situation, for it will not be at the pains of forming a nest, and the female drops her eggs in the ground. Her young seem, however, to call forth the powers of affection; for Labat informs us, that he tied two of them by the leg to a post, and the old one came to feed them with great regularity. The native Americans kill these birds in great numbers; for although the flesh is too coarse to be eaten, their pouches, when dry, are converted into bags or purses, and frequently embroidered for the use of the ladies.

With all its native indolence, the pelican is susceptible of instruction in a domestic state. Father Raymond says, he has seen one so tame and well-educated among the native Americans, that it would go off in the morning to fish, when commanded, and at night return to its master with its great pouch distended with the plunder it had taken,—a part of which it was compelled to disgorge, and was permitted to keep the rest for itself. The pelican, as Faber relates, is not destitute of other qualifications. "One," says he, "which was brought to the court of the Duke of Bavaria, where it lived forty years, seemed to be possessed of uncommon sensations. It was much delighted in the company and conversation of men," (this does not seem compatible with its supposed solitary and melancholy character,) "and in music, both vocal and instrumental; for it would willingly stand by those that sung or sounded the trumpet; and, stretching out its head, and turning its ear to the music, listened very attentively to its harmony, though its own voice was little pleasanter than the braying of an ass." The pelican is a bird remarkable for its longevity: and Gesner tells us, that the Emperor Maximilian had a tame one, which lived above eighty years, and always accompanied his army on its march.

THE FRIGATE PELICAN

Is chiefly met with between the tropics: it is about the size of a large fowl. It is often found above a hundred, or sometimes two hundred leagues from land; and sometimes settles on the masts of ships. Its extraordinary expansion of wing, which is not less than fourteen feet, enables it to take those immense flights. When it is unsuccessful in fishing, it attacks the gulls, and other water-fowl, and by compelling them to disgorge the fish they have taken, indemnifies itself for its own ill success.

THE CORMORANT

Is another species of the pelican, about the size of a Muscovy duck. It is chiefly remarkable for its indefatigable nature, and its dexterity in catching fish, for which purpose it is in some countries, and particularly in many parts of China, brought up tame, and regularly employed. "It is very pleasant," says a judicious writer, "to behold with what sagacity they portion out the lake or the canal where they are on duty. When they have found their prey, they seize it by the middle with their beak, and carry it without fail to their master. When the fish is too large, they give each other mutual assistance: one seizes it by the head, and another by the tail, and in this manner they carry it together to the boat. They have always, while they fish, a string fastened round their throats, to hinder them from devouring their prey. There are some other species of the pelican, which, for brevity's sake, we shall omit; those described being the most remarkable.

THE SOLAND GOOSE

Is about the size of a tame goose, but its wings are much longer, their expansion being not less than six feet. Its colour is chiefly white, and it has a pouch resembling that of the pelican, and of a size sufficient to contain five or six herrings, which, in the breeding season, it carries at once to its mate, or its young.

These birds, subsisting entirely on fish, always resort to those unfrequented shores or unknown islands, where they can find abundance of food without being disturbed by the intrusion of man. The islands on the coasts of Scotland, Ireland, and Norway, appear to be the great rendezvous of these birds. On the Bass island, in the Frith of Edinburgh, they swarm in such abundance, that, according to a modern author, "it is scarcely possible to walk without treading on them: the flocks on the wing are so numerous, as to darken the air like a cloud; and their noise is such, that one cannot without difficulty be heard by the person who is next to him." And we find, by the accounts of navigators, that they are scarcely less numerous in many other parts of the world.

The soland goose is migratory, but does not remove to countries far remote; and its migration appears to be determined by the course of the annual shoals of herrings, rather than by any circumstances of climate. It lays but one egg; and its young is reckoned a great delicacy, and sold at a high price.

THE ALBATROSS

Is an inhabitant of the tropical climates, and also beyond as far as the straits of Magellan, and even to Cape Horn, where it abounds, as well as about the Cape of Good Hope. Its body is larger than that of the swan, and its wings have ten feet of expansion. The bill, which is six inches long, is yellow, and terminates in a crooked point: the top of the head is of a bright brown, but the back is much darker; and under the belly and wings, it is perfectly white.

This bird, which is reckoned the first and the principal of the gull kind, not only eats fish, but also devours such small waterfowl as it can take by surprise. Like all of the same kind, it preys on the wing, and frequently pursues the flying-fish which has been forced out of the sea by the dolphin. If we except the frigate pelican, there is perhaps no other bird that is capable of supporting itself for such a length of time on the wing as the albatross. Except during the season of incubation, it seldom approaches the land, but continues night and day hovering in the air in search of its prey, stimulated by hunger, and apparently insensible of fatigue.

This feathered tyrant of the deep, which is not only one of the largest of the African and American birds, but also one of the most formidable of all those that prey upon the waters, seems to have a peculiar affection for the penguin, and a pleasure in its society. They always choose the same situation for their nests, which is in some distant and uninhabited island. In those places their nests are built in close vicinity, as if it were for mutual assistance and protection; and their friendship does not appear to be ever interrupted. The albatross admits of several varieties, all of them of a less size than the species here described; but they have in general the same propensities, and inhabit the same climates.

In reading the relations of voyagers who have visited the tropical seas, and those which extend to still more southern latitudes, we observe that scene of continued warfare among birds and fishes, alternately pursuing and pursued, which, as well as among animals on the land, every where presents itself, and which appears to agitate, and at the same time to animate, the world of life. When the circumstances are fully investigated, we are persuaded that the whole system of animal warfare, and their contribution to each other's support, will be found to be perfectly consistent with the wisdom and goodness of the Author of Nature, whose counsels are far beyond the reach of superficial inquiry.

CHAPTER XI.

"There o'er his head the cliffs tremendous frown,
The cordage cracks, the stones come rattling down,
While far and wide old Ocean rolls beneath!"

Having concluded the last chapter with a description of the albatross of the southern parts of the world, which is the first of the gull kind, we cannot proceed in a more regular and uniform manner than in giving in this at least a transient glance at that numerous race which is divided into about twenty species.

THE GULL, THE PETREL, AND THE TERN,

Are so well known, at least to all who live within any reasonable distance of the coast, that we shall not give a particular description, which among so great a variety of species would indeed be tiresome. They have most of them a fishy taste, and their flesh is coarse and unpalatable. The poor inhabitants of the islands on the north coast of Great Britain, however, esteem it a banquet; and indeed it may well be thought excellent by those who seldom taste any better. The gull, the petrel, the tern, and indeed most birds of this genus, have nearly the same nature and habits, frequent the same place, and are caught in the same manner, and by risking the same dangers.

In order to add to the multitude of examples of the connexion of animal life with human economy, which the history of Nature on every side presents to our view; and to impress on the mind an idea of a most dangerous and adventurous scene with which few are acquainted, and of which, without an exact account it would be impossible to form any conception; we shall devote a few moments to a description of the sport of catching sea-fowl and taking their eggs on the stupendous rocks which in some places are found on the northern coasts of Great Britain, and appear as a bulwark to oppose the assaults of the ocean. To these shores, the gull, the petrel, and innumerable other sea-fowl, resort, and breed in the cavities of these rocky cliffs. Of the tremendous sublimity of those immense elevations, it is not easy to form an idea. The stupendous works of art, the highest towers, the noblest domes, are mere ant-hills when put in the scale of comparison; and a single cavity in one of these rocks often exhibits a canopy more lofty than the ceiling of a Gothic cathedral. What would we think, were we placed on the rock of St. Kilda, elevated above three quarters of a mile, or more than fourteen times the height of St. Paul's cathedral, above the surface of the sea, and overhanging it in a most terrific manner?

With what awe should we approach that impending height, and look down on the immense abyss below! The waves that swell like mountains in an ocean three thousand miles wide, are scarcely seen to curl on the surface; and their tremendous roar can scarcely be heard from that stupendous elevation. Nothing could be better calculated than such a view to excite the most sublime ideas of the magnificence of Nature, and of the awful grandeur and majesty of Nature's God.

In those seemingly inaccessible mansions, within the sides of these rocks, fortified by dreadful precipices above and below, myriads of sea-fowl are seen sporting and flitting from fragment to fragment. To the spectator from above, those that are larger than the eagle appear less than the swallow. Here they might seem in perfect security from the arts and activity of man; but want, the impulse of which is irresistible, obliges the peasant to encounter the most formidable dangers, and excites him to exertions almost beyond the force of human resolution. When the precipice is to be assailed from below, the fowlers provide poles of five or six ells in length, with a hook at the end; and fixing one of these in the girdle of the person who is to ascend, his companions, in a boat or on a projection of the cliff, assist him until he has procured a firm footing: when this is accomplished, he draws up the others with a rope, and another man is again forwarded by means of the pole to a higher station. Frequently the person in the highest situation holds another suspended by a rope, and directs his course to the place where the birds have placed their nests. It unfortunately too often happens, that the person who holds the rope has not a footing sufficiently secure, and in that case both of them inevitably perish.

Many precipices, however, are so abrupt as not to be accessible from below In this case, a rope of eighty or a hundred fathoms long is provided, which one of the fowlers fastens round his waist and between his legs, in such a manner as to support him in a sitting posture. The rope is held by five or six persons at the top, and it slides upon a piece of wood laid so as to project beyond the precipice. By means of this apparatus, the man is gradually let down, until he can attack with success the habitations of the feathered tribes. This operation, however, is not without its attendant dangers. The descent and friction of the rope often cause the loose stones to tumble down on every side. To defend himself against them, the fowler covers his head with a kind of helmet, or some other safeguard; but many are notwithstanding killed by this kind of accident. Those who are unskilled in, or unaccustomed to, this business, are very often seized with a giddiness, on seeing themselves suspended from these tremendous heights; but the skilful practitioner swings

himself about with amazing dexterity, directs his attack to that part of the rock which seems to promise the greatest success, strikes with his fowling-staff the game as it comes out of the holes, occasionally disengages himself from the rope by which he was suspended, roams through the cavities of the rocks, and, when he has procured a sufficient booty, gives the signal to his companions, and is again drawn up; when a good supper of the coarse flesh of the sea-gull, compensates to these poor and hardy adventurers the dangers and fatigues of the day.

We have given this account of the manner of taking these birds in the northern and western islands, as an interesting exhibition of a grand and awful scene. Although the exertions of men in a state of poverty and obscurity pass unnoticed, these fowling enterprises of the northern peasants would perhaps have tried the resolution of some of the heroes of history.

THE PENGUIN

Chiefly frequents those parts of the globe, which are situated beyond the tropic of Capricorn, and seems to hold the same place in the southern as the gulls occupy in the northern hemisphere, neither of the kinds having ever been met with between the tropics. The wings of the penguin are not constructed for flight, and its legs are as little fitted for walking; but no bird can be more perfectly qualified for an aquatic life. Their legs, which are extremely short, are placed so far backward that they seem to spring from under the rump; but this conformation, which disqualifies them from living on land, renders them exceedingly well adapted for a residence in the deep; for the backward position of their feet fits them for answering the purpose of fins, and gives to the bird a power of pushing itself forward in the water with extraordinary velocity. The Magellanic penguin is as large as a goose. The upper part of its plumage is black; but the under parts white. This circumstance appears to be the effect of their continual immersion in the water, where, except during the time of their incubation, this bird constantly resides. The penguin always walks erect, with its short wings hanging down like arms; and a great number of them together have exactly the appearance of children with white aprons about their waists. Hence they have been said to exhibit some of the qualities of men, birds, and fishes; walking upright like the human species, being feathered like the volatile race, and provided with feet answering the purpose of fins, like the inhabitants of the watery element.

What is most to be remarked in the penguin, is, that being more constantly than any other bird immersed in the water, Creative Wisdom has furnished it with a plumage more close

compact, and warm, than that of any other known volatile,—a circumstance that strikingly manifests an all-wise design in the adaptation of creatures to their destined purposes and modes of living.

Fowls of the penguin tribe are social and gregarious, at least when they come on shore; which is never but at the season of breeding. At that time they are seen drawn up in great bodies, and from the steady composure of the whole assembly, have the appearance of being engaged in a consultation with the albatrosses, of which great numbers are mixed among them, and, as already observed, collectively form a peaceable and harmonious society. This happens about the beginning of November. All their preparations are soon made, as they construct no nest, but only make a small depression in the ground, which sufficiently answers their purpose. The female lays but one egg, which is about as large as that of a goose. It is said that in places where annoyance is to be apprehended from rapacious birds and other animals, they burrow deep in the ground, and three or four taking possession of the same hole, one stands sentinel to guard the rest. Some also assert, that two or three females often lay in one nest, and sit by turns. This work, however, does not long continue; for by the warmth of their bodies incubation is rapidly carried on, and their young are soon ready to follow them to the element which Nature has appointed for their residence.

We have now taken a cursory view of a numerous class of aquatic birds, and from this slight glance must be observed the exact conformity between their construction and their destination, which every where strikes the eye, and proclaims the wisdom of Him who has so admirably endowed every being with corresponding instinct and powers, indicated to them their proper food, and assigned them the place of their abode.

CHAPTER XII.

THE GOOSE KIND.

. . . . . "The stately swan
Gives out his snowy plumage to the gale;
And, arching proud his neck, with oary feet
Bends forward fierce, and guards his ozier isle,
Protective of his young."—THOMSON.

THE class of volatiles to which we are now about to give our attention, is of the most interesting kind. Intimately connected

with domestic economy, and producing a number of our conveniencies and comforts, this part of the feathered world affords a wide field for observation; of which, however, we shall at present give but a glance; and suggest at the same time a few leading reflections, which may be extended and multiplied into a variety of pleasing combinations.

THE GOOSE KIND

Constitutes a useful class of volatiles, some of which have from time immemorial been reclaimed from a state of nature, and seem pleased with their dependence on man, whose care for their support and protection they amply repay. At the head of this important class stand the swan, the goose, and the duck, of which the first is not less admirable for its elegance than the two latter are estimable on account of their utility.

THE SWAN

Is the most majestic and picturesque of all birds that swim in the waters. When it exhibits itself smoothly sailing along the stream, displaying its graceful attitudes, and moving forward without the smallest effort, a more beautiful figure can scarcely be found within the range of animated nature. This elegant bird admits of two varieties, the wild and the tame swan; the former has a loud cry, which may be heard at a great distance; but the latter seldom emits any sound. The wild swan is smaller by about one-fourth than the tame kind, and also of a different colour, its back and the tips of its wings being ash-coloured; while the tame swan is remarkable for the delicate and uniform whiteness of its whole plumage. In Cumberland county, in New-Holland, black swans are very common, and three of the species were in 1806 exhibited at Exeter 'Change, London.

The wild swan is a native of the arctic regions, and visits more temperate climates only when compelled by the severity of the cold. During the summer season they frequent the lakes of Lapland, in common with the numerous flocks of other aquatic fowl; there also it breeds and rears its young. Of the tame swan, any minute description is unnecessary; to give some idea of its size, it is sufficient to say, that it grows to the weight of upwards of twenty pounds. Its majestic appearance has been already noticed; and it is not less remarkable for the delicacy of its appetite than the elegance of its form: its food consists of corn, with herbs and roots that grow in the water, or are found near the margin. It prepares its nest in some retired part of the bank or in some islet in the stream, and lays seven or eight eggs, white and much longer than those of the goose. It sits two months, and the young, when first excluded, are ash-

coloured, and are some months before they acquire that delicate whiteness for which this magnificent bird is so much admired.

Dr. Latham says, he knows two females that for three or four years past have agreed to associate; and have had each a brood annually, bringing up together about eleven cygnets. They sit by turns, and never evince any disposition to quarrel. The same writer relates a singular instance of the strength of one of these creatures, exerted in self-defence. "A female at Pensip in Buckinghamshire, while in the act of sitting, observed a fox swimming towards her from the opposite shore: she instantly darted into the water, and having kept him at bay for a considerable time, with her wings, at last succeeded in drowning him: after which, in the sight of several persons, she returned in triumph."

Notwithstanding the elegance of the swan when in the water, it makes only an indifferent figure upon land; for its gait is heavy and waddling, and its attitudes and motions are as inelegant in walking as they are graceful in swimming.

All the stages of this bird's approach to maturity are slow, and seem indicative of its longevity. It is two months in hatching, several months in acquiring its colour, and a whole year in growing to its full size. Willoughby seems to think the swan may live three hundred years; and although this appears very doubtful if not absolutely incredible, it is universally allowed that it reaches the age of a hundred.

The swan is considered as one of the principal ornaments of artificial pieces of water; and formerly, in England, no one was suffered to keep them unless his annual income amounted to five marks. It is not surprising that a bird so remarked and esteemed for the majestic elegance of its appearance, should have been frequently introduced into poetry, and sometimes given birth to fiction. It is, however, difficult to account for the fabulous narratives and high-strained similies of the ancients relative to the musical powers of this bird, since experience shows that the tame swan is mute, and that the notes of the wild one are exceedingly harsh and dissonant. It appears that some mythological meaning was concealed in what they have said relating to the melody of the swan, and especially in regard to its dying song, since we cannot suppose that either its voice or its nature has undergone any change.

The revolutions of manners, however, have inverted tastes as well as ideas; and the swan, which among the ancients was esteemed a most delicious viand, is in this age seldom brought to table, except for the display of ostentatious magnificence;

while the goose, which they condemned as totally indigestible, is now in almost every place a favourite dish.

THE GOOSE,

In its domestic state, is so universally known as to preclude the necessity of any description. It exhibits indeed a variety of colours, while the wild-goose, which is considerably less in size, always retains the same marks; the whole plumage of its upper parts being of a dark ash colour, and the breast and belly of a dusky white.

The wild-goose is supposed to breed in the northern countries of Europe: in the beginning of winter, it descends into more temperate climates. Wild-geese are often seen flying, at a very great elevation, in flocks of from fifty to a hundred together, disposed in the most regular order, and generally forming either a direct line, or two lines joining in an angle. When they alight in the day-time, which seldom happens, they range themselves in a line, like cranes, and seem to have descended rather for rest than for feeding; for the latter business is chiefly performed in the night. When they have sat in this manner reposing themselves for an hour or two, one of them sounds a kind of charge, to which the whole flock pay the strictest attention. Every goose is instantly on the wing: their ranks are immediately formed in the air, and they pursue their route with renewed alacrity. This well-known bird admits of several varieties; for, besides the tame and the common wild-goose, there is the bean-goose, a bird of passage, which arrives in Lincolnshire in the autumn and departs in the month of May. This bird resembles the wild-goose in colour, and weighs about six pounds.

THE BARNACLE

Differs in some respects from these, being considerably less than any of them. Its bill, and the upper part of its plumage, are black; but the under parts, white.

THE BRENT-GOOSE

Is still smaller than the former. Both this and the barnacle are migratory: they frequent the shores of Great Britain in the winter; and in some seasons have been so numerous on the coasts of Picardy, as to be a nuisance to the inhabitants.

THE DUCK,

Like the goose, may be viewed in two grand divisions, the tame and the wild kind; and each admits of a number of varieties The wild-duck, or mallard, differs in many respects from the tame, and exhibits a still greater variety of species. These we

shall not attempt describing, nor shall we even enumerate the varieties which different countries afford; for the multiplying of names tends but little to increase the sphere of knowledge. The duck in its domestic state is universally known, and the most obvious distinction between the wild-duck and the tame consists in the colour of their feet; those of the former being yellow, and those of the latter black.

If a minute description of the different species of ducks, which by some naturalists are reckoned about ten in the tame, and more than twenty in the wild kind, be unnecessary, some particular traits, however, in the history of this bird will not be uninteresting. They all live nearly in the same manner, and, wild as well as tame, all on the same kind of food. They prefer corn, grass, and other vegetables, where these are plentiful; but their appetites are far from being delicate, and they will greedily devour frogs, toads, lizards, or any other kind of reptiles or insects that come in their way.

As ducks possess the faculties both of swimming and flying, they are well adapted for migration, and the wild are in general birds of passage; and it is not improbable that they perform their passage across the ocean alternately in the water and in the air. As soon as they arrive in Great Britain, they are seen flying in flocks, and appearing to take a survey of the lakes where they intend to make their winter's abode. In the choice of these, they have two objects in view,—freedom from disturbance, and the facility of procuring food.

Various methods of taking these birds have been tried, but none has succeeded so well as the decoy, in places where the situation is favourable. This is principally where there is a pond nearly surrounded by a wood, and beyond that a marshy and uncultivated ground. When a proper place is chosen, the pool is planted round with willows, unless it be shaded on every side. On the north and on the south, there ought to be three or four ditches, broad towards the pool, and growing gradually narrower till they end in a point. These ditches are covered over with nets, supported by covered sticks, fastened on each side, and terminated by a tunnel-net. The whole apparatus must be carefully concealed by a hedge of rushes or reeds, running along the margin of the pool, behind which the fowler manages his operations, which would be totally frustrated if the ducks should discover him. The places being fitted in this manner, the fowler is provided with a number of wild-ducks rendered tame and trained to the business. These are always fed at the mouth of the pipe, and accustomed to come at a whistle. They are called decoy-ducks, and without them the business could not be transacted. As soon as the evening is set in, the wild fowl begin

to feed; and the fowler, when he finds a fit opportunity, and sees the decoy covered with ducks, throws upon the water handfulls of hempseed, or any other seed that will float; and whistling to the decoy-ducks, easily allures them to their accustomed regale at the mouth of the pipe. These are readily followed by the wild-ducks, which are ignorant of the snare laid to trepan them, and push forward till they discover that the dimensions of the pipe continually decrease, and then they begin, too late, to suspect some concealed danger. Their retreat, however, is prevented by a person placed at the entrance. They are consequently compelled to push forward to the end of the funnel, where they are without any difficulty secured. When the wild-ducks are too drowsy and sluggish to pay attention to the enticements of the decoy-ducks, which sometimes happens to be the case, a little dog, trained up for the purpose, is made use of to drive them into the snare; but this method is not so certain nor so effectual as the former mode of proceeding. Of all the counties in England, Lincolnshire is one of the most famous for its decoys. They are let for considerable annual sums, and from them the London markets are chiefly supplied with this delicate fowl. It is said that upwards of thirty thousand ducks, widgeon, and teal, have been sent up to the metropolis, from the decoys in the vicinity of Wainfleet;—a circumstance that evidently proves the great importance of this valuable fowl, which furnishes so excellent an article of food, and shows how profusely Heaven has provided for our support and comfortable subsistence.

To this manner of taking wild ducks in England, we shall subjoin an account of another, still more extraordinary, which is practised in China, and is so exceedingly curious that it deserves to be mentioned.

As soon as the fowler sees a number of ducks settled on a particular piece of shallow water, he sends among them a number of gourds, which resemble our pumpkins. These, having the insides scooped out, easily swim, and sometimes twenty or thirty of them are seen floating in one pool. The birds are at first fearful of approaching them; but by degrees their shyness wears off, they become familiarized to the sight, gather about them, and rub their bills against them in sportive playfulness. As soon as the fowler perceives them perfectly fearless of the gourds, he prepares to deceive them. He hollows out a gourd large enough to contain his head, makes holes in it to see and breathe through, and then puts it on like a cap. Being thus accoutred, he wades slowly into the water, stooping or creeping where it is shallow, and always taking care that nothing but his head shall appear above the surface. In this manner, moving unperceived towards the unsuspecting birds, he gets in among

them, while they, having been already accustomed to the sight of the gourds, apprehend no danger when the enemy is in the very midst of them. He then begins his operations by seizing a duck by the legs, and instantly drawing it under the water before it has time to cry or give the alarm to the rest; he fastens it to his girdle, and approaching another serves it in the same manner, and thus proceeds until he has gotten a sufficient load. Having procured his quantity, he slowly moves off again. All this the Chinese fowlers perform with such dexterity, by keeping their bodies always concealed in the water, that they never alarm the flock, and the ducks, ignorant of what is transacting among them, neither suspect the unseen danger, nor notice the instantaneous disappearance of their companions. By the ingenuity of this method, and their dexterity in practising it, the Chinese obtain great quantities of the excellent food which the flesh of the duck is known to afford.

We could not but think it would afford some entertainment, as well as enlarge the sphere of information, to give a description of some of the most curious methods which the ingenuity of man has invented in order to turn the animal creation to his own pleasure or profit. These delineations are, indeed, peculiarly interesting, as they exhibit a curious display of natural history in connexion with human economy, and are calculated to give us an enlarged view of the beneficent and extensive plan of the all-wise Creator, in bestowing on the various kinds of animal life properties so useful to man, whom he has, by the gift of superior sagacity, enabled to convert the inferior departments of Nature to his own advantage.

The comforts and conveniencies which mankind derive from the various kinds of animals with which the face of Nature is overspread, are procured by taking such as are wild, and by breeding up others in a domestic state. From the latter method the greatest advantages, undoubtedly, result, as will readily be perceived, from contemplating the history of the horse, the cow, and a number of others. The method, however, is not always practicable; and it is obvious that the domestication of the feathered tribes is of less importance to man, than that of some of the quadruped race. Some volatiles, however, by being bred up under his protection, amply repay his cares. This may have been observed in respect to the common poultry, the turkey, and the pigeon. The goose and the duck may with great propriety be added to the number, and considered as holding one of the first places in the scale of utility.

The duck, in a state of domestication, is extremely beneficial to mankind; and as it subsists on waste corn, worms, snails, and other insects, or reptiles, it is maintained with little expense

Tame ducks lay a great number of eggs every year, produce many young, and are easily and expeditiously fatted for the table.

As a subject for reflection, perhaps, few are of more extraordinary importance than the history of these tribes of the feathered race which have been presented to view. One of our principal luxuries,—a luxury, indeed, which may reasonably be reckoned a conveniency, and which refinement and habit has rendered an absolute necessary of life,—is derived from the duck and the goose. The beds on which we so comfortably repose are filled with their feathers, and if these were wanting, it would be difficult to find any thing that could be conveniently substituted in their place. The quill of the goose is also an article of inestimable value, to the use of which we are in a great measure indebted for those literary and scientific compositions, from which the mind derives improvement; and indeed, without this important instrument, business would be carried on with great difficulty.

Feathers, in several countries, constitute an article of commerce. The down of the swan is imported from Dantzic, and the eider-down from Ireland and Norway; but the goose furnishes the chief part of the feathers made use of for bedding, as well as of the quills used for writing. From these various considerations, we cannot but rank the goose among those creatures which are most useful to mankind.

Having finished our sketch of the feathered tribes, it is with some regret that we lose sight of so charming a part of the creation. These beautiful inhabitants of the air, indeed, possess all those qualities that can amuse the fancy and exhilarate the mind; and many of them contribute to our benefit as much as to our pleasure. Some charm us with their melody, while others fascinate by their beauty. The variety of their notes, the elegance of their forms, and the brilliancy of their colours, all concur to exhibit a magnificent display of Nature's plastic energy, and irresistibly draw us to the contemplation of Him who is the essential source of all beauty, splendour, and harmony.

NATURAL HISTORY OF FISHES.

CHAPTER I.

"From icy oceans, where the whales
Toss in foam their lashing tails;
Where the snorting sea-horse shows
His ivory teeth in grinning rows."
Miss Aikin.

From the inhabitants of the air, we shall now take a cursory view of the natives of the deep, and endeavour to exhibit for inspection a few of the most striking and interesting objects among those numerous tribes of fishes which constitute this great division of animated nature.

Of these, the ocean is the grand receptacle, although the rivers and streams produce or contain great numbers of different kinds; and hence arises the general distinction between fresh water and salt water fish.

Of this numerous and prolific race, Linnæus reckons upwards of four hundred different species; but it is extremely probable that numbers are concealed in the vast extent and profundity of the ocean, which have never yet been exposed to human observation. The wants or the luxury of mankind have drawn numbers from their watery abodes, and made us acquainted with their formation; but their history is, for the most part, little known. Their migrations, their pursuits, and their pleasures, are in a great measure concealed by that element which affords them a residence. As far, however, as we can make probable conjectures on the history of animals so little exposed to our ob servation, the whole circle of their pursuits is confined to the preservation of their existence and the propagation of their species; and an incessant desire of food appears to be their domineering impulse. Their digestive faculties also seem extraordinary, for their stomachs can soften the most callous substances. The larger of the species subsist by devouring the smaller; and their whole lives are passed in a state of depredation.

In this circumstance, we seem to discover the reason why the predatory system exists among animals. The arguments generally adduced to reconcile the state of incessant hostility subsisting in the brute creation, with the paternal beneficence of the Author of Nature, will be abundantly illustrated, by contemplating the

same system, and reflecting on its necessary existence among the inhabitants of the deep. The sea does not, like the land, afford a profusion of vegetable food for the support of animal life, and consequently, without some other supply, the immense regions of water must have remained uninhabited, and have presented nothing more than one vast extent of inanimate matter. This immense vacuum in the system of animated nature, infinite wisdom and goodness has prevented, by ordaining that the natives of the deep should support one another's existence in a situation which produces no other aliment. Here we plainly perceive the wonderful economy of Nature, and how justly Creative Wisdom has balanced circumstances, and provided against all possible consequences.

The greatest part of quadrupeds and volatiles are supported by those vegetable aliments which the earth abundantly produces: the rest prey upon those which might multiply so as to become a nuisance; and the fecundity of each species is, with an admirable justness and calculation, proportioned to its exposure to destruction. Among the finny inhabitants of the ocean, this system, which seems so mysterious among land animals, appears far more luminous, far more easy to comprehend, and perfectly reconcileable with the beneficence of the Universal Parent. Fishes, being destitute of those resources which quadrupeds and volatiles possess, have no other means of subsistence than that of devouring one another, and consequently are all predaceous: the larger devour the smaller, and the smallest of all support themselves by the spawn which the others produce. For the supply of this continual demand, Nature has rendered the finny tribes extremely prolific, so that among them propagation and destruction keep as nearly as possible an equal pace, and counterbalance each other.

By this wonderful arrangement, which, on strict examination, will appear both wise and beneficent, myriads of creatures which could not otherwise have had a place in the scale of existence, enjoy for a season their portion of life with a degree of happiness suited to their faculties, and then serve for the support of others; and in this manner the blessing of existence is perpetuated in the deep recesses of the ocean, which, without this wise regulation, must have afforded no means of subsistence to any kind of living inhabitants. Thus, a disposition which seems, on a superficial view, incompatible with our confined ideas of the goodness of the Author of Nature, appears, after a more accurate examination, to be nothing less than a grand display of his infinite wisdom and extensive beneficence.

The senses of fishes are very imperfect, when compared with those of the generality of land animals; and, indeed, that of

sight is the only one which they may be truly said to possess: perhaps it is almost the only one which they need. The uninterrupted silence which prevails in the lower regions of the ocean, and the uniform noise of the waves on its surface, render the sense of hearing of little use to them; nor is it necessary to apprize them of the approach of danger, as the silent gliding of their enemies through the watery element, is unattended with any noise; and Nature, which has so perfectly suited the powers of animals to their wants and propensities, has bestowed no faculty without a purpose of utility. As the palate of fishes is bony and hard, it is supposed that their taste is defective; but of this we are not competent to judge. Of the sense of smelling, which in many beasts and birds is known to be exquisite, the fish seems to possess only a very moderate share, but yet as much as is necessary to an animal residing constantly in an element where any great variety of odours can scarcely exist, or must at least be very imperfect and faint. The sense of touching cannot be supposed very lively, in an animal covered with scales; nor is it indeed very needful, where the objects with which it can come into contact are so little diversified. Creative Wisdom has endowed every creature with faculties suitable to its place in the scale of being; and fishes undoubtedly possess a share of happiness corresponding with their nature and situation. They appear, it is true, inferior to beasts and birds, in acuteness of sensation and instinctive sagacity; and their brain is found to be exceedingly small in proportion to their size, when compared with the same organ in quadrupeds and volatiles. These deficiencies are, however, in some degree compensated by their astonishing longevity, several species being known to live more than a hundred years; and if the inhabitants of the ocean be capable of fewer enjoyments than those of the earth and the air, they are, by residing in an element that is liable to little variation, far less exposed to the inconveniencies resulting from the changes of the atmosphere, and the inclemencies of the weather.

The longevity of fishes, however, is less astonishing than their singular fecundity. A single codfish is said to produce at a birth, if they escape depredation, no fewer than nine millions of young, a number equal to that of the inhabitants of all England. The flounder produces at once above a million, and the mackarel not less than five hundred thousand. From this abundant fecundity, as it has been already observed, the predatory system of fishes is supported and their aliment supplied.

Amidst the general observations on this class of animal beings, we cannot omit recommending to notice one of a more particular nature, which eminently tends to demonstrate the agency of an all-wise Contriver in their formation. The nature of the

transmission and the refraction of the rays of light, requires that, in order to produce the same effect, these rays should, in passing from water into the eye, be refracted by a more convex surface, than when they are communicated to that organ through the medium of the air. Accordingly, we find that the eye of a fish is much rounder than that of a terrestrial animal. This circumstance is an evident proof of design in so nice an adaptation. "A mathematical instrument maker," observes the admirable Dr. Paley, "could not have done more to show his knowledge of his principle, his application of that knowledge, his suiting of his means to his end, and to testify counsel, choice, consideration, and purpose."

Fishes are generally divided into the cetaceous, or whale kind; the cartilaginous, or gristly kind; the spinous fishes, so called from the resemblance which their bones have to sharp thorns; and the testaceous kind, which are distinguished by being covered with shells instead of scales.

It is not our intention to give a nomenclature of a race of animals far remote from general observation, and with most of which few persons have an opportunity of becoming acquainted. We shall, on the contrary, select for contemplation, such as are of the greatest importance in commerce, and of the greatest utility to man, or have some remarkable property peculiarly interesting.

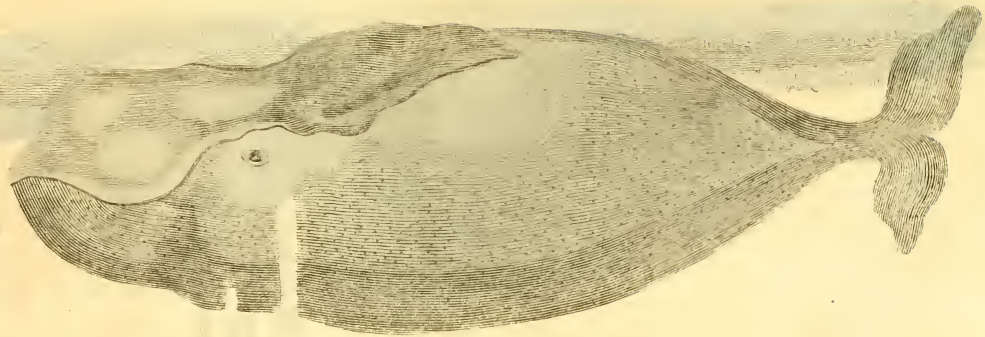
THE WHALE

May, with propriety, be reckoned one of the most interesting of those animals which have their residence in the deep. If we consider its stupendous size, it must be regarded as one of the greatest curiosities of animated nature; and if its commercial importance be justly appreciated, it will be esteemed an object worthy of the attention and examination of the naturalist, the politician, and the merchant.

Of the whale kind there are seven species, of which the great Greenland whale, and the spermaceti whale, or cachalot, are the most important in commerce.

THE GREAT GREENLAND WHALE

Is that fish, for the catching of which such vast preparations are made in different parts of Europe and America. This is, beyond dispute, the largest animal in the creation, of which we have any certain account. It is indeed of so enormous a size, that it usually measures from sixty to seventy feet in length, and its head constitutes a third part of its bulk. The fins on each side are from five to eight feet in length, composed of bones and muscles sufficiently strong to give to this great mass of body ac



tivity of speed. The tail is about twenty-four feet broad, and when the whale lies on one side, its stroke is tremendous. The skin of this fish is smooth and black, and in some places marbled with white and yellow, which, running over its surface, has a beautiful effect. The outward, or scarf skin of the whale, is no thicker than parchment; but underneath, another appears about an inch thick, covering the fat or blubber, which lies beneath to the thickness of ten or twelve inches, and when the fish is in health, is of a beautiful yellow colour. The cleft of the mouth is about twenty feet long, which, in general, is about a third part of the animal's length; and the upper-jaw is furnished with barbs, which lie like the pipes of an organ, the greatest in the middle, and the smallest on the sides. These compose the whalebone, the longest spars of which are not less than eighteen feet. The tongue seems but one great lump of fat, and produces several hogsheads of blubber. The eyes are not larger than those of an ox: they are placed towards the back part of the head,—the most convenient situation for enabling them to see before and behind, as well as above, where their food is principally found. They are guarded with eyelids and lashes like those of quadrupeds, and seem to possess great acuteness of sight. Their hearing also appears to be no less perfect; and they perceive at a great distance any danger that is preparing against them.

It has already been remarked, that the substance called whalebone is taken from the upper-jaw of the animal, and is very different from its real bones, which are hard like those of large quadrupeds, and full of marrow. Two enormous bones sustain the under-lip, placed against each other in the form of a crescent. These bones are very commonly not less than twenty feet long. They are often seen standing as ornaments in gardens, and are generally mistaken for whales' ribs.

After nine or ten months of gestation, this huge fish brings forth its young, which it suckles during a whole year, in the same manner as quadrupeds. The food of the whale consists chiefly of a small black insect, about the size of a bean, which is seen floating in clusters on the surface of the waters.

This enormous fish, however, notwithstanding its prodigious bulk and strength, meets with a number of enemies which it cannot resist. There is a small shell-fish called the water-louse, which sticks to its body, insinuates itself under the skin, and feeds upon its fat. The sword-fish is also one of its most invet erate and terrible enemies. "At the sight of this little animal," says Anderson, "the whale appears agitated in an extraor dinary manner. Wherever it appears, the whale perceives it at a distance, and flies from it in an opposite direction

"I have been myself," continues he, "a spectator of their terrible encounters. The whale has no instrument of defence, except its tail; with that it endeavours to strike the enemy, which a single blow taking place, would effectually destroy; but the sword-fish, which is as active as the other is strong, avoids the stroke. Then bounding into the air, it falls upon its enemy, and endeavours not to pierce him with its pointed beak, but to cut him with its toothed edges. The sea all around is immediately dyed with the blood proceeding from the wounds of the whale, while the enormous animal endeavours in vain to reach its assailant, and strikes with its tail against the surface of the water, making a report at each blow louder than that of a cannon."

There is also another, and a still more formidable enemy called, by the New-England fishermen, the killer. It is said that a number of these fishes surround the whale like so many dogs baiting a bull. Some attack him before, others behind, until at last, being lacerated in every part by their teeth, he is totally subdued and becomes their victim.

Against its adversaries of the deep, however, the whale might often prevail by force, or escape them by cunning; but man is a more dexterous and terrible assailant than all its other enemies; and destroys more of the species in one year, than all the rest in a whole century. That his assiduous and successful hostility has considerably diminished their numbers in that part of the world where they are chiefly sought, or at least expelled them in some measure from their ancient retreats, is evident, from several circumstances; for at the first discovery of Greenland, when they were unaccustomed to molestation and pursuit, they came frequently into the bays, and were killed close to the shores; so that the blubber, being cut up, was immediately boiled into oil on the spot. The ships at that time took in only the pure oil and the whalebone, and all the business was consequently executed in the country; by which mode of proceeding, a ship could bring home the produce of a far greater number of whales than it is possible to do in the present method of conducting the trade. Since that time, however, such numbers of ships arriving from Holland, Denmark, and several other parts, the whales took the alarm, and, as other fish, as well as birds and quadrupeds often do, began to forsake their accustomed haunts, and to seek more secure and peaceable retreats. They are now seldom found near the shores, but chiefly in the open spaces among the fields of ice in deep water, and at a considerable distance from land.

The whale fishery begins in May, continues all the month of June, and a part or the whole of July, according to their good

of ill success; but whatever may be the case in that respect, the ships must depart and get clear of the ice before the end of August. The latest may therefore be expected in September, but those that have been speedily successful, may return in June, or early in July.

The advantages derived from the whale fishery by the United States, as well as several European nations, and particularly Great Britain, are so well known, as to preclude the necessity of expatiating on the subject. We shall only observe, that near three hundred vessels sail from the latter country annually to Greenland and Davis's Straits, in this trade, and for the most part make profitable voyages.

The catching of whales in the Greenland seas, among immense masses of ice, presents one of the most curious scenes that are any where displayed in the whole circle of the transactions of mankind with the animal creation. These fields, or fragments of ice, which are as old as the world, are frequently more than a mile long, and above a hundred feet in thickness; and when they are first set in motion by a storm, nothing in Nature can exhibit a more terrific appearance. No less than thirteen Dutch ships were in one season crushed to pieces among those ponderous masses. Perhaps the voyages made to those rigorous climates and frozen seas, for the purpose of catching whales, may be reckoned among the boldest and most arduous enterprises of man.

Every ship employed in this business is provided with six boats, to each of which six men are appointed for rowing, and a harpooner for striking the whale. Two of these boats are constantly kept on the watch, at some distance from the ship. As soon as a whale is discovered, both the boats set out in pursuit of it, and if either of them can come up before the fish descends, which is known by his throwing up his tail, the harpooner darts his harpoon at him. As soon as he is struck, the men make a signal to the ship, and the watchman alarms all the rest with the cry of "fall! fall!" when all the other boats are immediately sent out to the assistance of the first. The whale, as soon as he finds himself wounded, runs off with amazing rapidity and violence. Sometimes he descends perpendicularly, and sometimes goes off in a horizontal direction, at a small depth below the surface. The rope that is fastened to the harpoon, is about two hundred fathoms long, and properly coiled up that it may be given out as fast as is requisite, otherwise the whale would immediately sink the boat. At first, the velocity with which the line runs over the side of the boat, is so great, that it is constantly wetted to prevent its taking fire; but in a short time the strength of the whale begins to diminish, and the men, instead

of letting out more rope, strive as much as possible to pull back that which is already given out. If the whole line belonging to one boat be run out, that of another is immediately fastened to it. This is repeated as necessity requires; and instances have occurred where all the rope belonging to the six boats has been necessary, although half the quantity is generally sufficient.

When the whale descends, and has run some hundred fathom deep, he is obliged to come up for air, and then makes so dreadful a noise with his spouting that some have compared it to the firing of artillery. As soon as he appears on the surface of the water, some of the harpooners fix another harpoon in him, upon which he plunges again into the deep; and on his coming up a second time, they pierce him with spears, till he spouts out streams of blood instead of water, beating the waves with his fins and his tail, till the sea is all in a foam. He is then known to be nearly dead, and the boats continue to follow him until he has totally lost his strength. When dying, he turns himself on his back, and is drawn on shore, or to the ship, if at a distance from land. He is then cut up, and his flesh or blubber generally put in barrels, and brought home, although formerly, as already observed, the oil was extracted in the country.

Every whale is computed to yield, on an average, from sixty to a hundred barrels of oil, of the value of about four pounds sterling per barrel, which, with the whalebone, is sufficient to prove the great importance of this fish considered in a commercial point of view.

The flesh of the whale is, among some nations, reckoned a dainty; and the inhabitants of Greenland are fond of it to excess. They not only eat the flesh, but drink the oil, which they consider as one of their first-rate delicacies. The finding of a dead whale is a circumstance which they rank among the fortunate events of their lives. A number of them make their abode near it, and seldom remove until they have picked the bones. We cannot here but reflect on the blessings of civilization; and in contemplating the wretched condition of man little advanced beyond a state of nature, be thankful to Divine Providence for having placed us in a country where plenty is procured by industry, and protected by judicious and equitable laws.

A skeleton of a whale, about sixty feet long, is preserved in the exhibition rooms at Exeter 'Change. It has twenty-two ribs, eleven on each side, and fifty-four vertebræ, or joints, in the back-bone.

THE NARWHALE, OR SEA UNICORN,

Is less than the whale, not being more than sixty feet long; its shape is also more slender, and its fat less abundant It is

distinguished from all the other inhabitants of the deep, by its tooth, which stands pointing out directly forward, and resembles a horn, being from ten to fourteen feet long. Of all the variety of weapons with which Nature has armed the different tribes of animals, no other so large and so formidable is found. This tooth, or horn, as it is sometimes called, is as straight as an arrow, as thick as a man's leg, and wreathed, as we sometimes see twisted bars of iron. It tapers to a sharp point, and is whiter, heavier, and harder than ivory.

Notwithstanding its accoutrements for combat, its long and pointed tusks, prodigious strength, and extraordinary celerity, the narwhale is one of the most harmless of animals. It is seen peaceably sporting among the other great monsters of the deep, no way attempting to injure them, but apparently pleased in their company; and these powerful fishes, although furnished with such terrible weapons of destruction, are as inoffensive as a drove of oxen. They are much swifter than the whale, and would never be taken, if their escape were not prevented by those very tusks which seem to be their principal defence. Being of a gregarious and social disposition, they are always found in herds of several together; and whenever they are attacked, they crowd so closely, that they are embarrassed by the entanglement of their horns, and prevented from descending towards the bottom. The fishermen, in consequence, seldom fail of making sure of one or two of the hindermost.

THE SPERMACETI WHALE, OR CACHALOT,

Is not so large as the whale, and consequently does not afford so great a quantity of oil. The head is so disproportioned to the body, that it constitutes the half of its bulk; and the throat is so formidably capacious, that it is supposed to be capable of swallowing an ox. Its appetite is at the same time so voracious, that it often devours a shoal of fishes at once. This may, with propriety, be called the tyrant of the deep; and Linnæus informs us, that dolphins and porpoises are frequently driven ashore by this devouring monster.

But although this voracious fish be so terrible to the other inhabitants of the ocean, mankind consider it as a most valuable animal, on account of the excellent drugs it affords. These are spermaceti and ambergris, which are so universally used as articles of luxury or medicine, that distant and dangerous voyages are undertaken solely for the purpose of taking this fish; and its capture is esteemed a sufficient compensation for all the expense and risk attending the enterprise.

The genuine spermaceti, which is naturally produced, is nothing but the brain of this fish; and one of them will yield about

sixteen barrels of this valuable commodity. By a simple process, lately invented, all the oil which it produces may be converted into spermaceti. This is said to be performed by boiling it with a lye of potash, and hardening it like soap. Of this substance candles are made, and it is found to be an excellent, as well as a cheap substitute for wax. The ambergris is found where the seminal vessels are usually placed in other animals. It is found in bags of three or four feet long, in round lumps, of from one to fifteen pounds weight: the largest ever seen of these, weighed twenty pounds. This substance is not found in all parts of this species, but only in the oldest and the strongest. The evident utility of the former, and the real or imaginary virtues of the latter of these drugs, have rendered the spermaceti whale an object of considerable importance in the commercial system.

THE GRAMPUS, THE DOLPHIN, AND THE PORPOISE,

Seem all to belong to the same genus; for their characteristic distinctions are not very considerable, and their general history appears to be the same. The grampus, which is the largest of the three, seldom exceeds twenty feet in length, and its head is remarkably flat. The porpoise very much resembles the former in shape, except that its snout is more like that of a hog; and the whole length of this fish seldom exceeds eight feet. The dolphin likewise bears a striking similitude to both, except that its snout is longer and more pointed. All these fishes have dorsal fins and large heads, and they seem perfectly to agree in their appetites and habits, being equally voracious and active.

The extraordinary agility of these animals, renders their capture extremely difficult. They seldom remain a moment above water, but their rapacious spirit of depredation sometimes exposes them to danger, and a shoal of herrings often allures them out of their depth. In these cases, the voracious animal continues to flounce about in the shallows until the returning tide comes to its relief. All this tribe, and particularly the dolphin, are not less swift than destructive; and no fish whatever could escape them, but from the awkward position of the mouth, which is placed almost under the head. With this disadvantage, their depredations are so great, that they have justly been styled the plunderers of the ocean. We have, however, already observed, that the tyranny which they exercise over a great part of the inhabitants of the deep, is compensated by that which they themselves experience from the cachalot, or spermaceti whale.

We are told that the grampus, the porpoise, and the dolphin, go ten months with young, and, like the whale, seldom produce above one at a time; that they live to the age of thirty years

and that they sleep with the snout above water; but some of these particulars seem difficult to ascertain.

No one who is ever so little conversant with the classical authors, is ignorant of the prejudices of the ancients in favour of the dolphin. In the times of antiquity, it was celebrated for its natural affection to the human race; and scarcely an accident could happen to an individual at sea, but the dolphin was introduced to bring him safely to land. The figure of this fish being in no respect prepossessing, and its rapacity but ill calculated to conciliate sentimental affection, this predilection of the Greeks and Romans in its favour, is a circumstance for which neither philosophy nor criticism can satisfactorily account. It is therefore, in all probability, to be attributed to some mythological story, or legendary fable, invented in the ages of ignorance, and rendered current by superstitious credulity. Their painters, in giving an erroneous delineation of its form, have incurred the same censure as the poets, in exhibiting a fictitious representation of its qualities. But the error of the former is more easily accounted for, in considering the attitude in which they have represented its figure, as they have invariably chosen that which it exhibits when bounding out of the water in those gambols, which, however they might be interpreted by the Greeks and Romans, are, among the more skilful mariners of modern times, generally considered as the forerunner of a storm. Our fishermen, more attached to reality than fiction, consider the capture of one of these fishes as no contemptible prize, on account of its oil as well as its flesh, which, when young, is said to be as good as veal, and to resemble it in taste. Modern industry has therefore discovered this fish to be of importance to mankind although not for the qualities attributed to it by the ancients.

CHAPTER II.

CARTILAGINOUS FISHES.

His jaws horrific, arm'd with three-fold fate,
Here dwells the direful shark."

We have often observed that Nature proceeds by successive gradations, and that the cetaceous fishes descend only one step downward from the quadruped race, may be perceived from a perusal of the last chaper. It may now be observed that the cartilaginous kind is still farther removed from that class of animals.

The leading characteristic that distinguishes this kind of fishes, is their having gristles instead of bones; and from their pliancy, they seem to have no bounds set to their dimensions, but are supposed to increase in size as long as they live.

Cartilaginous fishes seem to constitute the connecting link between the cetaceous and the spinous kinds, and to unite some of the principal properties of both in their conformation. Like the former, they have organs of hearing, and lungs; and like the latter, they have gills, and a heart without a partition. This double capacity of breathing is one of the most remarkable features in the history of animated nature. From the structure of their gills, they are able to live longer out of the water than any other kind of fishes. The shark will live some hours after it is taken: but the herring or the mackarel expire in a few minutes after they are drawn out of their natural element.

Of cartilaginous fishes there are so many kinds, that to give a description of each would extend our work beyond its proposed limits. We shall therefore only mention those striking features, by which they are distinguished, and afterwards give a description of a few of the most remarkable species.

They may be in general divided into five classes: the first comprehends those of the shark kind, with a body growing less towards the tail, a rough skin, the mouth placed far beneath the end of the nose, and five apertures on the side of the neck for breathing; the next division is that of the flat-fish, which may by its form be easily distinguished; the third division is the slender snake-shaped kind; the fourth, that of the sturgeon; and in the fifth may be comprised the sun-fish, the sea-snail, the fishing-frog, and a number of other varieties, each of which has something peculiar in its form that distinguishes it from the rest. The devouring fish, of which we are now going to describe the terrific appearance and rapacious habits, is too dreadfully remarkable to fail of attracting attention.

THE SHARK

Is, of all the inhabitants of the deep, the fiercest, the most formidable, and the most voracious. It comprises several varieties; and the smallest of the kind are formidable to fishes very far superior in size. The white shark may sometimes almost rank among the smaller whales, in respect of magnitude; it is often seen from twenty to thirty feet in length. Some assert that this fish has been found to weigh not less than four thousand pounds; and we are told of one in particular, that had a whole human corpse in his belly. The head of the shark is large and somewhat flatted, the snout long, and the eyes fierce, large, and fiery. The mouth and throat are enormously capacious, so that it is

capable of swallowing a man without difficulty. Its furniture of teeth, however, is still more terrible, and exhibits a most formidable apparatus of destruction. These are set in six rows, and are said to amount to a hundred and forty-four in number. With these both the upper and under jaws appear planted all over; and what is extremely singular, the fish has the power of erecting and depressing them at pleasure: when it is at rest, they lie flat in its mouth; but the moment that it prepares to seize its victim, these dreadful instruments of destruction are erected in rows.

The shark is indisputably the fiercest depredator that swims in the ocean; for neither the dolphin, the grampus, nor even the spermaceti whale, can, in regard to ferocity, boldness, and indefatigable activity, bear any comparison with this terrible devourer. No other fish can swim so fast: his agility is such that he outstrips, with ease, the fastest-sailing vessels.

Such amazing powers, united with such appetites for destruction, would depopulate the ocean, had not Creative Wisdom ordained a conformation of the jaws of this fish, which serves in some measure to counteract its insatiable voracity. The upper jaw projects so far over the lower, that the shark is obliged to turn on one side to seize his prey; and as this takes some small time in the performance, the animal pursued often takes that opportunity to make its escape.

Notwithstanding this disadvantage, the ravages of the shark are dreadful. He is the dread of sailors in all hot climates where he generally attends the ships in expectation of what may drop overboard. A man who happens to fall into the sea at such a time, meets certain destruction. A sailor who was bathing in the Mediterranean near Antibes, in the year 1744, perceiving one of those terrible monsters approaching him, from the extension of its jaws, anticipating his fate, called out in an agony of terror to his companions to throw out a rope. The rope was immediately thrown, and in eager haste he secured his hold; but in the very moment when his comrades were drawing him up to a place of safety, the shark sprang upon him, and at one snap snatched off one of his legs. This ferocious and formidable fish has been known to bite a person asunder in the middle; and indeed were we to mention all the dreadful instances of its voracity, it would prolong this article to an immoderate length. It is however to be observed, that bathing in the sea, which in hot climates is so delightful and salutary, is attended with great danger in those parts where the shark abounds; for his approach is sudden, and often unperceived, his spring instantaneous, his aim certain, and his bite fatal.

The usual method which sailors have contrived for taking this

ferocious creature, is by baiting a large hook with a piece of beef or pork, which is thrown into the sea, attached to a strong cable, furnished near the hook with an iron chain. Without this precaution, the shark would quickly liberate himself by biting asunder the rope. It is curious to observe the voracious animal coming up to survey the bait, especially when he is not sorely pressed with hunger. He approaches, swims around it, and for a time seems to neglect it, apprehensive perhaps of the cord and the chain: he quits it for some moments, but his appetite being aroused at the sight, he soon returns, and appears ready to devour it, but often quits it a second time. When the mariners have sufficiently amused themselves with observing his various evolutions, they make a pretence, by drawing the rope, to take away the bait. It is then that his natural voracity overpowers him; he darts with violence at the bait, and swallows it, together with the hook. Sometimes, however, he does not so entirely gorge the whole, but that he again gets free; yet even then, his insatiable appetite is so irresistible, that although wounded and bleeding with the hook, he will again pursue the bait until he is taken. When he finds the hook lodged in his stomach, his utmost efforts are exerted to get free, but in vain: he tries with his teeth to cut the chain; he pulls with all his force to break the rope; in this manner continuing his tremendous, but fruitless efforts, until his strength is quite exhausted, he suffers his head to be drawn above water, and his tail being first confined with a noose, he is drawn on board and despatched. The usual manner of killing him, is to beat him on the head till he dies: that, however, is not effected without difficulty and danger. This enormous fish, terrible in the agonies of death, struggles with his destroyers, and there is scarcely any animal that is more tenacious of life: even after he is cut in pieces, the muscles still preserve their motion, and vibrate for some time after being separated from the body. Sometimes he is taken by striking a barbed instrument, called a fizgig, into his body, as he swims alongside of the ship. As soon as he is drawn up into the ship, they cut off his tail with an axe as expeditiously as possible, in order to prevent any accidents from its tremendous strokes.

These are the methods taken by Europeans for destroying the shark: but some of the negroes on the African coast attack him in a bolder and more perilous manner. Armed with nothing but a knife, the assailant plunges into the water, where the shark is watching for his prey. At the moment when the voracious fish is turning upon his side to seize him, the negro, watching the opportunity, plunges his knife into the monster's body, and then vigorously repeats his blows till he brings him down to

the bottom. After that he drags him on shore, and makes a luxurious feast for his neighbours, although the flesh of the shark is a viand which the palate and stomach of none but a savage can relish or digest. This animal, indeed, so formidable when alive, is not of any great utility when dead, except that his liver affords a few quarts of oil; and his skin, which is the most valuable part, is sometimes polished, and made up into shagreen.

Divine Wisdom, however, has not permitted that one creature should, with uncontrollable despotism, tyrannize over the rest. The shark, so formidable in the empire of the ocean, has, exclusive of man, other enemies to fear. The remora follows him every where. This little fish has the power of adhering to any thing on which it fixes, in the same manner as a cupping-glass sticks to the body. From this adversary, the shark, with all his powers of annoyance and defence, is not able to disengage himself. It fixes itself upon his body, sticks immovably to it, sucks away its moisture, and produces a gradual decay.

Of the shark, there are many varieties; but they appear all to have the same ferocious propensities, and in proportion to their strength and size, to be equally formidable both to man and to their fellow-inhabitants of the deep; and all are said to have a predilection for human flesh.

In the shark genus are included the several species of the dog-fish, so common in most parts of the world; as also a singular species well known in the western ocean by the appellation of the saw-fish, and remarkable for a curious instrument with which its snout is furnished, and which resembles a saw: this appendage is sometimes not less than five feet in length.

One very curious circumstance has been observed relative to the shark. The young of this fish will, on the appearance of danger, take refuge in the belly of the mother, by swimming down her throat. This has been supposed peculiar to the blue shark, but Mr. Pennant thinks it common to the whole genus.

We shall now say something of

THE RAY KIND,

Of which the different species bear to each other so strong a resemblance, as not to be easily distinguishable; and a stranger to this tribe may imagine that he is going to handle a skait, when he is instantaneously paralyzed by the torpedo, or suppose that he has caught a thorn-back, until he finds himself stung by the fire-flare.

Of all the larger fishes of the ocean, this kind is the most numerous; a circumstance which they owe in a great measure to their size; for, except the great white shark, and the spermaceti

whale, no other rapacious fish has a throat sufficiently capacious to swallow them; and their prickly spines render them a still more dangerous morsel. The size of some of them is indeed so large, that even the shark is not able to devour them. Those caught on the British coasts have sometimes been found to weigh two hundred pounds, which is nothing in comparison of their enormous bulk in some other seas. Labat tells us of a ray that was taken by the negroes at Guadaloupe, which was thirteen feet eight inches broad, and ten feet from the snout to the insertion of the tail; and the tail itself fifteen feet long. The body was two feet in depth, and the skin as thick as leather, and marked with spots, which, in all this kind, appear to be no other than glands, supplying a mucus to lubricate and moisten the skin. This enormous fish was totally unfit to be eaten by Europeans, but the poor negroes were glad to cut up and salt some of its best parts.

It is chiefly during the winter season that our fishermen take the ray; but the Dutch, who are indefatigable, begin earlier, and fish with greater success. The value of their capture generally rewards them well for their assiduity, as the thorn-back and the skait are very good food, and weigh from eight or ten, to two hundred pounds; but sometimes their lines are visited by the rough ray, the fire-flare, or the torpedo, which are very unwelcome intruders.

The rough ray inflicts only slight wounds with the prickles that cover its whole body, of which there is not a single part that is not armed with spines. Of these the puncture cannot be otherwise avoided than by seizing the fish by the little fin at the extremity of the tail.

THE FIRE-FLARE, OR STING RAY,

Is a very singular species, and seems to be the terror of every fisherman. It is armed with a barbed dart, or sting, about five inches long, which is fixed in the tail. Concerning the formidable powers of this instrument, a number of fables have been invented and handed down from ancient to modern times. It is certain that the fish is capable of inflicting, with this weapon, a deep and dangerous wound. Modern naturalists, however, do not suppose that it possesses the poisonous qualities ascribed to it by the ancients, as well as by many in later times. The sting of this animal, which is so terrible to the apprehension of all fishermen, appears to be only an instrument, which the Author of Nature has, in his universal bounty, given it for its own preservation

THE TORPEDO, OR ELECTRIC RAY,

Is singular both in its conformation and its qualities. Its body is almost circular, and thicker than that of any other of the ray kind. The skin is of a yellowish colour, soft and smooth, and marked with large annular spots: the eyes are small, the tail tapers to a point, and the weight of the fish varies from one to fifteen pounds.

Although this wonderful creature does not, on inspection, appear to be furnished with any extraordinary qualities—although it has no muscles formed for great exertions, nor an internal conformation perceptibly differing from the rest of the ray kind; yet it possesses the unaccountable power of benumbing, the instant that it is touched, not only the hand and the arm, but sometimes even the whole body. The shock which it gives greatly resembles that of an electrical machine,—instantaneous, tingling, and painful. According to Kempfer's relation of his own experiments, scarcely any difference can be discovered between the shock produced by electricity, and that given by the torpedo, except that the latter is accompanied by some deleterious symptoms, such as a universal tremor, a sickness of the stomach, a general convulsion, and a total suspension of the mental faculties.

The nature of that principle which in the torpedo produces these extraordinary effects, are, and probably will for ever remain, a mystery; but we have facts sufficient to ascertain the manner in which this fish exerts its paralyzing powers.

Reaumur has, by several experiments, demonstrated, that it is not necessarily, but by a voluntary effort, that the torpedo benumbs the hand that touches it. On every trial, he could readily perceive when it intended to give the stroke, and when it was about to continue inoffensive. In preparing to give the shock, it flattened its back, raised its head and tail, and then, by a violent contraction in the opposite direction, struck with its back against the finger that touched it; and its body, which before was flat, became round and lumped.

Whether the ascription of this paralyzing faculty to electricity be a just explanation of this phenomenon, is a problem of difficult solution. It is, however, certain, that in communicating the shock to a number of persons in contact, it operates in the same manner as the stroke proceeding from an electrical ma chine.

It is said that the negroes can handle the torpedo, without being affected; and we are told that their whole secret of se curing themselves from its effects, consists in holding respira tion suspended at the time. The electrifying power, however, is known to terminate with the life of the animal; and when dead,

it is handled or eaten with perfect safety. It has lately been discovered that some other fishes of the ray kind possess the same benumbing quality, which, like the sting of the fire-flare, has undoubtedly been bestowed on them by a Providence all-gracious and all-wise, as an effectual defence against the predaceous tyrants of the deep; for unless it be instantaneously surprised, so as not to be able to prepare for giving the stroke, it deprives them in a moment of the means of annoyance.

We cannot here restrain our admiration, when we consider how wonderfully Infinite Wisdom has, by a hidden and mysterious quality, enabled the torpedo to set at defiance the attacks of creatures endowed with the most formidable powers.

There are two other species of the ray, which on account of their singularity, merit attention.

THE SEA-DEVIL

Has its snout divided as it were into two horns, and its sides are terminated by the fins. It grows sometimes to the length of seven feet.

THE SEA-EAGLE

Receives its appellation from the expansion of its sides resembling the spread wings of an eagle. Its head is somewhat like that of a toad, and its eyes are large and prominent. It is generally found small, but is said to grow sometimes to a very large size.

THE STURGEON

Constitutes another distinct class. It is long, pentagonal, and covered with five rows of large long knobs, one on the back, and two on each side, with a number of fins to promote its velocity in swimming. Though the sturgeon be nearly as large as the shark, and its figure almost as terrible, it is notwithstanding exceedingly inoffensive. Of this fish there are three distnict kinds, the common sturgeon, the cariar, and the isinglass fish.

About the beginning of summer, the sturgeons come up the rivers to deposit their spawn. They visit in this manner every country of Europe; but the inhabitants along the banks of the Po, the Danube, and the Wolga, are those who derive the greatest advantage from the sturgeon fishery. At Pillau, the shores are formed into districts allotted to companies of fishermen, at the annual rent of about three hundred pounds for each distinct fishery.

The sturgeon, when pickled, is well known, and greatly esteemed throughout all Europe. A very considerable trade is also carried on with the roe of the caviar, preserved in a partic-

ular manner: it is also made from the roe of the common stur geon; but as it is chiefly prepared from the former, it derives from that species the general name of caviar. This, however, is more in request in the other countries of Europe than in England. It is one of those high-relished viands, to which the appetite must be adapted by degrees, and which, although formerly esteemed at the most elegant tables in England, is now but little in use in that country. It is, however, still a considerable article of merchandise among the Turks, Greeks, and Venetians. It somewhat resembles soft soap in consistency; but is of a brown colour, and is frequently eaten with bread instead of cheese.

The isinglass fish, the third species of the sturgeon kind, furnishes the still more valuable commodity which derives from it its name. This fish is caught in great quantities in the Danube, and some other large rivers, from the month of October to that of January. It is sometimes found of the weight of four hundred pounds, and seldom under fifty. Its flesh is soft and flabby, and not held in great esteem; but it is chiefly sought for the commodity which it furnishes.

The manner of preparing isinglass is this: the skin, the entrails, the fins, and the tail of the fish, being cut into small pieces, and left for some time to macerate in a sufficient quantity of warm water, are afterwards boiled over a slow fire, until they are dissolved and reduced to a jelly. This jelly, having acquired a proper consistency, is spread into sheets, like those of parchment, and then formed into rolls, as we see them exposed to sale in the shops. Isinglass is of great use, not only in medicine, but likewise in the manufacture of various kinds of cloth. The wine-merchant, and the varnisher also, find it a necessary article in their respective branches of business. This valuable and extensively useful commodity is furnished chiefly from Russia, where great quantities of it are prepared at a very cheap rate. Thus, in the sturgeon and its congenerous species, we contemplate an animal of the deep, of great commercial importance and benefit to mankind.

To this description of a race of fishes so interesting, by reason of the profits and conveniencies derived from them, we shall subjoin a short account of one, which, from the singularity of its conformation, is scarcely less curious than the former are interesting.

THE FISHING-FROG

In shape very much resembles a tadpole, its head being equal in size to all the rest of its bulk. It grows to the length of five feet; and Mr. Pennant mentions one taken near Scarborough,

the mouth of which was not less than a yard wide. The under jaw of this animal is much longer than the upper. The eyes are placed on the top of the head, and encompassed with prickles. The colour of the upper part of the body is dusky, but the belly is white, and the skin smooth. The fishermen in general have a great regard for this monster, as it is known to be an inveterate enemy to the dog-fish—the bodies of these voracious creatures being often found in its stomach: on this account, therefore, whenever they catch the fishing-frog, they generally set it at liberty; and it must be considered as a fortunate circumstance in its favour, that it has thus conciliated their friendship.

THE SEA-PORCUPINE,

From its extraordinary figure, deserves to be mentioned. Like the land porcupine, it is covered with long prickles, which point every way; and when it is enraged, it can blow up its body as round as a bladder. These frightful fishes consist of several different species, and are of various sizes, some not larger than a football, and others as large as a bushel. Their bodies are almost round, with the mouth like that of a toad, and enormously wide. When caught with a bait, the spines, which before laid flat, are immediately erected, and the animal appears armed at all points, so that it is impossible to lay hold of it in any part. It must, therefore, be dragged by the line to the shore where it soon expires.

Having exhibited a slight view of some of the wondrous works of the Creator, displayed in this class of fishes, we shall prepare to diversify the subject, by a concise description of a few of the next class.

CHAPTER III.

SPINOUS FISHES.

"Thus the mail'd tortoise, and the wand'ring eel,
Oft to the neighbouring beach with silence steal."
APPIAN.

We have already stated that the third grand division of fishes is that of the spinous, or bony kind. These are obviously distinguished, by having a long covering to their gills; by being furnished with no other instruments of respiration than gills; by their bones, which are sharp and thorny; and by their tails, which are placed in a situation perpendicular to the body.

The bones of this order of fishes are exceedingly numerous

and sharp-pointed; and as in quadrupeds, so in these, they are the props or stays to which the muscles, which move the different parts of the body, are fixed. The history of any one of this order, in its general feature, includes that of all the rest. They breathe air and water through the gills, and live by rapine, each devouring such animals as it is able to swallow. They propagate, not like the cetaceous tribes, which bring forth their young alive; nor by distinct eggs, like most of the cartilaginous tribes; but by spawn, producing hundreds of thousands at one time.

It is difficult to account for the different operations of the same element upon animals that appear to have the same conformation. To some fishes bred in the sea, fresh water is immediate destruction; and on the other hand, some that live in our lakes and ponds, cannot bear the salt water. Philosophy may form some plausible hypotheses, but these can go no farther than probability, nor claim any higher merit than that of ingenious conjecture. Of the real history of fish, but little is yet known; and man has not the means of accurately observing the manner and habits of animals which pass their lives in the immense abyss of the waters. Some tribes, however, are known to spend part of their time in the rivers, and part in the ocean. We have already mentioned this circumstance in speaking of the sturgeon, but that is not the only fish of this migrating character. The salmon, the shad, the smelt, and the flounder, annually forsake the ocean, and ascend the rivers to deposit their spawn. This, indeed, seems the important business of their lives; and there is no danger which they will not encounter, to find a proper place for the deposition of their future offspring. The salmon is, upon these occasions, known to ascend rivers to the distance of five hundred miles from their mouths, and not only to brave the dangers arising from various enemies, but also to spring up cataracts of an amazing height. The length of the voyages taken by these fishes is short, in comparison with the annual migrations of some tribes, of which the residence is continually in the ocean. Of this kind are the cod, the haddock, the mackarel, the herring, the pilchard, and a variety of others. The fecundity of these creatures exceeds our conception, and would in a short time outstrip all calculation. A herring, if suffered to multiply unmolested, and its offspring to remain undiminished during the space of twenty years, would show a progeny many times greater in bulk than the whole earth. This extraordinary and incalculable fecundity, as already observed, in our general remarks on fishes, is the basis of support to the numerous inhabitants of the ocean, and exhibits in the clearest light, and the most striking point of view, the all-wise and comprehensive plan of the great Creator

Although spinous fishes in general produce by spawn, yet there are some, as the eel and the blenny, that bring forth their young alive. In regard to the growth of fishes, it appears that they are slow in attaining their full size, and they are a long time liable to become a prey to others before it comes to their turn to be destroyers.

That some fishes, in hot climates, are poisonous when eaten, is a fact that cannot be doubted. The author of a paper in the Philosophical Transactions, gives us an account of the poisonous qualities of those found near New-Providence, one of the Bahama islands, and assures us, that the greatest part of the fish found on that coast are of a deadly nature. What is extremely singular is, that all kinds on that coast are, at different times, alike dangerous; and the same species which has one day served for wholesome nourishment, is the next day found to be a deadly poison. The cause of this singular phenomenon is an enigma to naturalists. It is, however, far from being improbable, that these relations may have originated from the ignorance of those who have mistaken one species for another; and through want of accuracy in making those distinctions, have given a confused account of their effects.

The fishes of this order being exceedingly numerous, various methods of classing them have been invented by naturalists. As this work is designed for those who intend to study Nature only in its general appearances and most striking particulars, without entering into those minute investigations, which are compatible only with a life of leisure; we have, in our exhibitions of her various forms, endeavoured to avoid embarrassing with the multiplied distinctions of systematical writers. Here, however, where the varieties of animal life are so numerous, some kind of classification is necessary, in order to form distinct ideas. The simplest, as well as the most luminous, seems to be that of Linnæus, who ranks them in four grand divisions, according to the position of their fins.

The first division consists of those which that celebrated naturalist denominates

APODES,

Of which the principal distinctive character is, that they have no ventral fins.

THE COMMON EEL

Is the first genus in this order, and includes a variety of species. It may be considered as the most universal of all fishes, and is so generally known, that any description of it is unnecessary It frequents the fresh waters, the ponds, ditches, and

rivers of almost every country; yet it is scarcely ever found in the Danube, although it abounds in the lakes and rivers in Upper Austria. It is a singular fish in regard to many particulars of its natural history, and in some respects bears a great resemblance to the serpent tribe.

During the night, eels frequently quit the water, and wander over the meadows in quest of snails, frogs, and other small reptiles; and sometimes roam to other ponds or rivers, for change of habitation.

Mr. Anderson, in his Philosophical Transactions, says, that while he was one day viewing the flood-gates belonging to the water-works of Norwich, he perceived a great number of eels sliding up them, and up the adjacent parts, to the height of five or six feet above the surface of the water. Many of the posts were perfectly smooth and dry; yet the eels ascended with the utmost facility, first thrusting their heads and about half their bodies out of the water, and, after holding them against the wood-work for some time, mounting upward with as much apparent ease as if they had been sliding on level ground.

When kept in ponds, eels have been known to commit serious depredations among young ducks. Sir J. Hawkins, having missed several young ducks from a canal near his house at Twickenham, caused it to be drained, when great numbers of large eels were found, whose stomachs contained the undigested heads and parts of the bodies of the victims.

The eel is impatient of cold, and in winter buries itself deep in the mud, where, like the snake, it lies in a state of torpidity. No other fish is capable of living so long out of water; nor is any other so tenacious of life, as the parts will move for a long time after it is flayed and cut into small pieces. All these are characteristics that bear very great resemblance to those of the serpent tribe. The eel is also extremely voracious, and destructive to the young fry of fishes.

Eels vary much in their colours, from a sooty hue to a light olive green. They are with most people a favourite dish; but those which are taken in clear running water are by far the best tasted. The ancient Romans held this fish in very little esteem, probably on account of its similarity to the snake; and some people among us have the same prejudice against it. The Sybarites, who were famous for their attachment to the luxuries of the table, were so extravagantly fond of eels, that the persons who sold them were exempted from the payment of tribute.

THE CONGER EEL

Differs in many respects from the common eel, as it lives in the ocean, or at the mouth of great rivers, and grows to an

enormous size. Some have been taken which measured ten feet and a half in length, and eighteen inches in circumference. The flesh of the young ones, which are commonly called elves, is exceedingly delicious.

The conger is extremely voracious, preying on every creature, living or dead, without exception. In Cornwall, these fishes constitute a lucrative branch of commerce, great numbers being caught on that coast, and, when cured, exported to Spain and Portugal. They are caught by various methods; but the fishermen are extremely afraid of the longer kinds, lest they should entangle them by twisting round their legs; and therefore, when taken, they despatch them as soon as possible. They are common among the Hebrides; and Mr. Pennant supposes that the establishment of a conger fishery would be of singular advantage to the natives.

THE ELECTRICAL EEL

Is not only the most remarkable fish of this kind, but one of the most extraordinary creatures that Nature, in her incalculable variety, has produced. It is a fresh-water fish, found in the river of Surinam, in South America.

For the most important particulars relative to the description and history of this natural phenomenon, we are indebted to Mr. Bancroft and Dr. Garden, of South Carolina. The latter of these gentlemen had an opportunity of inspecting, at one time, five of these fishes, which had been taken in that river. The largest measured about three feet eight inches in length, and from ten to fourteen inches in circumference. Its head was large, broad, and flat, and the mouth marked here and there with holes, as if perforated with a blunt needle. The eyes were small, and of a bluish colour; and the whole body, from about four inches below the head, was clearly distinguished into four longitudinal stripes, or divisions. Across the body were a number of annular bands, or wrinkles, which gave it a worm-like appearance, by means of which the fish had the power of shortening or lengthening itself like a worm, and could swim either forward or backward. There were two pectoral fins behind the head, scarcely an inch long; and these the fish seemed to use chiefly for the purpose of raising its head out of the water, which it frequently did for the sake of breathing.

The electrical eel gives to any person, or number of persons joining hands, that touch it, a most violent shock, which, like that of electricity, may be communicated through a metallic conductor. This shock is indeed attended with all the phenomena and effects of that produced by the electrical machine, so far as experiment has hitherto enabled us to discover. A power so

extraordinary has undoubtedly been given to this fish, as well as to the torpedo, by the all-wise and beneficent Creator, as a means of defence against enemies beyond comparison superior in strength and agility.

The second grand division by which Linnæus distinguishes fishes of the spinous kind, is the

JUGULARES,

Of which the general characteristic consists in the position of the ventral before the pectoral fins; it contains five genera, and about thirty-five species.

So far as is consistent with the brevity of our plan, we shall particularize two of this order,—one the most conspicuous by its beauty, and the other the most remarkable for its importance and extensive utility.

THE DRAGONET,

Which is about ten or twelve inches long, with a large head, and a body slender, round, and smooth, is one of the most beautiful of the inhabitants of the deep. The colours of this fish are amazingly resplendent, exhibiting a delightful variety of white, blue, and yellow. The blue in particular is inconceivably beautiful, and shines with all the lustre of the sapphire. The throat is black, and the membranes of its fins are delicately thin. Pontopidan calls this species the flying-fish; but whether it makes use of its fins as the means of elevating itself in the air, is a circumstance which has not yet been ascertained. This fish is found in all the different latitudes from Spitzbergen to the Mediterranean, and is not uncommon on the English coast.

From this exhibition of brilliancy in a tribe of the finny race, we shall now, as has been already hinted, attend to a display of commercial utility existing in another of this numerous class.

THE COD

Is a most extensive genus, including a variety of well-known and useful fishes; and is so commonly seen in our markets, that little need be said of it by way of description. It is short in proportion to its bulk; its colour cinerous on the back, and white on the belly. There are, however, in this fish, many varieties, in regard to colour as well as size; but all are distinguished by an unfurcated tail, three soft fins on the back, the ventral fins slender and pointed, and a sort of small beard at the extremity of the lower-jaw.

This valuable fish is found only in the northern parts of the world. The coasts of Cape Breton, Nova-Scotia, New-England, and, above all, the banks of Newfoundland, are its principal

places of resort; and its whole range appears to be confined between the 50th degree of latitude and the arctic circle.

The famous fishing banks of Newfoundland, and those which lie off Cape Breton, appear to be the tops of vast chains of submarine mountains, extending above five hundred miles in length, and surrounded with deep seas. These extensive shallows are, by the resort of the cod-fish, rendered, if not intrinsically, at least ultimately of more value to the United States and Great Britain, than the mines of Potosi were to Spain. Previous to the discovery of the banks of Newfoundland, the seas of Iceland, and those which surround the Hebrides, contained the principal, and almost the only cod fisheries, and were in consequence the grand resort of ships from most commercial countries.

The fishing season on the banks of Newfoundland commences about February, and ends in May; the fish being then in the highest perfection, and the state of the atmosphere the most proper for its curing. The method of taking them is by the hook and line, and the fishermen draw them in as fast as they can throw out for them. Stages are erected along the shore for salting and drying the fish; and the number caught would be sufficient to exterminate the species, had not the wisdom of Providence bountifully ordained that the fecundity of this fish, so beneficial to mankind, should keep pace with the annual depredations. This astonishing fecundity would surpass conception, as well as belief, were it not ascertained by experiment. Leewenhoek counted nine millions three hundred and eighty-four thousand eggs in a cod-fish of a moderate size. The fact exhibits a grand display of creative wisdom, in thus proportioning the measure of propagation and destruction in the system of animal existence.

The greatest part of the cod taken on the banks of Newfoundland, is disposed of in the Catholic countries of Europe during the time of lent. Considerable numbers, indeed, are used in this country; but these are mostly caught on our own coasts, and generally eaten fresh. The cod is also found in tolerable plenty on the coasts of Norway, in the Baltic, and in most parts of the British seas. More southward they are less plentiful, and are never seen further towards that quarter than the Straits of Gibraltar.

Thus we find in this fish an important object of attention, not only to the naturalist, but also to the merchant and the politician. If we consider the number of ships, and consequently of shipwrights, with other mechanics concerned in the different departments of ship-building, and also of sailors and fishermen employed in this trade, as well as in the herring and whale fishery, we perceive what numbers of the human species derive their sub-

sistence from these inhabitants of the ocean, of which the astonishing fecundity is to several nations an inexhaustible source of wealth.

CHAPTER IV.

"Here the dorado and the gilt-head glide,
With spots enamell'd, burnished, too like gold."

In continuing our survey of the various tribes that inhabit the watery element, we now come to the third order of the Linnæan division, distinguished by the appellation of

THORAICI,

Of which the position of the ventral beneath the pectoral fins, is the discriminative characteristic. In this order are comprehended seventeen genera, and upwards of two hundred and twenty species, only a few of which the conciseness of our plan will permit us to delineate.

THE GILT-HEAD

Derives it name from its predominant colour, the head being of a fine gold colour, and the sides of the same, but somewhat tinged with a brownish cast. It has only one back fin, which reaches the whole length of the body. Some of this species grow to the weight of ten pounds. It subsists chiefly on shell-fish, and is found in deep waters, and near bold and rocky shores.

THE DORADO,

Which in some degree resembles the preceding, but far exceeds it in the splendour of its golden tints, is an inhabitant of the tropical climates, and at once the most active and the most beautiful of the finny race. It is about six feet long; its back is all over enamelled with spots of a bluish green and silver colour; its tail and fins are of a golden hue; and all have a brilliancy to which nothing but Nature's pencil can attain. The eyes are large, beautiful, and surrounded with shining circles of gold colour. In the seas where they abound, these fishes are always in motion, playing round the ships. They are continually in a state of active warfare, pursuing or pursued, defending themselves against the shark, or darting after the small fishes.

Above all others, the flying-fish most abounds in these seas

and as it is a small animal, not larger than a herring, it is chiefly sought by the dorado.

THE FLYING-FISH

Properly belongs to the fourth order, that of abdominales, to be spoken of hereafter; but to render in this place the picture more complete, we shall anticipate its history, and exhibit it in the same view with the dorado.

The head of the flying-fish is scaly; its belly is angular; the pectoral fins, being the instruments of flight, are very large; and by their means it can, when pursued by any other fish, raise itself out of the water, and support itself in the air until they become dry; but as soon as their moisture is exhausted, it drops down again into its native element.

As to the depredations carried on by the dorado against this fish, the curious observer will perceive that Nature has, in an eminent degree, furnished each of them respectively with the powers of pursuit and evasion. The dorado, being above six feet long, and not thicker than a salmon, cuts its way through the water with amazing rapidity: on the other hand, the flying-fish being furnished with fins longer than its body, and these being moved by a set of muscles exceedingly strong, this equality of power furnishes one of the most animated scenes which those remote seas can exhibit. The efforts of pursuit on one side, and the arts of escape on the other, present a spectacle perfectly amusing. The dorado is, on these occasions, seen darting after its prey, which will not leave the water while it can ensure its safety by swimming; but, like a hunted hare, being at last wearied, it then has recourse to another expedient. The long fins which began to grow useless in the water, are now employed in a different manner; for, by means of these instruments, the affrighted little creature rises out of the water, and flutters over its surface for the space of two or three hundred yards, till the moisture of its finny wings is exhausted, or the muscles which move them are enfeebled by this extraordinary mode of exertion. During this time the animal has acquired a fresh power of renewing its efforts in the water, and is capable of swimming with a considerable degree of velocity. The active and persevering enemy, however, still keeps it in view, and again drives it from the deep, till at length the poor little fish, quite wearied out, is observed to dart to shorter distances, to flutter with greater effort, and at last to drop down into the mouth of its pursuer.

The dorado, however, although one of the most formidable enemies, is not the only one that the flying-fish has to dread. All the predaceous fishes that swim in the ocean, and all the birds of prey that range its surface, seem to be combined against

it; for when it has escaped from its enemies of the deep, the tropic-bird, and the albatross, ever upon the wing, are frequently ready to seize it. In the tropical climates, these fishes, when hotly pursued, are seen springing by hundreds out of the water, and sometimes they throw themselves on board of ships, in order to escape their various assailants. We cannot, however, but remark, that the all-wise and beneficent Author of Nature, in destining this fish to be exposed to the assaults of such a variety of enemies, has endowed it with double powers of escape.

To this third order of fishes belong the plaice and the flounder, the sole and the turbot, the perch and the tunny; all furnishing a delicious supply to our tables, and exhibiting, at the same time, a grand display of Nature's prolific energy, and of the beneficence of the Creator, in thus amply providing for the comfortable subsistence of the human species.

To these, and a great number of others of the same description, may be added, the surmulet, so highly valued among the Roman epicures, as we learn both from Horace and Juvenal. In this class, also, must be reckoned the mackarel, so much esteemed, on account of the rich and wholesome nutriment which it affords.

THE MACKAREL

Is, when alive, a beautiful fish, and all its colours are brilliant; but their lustre fades as soon as it is drawn out of its native element. This fish furnished the precious garum of the Romans, a sort of pickle, which gave a high relish to sauces, and was likewise supposed to possess some medicinal powers. Among them, therefore, the fish that produced it was held in high estimation.

Mackarel visit the British and American coasts in numerous shoals, during the summer season. They are easily caught with a bait; and a bit of white paper, or red rag, will answer that purpose. Although they cannot be preserved fresh in distant carriage, they furnish a supply of excellent food to those who can have them by a ready conveyance. They are salted and laid up for winter provision, in vast quantities.

THE ABDOMINALES,

Or fourth order of spinous fishes, have the ventral fins placed behind the pectoral, in the abdomen; and from this characteristic the appellation is derived. This division includes seventeen genera, and about one hundred and thirty species.

To this numerous class belong the carp, the roach, the tench, and a variety of others, which furnish copious supplies of excel lent food, among which may be numbered the anchovy, so plen-

tiful in the Mediterranean and, when pickled, so highly esteemed in sauces.

THE PIKE,

One of the most active and voracious of all the finny race, is comprehended in this order. To describe a fish so universally known as the pike, is unnecessary; but we cannot omit a few traits of its history: it is said to have been first introduced into England about A. D. 1537, and it was then so scarce, that one of them sold for double the price of a lamb fit for the butcher. Such is the extreme voracity of the pike, that it devours not only other fishes, but also rats and the smaller aquatic fowls; and its courage is so great, that it will maintain a contest with the otter. It has been known to seize a mule by the nose while drinking at a pond, and so firmly to keep its hold, that the animal could not disengage himself from it until he threw it on shore.

Longevity is one of the most remarkable characteristics of the pike; and if the following story, quoted from Gesner, be authentic, it certainly possesses that property in an extraordinary degree. That author informs us, that a pike was taken at Hailbrun, in Swabia, A. D. 1497, with a brazen ring affixed to it, bearing this inscription, "I am the fish that was first put into this lake by the hands of the governor of the universe, Frederick II. the 6th of October, 1230."

We shall not endeavour to influence opinion respecting either the truth or the falsehood of this matter, nor attempt to explain the circumstance. If, however, we consider the improbability of the assumption of so bombastic a title by the prince there mentioned, it would almost authorize a conjecture, that the fish, with its ring, might have been thrown into the pond more than two centuries afterwards by some mischievous wag, in order to astonish future naturalists.

THE SALMON

Is a fish that may stand in the first rank in regard to utility, and is too well known to need any description. It appears to be chiefly, or perhaps wholly, confined to the northern climates, for it is unknown in the Mediterranean, although it is diffused as far north as Greenland, and is also found on the coast of Kamtschatka.

In Iceland and Norway, in the Baltic, at Colerain in Ireland, at Berwick-upon-Tweed, at Aberdeen, and various other places in Great Britain, stationary salmon fisheries are established; which are extremely productive, and enrich the occupiers, after paying very considerable rents to the proprietors. In some places, indeed, the salmon constitutes one of the principal re-

sources of the inhabitants, as an article of food and commerce. The general weight of these fishes is from twenty to thirty, or sometimes even to forty pounds, although we have heard of some being caught that weighed seventy; but instances of this kind are rarely met with. About the time of spawning, the salmon becomes insipid, and loses much of its beautiful rose colour, with which its flesh is at other times tinged.

Although the salmon inhabits the ocean, it ascends the rivers to deposit its spawn in security, at a great distance from their efflux. These fishes are often taken in the Rhine, as high as Basle, and even ascend to the sources of the rapid rivers of Lapland.

Nothing in the history of the salmon is more remarkable than their instinctive perseverance in surmounting every obstacle that opposes itself to their progress, and the surprising agility with which they throw themselves up cataracts and precipices many yards above the level of the water. In these leaps, although foiled at a first or even a second attempt, they never desist until they have gained their point. On the river Tivy, in England, is a remarkable cataract, where the inhabitants of the environs often amuse themselves with contemplating the strength and agility of these fishes, when endeavouring to ascend the river from the sea. There are in many other rivers these falls, called salmon leaps; but none that we know equal to the famous one at Leixlip, in Ireland, where the agility of the salmon, and the height to which they throw themselves, astonish every spectator.

From this short sketch of the salmon, it is easy to form a conception of its importance in commerce, and of the copious supply of palatable, wholesome and nutritious food, which it furnishes for the table. We shall now direct attention to another fish, inferior indeed to the salmon in regard to the quality of the aliment which it furnishes; but equal, or even superior, in regard to its commercial importance.

THE HERRING

Is universally known; but although any description of its conformation would, on that account, be totally useless, its history is exceedingly interesting. The high northern latitudes appear to be its native regions: it is there in the greatest abundance; and the frozen ocean which surrounds the pole seems to be the cradle of the species. In those navigable seas, bound up with ice the greatest part of the year, the herring and the pilchard find a secure and peaceful retreat, equally inaccessible to man, and to their numerous enemies of the deep. In those sequestered abodes, their increase is beyond conception; and it seems that the consequent deficiency of insect food, on which they

subsist, is the cause of their annual migrations. About the middle of winter the great colony sets out from the polar seas, composed of such numbers, that if all the horses in the world were loaded with herrings, they could not carry the thousandth part of them. However, they no sooner leave their peaceful abode, than they enter into a world of warfare and depredation; and numerous enemies appear to thin their squadrons. The cachalot swallows thousands in an instant; the porpoise, the grampus, the shark, and the dolphin, with the whole tribe of dog-fish, suspend their mutual hostilities, and unite against the easy prey. The numerous flocks of sea-fowl that inhabit the northern regions, also watch the outset of the dangerous migration, and spread destruction among their defenceless shoals.

After proceeding about as far as the northern extremity of Europe, the colony separates into two great bodies, one of which directs its course westward, and pours along the coast of America as far southward as Carolina, which seems to be the utmos limit of their progress towards that quarter. In the bay of Chesapeake, the annual inundation of herrings is so great, tha they cover the shores and become a nuisance. That body which moves towards Europe, first approaches the coast of Iceland, in the beginning of March. Upon their arrival on that coast, their phalanx, already considerably diminished, is still of a prodigious extent, depth, and closeness, covering an extent as large as the island itself. The whole sea seems alive to a vast distance; and imagination can scarcely conceive any limit to the numbers which cover the watery surface.

The shoal which arrives on the British coasts begins to appear off the Shetland islands in April. These are the forerunners of the grand shoal, which descends in June, and of which the arrival is also announced by the swarms of its greedy attendants, the gannet, the gull, the shark, the porpoise, and numbers besides of the same predaceous race. When the main body approaches, its extent and depth are such, as to make a visible alteration in the appearance of the ocean. It is generally divided into distinct columns of five or six miles in length, and three or four in breadth; and the water curls up before them, as if forced out of its bed. Sometimes the whole column sinks for the space of ten or fifteen minutes, then rises again to the surface, and in bright weather reflects a variety of resplendent colours, resembling a field bespangled with flowers of purple, golden, and azure tints. On their arrival, the fishermen are ready for their reception, and, with nets made for the occasion, sometimes take two thousand barrels at one draught.

There are few persons who have formed any conception of the importance of the herring fishery; and we have expatiated

a little on the subject, in order to give a comprehensive view of so interesting a portion of natural history. From what has been said it will be readily perceived that the herring is an important article in the commercial, as well as a curious one in the natural system. The advantages that may be drawn from this small fish, are indeed incalculable, for the herring trade can be limited only by the consumption of the commodity, and the number of hands employed in the business. The article itself is absolutely inexhaustible.

THE PILCHARD

Bears so great a resemblance to the herring, that it appears only to be a different species of the same fish. Its history is also as nearly as possible the same. Instead therefore of entering into any detail on the subject, we shall only offer, for consideration, a circumstance, which, by showing what astonishing numbers are sometimes taken on the coast of Cornwall at one single shooting of the nets, will give an idea of the immense profits resulting from these fisheries.

Mr. Pennant was assured by Dr. Borlase, that on the 5th of October, 1767, there was at one time inclosed, and caught in St. Anne's Bay, seven thousand hogsheads of pilchards, each hogshead containing thirty-five thousand fishes. This circumstance is well worth notice: it tends to show the vast importance of those animals of the deep in the system of economy and commerce, to develope the vast and complicated plan of the Author of Nature, and to display his infinite wisdom and diffusive goodness, in causing both land and sea to contribute to the support of animal existence, and the comforts of human life.

Having been engaged in an important view of matters of extensive utility, we shall conclude this article with an exhibition of an interesting object of curiosity. In the various departments of Nature, we see usefulness and beauty blended with endless diversity, and forming innumerable combinations.

THE GOLDEN-FISH

Is a native of China, but is now completely naturalized in England, where it thrives and breeds as well as if it were indigenous. These beautiful fishes were little known in that country previous to A. D. 1728, when a number of them were imported and circulated in the vicinity of London, from whence they have been disseminated into every part of the kingdom.

The gold-fish grows to the length of eight inches, and in its form greatly resembles the carp. The colours vary considerably in the individuals of this species. Some are marked with fine blue, brown, or silver; but a resplendent gold colour is gene-

rally predominant; and their motions are as lively as their tints are beautiful. In China, they are every where kept in porcelain vessels, for the amusement of the opulent, and as ornaments to their palaces and gardens. It is said that they will live several months in a vessel without food, provided that the water be frequently changed; but it would be cruel to make the experiment. Every kind of suffering unnecessarily imposed on the anima creation, is shocking to humanity, and an offence against the Creator.

CHAPTER V.

SHELL-FISH.

"In shelly armour wrapt, the lobsters seek
Safe shelter in some bay, or winding creek;
To rocky chasms the dusky natives cleave,
Tenacious hold, nor will the dwelling leave."

OPPIAN.

ALTHOUGH, in describing the inhabitants of the waters, a race of animals presents itself, to which, from the place of their residence, custom has given the appellation of fishes; yet some naturalists seem to doubt whether they ought to be included in that class. These are the shell-fish, which might, perhaps, with propriety, be considered as a distinct order of creatures, forming that link in the great chain of being which connects the piscine with the reptile race. They are, in fact, the reptiles of the deep; never swimming upon its surface, but creeping along the shores, and lodging at the bottom of the waters.

These animals, however, considered as fish, are distinguished into two kinds, the crustaceous and the testaceous: the former, such as the crab and the lobster, have a shell that is not quite of a bony substance, but rather resembling a strong crust, while that of the latter is of a bony hardness.

Of this kind of animals, the lobster and the crab are the most generally known, and of the greatest utility to man, to whom they furnish an excellent article of food, wholesome and nutritious.

THE LOBSTER, AND THE CRAB,

Being so frequently seen in our markets, it would be useless to describe their form, and, indeed, no verbal description could exhibit an accurate representation of either. Nothing but the sight of the animal could give a just idea of so singular a conformation

Although the lobster and the crab are exceedingly different in figure, their propensities and habits have a great similarity; both kinds annually cast their shells. After losing the old shell, and before a new one is formed, the animal is in a very uncomfortable and dangerous situation, exposed to the dog-fish, and a multitude of other depredators. In this defenceless state, however, they do not continue long, for the new covering is formed, and completely hardened in little more than forty-eight hours. These creatures are extremely fierce and voracious; but it is a singular circumstance in their nature, that when they chance to lose a limb in their frequent combats, it is completely renewed in the course of about three weeks.

THE LAND-CRAB

Is a very singular animal: it is found in some of the warmer countries of Europe, and abounds in the tropical climates. This animal comprises a variety of species, some of which are excellent food, while others are unpalatable, and even poisonous Some are a foot in breadth, and others not above an inch. They admit also of great variety in their colours; but the violet crab of the Caribbee islands has attained the pre-eminence over the whole tribe.

This animal somewhat resembles two hands cut through the middle and joined together; for each side has the appearance of four fingers, and the two claws or nippers resemble the thumbs. All the rest of the body is covered with a shell as thick as a man's hand, and bunched in the middle, on the fore-part of which are two eyes of the form of a grain of barley, transparent as crystal, and hard as horn. A little below is the mouth, which contains two broad and sharp teeth, of an ivory whiteness, and placed, not as in other animals crosswise, but in an opposite direction, resembling a pair of scissors. With these teeth they can easily cut leaves, fruit, and rotten wood, which constitute their usual food. This singular creature takes so firm a hold with its nippers, that it will lose its limb rather than its grasp; and it is often seen scampering away after leaving its claw, still holding fast to its enemy. In fact, the loss of a leg or an arm, is a trifling matter to the land-crab; for a new one soon grows in its place, and the animal is as perfect as before.

This circumstance, however extraordinary it may appear, is not the most wonderful part of the history of these singular creatures. They reside in the mountainous parts of the country where they live in a kind of regulated society, in this respect resembling the beaver. From these inland recesses they descend once a year in regular bodies, containing millions at a time, for the purpose of depositing their spawn upon the shore. As they

multiply in astonishing numbers, they choose the month of April or May for commencing their expedition, when they issue by thousands from the trunks of hollow trees, or the clefts of rocks, and pursue their march with all the order and regularity of the best disciplined army. They generally form themselves into three columns, and hold a direct course, without ever allowing any obstacles to impede their journey, except such as are absolutely insurmountable; and it is only when steep precipices or large rivers oppose their progress, that they are obliged to turn out of their way, and regulate their route by the situation of the country. They generally halt during the day, and in the evening resume their march. As soon as they arrive at the coast, the whole body crawls into the sea, where they all remain for some minutes to let the waves pass over their shells. After this, they leave the margin of the ocean, in search of some retired situation on land, where they remain a few days, and again return to the sea-shore, where they deposit their spawn, the greatest part of which is devoured by different fish, while the eggs tha escape are hatched under the sand.

The strength of the old ones being by this time almost exhausted, they make holes in the ground, in which they hide themselves while they cast their shells, remaining for five or six days in a state of torpidity. During that period they grow very fat, and are then in the highest perfection. In some countries, the slaves are entirely fed with them; and by many people, they are considered as delicious food. The whole time of performing their expedition, from the moment of their outset to that of their return to their inland retreats, is sometimes not more than six or seven weeks; but when great obstacles impede their march, it often requires more than three months.

THE SOLDIER-CRAB,

Like the former, makes an annual excursion, from the mountains to the sea-coast, for the same purpose. When these animals are taken, they emit a feeble cry, and endeavour to seize their enemies with their claws; and as they inflict a very painful and even a dangerous wound, they are generally suffered to perform their journeys unmolested.

The soldier-crab, like the violet-crab, is a native of the West-India islands, and bears some resemblance to the lobster; although it is not more than four inches in length. It has no shell, and is covered only with a rough skin; but it artfully contrives to supply this deficiency of armour, by taking possession of the deserted shell of some other animal, and when its body grows too large for its case, it quits it for one that fits it better. sometimes making successively three or four of these changes.

Indeed, the habits of these land-crabs may be reckoned among the phenomena of animated nature.

CRUSTACEOUS FISHES OF THE TORTOISE KIND,

Form also a curious subject of natural history. Animals of this nature are divided into two classes, one residing on land and the other in the water; and in this respect resemble the crab genus. The two species are distinguished by the names of the tortoise and the turtle, the former being an inhabitant of the land, and the other of the sea. In their internal conformation they bear a strong resemblance to each other, but they differ very much in size.

The land tortoise is found from one to four or five feet in length, and from five to eighteen inches across the back. The head, which it can, at pleasure, protend beyond or draw within the shell, resembles that of the serpent kind. The tail is long and scaly, and the exterior covering of the animal is composed of several pieces of shell joined together in the firmest and most compact manner, and somewhat resembling the tiling of a house.

This animal, which is of the most pacific disposition, is admirably armed for defence. It is also remarkable for longevity; and although it is difficult to ascertain the precise duration of its life, there is a well-authenticated instance recorded of one kept in the gardens of Lambeth Palace, which was known to have lived above a hundred and twenty years. The tortoise is, indeed, so tenacious of life, that it cannot, without difficulty, be destroyed: it even, in some measure, seems calculated for immortality; for it is said that it retains the vital principle a considerable time after the loss of its brain, and even of its head. Experiments, shocking to humanity, have sometimes been made, in order to see how far this animal is capable of enduring pain, but all knowledge gained by so flagrant an offence against the Creator of the universe, as this infliction of torments on his unoffending creatures, had better remain for ever concealed.

THE SEA-TURTLE

Comprehends a variety of species, some of which are neither palatable nor wholesome; while others are celebrated in the annals of epicurism. Of the former class is the great turtle of the Mediterranean, which is the largest of the whole race, though its flesh is coarse and unwholesome. One species, called the hawksbill, is valued for its shell, of which all our tortoise-shell snuff-boxes, and other trinkets, are made. The green turtle is that which is held in such high esteem for the table

This, indeed, is both a wholesome and an exquisitely delicious food, and also a valuable article of commerce; for our ships are now generally furnished with conveniencies for importing this animal alive from the West-Indies. It is said, however, that the flesh of the turtle has the full perfection of its flavour only on its native shores.

A common green turtle weighs about two hundred weight, and some have been found that weighed above eight hundred. This animal seldom quits the sea, except to deposit its eggs, which, in about twenty-five days, are hatched by the heat of the sun. The young ones, as soon as they burst from the sand, directed by instinct, run immediately towards the sea, which Providence has designed for their abode. Turtles have sometimes, although seldom, been caught on the British shores.

TESTACEOUS FISHES

Admit of so great a diversity both in the form and colour of their shells, that the study of them has been the principal employment of the lives of some naturalists; and collections of them have been made, at an expense difficult to estimate, or even to conceive. It will not, therefore, be expected that we should enter into any minute details on a subject varied and ramified almost to infinity. It would only burden the memory, without furnishing the mind with useful information. We shall only mention a few general distinctions.

Naturalists have varied in their methods of classing and distinguishing shells, and the animals that wear them. The greatest number, however, with Aristotle at their head, divide them into three classes,—the turbinated, or snail kind; the bivalved, or those of the oyster kind; and the multivalved, or those which consist of many foldings.

Among the turbinated kind, the common garden-snail, which appears so insignificant, is a curious animal, and, when thoroughly examined, displays the wonders of Creative Wisdom as much as the largest of the quadruped race. It has, in the watery element, its corresponding kind, the sea-snail, which is equally curious, and has similar propensities. Of the bivalvular kind, the oyster is the most estimable, both as excellent and nutritious food, and as a valuable article of commerce. A species of these, called rock oysters, are frequently seen as large as a plate; and those which are caught on the coast of Coromandel, are said to be of so great a size, that one of them will serve several men for a meal; but they have not so delicate a flavour as those of the smaller kinds.

All oysters, and many other shell-fish, are known sometimes to contain pearls; but that which particularly obtains the name

of the pearl-oyster, has a large, strong, whitish shell, rough and hard on the outside, but smooth and polished within. From this is taken the substance called mother-of-pearl, of which so many beautiful trinkets are made. This is nothing more than the internal coats of the shell, which resemble the pearl in colour and consistence. There are many pearl fisheries in Asia and America; but the principal are those in the Persian Gulf. The pearls there produced are the most beautiful, and consequently fetch the highest prices.

The pearl fishery is one of the most destructive employments in which any of the human species can be occupied. It is said that the best divers will continue three quarters of an hour under water, but many find that fifteen minutes quite exhaust their strength. Every diver descends perfectly naked, except a net fastened to his neck, for the purpose of containing the oysters, and is let down by a rope, with a stone of forty or fifty pounds' weight fastened to it, to keep him at the bottom.

The wretched people who attend these fisheries are generally slaves, and are mostly cut off in the prime of life; for the pressure of the air upon the lungs at the bottom of the water, is too great for the human frame to sustain; and a consumption is almost always the consequence. Thus an insignificant glittering gem is obtained at the expense of a number of lives.

Shell-fish of the multivalve kind are too numerous to admit of investigation in this place; and of so many various species, that a naturalist would be baffled to make a judicious selection Every one is an object of curiosity; all of them claim the diversity of Nature's works, and the wonders of Creative Wisdom.

NATURAL HISTORY OF REPTILES.

CHAPTER I.

"Some say the lark and loathed toad change eyes."
SHAKSPEARE.

"Like a fall'n cedar, far diffus'd his train,
Cased in green scales, the crocodile extends."
THOMSON.

We shall now glance at a race not less numerous, and scarcely less various, than that of fishes. This is the reptile race, of which the almost innumerable tribes may be comprehended under the frog, toad, lizard, and serpent kinds. However uninteresting many of these may appear, or however disgusting their figure may seem to fastidious delicacy, the great Author of Nature has undoubtedly created them for a wise and good purpose. We are too little acquainted with their habits, propensities, and general economy, to be fully able to estimate their utility; but their importance in the scale of being is well known to Him who has made nothing in vain.

THE TOAD AND THE FROG

Are universally known, and the frequent opportunities which every one has of viewing them, preclude the necessity of description. Their history, however, is sufficiently curious, if the conciseness of our plan would admit of minute investigation.

In their figure, these two animals have a considerable resemblance; but custom and prejudice have taught us to make a very different estimate of their properties: the first is considered as perfectly harmless, while the latter is supposed to be poisonous. In this respect, the toad has been treated with great injustice: it is a torpid, harmless animal, that passes the greatest part of the winter in sleep.

Astonishing stories have been told of toads found in the centre of solid blocks of stone, and other similar situations, without the least trace of the way by which they entered, and without any possibility of their finding any kind of nutriment. Without pretending to decide on the authenticity of these relations, we may venture to say, that if the truth of such singular circumstances be admitted, they exhibit a manifest violation of the laws of Nature.

and constitute a phenomenon which philosophy will perhaps be for ever unable to elucidate.

Toads, as well as frogs, admit of a variety of species; and in the tropical climates, they grow to an enormous size. If we should hazard a conjecture of their utility, it is very probable that they contribute to clear both the land and the water of many noxious reptiles of a diminutive size, which might prove exceedingly hurtful to man. The toad, however, is one of the most inoffensive of all animals. We have even heard that it has sometimes been successfully applied for the cure of the cancer, the most dreadful, and one of the most fatal, of human evils.

Mr. Pennant has related, on the authority of a correspondent, some interesting particulars respecting a toad which was perfectly domesticated, and continued in the same spot for upwards of thirty-six years. It frequented the steps before the hall-door of a gentleman's house in Devonshire; and from receiving a regular supply of food, it became so tame as always to crawl out of its hole in an evening, when a candle was brought, and look up, as if expecting to be carried into the house. A reptile so generally detested being taken into favour, excited the curiosity of every visitant, and even ladies so far conquered their natural horror and disgust, as to request to see it fed. It seemed particularly fond of flesh maggots, which were kept for it in bran. When these were laid upon a table, it would follow them, and, at a certain distance, would fix its eyes and remain motionless for a little while, as if preparing for the stroke, which was always instantaneous. It threw out its tongue to a great distance, when the insect stuck by the glutinous matter to its lip, and was swallowed with inconceivable quickness. After living under the protection of its benefactor upwards of thirty-six years, it was one day attacked by a tame raven, which wounded it so severely, that it died shortly afterward.

The erroneous opinion of toads containing and ejecting poison, has caused many cruelties to be exercised upon this harmless, and undoubtedly useful tribe. Toads have been inhumanly treated, merely because they are ugly; and frogs have been abused, because they are like them. But, we are to observe, that our ideas of beauty and deformity, of which some arise from natural antipathies implanted in us for wise and good purposes, and others from custom and caprice, are of a relative nature, and peculiar to ourselves. None of these relative distinctions of great and small, beautiful or ugly, exist in the all-comprising view of the Creator of the universe: in his eyes, the toad is as pleasing an object as the canary-bird or the bullfinch.

THE CROCODILE

Is one of the most terrible and mischievous animals, not only of the lizard kind, but also of all those which Nature has produced; fortunately, however, it is principally confined to those regions where men are scarce, and the arts of civilization in a great measure unknown.

To observe this formidable creature invested with all its natural terrors, grown to an enormous size, and propagated in surprising numbers, we must visit the uninhabited regions of Africa and America. In those vast rivers, which roll through extensive and desolate countries, where cultivation and commerce have never exerted their beneficial influence, and the most powerful and ferocious animals exercise their strength and rapacity uncontrolled by man, the crocodile reigns in perfect security, terrible to every living creature that enters the water, or approaches its margin.

Although this animal admits of several varieties, of which the crocodile, properly so called, and the cayman, or alligator, appear to be the principal; yet these distinctions seem to be made rather by travellers than by Nature. The crocodile is, by them, confined chiefly to the old, and the alligator to the new continent; but the distinction of form and colour is very trifling. All the animals of this tribe agree in strength, size, and ferocity, and are justly considered as objects of terror wherever they are found.

The crocodile frequently grows to the size of twenty feet in length, and five feet in circumference. Some, it is said, have been found of the length of thirty feet. The fore-legs have the same parts and conformation as that of a man, each paw having five fingers. The hind-legs, including the thigh and foot, are about two feet two inches long. The hind-paw is about nine inches long, divided into four toes, united by a membrane or web, like those of a duck, and armed with large claws. The head is long and flat, and the eyes are very small. It may be observed, that the dimensions here given, are taken from one of these animals which was dissected by the Jesuits at Siam, and which was not one of the very largest size, as its whole length did not exceed eighteen feet, and yet its jaws opened to the terrible width of fifteen inches and a half; so that it was completely able to swallow a man. The Jesuits, by this dissection, made the important discovery, that the accounts we often hear of the crocodile being unable to turn itself readily, or to pursue its prey otherwise than by a direct course, are not to be depended on for their accuracy; for they found no less than sixty-two joints in the back-bone, which, though very closely united

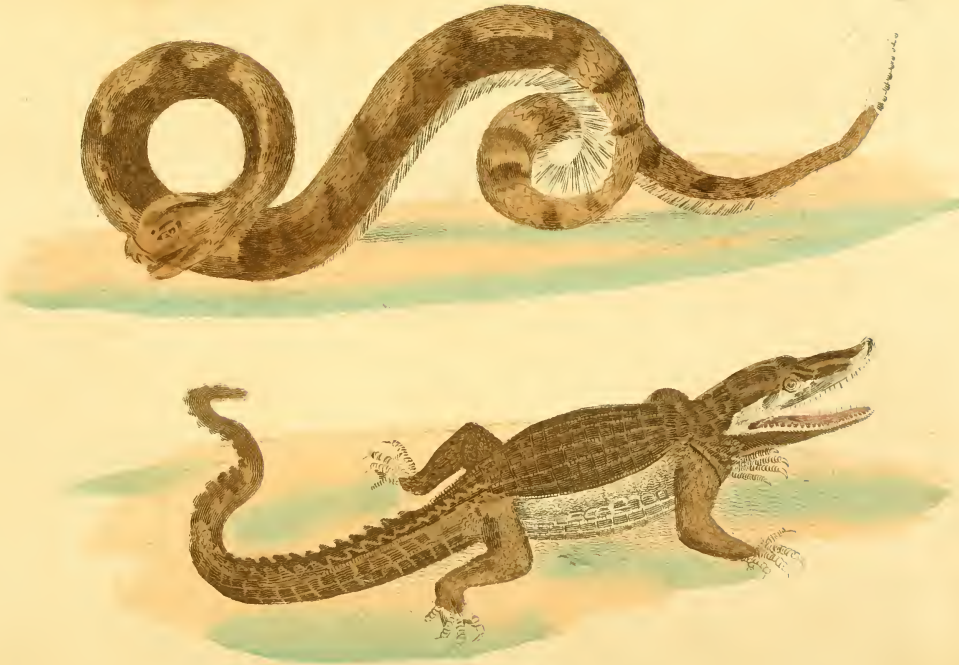
seemed to have sufficient play to enable the animal to bend like a bow to either side, and consequently to wheel round without any great difficulty. The skin is defended by a suit of armour, composed of large scales, disposed like parallel girdles, and al most impenetrable to a musket-ball, so that the belly is the most vulnerable part. The general colour of the crocodile is a dark ash-coloured brown on the upper part, and a whitish citron on the belly; the sides being speckled with large spots of both these colours.

Such are the figure and conformation of this terrible animal, which, under the name of the crocodile, or the alligator, abounds in the Nile, the Niger, the Ganges, and other great rivers of Africa, and the warmer parts of Asia and America. In Upper Egypt, and in the Niger, they are extremely destructive, lying in wait whole hours, and even days, at the edge of the water, quite motionless, resembling the trunk of an old tree, until some animal comes to drink.

This formidable creature spares neither man, nor the fiercest quadruped that comes within its reach. It seizes its victim with a spring, and instantly drags it into the water, and if the captive happen to escape, it pursues with greater celerity than might be expected from its conformation. The strength of the crocodile is amazingly great, and, as its scaly coat of mail is impenetrable, so its offensive arms are irresistible; and escape, rather than contest, can alone afford security against its attacks.

Frequent combats happen between this creature and the tiger, one of the fiercest and most terrible of all quadrupeds. Tigers frequently go down to the rivers to drink, and, upon these occasions, the crocodile, if near, never fails to seize them. The ferocious beast, however, seldom falls unrevenged; for the instant he finds himself seized, he turns with great agility and fierceness on his enemy, and endeavours to strike his claws into the crocodile's eyes, while the latter drags him into the water, where they continue to struggle until the tiger be drowned, and his triumphant antagonist feasts upon his carcass. Notwithstanding the formidable teeth and claws of the crocodile, its tail is an instrument of destruction scarcely less formidable; for with a single stroke of it, this animal has frequently been known to overturn a canoe, and then devour the poor savage, its conductor.

The crocodile, thus seizing and devouring every living creature without distinction, is equally dreaded by all. No animal, but man alone, can combat it with success. We are informed by Labat, that a negro, with no other weapon than a knife in his right hand, and his left arm wrapt about with a strong piece of cow's hide, has sometimes ventured to attack this animal in its



own element. As soon as he approaches, he presents his left arm, which the crocodile greedily snatches into his mouth, when the negro immediately gives it several stabs in the soft part under the throat. The wounds thus inflicted, together with the water rapidly entering his mouth, which is involuntarily held open, and choking it, accomplish its destruction. This is certainly a daring exploit; but few would consider it as a very delightful pastime.

The Siamese take abundance of crocodiles, by throwing several exceedingly strong nets across a river, so that if the animal burst through one, he may be entangled in another. They then approach him in boats, and by various means secure him. When thus brought into subjection, and especially when bred up young, the crocodile is kept to divert the great men of the eastern countries of Asia. He is said to be managed, in those parts, in the same manner as a horse; a curb being put into his mouth, and the rider directing him at pleasure. In some parts also of Africa, as at Siam, this animal constitutes one of the appendages of savage pomp. Philips informs us that, at Sabi, on the Gold coast, there are two pools of water near the royal palace, where crocodiles are bred as we breed carp in our fish-ponds.

In the rivers of Africa, this animal is sometimes taken in the same manner as the shark, of which an account has already been given. The natives of some countries pursue it for the sake of its flesh, which, as well as its eggs, they consider as excellent food; but such is its amazing fecundity, that it would soon render the rivers in those warm climates unnavigable, and their banks uninhabitable, did not every beast and bird of prey, particularly the ichneumon and the ibis, as well as a multitude of predaceous fishes, concur, with unceasing assiduity, in devouring its eggs or its young.

The crocodile produces from eighty to a hundred eggs, of the size and form of a tennis-ball: these she deposits in the sand, where they are vivified by the heat of the sun, and the young are excluded at the expiration of about thirty days. At this time, she is instinctively directed to return upon land, and by scratching away the sand, to set them at liberty; and this recollection of the period of the vivification of her offspring which the crocodile possesses, may be added to the numerous and wonderful instances of animal instinct which the Author of Nature has implanted in his creatures. The young brood quickly avail themselves of their freedom; some run unguided to the water, while others are conveyed thither on the back of the parent. They all immediately disperse into different parts of the stream, where the greatest part are soon destroyed, and those that escape owe their safety chiefly to their minuteness

THE SALAMANDER

Is an animal of the lizard kind, concerning which a number of fables have been invented and propagated, from age to age, and from country to country. The ancients have described it as engendered by heat, living in flames, and feeding on fire as its proper nutriment. This fictitious picture of an animal that never existed, has vanished before modern investigation; and the salamander, divested of its fabulous properties, is found to be no more than a particular kind of lizard, about seven or eight inches long, and generally of a black colour, spotted with yellow. When touched, it feels extremely cold to the hand; and it is not improbable that this circumstance may have contributed somewhat to the fabulous descriptions of which it has been the subject. When thrown into the fire it bursts, and by ejecting its fluids, may seem to have some power in regard to extinguishing a small flame; but it immediately loses its life, and consequently the experiment must be condemned as a reproach to humanity.

In forming an idea of the figure of the salamander, we ought to suppose the tail of a lizard joined to the body of a frog, and then we shall not be far short of precision. It differs also from the rest of the lizard kind, in being viviparous, whereas all the others are oviparous.

THE CHAMELEON

Is an animal of which the head is about two, the body four, and the tail five inches long. In form, it not a little resembles the crocodile; but the thickness of its body varies considerably at different times, as it possesses the faculty of blowing itself up from one inch to two in depth; and this power of inflation and contraction is not confined to the body, but also extends to the legs and tail.

The colour of this animal is its most remarkable peculiarity. The salamander has not been a more distinguished subject of ignorant misrepresentation, than the chameleon has been of philosophical inquiry. The surface of its skin is unequal, but soft; and when the creature is at rest in the shade, the eminences appear of a bluish grey, and the intermediate spaces of a pale red and yellow. When viewed in different lights, it assumes every tint that can possibly be imagined; and no two spectators could ever agree concerning its true colour. From this circumstance it derives its celebrity, and on this account has, in all ages, been introduced by moral writers as the emblem of a fickle and inconstant mind.

THE INGUANA

Is the largest of all the land lizards, being from three to five feet long, as thick as a man's thigh, and in figure resembling the crocodile. Its skin is covered with small scales, and its back is garnished with a row of prickles, standing up like the teeth of a saw. Both the upper and the lower jaws are full of very sharp teeth, and its bite is dangerous, although not always mortal. The males are one-third larger than the females: the former are ash-coloured, but the latter green.

Notwithstanding the formidable and disgusting appearance of this animal, it is perfectly inoffensive; and its flesh is esteemed a delicacy, both in Africa and America.

The sportsmen of these quarters of the world go out to hunt the inguana, as those of Europe do in pursuit of the hare or the pheasant; and in the season when the tropical rains are past, and vegetation flushes into universal verdure, the sportsmen are seen with a noose and a stick in search of the inguana. Upon land this animal is swift of foot, but when it has the opportunity of ascending a tree, it considers the situation as secure, and is never willing to remove.

There are several species of lizards in Great Britain; that which is the most common is the eft, in some provinces called the newt, and in others the askar. The same prejudices are entertained against this animal as against the toad; but both are equally inoffensive; and however disgusting their figure may appear to us, the all-wise Creator has undoubtedly, for some wise and good purpose, given them a place in the system of animated nature.

CHAPTER II.

THE SERPENT KIND.

"Lo! the green serpent, from his dark abode,
Which ev'n imagination fears to tread;
At noon forth issuing, gathers up his train
In orbs immense; . . . . . .
. . . . . with threatening tongue
And deathful jaws erect, the monster curls
His flaming crest."—THOMSON.

AFTER continuing our range for so long a time among the various tribes of animal life, we now come to a class, which, above all others, has excited terror in man, as well as in almost every other creature. This is the serpent race, of which the view always excites sensations of horror.

The distinguishing characteristics of serpents are, that they breathe through the mouth, and have neither legs, ears, nor fins. The serpent tribe are not in any of the European countries sufficiently numerous or formidable to be truly objects of terror. There are not above three or four kinds that are dangerous, and the poison of all operates in the same manner. A burning pain, easily removed by timely application, is the worst consequence that is to be apprehended from the bite of any of the serpents found in Europe. However, although that quarter of the globe is free from these dangerous reptiles, in the tropical regions, where the climate is sultry, the forests thick, and the inhabitants few in number, serpents multiply in proportion. Along the swampy banks of the great rivers of Africa and America, particularly the Niger and Oronoko, they are seen clinging in amazing numbers to the branches of trees; and in those parts, they carry on unceasing hostilities against all the other animals in their vicinity. In those warm and fertile countries, the serpent tribes grow to an enormous size, and are objects of terror rather than of curiosity.

History informs us, that when Regulus, the Roman general, led his army along the banks of the river Bagrada, in Africa, an enormous serpent disputed his passage, and destroyed many of his soldiers. This unexpected enemy could not be subdued, until the battering engines were brought against it, which assailing it at a distance, soon accomplished its destruction. Pliny informs us, that he himself saw the skin, and asserts, that it was not less than a hundred and twenty feet in length.

Perhaps it would not be just to reject as wholly fabulous, the

accounts left us by the ancients, of the terrible devastations sometimes committed by a single serpent. It is not improbable, that in early times, when mankind were few in number, and the greatest part of the earth inhabited only by the animal tribes, which then multiplied and ranged the forests without control, serpents might sometimes grow to an extraordinary size, and exterminate, or expel from their vicinity, all the rest of the brute creation This tribe of animals, indeed, as their bones are in a great measure cartilaginous, and consequently capable of great extension, seem, like several kinds of fishes, to have no bounds set to their growth; and as they appear to live a great number of years, it is no wonder that where the climate is favourable to their constitution, they should grow to an enormous size. In the sultry regions of the torrid zone, where the combination of heat and moisture is peculiarly favourable to the growth of the reptile and insect tribes, they are found of such a magnitude as would exceed credibility, if incontestible evidence did not furnish full proof of the fact.

THE BOA, OR LIBOYA,

Of the torrid zone, is frequently found in the island of Java, and several other parts of the East-Indies; as also in Brazil, and some other countries of South America.

This enormous reptile, which includes several species, all of them terrible from their magnitude and strength, but destitute of venom, is generally thirty feet long, and of a proportionable thickness: its colour is of a dusky white, variously spotted. The scales are round, small, and smooth; and the Malayans, Ceylonese, and some other natives of the East, adore this monstrous production of Nature when living, and when dead make use of its skin for clothing.

These formidable serpents lie hid in thickets, whence they sally out unawares, and, raising themselves upright on their tails, attack both man and every animal without distinction. In a letter printed in the German Ephemerides, we have an account of the seizure of a buffalo by one of these enormous reptiles. The serpent had been waiting some time near the brink of a pool, in expectation of its prey, when a buffalo was the first victim that presented itself. Having darted upon the animal, it instantly began to wrap around it with its voluminous twistings; and at every twist, the bones of the buffalo were heard to crack. The poor animal struggled and bellowed; but its terrible enemy encircled it too closely to suffer it to get free, till at length all its bones being crushed to pieces, and the whole body reduced to a uniform mass, the serpent untwined its folds in order to swallow it at leisure: to prepare for this, it was seen to lick the

body all over, and thus cover it with its mucus, to make it slip down more readily. It then began to swallow the buffalo; and its body dilating itself to receive it, the monstrous serpent took in, at one morsel, a creature three times as thick as itself. These terrible reptiles are sometimes found with the body of a stag in their gullet, and the horns which they are unable to swallow sticking out of their mouth. When the serpent has thus swallowed a stag, a tiger, or any other large animal, it is for some time unable to move from repletion, and may then be without danger approached and destroyed. Leguat assures us, that in Java, he saw one of these serpents that was fifty feet long. Carli mentions their growing to the length of forty feet; and these accounts are corroborated by the concurrent testimony of travellers.

THE RATTLESNAKE

Is a native of the American continent. It is sometimes found as thick as a man's leg, and more than six feet in length. It resembles the viper in the shape of its head and neck, as well as in its colours. This dreadfully poisonous reptile, however, is chiefly distinguished for the fatality of its bite and the rattle in its tail, with which it makes a loud noise on the least motion.

This instrument appears to have been given it by the wise and gracious providence of the Author of Nature, for the purpose of warning other creatures of its approach, and thus giving them an opportunity of avoiding the danger. In effect, no sooner does this rattle begin its harsh and alarming sound, than all the other tribes of animated nature testify their fear by a precipitate retreat; and the universal terror which this dangerous serpent inspires, creates a solitude around its haunts. This rattle is composed of several thin, hard, and hollow bones, linked together. It has generally been supposed that the serpent acquires every year an additional bone; and this opinion appears probable, from the circumstance of the young being wholly destitute of this appendage.

For the bite of this animal, various antidotes have been recommended; but whether any of them can be depended on, appears somewhat doubtful. Some few instances have occured of persons who have recovered, but whether this was owing to vigour of constitution, the slightness of the wound, the power of medicaments, or the combination of all these, in concurrence perhaps with a variety of other adventitious circumstances, seems difficult to decide. It is certain that cases of recovery are rare; for such is the extreme malignity of the venom, that the pain soon grows insupportable. Some have expired under it in five or six hours; and those whose vigour of constitution enables

them to survive a little longer, are usually carried off by a mortification, which rapidly diffuses itself through the whole system.

Of the serpent kind there are a great number and variety of species, which it would at this time be tedious to describe, and useless to enumerate. The only species of the venomous kind which is with certainty known to exist in Great Britain, is the viper. The common snake, the largest of the British serpents, is perfectly innoxious. It feeds on insects, worms, and mice, and deposits its eggs very frequently in dunghills, where the natural heat promotes the exclusion of the young; or in dry sandy banks, where the heat of the sun answers the same purpose.

The slow, or blind worm, is the smallest of the serpent race that is found in England, and, like the snake, is perfectly harmless. To distinguish the venomous viper from these inoffensive tribes, is a matter of no small importance; and this may easily be done, by observing these characteristic marks.

The head of the viper is thicker than its body: its usual length is about two feet: the ground colour of the male is a dull yellow, but that of the female somewhat more lively. The whole length of the back is marked with a series of rhomboidal black spots, touching one another at the points, the sides with triangular spots of the same colour, and the belly is entirely black. The common black snake is more beautifully mottled, and its sides are variegated with spots and lines of a palish blue. But the tail of the viper furnishes the most obvious distinction; for although it terminates in a point, it does not run tapering to so great a length as that of the other species.

If these marks of discrimination be strictly attended to, the poisonous viper may at one glance be distinguished from the harmless snake. In those who are not well acquainted with these distinctions, it is the most prudent to approach none of the serpent tribe. The bite of the viper, however, although exceedingly painful, seldom endangers life; and its bad effects may easily be removed, by the free use of sallad oil, both applied to the wound and taken inwardly. The viper differs from most others of the serpent kind, in bringing forth its young alive; almost all the other species being oviparous.

We cannot conclude this article, without some general remarks on certain properties which are perhaps peculiar to the serpent tribe. From the width of their mouths, the conformation of their jaws, and the yielding texture of their whole bodies, serpents are capable of swallowing animals much more bulky than themselves. It is, however, not a little remarkable, that although they

are voracious to excess, and although the liboya, the largest of the race, will swallow without chewing a larger morsel than the whale itself can take in, no other animal whatever can so long support abstinence.

The long forked tongue of the serpent has sometimes been supposed to be the instrument with which it inflicts the poisonous wound; but this weapon is perfectly harmless, and is, indeed, too soft to make any puncture. The poison lodges in a bag under the teeth, and is communicated by the bite. It is, however, a happy circumstance, that none of the venomous race ever attack mankind. The rattlesnake itself never becomes the assailant, and only acts on the defensive when trodden upon or attacked.

We have now taken a view of an order of animals different from all others in their conformation; and, by a peculiar mechanism, exhibiting a new and singular display of the wonderful works of the Creator of the universe. Without either legs, wings, or fins, they are notwithstanding locomotive, and tolerably swift in their movements. The want of feet is wonderfully compensated by the disposition of the muscles and fibres of their bodies, and shows that the Author of Nature has a multiplicity of means for accomplishing every purpose.

Some may perhaps be inclined to doubt the utility of the serpent race, but it must be remembered that we, who only see by parts, cannot comprehend the whole complicated plan of infinite wisdom. We can discover the use of many of the reptile race; and serpents, no doubt, have a part assigned them to act in the general system for the purpose of contributing to its perfection. In regard to their formidable qualities, they are rather terrific than hurtful to the human species. Not a tenth part of them are venomous, and these, as already observed, act only on the defensive. Their figure excites horror and disgust, and this antipathy against the serpent, and most of the reptile race, has undoubtedly been implanted in our nature, in order to secure us from the danger of rashly approaching the noxious, which we may not always be able to distinguish from the harmless kinds

NATURAL HISTORY OF INSECTS.

CHAPTER I.

. . . . . "Each crawling insect holds a rank
Important in the plan of Him who fram'd
This scale of beings; holds a rank, which lost
Would break the chain, and leave a gap,
That Nature's self would rue."

By a gradual progress in a survey of animated nature, we at last come to a part which can never be fully investigated. The different species of insects are too numerous, and many of them too much concealed from our view, to permit us to be acquainted with their history. The larger and more conspicuous objects of creation, whether animate or inanimate, admit of obvious distinctions; but when we descend to the inferior classes and more minute parts of the animal and vegetable kingdoms, the variety multiplies so fast as to preclude all possibility of describing in detail.

Nature descends gradually in her progress, from man to the quadruped, and afterwards to the volatile race, from these to fishes, and afterwards to reptiles and insects; and all the investigations of naturalists have not yet been able to determine the boundaries of the world of life. Philosophical inquiry has descended to the order of zoophites, without being able to agree whether they ought to be considered as a superior kind of vegetables, or the lowest order of animated nature.

Of all the classes of animal being, insects appear to us the most imperfectly formed; and, if they be considered in relation to man, and to the necessities or pleasures of human life, they will in this respect sink in the comparison with the larger tribes of Nature. The bee, the silk-worm, the cochineal-fly, and the cantharides, render signal services to our species; but multitudes of others are either totally unserviceable or prejudicial to us. Even in those countries where noxious animals of the large kinds have been extirpated by the repeated efforts of a constantly increasing population, the insect tribes still maintain their ground, and are often unwelcome intruders; but in uncultivated and thinly peopled regions, their annoyance and devastations are terrible and almost incredible. In Lapland, in many parts of

Africa and America, and other countries, their innumerable swarms render life uncomfortable. In some of these unpleasant regions, if a candle be lighted such multitudes of insects rush upon it as immediately to extinguish it; and the inhabitants are obliged to smear their faces with tar or some other composition, to protect them from the puncture of these diminutive enemies, of which, when millions are destroyed, millions still succeed, and the numbers appear undiminished.

The longest life would be far too short for the acquisition of a complete knowledge of the insect tribes, and a folio would not suffice for the descriptions of their different species. The definitions used by naturalists are filled with technical terms, of little use to a person who has other pursuits to occupy his attention; and to enumerate the immense variety of genera and species, would give no information to the juvenile student.

Buffon divides the whole tribe of insects into four classes, and Linnæus into seven, which, as we know the value of time and the importance of other studies to the young student, we shall not enumerate; but shall only mention two or three species, which are particularly interesting to man, on account of the inconveniencies or benefits of which they are productive, or from being frequently alluded to by ancient writer

THE SCORPION

Is an insect of this description, and is frequently mentioned in the Scripture, but scarcely ever without being associated with representations of malevolence and mischief. Among all the insect tribe, the scorpion, indeed, is the most terrible; its figure is hideous, and its sting is generally fatal. This creature, which, of all the insects without wings, is the largest as well as most formidable, somewhat resembles a lobster in shape, although beyond comparison more horrible. Of this dangerous insect nine different species have been enumerated, and all of them remarkable for their malignity. Indeed there are few animals more dreadfully mischievous than the scorpion. As it frequently takes refuge in houses, it is found to be a dangerous inmate, and often stings those among whom it resides. In some parts of Italy, and also in the south of France, it is one of the greatest pests that torment mankind; but as in those countries its sting seldom proves mortal, the malignity of the European scorpion is trifling in comparison of that which the natives of Africa and the East experience from those bred in their climates. In Batavia, where they grow to a foot in length, it is scarcely possible to remove any furniture without being in danger of being stung by these poisonous animals. Bossman also informs us that on the Gold coast in Africa they are often found larger than a lobster

and that their sting is inevitably fatal. In Europe their size does not exceed two or three inches, and those who are stung generally recover.

The malevolent disposition of the scorpion has been proved by a number of experiments, which show that no animal in creation is endued with so irascible a nature. Its fierceness is dangerous not only to all other creatures that approach it, but also to its own species; for scorpions are the most cruel enemies to one another, which is a happy means of preventing the too great increase of their numbers, as whenever two of them meet, a combat immediately commences, and they never cease fighting till one of them be destroyed. Maupertius put a hundred of them together in a vessel, and they scarcely came into contact before they began to exert their rage in mutual destruction. Nothing was to be seen but universal carnage; and in a few days there remained only fourteen, which had killed and devoured all the rest. He also enclosed in a glass vessel a female scorpion big with young, and she was observed to devour them as soon as they were brought forth: only one of the number escaped the general destruction by taking refuge on the back of the old one; and this parricidal offspring of an unnatural mother soon avenged the cause of its brethren by killing its cruel parent. These observations demonstrate the propriety of the scriptural metaphors, which exhibit the scorpion as the lively emblem of finished malignity.

THE SILK-WORM

Is as beneficial as the scorpion is noxious, and produces an article of ornament and commerce universally known and admired. This insect is of the caterpillar genus, of a whitish colour, with twelve feet, and at last produces a butterfly of the moth kind. It is a native of China and the easternmost parts of Asia, and has been gradually introduced into various parts of the world. Silk was anciently brought in small quantities to Rome; but it was so scarce as to be sold there for its weight in gold.

There is given, in the "Letters on Ancient and Modern History," a succinct account of the silk trade carried on between ancient Rome and the oriental countries of Asia, and of the introduction of the silk-worm into the Roman empire; which it is therefore unnecessary here to repeat. Since that event, which forms an important era in the history of commerce, this valuable insect has been diffused throughout all the warm countries of Asia and Europe. In China, Tonquin, and other hot countries, they are left at liberty on the trees where they are hatched; but to breed them in Europe, they must be sheltered from the inclemency of the weather, and carefully protected from every

external injury. For this purpose, a room is chosen with a southern aspect, the windows of which are so well glazed as not to admit of the least air when it is cold. The walls are well built, and the planks of the floor laid close, so as not to admit the entrance of birds, mice, or even insects. In the middle of the room four pillars or posts are erected, and placed so as to form a pretty large square. Between these are diverse stories constructed with ozier hurdles, and under each hurdle is a floor surrounded with an upright border. These all hang upon pillars, in such a manner as to be placed or taken down at pleasure.

This is the mode of constructing a habitation for the silk-worms generally used by the most skilful breeders of these valuable insects in European countries. Their food consists of mulberry leaves, of which they must have a fresh supply every morning, and the remainder of the old leaves must also be carefully taken away, and every thing must be kept very clean; for nothing is so hurtful to them as uncleanness and moisture. For this reason the leaves must be gathered when dry, and kept in a dry place, if it be necessary to lay in a store. If mulberry leaves cannot be obtained, the leaves of lettuce or hollyoak will sustain the worms; but they will not thrive so well upon this diet; their silk will neither be so abundant nor of so good a quality. Although the judicious choice and careful management of their diet, with a strict attention to cleanliness, be absolutely necessary, there is yet another precaution of equal importance,—which is, to give them air, by opening the windows at such times as the sun shines with the greatest heat and clearness.

As the silk-worm has but a short time to live, it makes use of every moment, and is almost constantly spinning, except at those intervals when it changes it skin. The cone or ball of silk in which it envelopes itself, and which Nature has taught it to form with such exquisite art, is spun from two little longish bags, placed above the intestines, and filled with a gummy fluid of a marigold colour. This is the substance of which the threads are formed; and the little animal is furnished with a wonderful apparatus for spinning it out to the degree of fineness, which its occasions may require. This instrument in some measure resembles a wire-drawer's machine, in which gold or silver threads are drawn to any degree of minuteness. The whole length of thread composing one of the cones will, if measured, be found to be about three hundred yards; and it is so very fine, that eight or ten threads are generally reeled off into one by the manufacturers. The cone appears to be of the size of a pigeon's egg. When this is completed, and the worm appears ready to burst out, the manufacturers generally take care to kill the aurelia, by exposing it either to the sun or to an artificial heat:

because its bursting through the cone destroys, or at least exceedingly damages, the silk. This being done, they throw the cones into warm water, and stir them about until the commencement of the first thread furnishes them a clue for winding. They generally take eight of the silken threads together, the cones being kept in water till a proper quantity be wound off; but they do not take all, as the last parts grow weak, and are of a bad colour. At the last, a paper-like substance remains, which some stain with a variety of colours for the purpose of making artificial flowers, and others let lie in the water till the glutinous matter which cements it be dissolved: it is then carded like wool, spun with a wheel, and converted into silk stuffs of an inferior kind.

We have here given a slight view of the history of the silk-worm, its operations, and valuable productions. This glance, however, is sufficient to show that it may be regarded as a singular phenomenon of Nature and Providence, exhibiting in a wonderful manner the wisdom and goodness of the Creator in the various operations of animal instinct, and the exertions of human ingenuity forming those relations which enable man to derive the most important benefits. The subject would have admitted of a more detailed description; but this will suffice to give a general and tolerably just idea of this extraordinary insect, so distinguished in the history of commerce and fashion.

THE BEE

Is, of all the classes of winged insects, the most beneficial to man, and certainly one of the most wonderful. Bees are common in most countries; but although naturalists have for ages considered them as an important subject of inquiry, and large volumes have been written in order to elucidate their history, it is yet but imperfectly known. The account given of them by Reaumur is sufficiently minute, and, if true, exceedingly wonderful; but many parts of it are called in question, and some of them flatly contradicted by those who have been long conversant with bees. The greatest part, however, of the life of this great naturalist, was spent in contemplating their nature and habits; and it would require an attention equally assiduous and continued, to prove the error of his discoveries and conclusions To enter into a minute investigation of so complicated and so extensive a subject, would not at present suit our purpose; and therefore we shall content ourselves with mentioning a few obvious particulars.

How numerous soever may appear the multitude of bees in a swarm, they all owe their origin to a single parent, which is called the queen bee It may indeed seem astonishing, and

even almost incredible, that a single insect should in one summer give birth to so many thousands of young; but on opening her body the wonder will cease, as the number of eggs it contains is found to amount to upwards of five thousand. This animal, whose existence is of such importance to the commonwealth, may be easily distinguished from the rest by her size. If she be carefully observed, she will be seen at all times accompanied by a numerous retinue; and the attention paid her by the whole hive shows how much the welfare of her subjects depends on her security.

In some countries bees are an object of great attention to the peasant, and their honey and wax are considerable articles of trade. In many of the forests of Russia and Poland, holes are made in the trunks of trees for the reception of the bees, which abound in those parts. By this method the country people obtain a great quantity of honey and wax, and derive no small profit from those valuable commodities.

A country or a district may be overstocked with bees, as well as with any other kind of animals; for a certain number of hives require a certain quantity of flowers for their subsistence. When the flowers in the vicinity are exhausted, the industrious insects are obliged to take a more extensive range; and in going too far from home, they are liable to be devoured by birds, beaten down by storms, or to perish through excess of fatigue. From a consideration of these disadvantages, they have, in some parts of France and Piedmont, contrived a kind of floating bee-house, or barge, in which are placed sixty or a hundred hives, well defended from the effects of an accidental storm. These vessels, conducted by their owners, float gently down a river. As the bees are continually choosing their flowery pasture along the banks, they are furnished with a succession of sweets before unrifled; and by this means, a single floating bee-house yields to the proprietor a considerable income. Thus is the ingenuity of man exercised in turning to his own advantage the various classes of animal existence, as well as the different substances of inanimate matter.

> "Here their delicious task the fervent bees
> In swarming millions tend: around, athwart,
> Thro' the swift air the busy nations fly,
> Cling to the bud, and with inserted tube,
> Suck its pure essence, its ethereal soul.
> And oft with bolder wing, they soaring dare
> The purple heath, or where the wild thyme grows,
> And yellow load them with the luscious spoils."

Instead of entering into any particulars on so copious a subject, which might afford matter of almost endless investigation,

we shall only in general terms observe, that in contemplating the commonwealth of bees, and viewing the exactness of their police, the regularity of their civil and domestic economy, the activity and assiduity of their industrious exertions, and, above all, the geometrical exactness with which they fabricate the honey-comb, and construct their cells, scepticism itself can scarcely avoid discovering the agency of an Almighty hand, in directing their various and wonderful operations.

Among the innumerable tribes of insects which swarm in the earth and the air, we shall only mention one more in particular, which, from its being so frequently the subject of scriptural allusion, we cannot entirely omit. This is

THE LOCUST,

Of which the sacred writings give such terrific descriptions The scriptures, being written in a country where the locust made a prominent figure in the picture of Nature, have exhibited striking views of multitudinous numbers, and dreadful rapacity In the Old Testament, an invading army, whose multitudes appear innumerable, and every where carry terror and desolation, is generally compared to a swarm of locusts; and these destructive insects are often represented as the instruments of divine vengeance.

This winged insect, of which the devastating voracity has in many countries been too often experienced, is a larger species of the grasshopper genus. It is about three inches long, and has two horns, or feelers, of about one inch. The head and horns are of a brownish colour: it is blue about the mouth, and on the inside of the larger legs. The shield that covers the back is greenish; the upper side of the body, brown spotted with black; and the under side, purple. The upper wings are of a dusky brown, the under wings of a lighter brown, and tinctured with green, and more transparent, with a cloud of dark spots near the tips. No animal in the creation multiplies so rapidly as these, in a warm climate and a dry soil; for there its eggs are safely deposited, and speedily hatched by the heat of the sun.

When the locusts make their destructive invasions, they appear at a distance like a black cloud gathering in the horizon, which, as it approaches, almost hides the face of day. Sometimes the husbandman sees this imminent danger pass over head without doing him any mischief; and the whole swarm proceeds forward to settle upon some less fortunate country; and wretched is the place where they alight! Every trace of vegetation immediately disappears; the visitation of a few minutes destroys the expectations of a year; every thing that grows is immediately devoured, and nothing but barren desolation left

behind them. But if they be noxious when living, they are still more so when dead; for, wherever they die, they infect the air in such a manner that the smell is insupportable. Orosius informs us, that, A. M. 3800, an incredible number of locusts which had infested Africa, after having devoured every thing that was green, flew off and were drowned in the sea, where they caused such a stench as the putrefying carcasses of hundreds of thousands of men could not have produced. In the year 1690, three vast clouds of locusts entered Russia in three different places, and from thence spread themselves over Poland and Lithuania, in such astonishing swarms, that in many parts of these countries the air was darkened, and the earth covered with their multitudes. In some places they were seen lying dead, heaped one upon another, four feet deep upon the ground. The trees bent beneath their weight; and the damage which the country sustained was beyond computation.

In Barbary, their visits are frequent, and their numbers formidable. In the year 1724, Dr. Shaw was, in that country, a witness of their devastations. Their first appearance was at the latter end of March, when the wind had for some time blown from the south. In the beginning of April their numbers were so increased, that in the heat of the day they formed themselves into large and thick clouds, which darkened the sun. In the middle of May, they retired into the plain to deposit their eggs; and in June, the young brood began to make their appearance; forming a number of compact bodies, of several hundred yards square, which, marching forward, climbed the trees, and went over the walls and houses, devouring every thing that was green. The inhabitants, to stop their progress, dug trenches across their fields, and filled them with water. They also placed large quantities of heath, stubble, and other combustible matter, in rows, which they set on fire on the approach of the locusts,—but all proved in vain; for the trenches were quickly filled up, and the fires extinguished, by the numerous swarms that followed each other in constant succession.

In about a month, these young insects acquired their full growth, and threw off their worm-like state, by casting their skins. This transformation was accomplished in seven or eight minutes, after which they appeared for a short time in a languid state; but as soon as the sun had hardened their wings, they resumed their former voracity with an addition of agility and strength. But they were soon afterwards totally dispersed; for, having laid their eggs, they directed their course northward, and probably were all drowned in the sea.

These desolating insects are seldom seen in England; although in the year 1748, a few of them made their appearance

there, from which dreadful consequences were apprehended; but they were not followed by any numerous swarms. In the United States, also, their visitations are rare, and they cause but little damage. The annals, however, of most countries, are marked with the devastations made by their devouring multitudes; and although they do not visit Europe in such destructive swarms as formerly, yet, in some of the southern countries they are still formidable. Those which at uncertain intervals have visited that quarter of the globe are generally supposed to have come from Africa.

In several countries, the inhabitants endeavour to turn this evil in some measure to their advantage. Locusts are eaten by the natives in some countries of the East, being caught in small nets provided for that purpose. They parch them over the fire in an earthen pan, and when their legs and wings are fallen off, they turn reddish like boiled shrimps. Dampier, who had eaten them thus prepared, describes them as a tolerable dish. They appear to have constituted a considerable article of food, among the ancient anchorites; and John the Baptist is represented as living, in a great measure, on locusts and wild honey. Such is the history of this destructive insect, which, in scriptural language, is so frequently made the emblem of invading armies, and of extensive desolation.

The hydra, or fresh-water polypus, which was first noticed by Mr. Tremblay, A. D. 1741, may serve to give a general idea of zoophites—an order of compound animals, furnished with a kind of flowers, and having a vegetable root and stem. This order, which naturalists have divided into fifteen genera, seems to form that link in the chain of being which connects the animal and vegetable kingdoms.

The hydra was at first considered as a mere plant; but it was soon discovered to be a sensitive being, and yet capable of propagation by slips. Of this genus, various species are found in different situations, in ditches and pools of stagnant water; but all of them possess the property of reproduction in whatever manner they are divided. If cut into three parts, each puts out a head from one, and a tail from the other, so as to become three distinct animals; all performing the functions of their species, and exhibiting perfect copies of their original. Although the different genera and species of insects which our eyes can discover, are, as already observed, numerous beyond calculation; and in their formation, their colours, and their habits, various beyond all that fancy itself could conceive, yet there are multitudes of others which cannot be perceived without the aid of the microscope. There is also not the least reason to doubt

that there are gradations of existence below the smallest animal cules, which our nicest instruments have not brought to light. We have already been able to discover myriads of living creatures, in the least drop of the purest water; and it seems to be a rational presumption to infer, that he who has filled the immensity of space with habitable matter, with suns and worlds innumerable, has also peopled every part of that matter with appropriate inhabitants, although too minute to be perceived by any apparatus yet invented. The supposition is not unworthy of the Creator of the Universe; and all the analogies that can be drawn from our observations of the system of Nature, render it probable.

"Full nature swarms with life, one wond'rous mass
Of animals or atoms organized,
Waiting the vital breath, when parent Heaven
Shall bid his spirit blow. . . . . .
. . . . . Nor is the stream
Of purest crystal, nor the lucid air,
Tho' one transparent vacancy it seem,
Void of their unseen people. These conceal'd
By the kind art of forming Heaven, escape
The grosser eye of man."—THOMSON.

CHAPTER II.

CONCLUDING REFLECTIONS.

. . . . . "Let us read
The living page, whose ev'ry character
Delights, and gives us wisdom."
HURDIS.

WE cannot close this partial survey of a part of animated nature, without bringing forward some general observations relative to the evident display of an all-wise design, which in every part of animal mechanism, shows itself so clearly, as not to admit of any doubt, and must indeed on the slightest reflection put Atheism to the blush.

Some of these demonstrations of an all-wise intelligence manifested in his works, are so obvious, as to strike even the most superficial observer. If it suited our present purpose to enter into a minute survey of the human, or any animal body, this alone would answer all inquiries on the subject; but in conformity to the plan on which we have proceeded, we shall content ourselves with offering for consideration a few of the most striking correspondencies of animal organization, with its destined purposes.

Every animal frame, considered as a mass, exhibits a number of properties which scepticism itself could scarcely forbear to acknowledge indubitable evidences, not only of a regular plan, but of consummate accuracy in carrying it into execution.

In the first place, let us consider the exact correspondence of the two sides of each animal. We see the right side answering to the left, eye to eye, leg to leg, wing to wing, one side of the face to the other, with a precision which human art finds exceedingly difficult to imitate. The exact resemblance of the two eyes of each individual, considering the curious and compound structure of this organ, with the various and delicate shades of colour, with which the iris is tinged, is a circumstance in the construction of animal bodies, which can never be too much admired, and which is rendered still more wonderful by the difference observable, not only in the different species, but also between particulars of the same species: of ten thousand eyes, it is questionable whether one could be matched except by that which is placed on the opposite side of the same head, or whether it would be possible to dispose them in suitable pairs by any other collection or arrangement than that which actually prevails.

The general disposition of the external and internal parts, which constitute the animal frame, is a proof of its being the work of an infinitely wise Being. We know that the internal parts are tender, soft, intricate, and pliable, that so their constant action, which is necessary to life, may not, by any obstruction or rigidity, be impeded. All the internal operations are going on with regularity, while the body itself, the external case, which holds together the whole complex machinery, is tossed and jolted about in every manner, and with every degree of agitation. Observe this, and then consider how well every part must be secured, how carefully surrounded with safeguards, how well packed together, that notwithstanding the frequent and often sudden and violent agitations and contortions of the body, the interior mechanism remains uninjured, and even its nicer motions unimpeded.

Were we permitted to investigate the intricacies of anatomical science, we should point out all the curious construction and well-adapted situation of the brain, the heart, the lungs, the liver, the bladder, the intestines, and other organs of life; but it suits our present purpose to generalize, rather than to descend to particulars, which would burden the memory without illuminating the mind. However, when we contemplate an animal body, we can perfectly comprehend the numerous instruments which are put together, and often within a very narrow compass. In the single ounce of matter which composes the body of a sparrow, we see all the instruments necessary for eating, for di-

gesting, for respiration, for seeing, for hearing, for smelling, for walking, for flying, for the performance of every animal function and of every motion. All the parts of the complicated machine are perfectly appropriate, completely adapted to their respective uses, and all disposed with the most exact organization.

Thinking this general view of the animal frame sufficient to demonstrate the agency of an all-wise and almighty mechanist in its formation, we shall, in conformity to our original design, limit ourselves chiefly to this general exhibition, and only mention two or three particulars which might possibly escape attention, although too important to be left unnoticed.

Of the covering of animals, we have had an opportunity of contemplating the perfect adaptation to their various circumstances of living. We shall therefore only remark, that the furs of all animals are known to grow thicker and warmer in winter than in summer, and in cold than in hot climates. Animals also which constantly live on dry land, such as bears, foxes, hares, &c. have the hair closer set on the back than on the belly, —an arrangement admirably adapted to fortify them against the rains and storms from above; while the fur of the beaver, and the feathers of water-fowl, are thicker and warmer on the belly, and peculiarly contrived for resisting the attrition and penetration of the cold and watery fluid to which they are so much exposed; and it may be seen that the covering of fishes is equally well calculated for their situation. The most unequivocal marks of an all-wise and benevolent design are obvious throughout the whole of this arrangement.

If we examine the heart of a dead animal, we cannot fail to perceive that the wisdom of the Creator is there displayed beyond all the powers of human comprehension. From the softness and extreme delicacy of the heart, and the complexity of its mechanism, we should suppose it liable to frequent derangements, and to be injured by the slightest causes; and in fine, we should from its texture conclude, that its regular and uniform motion could not long continue. This wonderful machine, however, goes with greater regularity than any watch, at the rate of about four thousand one hundred and fifty strokes every hour, night and day, for eighty or ninety years together in man, and much longer in some animals, and continues its action for this length of time without disorder or interruption.

The examination of the eye might alone convince the infidel and the sceptic of the existence of a Supreme Intelligence, and of his indubitable agency in the system of Nature. This is evident, from the exquisite mechanism of its structure, the existence of its powers, its commanding situation, so suited to its exercise, and the manner in which it is placed in a deep bony socket for

its preservation. The contemplative mind must be struck with astonishment in reflecting on the correctness of the picture formed at the bottom of the retina. In viewing a distant land scape, with its whole assemblage of constituent objects, hills dales, forests, groves, rivers, fields, and buildings, variously intermixed, which compose the scenery, we should consider, that all this multitudinous group, covering tracts of country to the extent of ten, fifteen, or perhaps twenty square miles, is brought within the compass of a sixpence in our eye, and yet all exactly delineated. In reflecting on this wonderful circumstance, we find the fact incontestible, and the means by which it is produced, calculated equally to excite our admiration of the wisdom of the Creator, and our gratitude for his ineffable goodness.

The subject now under consideration would require a ponderous folio, rather than a short chapter; for every animal body is a complicated machine, composed of a number scarcely less complex. Every organ of sensation, and every instrument of action, exhibits an all-wise contrivance; the smallest appendages display the most exquisite workmanship: every feather of a bird, every quill of its wing, is a mechanical wonder. From these considerations, we cannot but perceive the absurdity of the doctrine of blind chance, when every part of creation evidently appears the effect of intelligence and design, and irresistibly leads us to the contemplation of that Being, from whose infinite wisdom alone such harmony could result.

APPENDIX.

(FROM GOLDSMITH'S ANIMATED NATURE)

CHAPTER I.

THE SPIDER KIND.

Among insects without wings, the spider is worthy of particular notice, its manners being of all others the most subtle, and its instincts the most various. Formed for a life of rapacity and incapable of living upon any other than insect food, all its habits are calculated to deceive and surprise: it spreads toils to entangle its prey, it is endued with patience to expect its coming and is possessed of arms and strength to destroy it when fallen into the snare.

In this country, where all the insect tribes are kept under by human assiduity, the spiders are but small and harmless. We are acquainted with few but the House Spider, which weaves its web in neglected rooms; the Garden Spider, that spreads its toils from tree to tree, and rests in the centre; the Wandering Spider, that has no abode like the rest; and the Field Spider, that is sometimes seen mounting, web and all, into the clouds. These are the chief of our native spiders, which, though reputed venomous, are entirely inoffensive. But they form a much more terrible tribe in Africa and America. In those regions, where all the insect species acquire their greatest growth, where the butterfly is seen to expand a wing as broad as our sparrow, and the ant to build a habitation as tall as a man, it is not to be wondered at that the spiders are seen bearing a proportionable magnitude. In fact, the bottom of the Martinico spider's body is as large as a hen's egg, and covered all over with hair. Its web is strong, and its bite dangerous. It is happy for us, however, that we are placed at a distance from these formidable creatures, and that we can examine their history without feeling their resentment.

Every spider has two divisions in its body. The fore part, containing the head and breast, is separated from the hinder part or belly by a very slender thread, through which, however, there is communication from one part to the other. The fore part is covered with a hard shell, as well as the legs which adhere to

the breast. The hinder part is clothed with a supple skin, beset all over with hair. They have several eyes all round the head, brilliant and acute; these are sometimes eight in number, sometimes but six; two behind, two before, and the rest on each side. Like all other insects, their eyes are immoveable, and they want eyelids; but this organ is fortified with a transparent horny substance, which at once secures and assists their vision. As the animal procures its subsistence by the most watchful attention, so large a number of eyes was necessary to give it the earliest information of the capture of its prey. They have two pincers on the fore part of the head, rough, with strong points, toothed like a saw, and terminating in claws like those of a cat. A little below the point of the claw there is a small hole through which the animal emits a poison which, though harmless to us, is sufficiently capable of instantly destroying its prey. This is the most powerful weapon they have against their enemies: they can open or extend these pincers as occasion may require, and when they are undisturbed, they suffer them to lie one upon the other, never opening them but when there is a necessity for their exertion. They have all eight legs, jointed like those of lobsters, and similar also in another respect; for if a leg be torn away, or a joint cut off, a new one will quickly grow in its place, and the animal will find itself fitted for combat as before. At the end of each leg there are three crooked moveable claws; namely, a small one, placed higher up, like a cock's spur, by the assistance of which it adheres to the threads of its web; there are two others larger, which meet together like a lobster's claw, by which they can catch hold of the smallest depressions, walking up or down the most polished surfaces, on which they can find inequalities that are imperceptible to our grosser sight. But when they walk upon such bodies as are perfectly smooth, as looking-glass or polished marble, they squeeze a little sponge, which grows near the extremity of their claws, and thus diffusing a glutinous substance, adhere to the surface until they make a second step. Besides the eight legs just mentioned, these animals have two others, which may more properly be called arms, as they do not serve to assist motion, but are used in holding and managing their prey.

The spider, though thus formidably equipped, would seldom prove successful in the capture, were it not equally furnished with other instruments to assist its depredations. As it lives wholly upon flies, and is without wings to pursue them, it is obvious they must for ever escape so impotent an adversary; but the spider is a most experienced hunter, and spreads its nets to catch those animals it is unable to pursue. The spider's web is generally laid in those places where flies are most apt to come

and shelter, in the corners of rooms, round the edges of windows, and in the open air among the branches of trees. There the little animal remains for days, nay weeks together, in patient expectation, seldom changing its situation, though never so unsuccessful.

For the purposes of making this web, nature has supplied this animal with a large quantity of glutinous matter within its body, and five dugs or teats for spinning it into thread. This substance is contained in a little bag, and at first sight resembles soft glue; but when examined more accurately, it will be found twisted into many coils of an agate colour, and upon breaking it the contents may be easily drawn out into threads, from the tenacity of the substance, not from those threads being already formed. Those who have seen the machine by which wire is spun, will have an idea of the manner in which this animal forms the threads of its little net, the orifices of the five teats above mentioned, through which the thread is drawn, contracting or dilating at pleasure. The threads which we see, and appear so fine, are notwithstanding composed of five joined together, and these are many times doubled when the web is in formation.

When a house spider proposes to begin a web, it first makes a choice of some commodious spot, where there is an appearance of plunder and security. The animal then distils one little drop of its glutinous liquor, which is very tenacious, and then creeping up the wall, and joining its thread as it proceeds, it darts itself in a very surprising manner, as I have often seen, to the opposite place, where the other end of the web is to be fastened. The first thread thus formed, drawn tight and fixed at each end, the spider then runs upon it backward and forward, still assiduously employed in doubling and strengthening it, as upon its force depends the strength and stability of the whole. The scaffolding thus completed, the spider makes a number of threads parallel to the first in the same manner, and then crosses them with others; the clammy substance of which they are formed serving to bind them, when newly made, to each other.

The insect, after this operation, doubles and trebles the thread that borders its web, by opening all its teats at once, and secures the edges so as to prevent the wind from blowing the work away. The edges being thus fortified, the retreat is next to be attended to; and this is formed like a funnel at the bottom of the web, where the little creature lies concealed. To this are two passages or outlets, one above and the other below, very artfully contrived, to give the animal an opportunity of making excursions at proper seasons, of prying into every corner, and cleansing those parts which are observed to be clogged or encumbered. Still attentive to its web, the spider, from time to

time, cleans away the dust that gathers round it; which might otherwise clog and incommode it: for this purpose it gives the whole a shake with its paws; still, however, proportioning the blow so as not to endanger the fabric. It often happens also, that from the main web there are several threads extended at some distance on every side; these are, in some measure, the outworks of the fortification, which, whenever touched from without, the spider prepares for attack or self-defence. If the insect impinging be a fly, it springs forward with great agility; if, on the contrary, it be the assault of an enemy stronger than itself, it keeps within its fortress, and never ventures out till the danger be over. Another advantage which the spider reaps from this contrivance of a cell or retreat behind the web is, that it serves for a place where the creature can feast upon its game with all safety, snd conceal the fragments of those carcasses which it has picked, without exposing to public view the least trace of barbarity, that might create a suspicion in any insects that their enemy was near.

It often happens, however, that the wind, or the rustling of the branches, or the approach of some large animal, destroys in a minute the labours of an age. In this case, the spider is obliged to remain a patient spectator of the universal ruin; and when the danger is passed away, it sets about repairing the calamity. For this purpose, it is furnished with a large store of the glutinous substance of which the web is made, and with this it either makes a new web, or patches up the old one. In general, however, the animal is much fonder of mending than making, as it is furnished originally with but a certain quantity of glutinous matter, which, when exhausted, nothing can renew. The time seldom fails to come when their reservoirs are entirely dried up, and the poor animal is left to all the chances of irretrievable necessity. An old spider is thus frequently reduced to the greatest extremity; its web is destroyed, and it wants the materials to make a new one. But as these animals have been long accustomed to a life of shifting, it hunts about to find out the web of another spider, younger and weaker than itself, with whom it ventures a battle. The invader generally succeeds; the young one is driven out to make a new web, and the old one remains in quiet possession. If, however, the spider is unable to dispossess any other of its web, it then endeavours for a while to subsist upon accidental depredation, but in two or three months it inevitably dies of hunger.

The garden spider seems to work in a different manner. The method with this insect is, to spin a great quantity of thread, which, floating in the air in various directions, happens, from its glutinous quality, at last to stick to some object near it, a lofty

plant or the branch of a tree. The spider only wants to have one end of the line fast, in order to secure and tighten the other. It accordingly draws the line when thus fixed, and then, by passing and repassing upon it, strengthens the thread in such a manner as to answer all its intentions. The first cord being thus stretched, the spider walks along a part of it, and there fastens another, and dropping from thence, fastens the thread to some solid body below, then climbs up again and begins a third, which it fastens by the same contrivance. When three threads are thus fixed, it forms a square, or something that very nearly resembles one, and in this the animal is generally seen to reside. It often happens, however, when the young spider begins spinning, that its web becomes too buoyant, and not only the thread floats in the air, but even the little spinster. In this manner we have often seen the threads of spiders floating in the air; and what is still more surprising, the young spiders themselves attached to their own web. The reason is obvious; for as even gold itself may be so finely drawn out as to float in the air, so the finer thread of a spider is so buoyant as not only to swim in the air, but also to lift the spider itself; which, like the tail of a kite, rises with its own manufacture.

The spider's web being thus completed, and fixed in a proper place, its next care is to seize and secure whatever insect happens to be caught in the toil. For this purpose, it remains for weeks and even months upon the watch, without ever catching a single fly; for the spider, like most other insects, is surprisingly patient of hunger. It sometimes happens that too strong a fly strikes itself against the web, and thus, instead of being caught, tears the net to pieces. In general, however, the butterfly, or the hornet, when they touch the web, fly off again, and the spider seems no way disposed to interrupt their retreat. The large blue-bottle fly, the ichneumon fly, and the common meat-fly, seem to be its favourite game. When one of these strikes into the toils, the spider is instantly seen alert and watchful at the mouth of its hole, careful to observe whether the fly be completely immeshed. If that be the case, the spider walks leisurely forward, seizes its prey, and instantly kills it, by instilling a venomous juice into the wound it makes. If, however, the fly be not entirely immeshed, the spider patiently waits, without appearing, until its prey has fatigued itself by its struggles to obtain its liberty; for if the ravager should appear in all his terrors while the prey is but half involved, a desperate effort might give it force enough to get free. If the spider has fasted for a long time, it then drags the fly immediately into its hole and devours it; but if there has been plenty of game, and the animal be no way pressed by hunger, it then gives the fly two

or three turns in its web, so as completely to immesh it, and there leaves it impotently to struggle until the little tyrant comes to its appetite. Why the spider should at one time kill its prey, and at another suffer it to struggle in the toils for several hours together, I am not able to say; perhaps it only likes its prey newly killed, and therefore delays to put the captive to death until it is to be eaten.

It has been the opinion of some philosophers, that the spider was in itself both male and female; but Lister has been able to distinguish the sexes, and to perceive that the males were much less in size than the females. But this is not the chief peculiarity; for, different from all other animals, except the fish called the Ray, it has its instruments of generation placed in the fore-arms, which have been already described. When these animals copulate, they for some time seize each other with their legs and arms; then appear the instruments of generation in the male, as if bursting out from the points of its fore-feet, and are inserted into the receptacle beneath the body of the female.

The female generally lays from nine hundred to a thousand eggs in a season: they are of a bluish colour, speckled with black, and separated from each other by a glutinous substance, not unlike frog-spawn water. These eggs are large or small in proportion to the size of the animal that produces them. In some they are as large as a grain of mustard-seed, in others they are scarcely visible. The female never begins to lay till she be two years old at least, and her first brood is never so numerous as when she has come to her greatest maturity.

When the number of eggs the spider has brought forth have remained for an hour or two to dry after exclusion, the little animal then prepares to make them a bag, where they are to be hatched until they leave the shell. For this purpose she spins a web four or five times stronger than that made for catching flies; and, besides, lines it within-side by a down, which she plucks from her own breast. This bag, when completed, is as thick as paper, is smooth within-side, but rougher without. Within this they deposit their eggs; and it is almost incredible to relate the concern and industry which they bestow in the preservation of it. They stick it by means of their glutinous fluid to the end of their body; so that the animal, when thus loaded, appears as if she had one body placed behind another. If this bag be separated from her by any accident, she employs all her assiduity to stick it again in its former situation, and seldom abandons her treasure but with her life. When the young ones are excluded from their shells, within the bag, they remain for some time in their confinement, until the female instinctively knowing their maturity, bites open their prison, and sets them

free. But her parental care does not terminate with their exclusion; she receives them upon her back for some time, until they have strength to provide for themselves, when they leave her never to return, and each begins a separate manufactory of its own. The young ones begin to spin when they can scarcely be discerned; and prepare for a life of plunder before they have strength to overcome. Indeed nature seems to have formed them in every respect for a life of hostility. No other insect is possessed of such various powers of assault and defence; and they are able to destroy animals ten times bigger than themselves. Even after a severe defeat they quickly recover of their wounds; and as for their legs, they consider the loss of them as but a small misfortune, as they grow again very speedily to their former magnitude.

Thus there is no insect to which they are not an enemy; but what is more barbarous still, spiders are the enemies of each other. M. Reaumur, who was fond of making experiments upon insects, tried to turn the labours of the spider to human advantage, and actually made a pair of gloves from their webs. For this purpose, he collected a large number of those insects together; he took care to have them constantly supplied with flies, and the ends of young feathers, fresh picked from chickens and pigeons, which being full of blood, are the diet that spiders are particularly fond of. But notwithstanding all his care, he was soon convinced that it was impracticable to rear them, since they were of such a malignant nature, that they could never be brought to live in society, but, instead of their usual food, chose to devour each other. Indeed, were it practicable to reconcile them to each other, it would require too much attendance to rear up a sufficient number to make the project any way useful. The thread is four, if not five times finer than that of the silk-worm; so that, upon the smallest calculation, there must have been sixty thousand spiders to make a single pound of silk. That which Reaumur made use of, was only the web in which they deposited their eggs, which is five times stronger than their ordinary manufacture.

Of this animal there are several kinds, slightly differing from each other either in habits or conformation. The water spider is the most remarkable of the number. This insect resembles the common spider in its appearance, except that its hinder part is made rather in the shape of a nine-pin than a ball. They differ in being able to live as well by land as water, and in being capable of spinning as well in one element as the other. Their appearance under water is very remarkable; for though they inhabit the bottom, yet they are never touched by the element in which they reside, but are inclosed in a bubble of air

that, like a box, surrounds them on every side. This bubble has the bright appearance, at the bottom, of quicksilver; and within this they perform their several functions of eating, spinning, and sleeping, without its ever bursting, or in the least disturbing their operations: sometimes the bubble is seen divided into three distinct apartments; and in the spring, the male enters one of those to impregnate the female, in the manner mentioned above, while the bubble in which he was contained unites with the other, like two drops of water, when approached to each other. They spin their webs as well in the water as upon land; and it is most probable that they make their food of the small insects of either element.

The Tarantula is also of this species, and deserves particular notice, not for any remarkable properties that really attend it, but for the numerous falsehoods which have been propagated concerning it. What may be said with truth concerning it is, that it is the largest of the spider kind known in Europe, and is a native of Apulia in Italy. Its body is three quarters of an inch long, and about as thick as one's little finger; the colour is generally an olive brown, variegated with one that is more dusky; it has eight legs and eight eyes, like the rest, and nippers which are sharp and serrated; between these and the forelegs there are two little horns or feelers, which it is observed to move very briskly when it approaches its prey. It is covered all over the body with a soft down; and propagates as other spiders, by laying eggs. In the summer months, particularly in the dog-days, the tarantula, creeping among the corn, bites the mowers and passengers; but in winter it lurks in holes, and is seldom seen.

Thus far is true; but now the fable begins: for though the bite is attended with no dangerous symptoms, and will easily cure of itself, wonderful stories are reported concerning its virulence. The part which is bitten, as we are told, is soon after discoloured with a livid black, or yellowish circle, attended with an inflammation. At first the pain is scarcely felt; but a few hours after come on a violent sickness, difficulty of breathing, fainting, and sometimes trembling. The person bit, after this, does nothing but laugh, dance, skip about, putting himself into the most extravagant postures, and sometimes also is seized with a most frightful melancholy. At the return of the season in which he was bit, his madness begins again; and the patient always talks of the same things. Sometimes he fancies himself a shepherd, sometimes a king, appearing entirely out of his senses. These troublesome symptoms sometimes return for several years successively, and at last terminate in death. But so dreadful a disorder has, it seems, not been left without a

remedy; which is no other than a well-played fiddle. For this purpose the medical musician plays a particular tune, famous for the cure, which he begins slow, and increases in quickness as he sees the patient affected. The patient no sooner hears the music, but he begins to dance, and continues so doing till he is all over in a sweat, which forces out the venom that appeared so dangerous. This dancing sometimes continues for three or four hours before the patient is weary, and before the sweating is copious enough to cure the disorder. Such are the symptoms related of the tarantula poison; symptoms which some of the best and gravest physicians have credited, and attempted to account for. But the truth is that the whole is an imposition of the peasants upon travellers who happen to pass through that part of the country, and who procure a trifle for suffering themselves to be bitten by the tarantula. Whenever they find a traveller willing to try the experiment, they readily offer themselves; and are sure to counterfeit the whole train of symptoms which music is supposed to remove. A friend of mine who had passed through that part of the country, had a trusty servant bitten, without ever administering the musical cure; the only symptoms were a slight inflammation, which was readily removed, and no other consequence ever attended the bite.—It is thus that falsehoods prevail for a century or two; and mankind at last begin to wonder how it was possible to keep up the delusion so long.

CHAPTER II.

THE CATERPILLAR KIND.

If we take a cursory view of insects in general, Caterpillars alone, and the butterflies and moths they give birth to, will make a third part of the number. Wherever we move, wherever we turn, these insects, in one shape or another, present themselves to our view. Some, in every state, offer the most entertaining spectacle; others are beautiful only in their winged form. Many persons, of which number I am one, have an invincible aversion to caterpillars, and worms of every species; there is something disagreeable in their slow crawling motion, for which the variety of their colouring can never compensate But others feel no repugnance at observing, and even handling them with the most attentive application.

There is nothing in the butterfly state so beautiful or splendid as these insects. They serve, not less than the birds themselves,

to banish solitude from our walks, and to fill up our idle intervals with the most pleasing speculations. The butterfly makes one of the principal ornaments of oriental poetry; but in those countries the insect is larger and more beautiful than with us.

The beauties of the fly may therefore very well excite our curiosity to examine the reptile. But we are still more strongly attached to this tribe, from the usefulness of one of the number The silk-worm is, perhaps, the most serviceable of all other animals; since, from its labours, and the manufacture attending it, near a third part of the world are clothed, adorned, and supported.

Caterpillars may be easily distinguished from worms or maggots, by the number of their feet, and by their producing butterflies or moths. When the sun calls up vegetation, and vivifies the various eggs of insects, the caterpillars are the first that are seen, upon almost every vegetable and tree, eating its leaves, and preparing for a state of greater perfection. They have feet both before and behind, which not only enable them to move forward by a sort of steps made by their fore and hinder parts, but also to climb up vegetables, and to stretch themselves out from the boughs and stalks, to reach their food at a distance. All of this class have from eight feet, at the least, to sixteen; and this may serve to distinguish them from the worm tribe, that never have so many. The animal into which they are converted is always a butterfly or a moth; and these are always distinguished from other flies, by having their wings covered over with a painted dust, which gives them such various beauty. The wings of flies are transparent, as we see in the common flesh fly, while those of beetles are hard, like horn; from such the wings of a butterfly may be easily distinguished, and words would obscure their differences.

From hence it appears, that caterpillars, whether in the reptile state, or advanced to their last state of perfection into butterflies, may easily be distinguished from all other insects, being animals peculiarly formed, and also of a peculiar nature. The transmutations they undergo are also more numerous than those of other insects; for, when they are excluded from the egg, they assume the form of a small caterpillar, which feeds and grows larger every day, often changing its skin, but still preserving its form. When the animal has come to a certain magnitude in this state, it discontinues eating, makes itself a covering or husk, in which it remains wrapped up, seemingly without life or motion; and after having for some time continued in this state, it once more bursts its confinement, and comes forth a butterfly. Thus we see this animal put on no less than three different appearances from the time it is first excluded from the egg. It

appears a crawling caterpillar; then an insensible aurelia, as it is called, without life or motion; and lastly, a beautiful butterfly, variously painted, according to its different kind. Having thus distinguished this class of insects from all others, we will first survey their history in general, and then enter particularly into the manners and nature of a few of them which most deserve our curiosity and attention.

CHAPTER III.

OF THE TRANSFORMATION OF THE CATERPILLAR INTO ITS CORRESPONDING BUTTERFLY OR MOTH.

When winter has disrobed the trees of their leaves, nature then seems to have lost her insects. There are thousands of different kinds, with and without wings, which, though swarming at other seasons, then entirely disappear. Our fields are repeopled, when the leaves begin to bud, by the genial influence of spring; and caterpillars, of various sorts, are seen feeding upon the promise of the year, even before the leaves are completely unfolded. Those caterpillars which we then see, may serve to give us a view of the general means which nature employs to preserve such a number of insects during that season when they can no longer find subsistence. It is known, by united experience, that all these animals are hatched from the eggs of butterflies; and those who observe them more closely, will find the fly very careful in depositing its eggs in those places where they are likely to be hatched with the greatest safety and success. During winter, therefore, the greatest numbers of caterpillars are in an egg state; and in this lifeless situation brave all the rigours and the humidity of the climate; and though often exposed to all its changes, still preserve the latent principle of life, which is more fully exerted at the approach of spring. That same power that pushes forth the budding leaf and the opening flower, impels the insect into animation; and nature at once seems to furnish the guest and the banquet. When the insect has found force to break its shell, it always finds its favourite aliment provided in abundance before it.

But all caterpillars are not sent off from the egg in the beginning of spring; for many of them have subsisted during the winter in their aurelia state, in which, as we have briefly observed above, the animal is seemingly deprived of life and motion. In this state of insensibility many of these insects continue during the rigours of winter: some inclosed in a kind of shell,

which they have spun for themselves at the end of autumn ; some concealed under the bark of trees, others in the chinks of old walls, and many buried under ground. From all these a variety of butterflies are seen to issue in the beginning of spring, and adorn the earliest part of the year with their painted flutterings.

Some caterpillars do not make any change whatsoever at the approach of winter, but continue to live in their reptile state through all the severity of the season. These choose themselves some retreat, where they may remain undisturbed for months together ; and there they continue motionless, and as insensible as if they were actually dead. Their constitution is such, that food at that time would be useless, and the cold prevents their making those dissipations which require restoration. In general caterpillars of this kind are found in great numbers together inclosed in one common web, that covers them all, and serves to protect them from the injuries of the air.

Lastly, there are some of the caterpillar kind whose butterflies live all the winter, and who, having fluttered about for some part of the latter end of autumn, seek for some retreat during the winter, in order to answer the ends of propagation at the approach of spring. These are often found lifeless or motionless in the hollows of trees or the clefts of timber ; but, by being approached to the fire, they recover life and activity, and seem to anticipate the desires of spring.

In general, however, whether the animal has subsisted in an egg state during the winter ; or whether as a butterfly, bred from an aurelia, in the beginning of spring ; or a butterfly that has subsisted during the winter, and lays eggs as soon as the leaves of plants are shot forward ; the whole swarm of caterpillars are in motion to share the banquet that nature has provided. There is scarcely a plant that has not its own peculiar insects, and some are known to support several of different kinds. Of these, many are hatched from the egg at the foot of the tree, and climb up to its leaves for subsistence ; the eggs of others have been glued by the parent butterfly to the leaves, and they are no sooner excluded from the shell but they find themselves in the midst of plenty.

When the caterpillar first bursts from the egg, it is small and feeble ; its appetites are in proportion to its size, and it seems to make no great consumption : but as it increases in magnitude it improves in its appetites ; so that, in its adult caterpillar state, it is the most ravenous of all animals whatsoever. A single caterpillar will eat double its own weight of leaves in a day, and yet seems no way disordered by the meal.—What would mankind do, if their oxen or their horses were so voracious ?

These voracious habits, with its slow crawling motion, but

still more a stinging like that of nettles, which follows upon handling the greatest number of them, make these insects not the most agreeable objects of human curiosity. However, there are many philosophers who have spent years in their contemplation, and who have not only attended to their habits and labours, but minutely examined their structure and internal conformation.

The body of the caterpillar, when anatomically considered, is found composed of rings, whose circumference is pretty near circular or oval. They are generally twelve in number, and are all membranaceous, by which caterpillars may be distinguished from many other insects that nearly resemble them in form. The head of the caterpillar is connected to the first ring by the neck, that is generally so short and contracted that it is scarcely visible. All the covering of the head in caterpillars seems to consist of a shell; and they have neither upper nor under jaw, for they are both placed rather vertically, and each jaw armed with a large thick tooth, which is singly equal to numbers. With these the animals devour their food in such amazing quantities; and with these, some of the kind defend themselves against their enemies. Though the mouth be kept shut, the teeth are always uncovered; and while the insect is in health, they are seldom without employment. Whatever the caterpillar devours, these teeth serve to chop it into small pieces, and render the parts of the leaf fit for swallowing. Many kinds, while they are yet young, eat only the succulent part of the leaf, and leave all the fibres untouched; others, however, attack the whole leaf, and eat it clean away. One may be amused, for a little time, in observing the avidity with which they are seen to feed; some are seen eating the whole day, others have their hours of repast; some choose the night, and others the day. When the caterpillar attacks a leaf, it places its body in such a manner that the edge of the leaf shall fall between its feet, which keeps it steady while the teeth are employed in cutting it; these fall upon the leaf somewhat in the manner of a pair of gardener's shears, and every morsel is swallowed as soon as cut. Some caterpillars feed upon leaves so very narrow, that they are not broader than their mouths; in this case the animal is seen to devour it from the point, as we would eat a radish.

As there are various kinds of caterpillars, the number of their feet are various, some having eight, and some sixteen. Of these feet the six foremost are covered with a sort of shining gristle, and are therefore called the shelly legs. The hindmost feet, whatever be their number, are soft and flexible, and are called membranaceous. Caterpillars, also, with regard to their external figure, are either smooth or hairy. The skin of the first

kind is soft to the touch, or hard, like shagreen ; the skin of the latter is hairy, and as it were thorny, and generally, if handled, stings like nettles. Some of them even cause this stinging pain, if but approached too nearly.

Caterpillars in general have six small black spots placed on the circumference of the fore ring, and a little to the side of the head. Three of these are larger than the rest, and are convex and transparent: these Reaumur takes to be the eyes of the caterpillar ; however most of these reptiles have very little occasion for sight, and seem only to be directed by their feeling.

But the parts of the caterpillar's body which most justly demand our attention, are the *stigmata*, as they are called ; or those holes on the side of its body, through which the animal is supposed to breathe. All along this insect's body on each side, these holes are easily discoverable. They are eighteen in number, nine on a side, rather nearer the belly than the back ; a hole for every ring of which the animal's body is composed, except the second, the third, and the last. These oval openings may be considered as so many mouths, through which the insect breathes ; but with this difference, that as we have but one pair of lungs, the caterpillar has no less than eighteen. It requires no great anatomical dexterity to discover these lungs in the larger kind of caterpillars ; they appear at first view to be hollow cartilaginous tubes, and of the colour of mother-of-pearl. These tubes are often seen to unite with each other ; some are perceived to open into the intestines, and some go to different parts of the surface of the body. That these vessels serve to convey the air, appears evidently from the famous experiment of Malphigi ; who, by stopping up the mouths of the stigmata with oil, quickly suffocated the animal, which was seen to die convulsed the instant after. In order to ascertain his theory, he rubbed oil upon other parts of the insect's body, leaving the stigmata free ; and this seemed to have no effect upon the animal's health, but it continued to move and eat as usual: he rubbed oil on the stigmata on one side, and the animal underwent a partial convulsion, but recovered soon after. However, it ought to be observed, that air is not so necessary to these as to the nobler ranks of animals, since caterpillars will live in an exhausted receiver for several days together ; and though they seem dead at the bottom, yet, when taken out, recover, and resume their former vivacity.

If the caterpillar be cut open longitudinally along the back, its intestines will be perceived running directly in a straight line from the mouth to the anus. They resemble a number of small bags opening into each other, and strengthened on both sides by a fleshy cord, by which they are united. These insects are, upon

many occasions, seen to cast forth the internal coat of their intestines with their food, in the changes which they so frequently undergo. But the intestines take up but a small part of the animal's body, if compared to the fatty substance in which they are involved. This substance changes its colour when the insect's metamorphosis begins to approach; and from white it is usually seen to become yellow. If to these parts we add the caterpillar's implements for spinning (for all caterpillars spin at one time or another,) we shall have a rude sketch of this animal's conformation.

The life of a caterpillar seems one continued succession of changes; and it is seen to throw off one skin only to assume another; which also is divested in its turn: and thus for eight or ten times successively. We must not, however, confound this changing of the skin with the great metamorphosis which it is afterwards to undergo. The throwing off one skin and assuming another, seems, in comparison, but a slight operation among these animals; this is but the work of a day, the other is the great adventure of their lives. Indeed, this faculty of changing the skin is not peculiar to caterpillars only, but is common to all the insect kind, and even to some animals that claim a higher rank in nature. We have already seen the lobster and the crab outgrowing their first shells, and then bursting from their confinement, in order to assume a covering more roomy and convenient. It is probable that the louse, the flea, and the spider, change their covering from the same necessity; and growing too large for the crust in which they have been for some time inclosed, burst it for another. This period is probably that of their growth; for as soon as their new skin is hardened round them, the animal's growth is necessarily circumscribed while it remains within it. With respect to caterpillars, many of them change their skins five or six times in a season; and this covering when cast off, often seems so complete, that many might mistake the empty skin for the real insect. Among the hairy caterpillars, for instance, the cast skin is covered with hair; the feet, as well gristly as membranous, remain fixed to it; even the parts which nothing but a microscope can discover are visible in it: in short, all the parts of the head, not only the skull, but the teeth.

In proportion as the time approaches in which the caterpillar is to cast its old skin, its colours become more feeble, the skin seems to wither and grow dry, and in some measure resembles a leaf when it is no longer supplied with moisture from the stock. At that time the insect begins to find itself under a necessity of changing; and it is not effected without violent labour, and perhaps pain. A day or two before the critical

hour approaches, the insect ceases to eat, loses its usual activity, and seems to rest immovable. It seeks some place to remain in security; and no longer timorous, seems regardless even of the touch. It is now and then seen to bend itself and elevate its back; again it stretches to its utmost extent: it sometimes lifts up its head, and then lets it fall again, it sometimes waves it three or four times from side to side, and then remains in quiet. At length some of the rings of its body, particularly the first and the second, are seen to swell considerably, the old skin distends and bursts, till by repeated swellings and contractions in every ring, the animal disengages itself, and creeps from its inconvenient covering.

How laborious soever this operation may be, it is performed in the space of a minute; and the animal having thrown off its old skin, seems to enjoy new vigour, as well as acquired colouring and beauty. Sometimes it happens that it takes a new appearance, and colours very different from the old. Those that are hairy still preserve their covering, although their ancient skin seems not to have lost a single hair; every hair appears to have been drawn, like a sword from the scabbard. However, the fact is, that a new crop of hair grows between the old skin and the new, and probably helps to throw off the external covering.

The caterpillar having in this manner continued for several days feeding, and at intervals casting its skin, begins at last to prepare for its change into an aurelia. It is most probable, that from the beginning all the parts of the butterfly lay hid in this insect in its reptile state; but it required time to bring them to perfection, and a large quantity of food to enable the animal to undergo all the changes requisite for throwing off these skins, which seemed to clog the butterfly form. However, when the caterpillar has fed sufficiently, and the parts of the future butterfly have formed themselves beneath its skin, it is then time for it to make its first great and principal change into an aurelia, or a chrysalis, as some have chosen to call it; during which, as was observed, it seems to remain for several days, or even months, without life or motion.

Preparatory to this important change, the caterpillar most usually quits the plant or the tree on which it fed, or at least attaches itself to the stalk or the stem, more gladly than the leaves. It forsakes its food, and prepares by fasting to undergo its transmutation. In this period, all the food it has taken is thoroughly digested, and it often voids even the internal membrane which lined its intestines. Some of this tribe, at this period also, are seen entirely to change colour; and the vivacity of the tints in all seems faded. Those of them which are

capable of spinning themselves a web, set about this operation; those which have already spun, await the change in the best manner they are able. The web or cone with which some cover themselves, hides the aurelia contained within from the view; but in others, where it is more transparent, the caterpillar, when it has done spinning, strikes into it the claws of the two feet under the tail, and afterwards forces in the tail itself, by contracting those claws, and violently striking the feet one against the other. If, however, they be taken from their web at this time, they appear in a state of great languor, and, incapable of walking, remain on that spot where they are placed. In this condition they remain one or two days, preparing to change into an aurelia, somewhat in the manner they made preparations for changing their skin, They then appear with their bodies bent into a bow, which they now and then are seen to straighten; they make no use of their legs, but if they attempt to change place, do it by the contortions of their body. In proportion as their change into an aurelia approaches, their bodies become more and more bent, while their extensions and convulsive contractions become more frequent. The hinder end of the body is the part which the animal first disengages from its caterpillar skin; that part of the skin remains empty, while the body is drawn up contractedly towards the head. In the same manner they disengage themselves from the two succeeding rings, so that the animal is then lodged entirely in the fore part of its caterpillar covering; that half which is abandoned remains lax and empty, while the fore part, on the contrary, is swoln and distended. The animal having thus quitted the hinder part of its skin to drive itself up into the fore part, still continues to heave and work as before; so that the skull is soon seen to burst into three pieces, and a longitudinal opening is made in the three first rings of the body, through which the insect thrusts forth its naked body, with strong efforts. Thus at last it entirely gets free from its caterpillar skin, and for ever forsakes its most odious reptile form.

The caterpillar, thus stripped of its skin for the last time, is now become an aurelia; in which the parts of the future butterfly are all visible, but in so soft a state, that the smallest touch can discompose them. The animal is now become helpless and motionless; but only waits for the assistance of the air to dry up the moisture on its surface, and supply it with a crust capable of resisting external injuries. Immediately after being stripped of its caterpillar skin, it is of a green colour, especially in those parts which are distended by an extraordinary afflux of animal moisture; but in ten or twelve hours after being thus exposed, its parts harden, the air forms its external covering

into a firm crust, and in about four-and-twenty hours the aurelia may be handled, without endangering the little animal that is thus left in so defenceless a situation. Such is the history of the little pod or cone that is found so common by every pathway, sticking to nettles, and sometimes shining like polished gold. From the beautiful and resplendent colour with which it is thus sometimes adorned, some authors have called it a Chrysalis, implying a creature made of gold.

Such are the efforts by which these little animals prepare for a state of perfection ; but their care is still greater to provide themselves a secure retreat during the season of their imbecility It would seem like erecting themselves a monument, where they were to rest secure, until nature had called them into a new and more improved existence. For this purpose, some spin themselves a cone or web, in which they lie secure till they have arrived at maturity ; others, that cannot spin so copious a covering, suspend themselves by the tail, in some retreat where they are not likely to meet disturbances. Some mix sand with their gummy and moist webs, and thus make themselves a secure incrustation ; while others, before their change, bury themselves in the ground, and thus avoid the numerous dangers that might attend them. One would imagine that they were conscious of the precise time of their continuance in their aurelia state, since their little sepulchres, with respect to the solidity of the building, are proportioned to such duration. Those that are to lie in that state of existence but a few days, make choice of some tender leaf, which they render still more pliant by diffusing a kind of glue upon it ; the leaf thus gradually curls up, and withering as it enfolds, the insect wraps itself within, as in a mantle, till the genial warmth of the sun enables it to struggle for new life, and bursts from its confinement. Others, whose time of transformation is also near at hand, fasten their tails to a tree, or to the first worm-hole they meet in a beam, and wait in that defenceless situation. Such caterpillars, on the other hand, as are seen to lie several months in their aurelia state, act with much greater circumspection. Most of them mix their web with sand, and thus make themselves a strong covering ; others build in wood, which serves them in the nature of a coffin. Such as have made the leaves of willows their favourite food, break the tender twigs of them first into small pieces, then pound them as it were to powder ; and, by means of their glutinous silk, make a kind of paste, in which they wrap themselves up. Many are the forms which these animals assume in this helpless state ; and it often happens, that the most deformed butterflies issue from the most beautiful aurelias.

In general, however, the aurelia takes the rude outline of the

parts of the animal which is contained within it; but as to the various colours which it is seen to assume, they are rather the effect of accident; for the same species of insect does not at all times assume the same hue when it becomes an aurelia. In some, the beautiful gold colour is at one time found; in others it is wanting. This brilliant hue, which does not fall short of the best gilding, is formed in the same manner in which we see leather obtain a gold colour, though none of that metal ever enters into the tincture. It is only formed by a beautiful brown varnish, laid upon a white ground; and the white thus gleaming through the transparency of the brown, gives a charming golden yellow. These two colours are found, one over the other, in the aurelia of the little animal we are describing; and the whole appears gilded, without any real gilding.

The aurelia thus formed, and left to time to expand into a butterfly, in some measure resembles an animal in an egg, that is to wait for external warmth to hatch it into life and vigour. As the quantity of moisture that is inclosed within the covering of the aurelia, continues to keep its body in the most tender state, so it is requisite that this humidity should be dried away, before the little butterfly can burst its prison. Many have been the experiments to prove that nature may in this respect be assisted by art; and that the life of the insect may be retarded or quickened, without doing it the smallest injury. For this purpose, it is only requisite to continue the insect in its aurelia state, by preventing the evaporation of its humidity, which will consequently add some days, nay weeks, to its life; on the other hand, by evaporating its moisture in a warm situation, the animal assumes its winged state before its usual time, and goes through the offices assigned its existence. To prove this, M. Reaumur inclosed the aurelia in a glass tube, and found the evaporated water which exhaled from the body of the insect, collected in drops at the bottom of the tube; he covered the aurelia with varnish, and this making the evaporation more difficult and slow, the butterfly was two months longer than its natural term in coming out of its case; he found, on the other hand, that by laying the animal in a warm room, he hastened the disclosure of the butterfly; and by keeping it in an ice-house in the same manner, he delayed it. Warmth acted, in this case, in a double capacity, invigorating the animal, and evaporating the moisture.

The aurelia, though it bears a different external appearance, nevertheless contains within it all the parts of the butterfly in perfect formation, and lying each in a very orderly manner, though in the smallest compass. These, however, are so fast and tender, that it is impossible to visit without discomposing them When either by warmth, or increasing vigour, the parts

have acquired the necessary force and solidity, the butterfly then seeks to disembarrass itself of those bands which kept it so long in confinement. Some insects continue under the form of an aurelia not above ten days, some twenty, some several months, and even for a year together.

The butterfly, however, does not continue so long under the form of an aurelia as one would be apt to imagine. In general, those caterpillars that provide themselves with cones, continue within them but a few days after the cone is completely finished. Some, however, remain buried in this artificial covering for eight or nine months, without taking the smallest sustenance during the whole time; and though in the caterpillar state no animals were so voracious, when thus transformed they appear a miracle of abstinence. In all, sooner or later, the butterfly bursts from its prison, not only that natural prison which is formed by the skin of the aurelia, but also from that artificial one of silk, or any other substance in which it has inclosed itself.

The efforts which the butterfly makes to get free from its aurelia state, are by no means so violent as those which the insect had in changing from the caterpillar into the aurelia. The quantity of moisture surrounding the butterfly is by no means so great as that attending its former change; and the shell of the aurelia is so dry, that it may be cracked between the fingers.

If the animal be shut up within a cone, the butterfly always gets rid of the natural internal skin of the aurelia, before it eats its way through the external covering which its own industry has formed round it. In order to observe the manner in which it thus gets rid of the aurelia covering, we must cut open the cone, and then we shall have an opportunity of discovering the insect's efforts to emancipate itself from its natural shell. When this operation begins, there seems to be a violent agitation in the humours contained within the little animal's body. Its fluid seems driven, by a hasty fermentation, through all the vessels, while it labours violently with its legs, and makes several other violent struggles to get free. As all these motions concur with the growth of the insect's wings and body, it is impossible that the brittle skin which covers it should longer resist; it at length gives way, by bursting into four distinct and regular pieces. The skin of the head and legs first separates; then the skin at the back flies open, and dividing into two regular portions, disengages the back and wings; then there likewise happens another rupture in that portion which covered the rings of the back of the aurelia. After this, the butterfly, as if fatigued with its struggles, remains very quiet for some time, with its wings pointed downwards, and its legs fixed in the skin which it had

just thrown off. At first sight, the animal, just set free, and permitted the future use of its wings, seems to want them entirely; they take up such little room, that one would wonder where they were hidden. But soon after, they expand so rapidly, that the eye can scarcely attend their unfolding. From reaching scarcely half the length of the body, they acquire, in a most wonderful manner, their full extent and bigness, so as to be each five times larger than they were before. Nor is it the wings alone that are thus increased; all their spots and paintings, before so minute as to be scarcely discernible, are proportionably extended; so that, what a few minutes before seemed only a number of confused, unmeaning points, now become distinct and most beautiful ornaments. Nor are the wings, when they are thus expanded, unfolded in the manner in which earwigs and grasshoppers display theirs, who unfurl them like a lady's fan; on the contrary, those of butterflies actually grow to their natural size in this very short space. The wing, at the instant it is freed from its late confinement, is considerably thicker than afterwards; so that it spreads in all its dimensions, growing thinner as it becomes broader. If one of the wings be plucked from the animal just set free, it may be spread by the fingers, and it will soon become as broad as the other which has been left behind. As the wings extend themselves so suddenly, they have not yet had time to dry, and accordingly appear like pieces of wet paper, soft and full of wrinkles. In about half an hour they are perfectly dry, their wrinkles entirely disappear, and the little animal assumes all its splendour. The transmutation being thus perfectly finished, the butterfly discharges three or four drops of a blood-coloured liquid, which are the last remains of its superfluous moisture. Those aurelias which are inclosed within a cone find their exit more difficult, as they have still another prison to break through: this, however, they perform in a short time; for the butterfly, freed from its aurelia skin, butts with its head violently against the walls of its artificial prison; and probably with its eyes, that are rough and like a file, it rubs the internal surface away, till it is at last seen bursting its way into open light, and, in less than a quarter of an hour, the animal acquires its full perfection.

Thus, to use the words of Swammerdam, we see a little insignificant creature distinguished, in its last birth, with qualifications and ornaments, which man, during his stay upon earth, can never even hope to acquire. The butterfly, to enjoy life, needs no other food but the dews of heaven, and the honied juices which are distilled from every flower. The pageantry of princes cannot equal the ornaments with which it is invested, nor the rich colouring that embellishes its wings. The skies are the butter-

fly's proper habitation, and the air its element; whilst man comes into the world naked, and often roves about without habitation or shelter; exposed, on one hand, to the heat of the sun, and on the other, to the damps and exhalations of the earth, both alike enemies of his happiness and existence.—A strong proof that, while this little animal is raised to its greatest height, we are as yet, in this world, only candidates for perfection!

CHAPTER IV.

BUTTERFLIES AND MOTHS.

It has been already shown, that all Butterflies are bred from caterpillars; and we have exhibited the various circumstances of that surprising change. It has been remarked, that butterflies may be easily distinguished from flies of every other kind by their wings; for, in others, they are either transparent, like gauze, as we see in the common flesh fly, or they are hard and crusted, as we see in the wings of the beetle. But in the butterfly, the wings are soft, opaque, and painted over with a beautiful dust that comes off with handling.

The number of these beautiful animals is very great; and though Linnæus has reckoned up above seven hundred and sixty different kinds, the catalogue is still very incomplete. Every collector of butterflies can show undescribed species; and such as are fond of minute discovery, can here produce animals that have been examined only by himself. In general, however, those of the warm climates are larger and more beautiful than such as are bred at home; and we can easily admit the beauty of the butterfly, since we are thus freed from the damage of the caterpillar. It has been the amusement of some to collect these animals from different parts of the world, or to breed them from caterpillars at home. These they arrange in systematic order, or dispose so as to make striking and agreeable pictures; and all must grant, that this specious idleness is far preferable to that unhappy state which is produced by a total want of employment.

The wings of butterflies, as was observed, fully distinguish them from flies of every other kind. They are four in number; and, although two of them be cut off, the animal can fly with the two others remaining. They are, in their own substance, transparent; but owe their opacity to the beautiful dust with which they are covered, and which has been likened, by some naturalists, to the feathers of birds, by others, to the scales of

fishes, as their imaginations were disposed to catch the resemblance. In fact, if we regard the wing of a butterfly with a good microscope, we shall perceive it studded over with a variety of little grains of different dimensions and forms, generally supported upon a foot-stalk, regularly laid upon the whole surface. Nothing can exceed the beautiful and regular arrangement of these little substances, which thus serve to paint the butterfly's wing, like the tiles of a house. Those of one rank are a little covered by those that follow; they are of many figures: on one part of the wing may be seen a succession of oval studs, on another part a cluster of studs, each in the form of a heart; in one place they resemble a hand open, and in another they are long or triangular; while all are interspersed with taller studs, that grow between the rest, like mushrooms upon a stalk. The wing itself is composed of several thick nerves, which render the construction very strong, though light; and though it be covered over with thousands of these scales or studs, yet its weight is very little increased by the number. The animal is with ease enabled to support itself a long while in the air, although its flight be not very graceful. When it designs to fly to a considerable distance, it ascends and descends alternately; going sometimes to the right, sometimes to the left, without any apparent reason. Upon closer examination, however, it will be found that it flies thus irregularly in pursuit of its mate; and as dogs bait and quarter the ground in pursuit of their game, so these insects traverse the air in quest of their mates, whom they can discover at more than a mile's distance.

If we prosecute our description of the butterfly, the animal may be divided into three parts; the head, the corslet, and the body.

The body is the hinder part of the butterfly, and is composed of rings, which are generally concealed under long hair, with which that part of the animal is clothed. The corslet is more solid than the rest of the body, because the fore wings and the legs are fixed therein. The legs are six in number, although four only are made use of by the animal; the two fore legs being often so much concealed in the long hair of the body, that it is sometimes difficult to discover them. If we examine these parts internally, we shall find the same set of vessels in the butterfly that we observed in the caterpillar, but with this great difference —that as the blood, or humours, in the caterpillar, circulated from the tail to the head, they are found in the butterfly, to take a direct contrary course, and to circulate from the head to the tail; so that the caterpillar may be considered as the embryo animal, in which, as we have formerly seen, the circulation is

carried on differently from what it is in animals when excluded.

But leaving the other parts of the butterfly, let us turn our attention particularly to the head. The eyes of butterflies have not all the same form; for in some they are large, in others small; in some they are the larger portion of a sphere, in others they are but a small part of it, and just appearing from the head. In all of them, however, the outward coat has a lustre, in which may be discovered the various colours of the rainbow. When examined a little closely, it will be found to have the appearance of a multiplying glass; having a great number of sides, or facets, in the manner of a brilliant cut diamond. In this particular the eye of the butterfly, and of most other insects, entirely correspond; and Leuwenhoek pretends there are above six thousand facets on the cornea of a flea. These animals, therefore, see not only with great clearness, but view every object multiplied in a surprising manner. Puget adapted the cornea of a flea in such a position, as to see objects through it by the means of a microscope; and nothing could exceed the strangeness of its representations: a soldier, who was seen through it, appeared like an army of pigmies; for while it multipled, it also diminished the object; the arch of a bridge exhibited a spectacle more magnificent than human skill could perform; the flame of a candle seemed a beautiful illumination. It still, however, remains a doubt, whether the insect sees objects singly, as with one eye, or whether every facet is itself a complete eye, exhibiting its own object distinct from all the rest.

Butterflies, as well as most other flying insects, have two instruments like horns on their heads, which are commonly called feelers. They differ from the horns of greater animals, in being moveable at their base, and in having a great number of joints, by which means the insect is enabled to turn them in every direction. Those of butterflies are placed at the top of the head, pretty near the external edge of each eye. What the use of these instruments may be, which are thus formed with so much art, and by a Workman who does nothing without reason, is as yet unknown to man. They may serve to guard the eye, they may be of use to clean it, or they may be the organ of some sense which we are ignorant of; but this is only explaining one difficulty by another.

We are not so ignorant of the uses of the trunk, which f w insects of the butterfly kind are without. This instrument is placed exactly between the eyes; and when the animal is not employed in seeking its nourishment, it is rolled up like a curl.

A butterfly, when it is feeding, flies round some flower and settles upon it. The trunk is then uncurled, and thrust out either wholly or in part, and is employed in searching the flower to its very bottom, let it be ever so deep. This search being repeated seven or eight times, the butterfly then passes to another, and continues to hover over those agreeable to its taste, like a bird over its prey. This trunk consists of two equal hollow tubes, nicely joined to each other, like the pipes of an organ.

Such is the figure and conformation of these beautiful insects, that cheer our walks, and give us the earliest intimations of summer. But it is not by day alone that they 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. This tribe of insects has therefore been divided into Diurnal and Nocturnal Flies, or, more properly speaking, into Butterflies and Moths; the one flying only by day, the other most usually on the wing in the night. They may be easily distinguished from each other by their horns or feelers; those of the butterfly being clubbed, or knobbed at the end, those of the moth tapering finer and finer to a point. To express it technically—the feelers of butterflies are clavated, those of moths are filiform.

The butterflies, as well as the moths, employ the short life assigned them in a variety of enjoyments. Their whole time is spent either in quest of food, which every flower offers, or in pursuit of the female, whose approach they can often perceive at two miles' distance. Their sagacity in this particular is not less astonishing than true; but by what sense they are thus capable of distinguishing each other at such distances, is not easy to conceive. It cannot be by the sight, since such small objects as they are must be utterly imperceptible at half the distance at which they perceive each other; it can scarcely be by the sense of smelling, since the animal has no organs for that purpose. Whatever be their powers of perception, certain it is, that the male, after having fluttered, as if carelessly, about for some time, is seen to take wing, and go forward, sometimes for two miles together, in a direct line to where the female is perched on a flower.

The general rule among insects is, that the female is larger than the male; and this obtains particularly in the tribe that I am describing. The body of the male is smaller and slenderer, that of the female more thick and oval. Previous to the junction of these animals, they are seen sporting in the air, pursuing and flying from each other, and preparing, by a mock combat

for the more important business of their lives. If they be disturbed while united, the female flies off with the male on her back, who seems entirely passive on the occasion.

But the females of many moths and butterflies seem to have assumed their airy form for no other reason but to fecundate their eggs and lay them. They are not seen fluttering about in quest of food, or a mate; all that passes during their short lives, is a junction with the male of about half an hour, after which they deposit their eggs, and die, without taking any nourishment, or seeking any. It may be observed, however, that in all the females of this tribe, they are impregnated by the male by one aperture, and lay their eggs by another.

The eggs of female butterflies are disposed in the body like a bed of chaplets, which, when excluded, are usually oval, and of a whitish colour: some, however, are quite round, and others flatted like a turnip. The covering or shell of the egg, though solid, is thin and transparent; and in proportion as the caterpillar grows within the egg, the colours change, and are distributed differently. The butterfly seems very well instructed by nature in its choice of the plant or the leaf where it shall deposit its burden. Each egg contains but one caterpillar, and it is requisite that this little animal, when excluded, should be near its peculiar provision. The butterfly, therefore, is careful to place her brood only upon those plants that afford good nourishment to its posterity. Though the little winged animal has been fed itself upon dew, or the honey of flowers, yet it makes choice for its young of a very different provision, and lays its eggs on the most unsavoury plants—the rag-weed, the cabbage, or the nettle. Thus every butterfly chooses, not the plant most grateful to it in its winged state, but such as it has fed upon in its reptile form.

All the eggs of butterflies are attached to the leaves of the favourite plant, by a sort of size or glue, where they continue unobserved, unless carefully sought after. The eggs are sometimes placed round the tender shoots of plants, in the form of bracelets, consisting of above two hundred in each, and generally surrounding the shoot, like a ring upon a finger. Some butterflies secure their eggs from the injuries of air, by covering them with hair plucked from their own bodies, as birds sometimes are seen to make their nests; so that their eggs are thus kept warm, and also entirely concealed.

All the tribe of female moths lay their eggs a short time after hey leave the aurelia; but there are many butterflies that flutter about the whole summer, and do not think of laying till the winter begins to warn them of their approaching end; some even continue the whole winter in the hollows of trees, and do

not provide for posterity until the beginning of April, when they leave their retreats, deposit their eggs, and die. Their eggs soon begin to feel the genial influence of the season; the little animals burst from them in their caterpillar state, to become aurelias and butterflies in their turn, and thus to continue the round of nature.

BIRDS.

CHAP. I.—Into how many classes are birds divided? How are the different classes distinguished from each other?

CHAP. II.—Describe the Ostrich. Where is it found? For what is it chiefly valuable? What is said of the Cassowary? Of the Dodo?

CHAP. III.—Name the varieties which constitute the rapacious kind. Describe the Golden Eagle. The American Condor. The Vulture. Where is it found? What service does it render to the Inhabitants of Grand Cairo? Describe the Falcon. The Kite. The Buzzard. The Great Horned Owl. The White Owl. The Screech Owl. In what repute is it held by the Kalmuc Tartars?

CHAP. IV.—What is said of the Poultry kind? How are they distinguished from the rapacious kind? Describe the Cock. The Turkey. The Guinea Hen. The Peacock. The Pheasant. The Bustard, &c.

CHAP. V.—In what estimation is the Pie kind held? Name its varieties. What is said of the Raven? Its sagacity? The respect paid to it in Sweden? Describe the Magpie, Jay, Kingfisher, &c.

CHAP. VI.—Describe the Parrot. The Bird of Paradise. Whence its name? Give some account of the Pigeon. Its former utility to man. Its rapid flights.

CHAP. VII.—What is said of the Thrush? The Red-Wing? The Blackbird? The Bullfinch? The Ortolan?

CHAP. VIII.—Describe the Lark. The Nightingale. The Redbreast. The Swallow. The American Mock-Bird. The Humming-bird.

CHAP. IX.—Into how many classes may water-fowl be divided? Name them. Describe the Crane kind. The Heron. The Bittern. The Stork. In what estimation did the Egyptians hold this bird, and why?

CHAP. X.—What is said of the Flamingo? For what is it remarkable? Describe the Pelican of Africa. The Cormorant. The Albatross.

CHAP. XI.—Describe the Gull. The Petrel. The Tern. What is said of the Penguin?

CHAP. XII.—Name and describe the varieties of the Goose kind. What is said of the Swan? In what respect does the Barnacle differ from the others of its kind? Describe the Brent-Goose. The Duck.

FISHES.

CHAP. I.—What do you know of the Fish tribes? How many species does Linnæus reckon? What is said of their digestive powers? Upon what do they subsist? How many species of the Whale are known, and

which are the principal? For what is the common whale chiefly valuable? Give some account of the method and season for taking the whale. What is said of the Narwhale? Of the Spermaceti Whale? What drugs does it afford? What is said of its ferocity and ravenous appetite? What is said of the Grampus? The Porpoise? The Dolphin?

Chap. II.—What are the varieties of the Shark? Describe the methods of taking them. What do you know of the Fire-Flare? The Torpedo? What wonderful property is possessed by this fish? Describe the Sea-Devil. The Sea-Eagle. The Sturgeon. The Fishing-Frog. The Sea-Porcupine.

Chap. III.—What is the third grand division of fishes? What is the principal characteristic of the Apodes? Describe the varieties of the Eel. The singular property of the Electrical Eel. What is the general characteristic of the Jugulares? For what is the Dragonet remarkable? What do you know of the Cod?

Chap. IV.—What is the Discriminative characteristic of the Thoraici? How many species and genera are comprehended in this order? Describe the Gilt-Head. The Dorado. The Flying-Fish. What is the principal characteristic of the Abdominales? How many genera and species are included in this division? Describe them.

Chap. V.—Name the varieties of shell-fish? What is said of the Lobster and Crab? Describe the Tortoise kind. What is said of the Sea-Turtle?

REPTILES.

Chap. I.—What animals are comprehended in the reptile race? Describe the Crocodile. The Salamander? The Chameleon. The Inguana.

Chap. II.—Describe the serpent kind. What is said of the Boa? What does History inform us concerning the serpent? What do you know of the Rattlesnake?

INSECTS.

Chap. I.—Into how many classes may the insect tribes be divided? Describe the Scorpion. How many different species of the Scorpion have been enumerated? What is said of its malignity? Describe the Silk-Worm. Its utility. The Bee. The Locust. What is said of its destructive migration? Describe the Hydra, or fresh-water Polypus.

Appendix.—Describe the varieties of the Spider kind. The Caterpillar kind. What do you know of the transformation of the Caterpillar into the Butterfly or Moth?