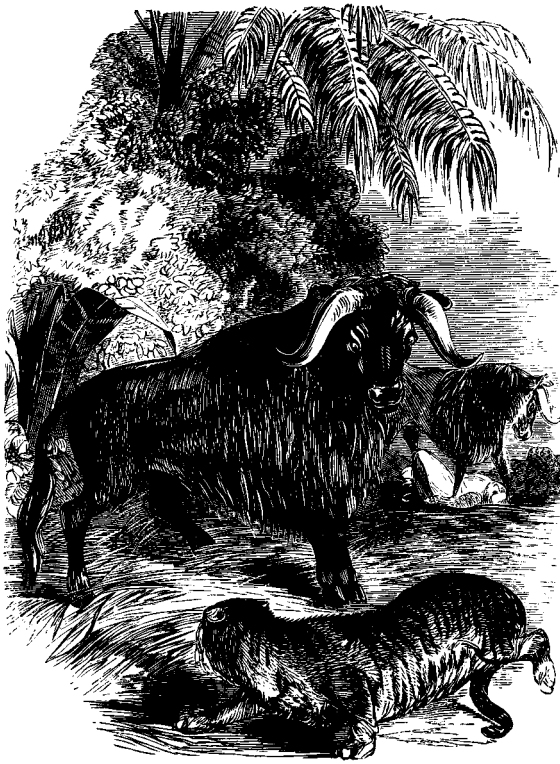
Treasury of the Animal World



A short fight ensued between the buffalo and the tiger, which ended in the flight of the latter. In the meantime, the other buffalo had placed himself above the body of the boy, which was lying on the ground, in such a way as to cover it entirely.—p. 150.

TREASURY

OF

THE ANIMAL WORLD.

FOR THE YOUNG.

EDITED BY

WILLIAM ANDERSON,

GALL & INGLIS.

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PREFACE

THE object of the present volume is to furnish a general account of the habits, history, instincts, organization, and other interesting particulars of various classes in the animal world, with some striking and well-authenticated illustrative facts and anecdotes of their dispositions and character. The prescribed limits of the work rendered it impossible for the Editor to give a description of every member of the animal kingdom, of which the enlarged stores of zoological information which we now possess, and which are every day increasing, supplies an account; but he has endeavoured, with a due regard to accuracy of detail and systematic arrangement, to produce such a popular volume on the subject, as will form a correct guide to the young in the study of that most delightful and attractive of all the sciences,—natural history. The perusal of a work like this is well calculated to call forth feelings of adoration and gratitude to that Almighty Being who, in His infinite wisdom, has

assigned to every creature its own place, and its own duties, in the great plan of creation; and who, on their first formation, saw that all was "very good."

Simplicity of style has been strictly aimed at; and an explanation of some of the scientific terms used in regard to animals is subjoined to the Contents.

CONTENTS.

SOME TERMS USED IN RELATION TO ANIMALS.

AMPHIBIA, animals that, by their peculiar anatomy, are able to live either upon land or in the water.

CARINATED, formed like the keel of a ship.

CARNIVOROUS, flesh-eating.

CETACEOUS, of the whale kind.

CRUSTACEA, animals having jointed shells, as the crab.

GRAMINIVOROUS, living upon grass.

MAMMALIA, (from *mammæ*, breasts,) animals which suckle their young. The mammalia are generally the most intelligent of animals. They are divided into orders according to the structure of their teeth and their feet, which determine the habits and manner of life of animals.

MOLLUSCA, animals without a skeleton or backbone, comprehended in the second great division of the animal kingdom. The muscles in this class of animals are attached to a soft skin, which is sometimes naked, and sometimes co-ered with shells of very various forms.

OVIPAROUS, producing eggs; from *ovum*, an egg; and *paro*, to produce. Fowls and fishes are oviparous.

PHOCÆ, the seal kind.

PLANTIGRADE animals, such as have the whole sole of the foot resting on the ground when walking, as the bear.

TESTACEA, animals having continuous shells, as the periwinkle.

VERTEBRATA, or vertebrate animals, those having a true skeleton, with a vertebral or spinal column for the protection of the spinal chord. From man, who, from his most perfect organization, stands at the head of the mammalia, to whales and their kind, which are classed at the end, the skeleton is formed upon the same general principles; and its parts are only altered and modified to suit the station which the animal is destined to fill.

VIVIPAROUS, bringing forth the young alive, as the mammalia; opposed to oviparous.

THE ANIMAL WORLD.

INSECTS,

THEIR HABITS AND HISTORY.

THE injuries caused by various insects to those vegetables which are objects of cultivation, comprise a very important branch of the history of these animals; and it is one, indeed, in which the labours of entomologists have really proved useful. By discovering the mode and times of their breeding, hatching, or laying eggs, observers have been enabled to point out the seasons at which it is most easy to destroy them. But their labours have also been of great use in tracing the animal through its transformations; and thus enabling us to determine the destructive parent of an innocent progeny, or the reverse. It may be worth while, for example, for housewives to know, that it is not the moth but the maggot that eats our blankets; and that, if such articles be exposed to light during the laying season, they may be neglected all the rest of the year.

Many insects, in the state of larvæ, or maggots, destroy wheat, and that in such quantities as to cause serious losses in agriculture, amounting even to many hundred acres in some cases. They insinuate them-

selves into the young plants below the surface, and devour the centre of the shoot. The parents of these are various beetles (in the popular sense) of the genera carabus, harpalus, melolontha, and others. But of all these pests, that known by the name of the Hessian fly, in America, is the most formidable, although its systematic name and nature are yet unknown. The ravages of this insect were first noticed in 1776; and it was supposed to have been brought from Germany by the Hessian troops. Beginning in Long Island, it proceeded inland at the rate of fifteen or twenty miles a-year, till at last it extended over a space of two hundred miles. Neither mountains nor rivers stopped them. They "crossed the Delaware like a cloud," and even filled the houses of the inhabitants. Rye, barley, rice, all other grains, in short, have their appropriate enemies, contending for possession against him who himself is the greatest devourer of wheat and barley, rice and maize. But peas and beans, clover, turnips, grass, hops, tea, sugar, vines, apples, pears, and peaches, and what not—all have their peculiar admirers among the insect tribes.

The account of the ant of Barbadoes—the formica saccharivora—is almost terrific. This insect appeared about the middle of the last century in such infinite hosts in the island of Granada, as to put a stop to the cultivation of the sugar-cane. A reward of twenty thousand pounds was offered to any one who should discover an effectual mode of destroying them. Their numbers were incredible; they descended from

the hills like torrents; and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, reptiles, birds, and even some of the domestic quadrupeds, were killed by them. "Streams of water opposed only a temporary obstacle to their progress; the foremost rushing blindly on to a certain death, and fresh armies continually following till a bank was formed of the carcases of those that were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety." They even rushed into the fires that were lighted to stop them. This pest was at length exterminated by a hurricane.

Of all the descriptions of armies of locusts that we have read, nothing comes near to that of Major Moore, author of the *Hindu Pantheon*. When at Poonah, "he was witness to an immense army" of these animals, "which ravished the Mahratta country, and was supposed to have come from Arabia. The column which they composed extended (as he was informed) five hundred miles; and so compact was it when on the wing that, like an eclipse, it completely hid the sun, so that no shadow was cast by any object; and some lofty tombs, distant from his residence not two hundred yards, were rendered quite invisible." Hasselquist tells us that the Pacha of Tripoli once raised an army of four thousand men, to fight the locusts that had invaded his dominions. Of such enemies as these, it may fairly be said, that their strength is in their weakness. Man, with all his machinery and his strategy, is not a match for these myriads of insignificant-looking creatures that

assail him in all quarters,—in his liver, his stomach, his skin, his house, his books, his food, his pleasures, and his repose. There is scarcely one of them all that might not drive him out of creation, were there no remedies provided against the consequences of that fertility with which they are so conspicuously gifted. The termes, or white ant of the East and West Indies, is the most dexterous, at least in the art of demolishing the wood of houses, and other matters of a solid nature. In a few nights they will destroy all the timber-work of a large apartment, leaving nothing but the external coats of the wood, which, in the end, they also demolish. These operations are carried on by a regular system of mining. Kœmpler, an author worthy of all credit, relates that, during one night the termites entered from the floor into one of the legs of his table, traversing the board in the same manner by a concealed passage as big as his finger, and returning down through the opposite leg into the floor below. They have even attacked and destroyed ships.

Fortunately for our species, many of our great enemies make war on each other; or find, in their own department of creation, their most natural enemies; and thus, if we have among them foes, we also have allies. It is a case, however, in which it is particularly necessary not to commit the common mistake of not knowing our friends from our enemies. The idle boy, or blundering gardener, imagines that he has gained a great victory when he has destroyed a dragon-fly. or a few wasps; when, for each of the former, there are

turned loose on him many thousands of plagues which these animals, the tigers of their division, were created to destroy; and when, for every one wasp, his peaches must submit to the depredations of a hundred flies. It is the business of ichneumons to keep caterpillars within bounds; the lady-bird protects our roses from the green aphis; the cicindelæ, worthy of being classed with the dragons of romance, make war on every insect; and, lastly, comes the formica omnivoræ, to swallow them all. Thus we have to choose very often between spiders and flies; and Betty's broom sometimes proves an enemy instead of a friend.

It has been said, that man is the only animal that makes war on his own species. But the insects who outdo us in so many things, vie with us in that species of policy too. The mantes have their fore legs somewhat in the shape of a sabre; so that they can cut off their antagonist's head, or cleave him down the middle, as dexterously as ever did Sergeant Shaw. We do not know if Rosel intended to be satirical when he asserted that he could never succeed in rearing the mantes religiosa, as the stronger always devoured the weaker. The Chinese children treat these animals like gamecocks; keeping them in cages for fighting. The scorpions seem peculiarly gifted with this human propensity. Monsieur Maupertuis placed a hundred in one box; and they "all destroyed each other." Spiders fight together till they have no legs left; and some caterpillars feed on each other.

The care which insects take in depositing their eggs,

and the provision which they lay up in many cases for the larvæ, are universally known. It is not common with them, however, to pay much personal attention to the eggs when once laid, nor to have any communication with their young. But the earwig, a much "traduced" and motherly animal, sits on its eggs; and if they are forcibly dispersed, will collect them again. The young ones, when "hatched, creep like a brood of chickens under the belly of their gentle mamma, who very quietly suffers them to push between her feet, and will often, as De Goer found, sit on them in this position for some hours." A certain field-bug, the cimex griscus, "conducts her family, of thirty or forty young ones, as a hen does her chickens. She never leaves them; and as soon as she begins to move, all the little ones closely follow, and whenever she stops, assemble in a cluster round her." A branch of a tree thus peopled having been cut off, "the mother shewed every symptom of excessive uneasiness. In other circumstances, such an alarm would have caused her immediate flight; but now she never stirred from her young, but kept beating her wings incessantly with a very rapid motion, evidently for the purpose of protecting them from the apprehended danger." Thus also spiders carry about their nest or egg-bag, which they protect with the greatest care; and even after they are hatched, the young ones are carried about on the mother's back. The care which bees and ants shew for their eggs and their young, is too generally known to require notice.

In the article of food there are some curious differences

among the tribes of insects, as much in the manner as in the matter and quantity. Caterpillars will consume more than twice their own weight of leaves in a day. Some larvæ that live on flesh will, in the course of a day, grow to be two hundred times heavier; others are extremely abstinent. A mite will live three months, or more, although glued down to a piece of glass. Spiders will live a year without food. M. Baker kept a beetle, the blaps mortisaga, three years in the same manner. As to the matter, they seem to eat everything but metals and stones. Every part of every plant, fruit, leaves, bark, wood, secretions, is the prey of some insect or other. In animals, they live within and without; not easily induced to quit, and eating everything to which they can gain access, they perforate our blood-vessels, and suck our blood. Myriads feed by destroying each other; and to numerous larvæ, and others, is delegated the important task of destroying and removing dead animal matter. A very jovial fly, the oinopota cellaris, lives entirely on wine and beer; and the book-worm, "beast of prey," literary in his pursuits, together with numerous tinæ and termites, regale on our manuscripts and books, destroying, in South America, all titles, genealogies, laws, records and cases. In short, nothing will stand but monumental brass, which, unluckily too, time, and the rains and heats, reduce to dust and verdigris, as the others do the hortus siccus of the botanist, and the treasures of the entomologist.

The manner of eating is infinitely varied in this

tribe, as much in consequence of their great variety of forms and of food, as of the different conditions in which the individual exists at different times. The forms of their jaws are endless; and many of them possess two pairs, the one intended for securing, and the other for masticating, their food. Those that feed on honey have a tubular proboscis, varying in its form, disposition, length, and other particulars, according to the various objects with which it is to be engaged. The fluids are extracted from the solid parts of plants or animals by other instruments, consisting of lancets or cutting tools, acting within a tubular or grooved beak. The proboscis of many flies has an apparatus at the extremity for forming a vacuum, thus aiding the ascent of the fluids. Some of these instruments are so sharp as to pierce the hard wing of a beetle. With respect to the sanguivorous species, they not only select the arteries for their operations, but also have the power, by means of some poisonous fluid, or chemical action probably, so to dilute the blood, as to make it flow through orifices which it otherwise could not pass. Equally extraordinary must be the animal compound which forms these perforating engines. Our midge is so minute an animal that its proboscis cannot be seen without a high magnifying power; yet it penetrates a tough epidermis and an artery also, and that with an engine that is flexible, is probably muscular, and which, for aught we can conjecture, cannot differ from the toughest animal matter we know, namely, horn or bone; whereas we

cannot cause even the toughest or hardest metals to produce these effects, when of a far greater size; nay, it is with some difficulty that we can reduce even the most tenacious to such dimensions.

With respect to the stratagems used by insects to ensnare their prey, we shall describe one that fell under our own observation. The cancer phulangium is provided with very long legs, and is entirely covered with glutinous hairs. By means of its cutting hands, it snips off the leaves of the small fuci in the pools which it inhabits, and by attaching them to these hairs, becomes undistinguishable from the plant itself. Thus dressed, it lies on its back, with its claws extended upwards, making immediate prize of the small shrimps or other insects that fly to the kalu plant for shelter. So perfect is the deception, that we only discovered this trick by finding that a plant, which we had placed in our book with the intention of drying it, turned round and ran away. We had the curiosity afterwards to examine the metamorphosed animals in their own element, when we found that nothing could induce them to shew any marks of life but the entrance of a shrimp among their leaves. When stripped of their borrowed plumes, they escaped with great rapidity.

With respect to the construction of their habitations, the bee tribe, as is well known, is the most remarkable. One species, the apis muraria, builds with stone. The materials are sand, which is first cemented, by some viscid fluid which the creature supplies, into the form of small shot, and then transported to the wall which

is chosen for the nest. With these, ranges of cells are constructed for the reception of eggs, and of the food of the future larvæ. The cells, when completed, are entirely covered with the same material, so as to conceal the whole; which thus becomes scarcely distinguishable from the stone to which it is fixed. The common wasp makes its nest of perfect paper; and, by some species, trees are excavated into cells as complicated as those of the common bee, entering by apertures scarcely visible. We have seen in Scotland a large larch tree, of which a foot in length of the trunk was thus manufactured, while living, into a beehive. The apis papaveris makes a cell in the ground, which she chooses to line with the scarlet petals of the poppy, and that alone. The leaves of trees, ingeniously cut, cemented, and adapted, form the materials of cells or houses to many other insects of this family

Among the habitations of other tribes of insects, few are more remarkable than the several galls, one of which furnishes us with a material for ink. The mere perforation formed by the insect for its egg, is sufficient so to alter the whole vegetable actions, as to generate a deformity which, for each insect, is invariable. Among these, the red hairy excrescence of the rose, formed by a cynips, is well known. From similar causes, some leaves are rolled up into cylinders, others swell so as to form cells, or else they produce tubercles and bladders of various kinds, in which the egg finds a protection, and the larva its food. Some insects excavate galleries in the substance of a leaf, leaving the external skins untouched; and those

which eat our fiddles and our floors, finding board and lodging at the same time, are far too well known. The anobia of Fabricius is our chief domestic pest of this tribe. Certain worms in New Holland, larvæ of a nyctorobius, shut up the holes which they bore in the trees with pendulous trap-doors, made of leaves interwoven with their own silk; and thus protect themselves from their enemies. The larvæ of two genera, tortrix and tinea, roll up leaves for themselves by means of silk threads, which are carried from one side to another, and shortened, till the effect is produced. Can this larva really reason so well as to gnaw through some nerve of the leaf, should any one, stronger than the rest, offer a resistance? Something must occasionally be allowed to the imagination of entomologists: the business of larvæ is simple—little else than to eat. In the winged insect, whose pursuits are far more complicated, and whose superior organization bespeaks the presence of a higher order of mental powers, such things are often as credible as they are unquestionable. Some of the aquatic insects clothe themselves in cases of agglutinated sand and stones; and one uses living shell-fish for the same purpose, "a covering as singular as if a savage, instead of clothing himself in squirrels' skins, should sew the animals themselves into a coat."

The emigrating associations of insects, or the temporary societies which they form, are often remarkable. Many flies and beetles travel in clouds or columns, often from the land to the sea, as if for the sole purpose of being destroyed. We remember an open column, of

a small collopterous insect, about five feet in diameter, which was flying for a whole day in a straight line past John-o'-Groat's house, and with considerable velocity; how much longer, our entomological patience was not sufficient to allow us to discover. In the same manner aphedis migrate in clouds, so as to fall in showers, and cover the ground. Such visitations are commonly called blights—a term of wide meaning. A small dragon-fly was observed some years ago to land from the sea, in Suffolk, in such abundance as to throw a shadow on the water of many acres in extent. The yellow cabbage-butterfly has been observed thus to migrate in clouds, as have many kinds of cimex, cicada, coccus, and others; and, in all these cases, such associations are, like those of swallows, formed among animals that do not live in societies, like the bee and ant, but which thus unite for some unknown purpose.

Like some birds, quadrupeds, and fishes, many insects are of the colour of the ground in which they dwell. The curculio nebulosus is undistinguishable from the mixed black and white soil which it inhabits, as is the brachyrinus niveus from its native chalk. A vast number resemble the leaves and flowers on which they reside. Some of the genus phasma so much resemble twigs, as well in their colour as in their strange shapes, that even an expert entomologist does not easily observe them. The imitation of dead leaves is very common, as in many of the genera mantis and phasma; as is that of living ones in some locusts, in the noctua ligustris, and some others. Some insects,

on the other hand, find their defence in their threatening aspect; while a great number possess very serious means of resistance in the variety of their spines, horns, bristles, scales, stings, or poisonous exudations. Caterpillars that have hairs often roll themselves up, so that, becoming an entire ball, like hedge-hogs, they are defended all round. The common wood-louse applies his scaly back to the same purpose; and so steady are most of these animals in their resistance, that they will sometimes not give way while they have life. Whether our blistering fly is intended for poison or spice to its enemies, entomologists are not yet agreed.

The vitality of some insects is a very provoking circumstance to us miserable mortals who die when the brains are out—and long before. The females of the moths and butterflies will not die upon any provocation, till they have laid their eggs. There are fifty, and fifty more, that will go on living and performing all their usual functions without wings, or legs, or heads, or intestines. They are as comfortable when impaled on a pin, and stuck into a pill-box, as in their native element. At least, they make love, and eat each other; and what more is wanted to prove that they are happy? Some mites will live in alcohol (acarus vegetans); so do the coccinellæ. Caterpillars may be frozen to the hardness of a stone, and yet revive. We know not why all these creatures should not be immortal. Many resist drowning for a long time. Dr. Reeve found living larvæ in a hot spring in the Valais, the temperature of which was 208°; and we have Lord Bute's

authority, that, in the boiling springs of Albano, there were not only confervæ living, but "black beetles, which died on being taken out and plunged into cold water."

The motions of insects, and the innumerable ways in which they attain their ends, form a wide subject. The activity of the cheese-maggot in jumping is well known. This motion is produced by bending itself, and inserting two claws which it possesses at one end, into as many cavities adapted to them at the other. From this position it suddenly disengages itself, by extending the body, and then makes a leap, as extraordinary in proportion to its length, as if a man was to jump one hundred and sixty feet high.

The modes of swimming are numerous in this tribe. Like fishes, some swim by means of their tails, or fins, or both. Some use their wings for that purpose. The stratyomis chamæleon carries with it below the water a bubble of air, included in some fibres of its tail, which it uses as a float, in the same manner as fishes use their air-bladder. There are species that swim by the recoil of water which they eject; the same contrivance by which the genus salpa, among the marine worms, moves. Some walk, or fly, or jump, on the surface of water, just as if it was land, as is the case with the water-bug and water-spider; while others again walk on the land below, as if there was no water around them. The organs intended for walking are as endless in variety of structure as of number. Even the caterpillars are provided with them That of the bombyx

leporina is extremely rapid in its movements, as are some others. Many, on the contrary, are very sluggish. The caterpillar of noctua pedata jumps from one leaf to another. Others travel by means of a web of silk, which they continue to spin as they proceed; and thus they are enabled to hold fast by smooth surfaces. The common fly effects the same purpose by means of a hollow muscle in the foot, which it contracts so as to form a vacuum, just as the limpet adheres to rocks. Among the running insects, the velocity is sometimes so great, that it is scarcely possible to imagine that they are not rather flying than using their legs. Mr. Delisle mentions a fly so small as scarcely to be visible, that ran six inches in a second; which, comparing its velocity to the size of its body, is an incredible degree of swiftness. The rapidity of the red mite of strawberries must have been remarked by every one; it appears to glide rather than run, and almost seems in two places at once. Some of the marine insects that infest fishes (monoculi) jump with such force, that, although an inch long, their passage through the air is invisible. This is done by the tail. The common spring-tails, (poduræ,) so familiar on our sea-shores, use the same engine for their leaps. Fleas leap by means of their hind legs, as do grasshoppers, and a great number of ideopterous insects—sagra, haltica, &c. The machilis polypoda has eight pair of springs under the belly, intended solely for this purpose; and some beetles have similar contrivances on the breast, to enable them to rise when they have fallen on their backs.

The flying of certain spiders by means of their webs, is not the least extraordinary mode of motion possessed by insects; nor, in truth, is it very intelligible, although the fact itself is unquestionable. In ordinary cases, the spiders spin their threads slowly from organs adapted to that end, perforated with numerous holes; so that each thread may consist of many thousand filaments. The flying spiders, on the contrary, can dart out the thread in a straight line for many inches, in any direction; and then, in some unknown manner, they follow it. In those cases where the animal and his chariot are wafted away together by the winds, there is no difficulty.

The luminous properties of many insects form a notable part of their economy. The glow-worm and the fire-flies of Italy and the West Indies, are known to every one—at least by reputation. In the glow-worm, there is a receptacle of the luminous matter near the tail. The elater noctilucus carries its light in four places; two in the thorax, and two under the wings. Hence this creature is most brilliant when flying. The light is so bright as to serve, when very near, to read the smallest print. In St. Domingo, it is said, they were formerly used by the natives as candles, as they are in many places for nocturnal ornaments. There is a pleasing story related of Sir R. Dudley and Sir T. Cavendish having been terrified by these lights, which they mistook for those of a detachment of Spaniards, as the land crabs—from the noise of their march—were, on another occasion mistaken for a body of

cavalry. This property is more widely diffused among insects than is commonly imagined; and among others hitherto unsuspected, may be mentioned the mole-cricket.

The marine insects share this property with the marine worms, and even with the fishes; so that, as far as general considerations are concerned, we need not, and cannot well separate them. In the examination of many hundred species of marine animals of all kinds, we have found no exception to this rule, and may therefore fairly consider it as universal. In some it is diffused over the whole surface; in others, as in the medusæ, beroes, and holothurias, among the worms, and the squillæ and cyclopes, among the insects, it resides in a single spot. The colour of the light varies in different animals; we have seen it red, yellowish, violet, and pale, resembling moonlight. It is evident, that in many it is under the command of the will, as in some of the land insects. Irritation of any kind, such as the friction of a line or agitation of the water, excites it readily; but if the animals are confined in a limited quantity of water, they soon become tired of shewing their powers; and, after one or two sparks, cease to give light until roused again at some distant time.

In the land insects, a yellowish fluid has been observed to be the seat of the light; but its nature and situation have not been discovered in any of the marine ones, except inasmuch as, in some of the fishes, it is entangled in the mucous secretion of the skin. In

this case it is diffusible in water, without immediately losing its properties. When it is excited by friction, it has been supposed to be in consequence of that diffusion. But it cannot thus be produced in a dead animal. It is probable, therefore, that it is a living action; and this is confirmed by the fact, that if a shoal of herrings is alarmed by any noise, the whole instantly becomes luminous.

This is the light, then, which produces the luminous appearance of the sea,—a phenomenon often splendid, and sometimes terrific, on which so much has been written to so little purpose. Sea-water is never luminous except when it contains animals of some kind; and wherever the lights are large and brilliant, it is very easy to ascertain the animals from which it proceeds. But it is often luminous, it is said, when no animals are present. This is a remark founded on carelessness; as it is scarcely possible, particularly near sea-coasts, where the luminous appearance chiefly prevails, to find a cubic foot of water that is not crowded with worms and insects, many of them invisible to the naked eye. It is these minute creatures that produce the more general diffused light, and which, in particular, cause that continuous line of it which attends the descent of a fishing-line.

We shall conclude with enumerating a few of the most remarkable things done by insects, as there is a vast deal relating to the ordinary business of their lives which is neither very much varied nor very in-

teresting. The important thing is to shew that they do not proceed by a blind impulse, but accommodate themselves to varying circumstances.

The scarabæus vernalis lays its eggs in small balls of dung, which it rolls up for that purpose; but if it meets with a sheep-pasture, it is wise enough to adopt what it finds ready-made. The caterpillar of the common yellow butterfly fastens itself to a wall by means of a silk thread, which, to insure its adhesion, is attached to a flat preparatory web laid on the stone; but upon being furnished with a piece of muslin, instead of the latter, it fastened the thread without any previous preparation. Thus, many other insects, if deprived of the substances which they commonly use for their nests, will find substitutes in something else. On a similar principle of accommodation, many of them alter their plans if disconcerted by an accident, varying them in such a manner as to meet the exigencies of the new case. The end of a cylindrical cell, constructed for the head of a caterpillar, having been cut off, and there being no room to replace it properly, the animal changed its place, and adapted it to receive the tail, making a new head-piece at the other end. In the beautiful geometrical web of the garden-spider, many guys are required to keep it tense, and to prevent it from being blown away by the wind. These, however, cannot be fixed by any invariable rule, as they depend on the forms and distances of the various supports. Moreover, it is easy to see that they are distributed always according to the necessities of the case. If the

position of a branch is altered, or a support taken away, a new guy is carried out to some convenient part; and when it comes to blow, the spider may be seen strengthening his standing rigging exactly at the places where his building is in want of most support. Dr. Darwin remarked, that a wasp, which he watched, attempted to carry away a large fly which he had caught, when, after various attempts, in which the wind, by acting on the dead animal's wings, had impeded its flight, it alighted on the ground with its prize, snipped off the wings, and then bore away the carcase with ease. The same has been observed in the case of other insects, compelled, after several trials, to the necessity of biting away one part after another till they had reduced their prey to a size capable of entering their holes. In bees and ants, the resources of this nature are endless.

That insects have the power of communicating their ideas, or intentions and wishes, to each other, seems fully ascertained, not only by the very pointed experiments of Huber, but by many other observers. A single ant is known to communicate its discovery of a piece of prey to its fraternity; and, in the same way, both these and other insects, when unable to execute some particular thing alone, are known to go and fetch assistance. According to Huber, the antennæ are the organs of communication, and the intelligence is conveyed by particular modes of contact.—*Edinburgh Review.*

INSECT LIFE IN AUSTRALIA FELIX.

The locusts (cicade) enliven the woods in the summer with their perpetual chirping; they measure about two inches in length, and are winged; they deposit a kind of honey on the trees they inhabit, which hardens into small white cakes, and is known to the colonists as manna. They have never been found to be destructive to the crops or gardens of the settlers, although in many seasons they appear in immense numbers; this is not the case with the swarms of grasshoppers which cover the bush in the hot season, and occasionally leave a garden quite bare by their ravages. They do not arrive at a great size, but are the most destructive of any insect known in that colony. The mole cricket is found all over the bush, and warns the traveller by its note when to expect rain. Several beautiful descriptions of mantis are found; one kind being as much as five inches in length, and of the most splendid form, when on the ground appearing like a large leaf. Belonging to this class is also the animated straw, a strange creature, having all the appearance of a piece of straw placed upon legs. Beetles with green and golden wings are in great variety. Spiders of every form and size are here met with, from the diminutive monkey-spider to the disgustingly large tarantula, a frequent and unwelcome visitor to most of the huts in the bush;—the bite of the tarantula is

poisonous, but not mortal. Centipedes are often disturbed from their retreats in rotten wood by the heat when placed in the settler's chimney-corner; and so also are scorpions of a small size. I never noticed one of these creatures more than two inches in length, and never heard of their inflicting serious injury. Ants of a great size and with formidable means of defence, are both numerous and annoying, giving by their sting a disagreeable notice when the traveller is intruding on their domains. In March a peculiar kind of fly becomes exceedingly numerous and troublesome; its appearance is not unlike the English gad-fly; in its ravenous predilection, however, for blood, it is far more to be dreaded, neither man nor beast being safe from its attacks. Its sting is not productive of more than a momentary sensation of pain; but from its repeated attacks it is looked upon as an animal pest. This fly settles on any exposed portion of the body, and, protruding from its mouth a sharp-pointed tubular weapon after the manner of the moschetto, it sucks the vital fluid with the rapacity of a vampire. "Anomalous as it may appear, it is an indubitable fact, that this insect is possessed of an internal bag, wherein it secretes a fluid which in flavour and appearance is pure honey." From the favourable climate there is little doubt that the silk-worm would thrive in this country, and the mulberry is already grown to some extent.—*Five Years in Australia Felix.*

THE LOCUST.

THE locust belongs to that class of insects which naturalists distinguish by the name of *gryllus*. The common grasshopper is of this genus, and, in its general appearance, resembles the "migratory locusts," of which we have to speak. The body of this insect is long in proportion to its size, and is defended on the back by a strong corslet, either of a greenish or light-brown hue. The head, which is vertical, is very large, and furnished with two antennæ of about an inch in length; the eyes are very prominent, dark, and rolling; the jaws are strong, and terminate in three incisive teeth, the sharp points of which traverse each other like scissors. The insect is furnished with four wings, of which the exterior pair, which are properly cases to the true wings, are tough, straight, and larger than those which they cover, which are pliant, reticulated, nearly transparent, and fold up in the manner of a fan. The four anterior legs are of middling size, and of great use in climbing and feeding; but the posterior pair are much larger and longer, and of such strength, that the locust is enabled, by their means, to leap more than two hundred times the length of its own body, which is usually from two to three inches. Locusts, as the writer of this article has seen them in the East, are generally of a light brown or stone colour, with dusky spots on the corslet and wing-cases; the mouth and

inside of the thighs tinctured with blue; and the wings with green, blue, or red. These wings are of a delicate and beautiful texture; and in the fine fibres, by which the transparency is traversed, the Moslems of western Asia fancy that they can decypher an Arabic sentence, which signifies, "We are the destroying army of God."

The female locust lays about forty eggs, which, in appearance, are not unlike oat-grains, but smaller. She covers them with a viscid matter, by which they are sometimes attached to blades of grass, but are more usually deposited in the ground. For this purpose she prefers light sandy earths, and will not leave the eggs in compact, moist, or cultivated grounds, unless she has been brought down on them by rain, wind, or fatigue, and rendered incapable of seeking a more eligible situation. Having performed this, the female dies; and the eggs remain in the ground throughout the winter. If much rain occurs, the wet spoils them, by destroying the viscid matter in which they are enveloped, and which is essential to their preservation. Heat also seems necessary to their production; for the little worm which proceeds from the egg, sometimes appears so early as February, and sometimes not until May, according to the state of the season. This, in the usual course, becomes a nymph, in which state it attains its full growth in about twenty-four days. After having for a few days abstained from food, it then bursts its skin, comes forth a perfect animal, and immediately begins to unfold and trim its wings with the hinder feet. The insects which first attain this state do not

immediately fly off, but wait in the neighbourhood for those whose development is more tardy; but when their army is formed, they take their flight from the district.

To those who have not seen a flight of locusts, it is difficult, by description, to convey an idea of the appearance it presents. As seen approaching in the distance, it resembles a vast opaque cloud; and as it advances, a clattering noise is heard, which is occasioned by the agitation and concussion of wings in their close phalanxes. When they arrive, they fill the air like flakes of thick falling snow; and we have known the bright and clear sky of Chaldea become darker than that of London on some heavy November day.

Wherever they alight, every vegetable substance disappears with inconceivable rapidity before them. The most beautiful and highly-cultivated lands assume the appearance of a desert, and the trees stand stripped of all their leaves, as in the midst of winter. After devouring the fruits, the herbage, and the leaves of trees, they attack the buds and the bark, and do not even spare the thatch of the houses. The most poisonous, caustic, or bitter plants, as well as the juicy and nutritive, are equally consumed; and thus "the land is as the garden of Eden before them, and behind them a desolate wilderness." It seems as if nothing could appease their devouring hunger; and the energy and activity they exhibit, and the rapidity of their operations, almost exceed belief. Their depredations are not confined to the open air;—they scale the walls, and penetrate to the granaries and houses. They swarm

from the cellar to the garret; and, within doors and without, they are a terrible nuisance, for they are continually springing about, and often, in consequence, give a person startling raps on different parts of the face, affording very sensible evidence of the force with which they leap; and as the mouth cannot be opened without the danger of receiving a locust, it is impossible to converse or eat with comfort. When they have settled themselves at night, the ground is covered with them to a vast extent; and, in some situations, they lie one above another several inches thick. In travelling, they are crushed beneath the feet of the horses; and the latter are so terribly annoyed by the bouncing against them, in all directions, of the insects they have disturbed, that they snort with alarm, and become unwilling to proceed.

It is not merely the living presence of these insects which is terrible, but new calamities are occasioned by their death, when the decomposition of their bodies fills the air with pestilential miasma, occasioning epidemic maladies,—the ravages of which are compared to those of the plague. Thus famine and death follow in their train; and instances are not of rare occurrence in the East, in which villages and whole districts have been depopulated by them.

Under these circumstances it necessarily becomes an object of anxious attention, in the countries they are most accustomed to visit, either to prevent them from alighting on the cultivated grounds, or to drive them off, or destroy them after they have descended.

The impression is very general, that noise frightens

these insect devastators, and prevents them from alighting. When, therefore, the people are aware of the approach of their armies, every kettle, or other noisy instrument in the place, is in requisition, with which, and by shouts and screeches, men, women, and children unite in the endeavour to make the most horrible din in their power. The scene would be truly laughable, from the earnestness which every one exhibits in this strange employment, were not all disposition to mirth checked by the consciousness of the fearful consequences of the invasion which it is thus endeavoured to avert.

How far noise may really operate in preventing their descent in ordinary circumstances, it is not easy to ascertain; but on the approach of evening, or when exhausted by their journey, nothing can prevent them from alighting. They will then descend even on the seas and rivers, of which some striking instances are recorded.

When a swarm has actually alighted, the means employed to drive them off are much the same as those to prevent their descent. But this is never attempted in wet weather, or until the sun has absorbed the dew, as the locust is quite incapable of flying while its wings are wet. When the swarm is large, or when it has come down on cultivated grounds, no measure of destruction is practicable without sacrificing the produce; but when the depredators have been driven to waste grounds, or have happened, in the first instance, to descend upon them, various modes of extirpation are resorted to, of which the following is the most effective:—

A large trench is dug, from three to four feet wide, and about the same depth. The off-side is lined with people furnished with sticks and brooms, while others form a semicircle, which encloses the extremities of the trench, and the troop of locusts are then driven into the grave intended for them, by the clamorous noises we have already described. The party stationed on the other side push back such insects as attempt to escape at the edges, crush them with their sticks and brooms, and throw in the earth upon them.

These insect devastators have fortunately a great number of enemies. Birds, lizards, hogs, foxes, and even frogs, devour a great number; and a high wind, a cold rain, or a tempest, destroys millions of them. In the East they are used as an article of food. In some parts they are dried and pounded, and a sort of bread is made, which is of much utility in bad harvests. They are sold as common eatables in the bazaar of Bagdad; and the cooks of the East have various ways of preparing them for use.

THE GLOWWORM.

The glowworm, the scientific name of which is *lampyris noctiluca*, when seen by daylight, is a short and thick worm, of a dingy and by no means inviting appearance. No person would suppose from its day-

light aspect that its brilliancy during the later hours of evening could be so beautiful. The light, which the worm has the power of extinguishing at pleasure, proceeds from three whitish-coloured rings towards the extremity of the body. The luminous matter is a yellow substance contained in vesicles. When these vesicles are removed entire they shine for some time, but when lacerated they are speedily extinguished. The worm can at any time extinguish its light when it is handled or put into a state of fear.

These worms begin to shine in the month of June, and may be seen till September. They are seen in greatest numbers on misty and warm evenings. They put out their lights between eleven and twelve o'clock at night. When placed under a glass cover, they give light within doors for several weeks, but gradually deposit the luminous matter and die.

The male is a dingy coloured scarabæus; and may be seen on every stalk of grass on which the light of the female is shining. The light, besides its extreme beauty, is a remarkable provision of nature afforded to so unlikely a creature, and, so far as we understand, for such a purpose.

The glowworm is not often met with in Scotland. The Rev. Thomas Wright, formerly minister of Borthwick, in his account of that parish in the *New Statistical Account of Scotland*, says, that during most of the summer evenings it may be seen in considerable numbers along the valley which intervenes between the castles of Borthwick and Crichton, although from the

extensive drainings which have taken place in that glen, the worms are less abundant than they were in former years. Their beautiful greenish light among the dewy grass, or by the sides of the footpath, never fails to awaken the admiration of all observers, and would form a treat worthy of a visit on purpose, were it not that the later hours of the evening are the only time for witnessing the sight.

THE SILKWORM.

The caterpillar tribe all spin silky cocoons, and are classed by entomologists under the genus *phalæna*. Of these the species phalena altus produces the greatest quantity of thread; but the species most commonly used in manufactures is the phalena bombyx.

The silkworm, like all others of its class, undergoes, during the course of its existence, several transformations. The changes of form it assumes, or rather its stages of existence, are four,—namely, the egg, or nascent; worm, or eating; pupæ, working and dormant; and moth, or propagating.

The eggs of the silkworm are deposited during the summer by the female, at this period in the form of a grey moth. When first laid, they are in size similar to a grain of mustard seed, and of a yellow colour:

which colour, in two or three days, changes to a bluish cast. These eggs are covered with a liquid which glues them to the cloth or paper on which the female is made to deposit them, but from which they are freed easily by immersion in cold water; and being afterwards dried and kept at a proper temperature, they may be preserved during the winter and spring without danger, until the food on which they feed when in a more perfect state is ripe for consumption. The eggs are preserved by being tied up in flat packages, containing about an ounce each. For hatching, in France they are tied round the girdles of the women during the day, and placed under their pillows at night. When otherwise treated, they are placed in a room heated gradually by a stove up to a temperature of about 80°. In the course of eight or ten days the eggs are hatched. The worms are now covered with sheets of paper on which leaves of the mulberry tree have been spread. The sheets of paper are perforated with numerous small holes, through which the worms make their way up to the mulberry leaves,—their natural food. The leaves soon become covered with worms. These leaves with the worms are now carried off the sheets of paper, and laid upon shelves of wicker work covered with brown paper. This is repeated twice a-day until all the hatched worms are laid on the wicker work. In a well-appointed nursery, this ought to be completed in from two to three days. Great care and attention are required to keep the room at a proper temperature and well ventilated, and

to supply the worms at proper intervals with fresh leaves, with as little trouble to the animal as possible, as the silkworm is remarkable for its indisposition to move from its place; a circumstance which greatly lessens the labour of the attendants.

The silkworm, when first hatched, is black in the colour, and in length does not exceed one-fourth of an inch. The desire for food is the first symptom it exhibits of life, and at this period it is more active than at any other. In about eight days after its hatching, its head becomes considerably enlarged, and it turns sick, refuses food, and remains in a state of lethargy for about three days. This sickness would appear to arise from the pressure of the animal's skin, which has become too tight for the increased bulk of its body. Indeed, the very great difference in the size of the worm, from the beginning to the end of its caterpillar state, is so great, that nature has furnished it with several skins, each of which it casts in succession. When the process of casting the skin has been performed, the animal again revives, and betakes itself to food.

The mulberry tree presents the only suitable food for the domesticated silkworms, and these are the only insects that feed upon its leaves. Attempts have been made to substitute other vegetables, such as lettuce leaves; but these are unsuitable to all the varieties. The trees thrive best in a temperate climate and in a dry soil, and bear careful defoliation every year. The important elements which enter into the composition

of the mulberry leaf, are the saccharine and the resinous. It is the leaves of the white mulberry that the silkworms prefer and thrive best upon; but they will not refuse those of the black or the red mulberry. Wild worms in China feed on pepper, ash, oak, and other trees, according to the various species.

It is extremely interesting to watch the several steps in the process of moulting. In order to diminish the action upon the new skin of the skin to be cast, the animal exudes a lubricating humour between them, which renders them more easy of separation. Small silken threads are likewise emitted, which bind the skin to the spot on which it now rests. These acts call forth considerable exertions; and after they are performed, the worm rests quiet for a little, to recover its energy. It now rubs its head among the leafy fibres surrounding it; and first its head, then its front legs, and afterwards the whole body, appear through the skin. On examining the cast skin, it will be found that the covering has been thrown off the animal entirely, even to the jaws and teeth. Sometimes the outer skin is not entirely detached, in which cases the animal generally dies. In five days after the first moulting, the worm has acquired considerable size, being now generally about half an inch long; at which period it again sickens, and a second moulting takes place. In five days more it has acquired the length of three-fourths of an inch, and a third moulting comes on. In five days more the worm casts its fourth and last skin, having increased in length to about two

nches. It now devours much food, and increases greatly in magnitude for ten days,—when it has reached its full growth of about three inches in length.

The worm may now be more advantageously examined as to its structure than at any other period. Its body is begirt by twelve rings, which approach to, or recede from, each other during the motion of the animal. It is furnished with six scaly legs in front, and ten membraneous ones, called holders, behind,—which latter are terminated by small hooks. The mouth is very large compared to the size of the body; it opens vertically, unlike the mouths of most animals; and the jaws are formed after the manner of the teeth of a saw. There are nine breathing holes on each side of the body; and there are likewise seven eyes on each side of the head. Below the jaw there are likewise two small orifices, through which the worm ejects its silken filament.

At this period of the worm's existence, it shews a disposition to leave its food, and diminishes in bulk, becoming at the same time semi-transparent. Twigs of broom, or green oak, are now laid on the wicker frames, and the worms are placed more closely together. The spinning process now commences. The worm throws its head about in various directions, and spins the flos or outer net-work of its cocoon, and then winds the silk thread round its body, as regularly as a spinner builds the thread upon the cope. The silken substance is a glutinous liquid matter in the body of the animal, which hardens by coming into con-

tact with the air; and this glutinous property causes the two filaments issuing from the orifices above-mentioned to adhere and form one continuous thread. The spinning process is finished in the course of from three to four days, after which the cocoons are collected together,—the finest being selected for seed, and the rest set apart for unwinding.

The animal remains in its silken tomb for about twenty days; it then exudes a lubricating liquid, to facilitate its liberation; and by knocking its head against the cocoon, it extricates itself in the form of a butterfly.

The number of eggs produced by the female moth varies from two hundred to five hundred; and about two hundred cocoons will yield one ounce of seed. Six full-grown worms will, on an average, weigh one ounce, which will give an idea of the wonderful increase of weight that the worm acquires during its progress from hatching. According to Dr. Ure, "fifteen parts, by weight, of mulberry leaves, furnish one part of cocoons; and one hundred parts of cocoons furnish eight parts of reeled silk. Under favourable circumstances, one ounce of seed-eggs will produce eighty pounds of cocoons, or even more. One pound of cocoons is required to yield one ounce of eggs; the silk of a cocoon weighs two and a-half grains, and affords a length of thread equal to from seven hundred and fifty to one thousand one hundred and sixty feet."

The great quantity of food the worms consume is surprising. It is stated by a competent authority,

that the worm increases in weight so much as thirty thousand times the weight of the egg; and Bonafons renders this not improbable, from his observations on the quantity of mulberry leaves consumed by the animal.

The art of making the filamentous substance of the cocoon available for the use of man, seems to have originated with the Chinese, and to have been discovered at a very early period. According to the written documents of China, it seems to have been known among this singularly ingenious people two thousand seven hundred years before the Christian era. Until the time of the Emperor Justinian, the silkworm was cultivated only in China; but the raw material was purchased and manufactured by the inhabitants of Persia, Tyre, &c., for a long time before. Aristotle relates, that the inhabitants of the island of Cos were in the habit of unweaving the heavy fabrics of the East, and of again spinning and weaving them into fabrics of a more variegated texture; and this, which is said to be the invention of Pamphela, appears to be the origin of silk gauze. Before the reign of Augustus, the use of silk was little known in Europe.

About the beginning of the sixth century, the silk trade of Constantinople was greatly depressed, in consequence of the impolitic interference of the Emperor Justinian. The culture of the silkworm was at this period unknown in Europe, but was introduced in rather a singular manner. Two Persian monks had gone as missionaries to the Christian churches at this

time established in India. These monks devoted great attention to the culture of the silkworm; and perceiving that this species of industry would be highly advantageous to other countries, they managed to carry away a quantity of the eggs packed in a hollow cane, which they conveyed to Constantinople. This occurred in the year 552. The monks superintended the hatching of the eggs, and thus originated all the silkworms that have ever been nurtured in Europe.

The first attempts to establish this branch of industry in the north, were made by French Protestant refugees, in the district of Wurtzburg, in 1564; and they were encouraged by the Prussian sovereigns. In the middle of the seventh century, the ramparts of Petz, and the environs of Frankfort on the Oder, were planted with mulberry trees; and in the following century, Frederick the Great caused plantations to be made at Cœpnik, Potsdam, and in the immediate vicinity of Berlin. Since 1821, the production of silk has become considerable, not only in Prussia, but in the other states of the Zollverein: the annual production is at present several thousand pounds. In quality, it is remarkably white, and finer than in the southern countries; and Berlin manufacturers say, that if enough of it could be obtained, they would not apply to the producers of Lombardy. From Berlin and Potsdam, the cultivation of mulberry trees gradually extended to Silesia and Hanover. It is schoolmasters who chiefly occupy themselves with it, —one of their body having, in the eighteenth century,

commenced it as a means of adding to his income; and some of these persons now gain from 20 to 80 thalers (75 to 300 francs) annually. Several of the German governments encourage the productions of silk by granting premiums, and causing societies of patronage to be formed. A short time ago, the Minister of Commerce recommended that the sides of all the railways should be planted with mulberry trees. The king of Wurtemburg has caused the French translation of the Chinese treatise on the breeding of silkworms to be translated into German, and to be extensively circulated at Dresden; M. D. Carlowitz, one of the ministers, has published a work on the subject; and at Munich, the queen, the royal princesses, and the principal ladies of the aristocracy, patronize societies for encouraging it. In the Grand Duchy of Baden, the roads and sides of the railways have been planted with mulberry trees; and in the village of St. Ilgen, near Heidelberg, the breeding of worms is carried on, on an extensive scale. Austria, on its part, is sparing no pains to increase its production, which amounts to about 100,000,000 francs annually—one-half coming from Lombardy alone. On the military frontier of Turkey, a garden of mulberry trees has been established in every village; and the military colonists are encouraged to extend the cultivation. At Prague, the fosses of the fortifications have been planted with mulberry trees; and orders have been given that such trees shall be planted by the side of all the railways in the monarchy.

THE SPIDER.

This well-known insect possesses eight legs, each of which is terminated by a moveable hook. The eyes are also eight, though in some particular species they are only six. Eight, however, is its general *quantum* of visionary power; and as the eyes are immoveable, and each consists of one lens, nature, with her unerring wisdom, has so distributed them in the different species, as to serve every exigency required; so that few objects escape the spider's sharp and keen sight.

The spider has five spinnerets, which are placed near the extremity of the abdomen. About as many as one thousand apertures belong to each spinneret, and these the insect can dilate or contract at its pleasure. These orifices communicate by a tube with four reservoirs, situated within, containing the glue-like matter of which the thread is spun. The web is of network; but formed in a manner very different from anything constructed by human ingenuity; the cross threads, instead of being interwoven, are merely glued at the points where they touch. As the web lasts for a long time, the spider occasionally clears it from dust, which otherwise would accumulate and incommode his operations. This is done by giving it, as wanted, a strong shake with his paw. The whole race of spiders enclose their eggs in cocoons of silk, varying in form and texture according to the species; and

although they do not undergo transformations like other insects, as the butterfly, &c., yet they change their skins at certain seasons of the year. Whenever this is about to take plæce, the creature forms a cocoon in one corner of its web, and then, going along some of its threads, it begins to swell and distend itself until it splits the skin along its back. It then forces the body and legs slowly and gradually out of its old coat, which retains the perfect form of the creature, and is transparent. The spider, now of a pale green colour, and quite gelatinous, seeks shelter in its cocoon in the corner, where, in about three days, it issues forth in a new garment which nature has bestowed upon it.

One of the most remarkable species is the great West Indian bird-spider,—the body of which consists of two parts, one flat, the other round; and its bulk, with the legs extended, is so great as to cover more than a span of a man's hand. From its monstrous size it looks frightful; but its hideousness is somewhat ameliorated by the beauty and variety of its colours. The round part of the body is shaped much like a pigeon's egg; and under the flattened side are its legs, ten in number, (instead of eight, the usual complement,) five on each side, with four joints, and claws at the end. In the back is a small hole; and the mouth, besides having a crooked tooth on each side, is also covered with greyish hairs intermixed with red. When this creature becomes old, it is covered with a sort of down of a brown or blackish colour, very smooth, soft, and shining, like velvet. This skin is said to be cast every

year, as also are the two teeth, which consist of a hard substance, and are of a bright, shining black colour. Of these the people often form toothpicks, having them set in gold or silver. It displays most astonishing skill and dexterity, as well as agility, in spreading its web from tree to tree. This is so amazingly large and strong as to extend thirty or forty feet, and when finished will ensnare a bird the size of a thrush. Its principal food is a large kind of ant, which is very plentiful in those regions, and causes great destruction to property; therefore this spider is of use in keeping their numbers a little within bounds. It sometimes happens that this warlike ant will attack the spider in swarms, and thus destroy him. The eggs of the humming bird, and even the birds themselves, often fall a prey to this voracious spider, particularly if its natural food fails it.

New Holland possesses a peculiar species, called the white-jointed spider, which is particularly remarkable for the lucid surface of its throat and legs. The latter are furnished with several long moveable spines, which the creature can elevate or depress at pleasure. Its general colour is a pale brown. The orifice at the top of each fang may be seen with a glass of a small magnifying power. It is thought that it poisons its prey before destroying it.

The mason-spider forms for itself a circular web under ground, having a lid with a glue-like hinge, which the inhabitant of the cell can open and shut at pleasure. Indeed, the door closes by its own weight, and of course the insect can open it for its own convenience.

The water-spider, another species of the same family, is an amphibious creature; but its domicile is fixed at the bottom of the water. To erect this mansion, it begins by spinning loose threads in various directions to the leaves of aquatic plants. These it covers with a transparent varnish, in appearance like liquid glass, which issues from the middle of the spinnerets. The framework, being thus formed and coated, possesses great elastic powers. The method of filling it with air is performed by the insect making a kind of bag of this gluey matter; then, rising to the surface, it punctures the bag, and lets in the air; after which, closing the orifice, it descends to the bottom of the water. Here, puncturing the bag again, the air rushes into its house. This being done about a dozen times, causes the apartment to expand to the required size, and this industrious little creature finds a safe and dry retreat, though under water. On this element it swims with great swiftness, sometimes on its stomach, but generally on its back; and in diving it is also very expert. It not unfrequently seeks its prey on the land, and having caught it, plunges with its food to its subaqueous palace.

The distance to which the threads of the spider are wafted is very great. Sometimes these fine lines may be observed floating in the atmosphere, and overtopping the highest steeples; and, on account of their adhesive nature, they stick to every object they meet in their course, and thus serve as bridges to transport the spinner itself from one place to another

The spiders are arranged under numerous genera, differing not only in anatomical characters, but very generally in their habits and the form of the web which they construct. The most familiar form of a web is that of a wheel perpendicular, or slightly inclined, having its radii or spokes crossed by numerous concentric circles. In the centre of this the spider remains immoveable, or more frequently in a little cell, at some distance from the web, but connected with it by threads. The struggles of an entangled insect communicate an undulatory motion to the whole web, which gives notice to the spider, and it immediately sallies forth; and, if its victim be small, seizes it at once, and immediately sucks its blood; if, however, it be too large to be thus disposed of, the spider rolls it with its hinder feet, encircling it with a new thread at every turn, until sometimes the insect is completely coated, when it may be devoured at pleasure. Other spiders spin an irregular web, consisting of threads intersecting each other at every angle. Others, again, make a horizontal closely-matted web, having a funnel-shaped retreat, into which they convey their prey. Others make only a retreat by binding a few leaves together, from which they sally forth and seize insects which approach them. Some of these seem to be extremely venomous; for it is observed that no insect that has been once bitten by them ever recovers, even though it be many times larger and more powerful than its adversary.

Some spiders spin no web, but take their prey by running; others by approaching quietly till within a

certain distance, when they suddenly leap upon their prey. Other spiders form cylindrical and perpendicular holes in the ground, into which they retreat on the approach of danger.

It has been computed by means of a microscope, that four millions of young spiders' threads are not equal to the size of a single hair of a man's beard. Every spider lays from six to seven hundred eggs. Attempts have been made to obtain a substitute for silk from the spider; but these have never been rendered available in a commercial point of view, and specimens are only to be found in the cabinets of the curious. The secret of spinning silk from cobwebs was first discovered in France. Stockings and gloves were made of it, and presented to the Academy of Paris, as well as to the Royal Society of London.

THE HONEY-BEE.

THE scientific name of this hymenopterous insect is apis melifica. It is universally celebrated for its singular instincts, and highly prized for the valuable products of its industry.

Three sorts of individuals are found to form a community of honey-bees;—the female, mother, or, as she

is commonly called, queen; the males or drones; and the working bees, improperly termed neuters, as they are actually females, though, in a peculiar respect, imperfect. A hive commonly consists of one mother or queen, from six to eight hundred males, and from fifteen to twenty thousand working bees. The last mentioned are the smallest, have twelve joints to their antennæ, and six abdominal rings: the first joint, or square portion of the posterior tarsi, is enlarged at the posterior angle of its base, and shaped like a pointed auricle, having its internal surface covered with a fine, short, close, silky down. They are provided with stings. The mandibles are spoon-shaped, and not dentated. There is on the outside of the hind legs a smooth hollow, edged with hairs, called the basket: the silky brush of the first joint of the posterior tarsi has seven or eight transverse striæ. The mother or queen has the same characteristics, but is of larger size, especially in the abdomen: she has a shorter sucker or trunk, and the mandibles grooved and velvet-like beneath the tip. The males or drones differ from both the preceding by having thirteen joints to the antennæ; a rounded head, with larger eyes, elongated and united at the summit; smaller and more velvety mandibles, and shorter anterior feet; the two first of which are arched. They have no auricular dilatation, or silky brush on the square part of the posterior tarsi, and are destitute of stings.

When we examine the internal structure of this insect, we find at the superior base of the trunk or

sucker, below the labrum, a considerable aperture, shut by a small triangular piece, which has been called tongue, epipharynx, &c. This opening receives the food, which is thence conveyed by a delicate æsophagus through the corslet to the anterior stomach, which contains the honey; the second stomach receives the pollen of flowers, and has on its internal surface a number of transverse and annular wrinkles. The abdominal cavity of the queen and working bees also contains the little bag of poison communicating with the sting. In the queen there are, moreover, two large ovaries, consisting of a great number of small cavities, each containing sixteen or seventeen eggs. These ovaries open near the anus, previous to which they dilate into pouches, where the egg is delayed to receive a viscous coating from an adjacent gland. The inferior half-circles, except the first and last, on the abdomens of working bees, have each on their inner surface two cavities, where the wax is formed in layers, and comes out from between the abdominal rings. Below these cavities is a particular membrane, formed of a very small hexagonally-meshed network, which is connected with the membrane lining the walls of the abdominal cavity.

Wax, of which the combs are formed, is elaborated with honey. The pollen collected from flowers, mixed with a small quantity of wax, constitutes the food of bees and their larvæ; and this food appears to be modified in its composition according to the sort of individuals it is intended for. Another substance collected

by bees from the opening buds of poplar and other trees, and used by them for lining their hives, stopping holes, &c., is called propolis.

Besides the distinction remarked in the female, male, and working bees, Huber regards the latter as of two sorts;—one devoted to the collection of provisions, and all the materials necessary to the comb, as well as to its construction; these he calls cirières. The others are more delicate, small, and feeble, and employed exclusively within the hive in feeding and taking care of the young.

The resemblance existing between the working and female bees first led to the idea that they were of the same sex; and the ingenious experiments and accurate observations of Huber enabled him to establish this fact in the most satisfactory manner. Having deprived a hive of the mother or queen, he found that the working bees immediately began to prepare a larva of their own class to occupy this important station. This was effected by enlarging the cell to the dimensions of a maternal or royal chamber, and feeding the selected individual on food exclusively destined for the nourishment of the royal larvæ. If merely fed upon this food without an accompanying enlargement of the cell, the maternal faculties were but imperfectly acquired, as the female did not attain the proper size, and was incapable of laying any eggs but those which produced males.

Reaumur states, that the female, in the spring, lays as many as twelve thousand eggs in the lapse of

twenty-four days. Each sort of egg is deposited in the appropriate cell, unless a sufficient number of cells have not been prepared: in this case she places several eggs in one, and leaves to the working bees the task of subsequently arranging them. The eggs laid at the commencement of fine weather all belong to the working sort, and hatch at the end of four days. The larvæ are regularly fed by the workers for six or seven days, when they are enclosed in their cell, spin a cocoon, and become nymphs; and in about twelve days acquire their perfect state. The cells are then immediately fitted up for the reception of new eggs. The eggs for producing males are laid two months later, and those for the females immediately afterwards. This succession of generations forms so many particular communities, which, when increased beyond a certain degree, leave the parent hive to found a new colony elsewhere. Three or four good swarms sometimes leave a hive in a season. A good swarm is said to weigh at least six or eight pounds. The life of the bee, like that of all the other insects of its class, does not continue long after the great business of providing for the continuance of the species is completed.

The cells of the comb compose two opposite ranges of horizontal hexagons, with pyramidal bases: each layer of the comb is perpendicular, and attached by the summit, and separated from the rest by a space sufficient for the bees to pass in and out. The comb is always built from above downward. The cells, with the exception of those for the female larvæ and nymphs,

are nearly of equal size, some containing the progeny, and others the honey and pollen of flowers. Some honey cells are left open, others are closed for future use by a flat or slightly convex covering of wax. The maternal or regal cells vary from two to forty in number, are greatly superior in size, nearly cylindrical, and somewhat larger at the extremity. They have small cavities on the outside, and commonly depend from the comb like stalactites, so that the larva has its head downwards.

Jesse, in his *Gleanings of Natural History*, gives the following anecdote of the ingenuity of bees:—

A large brown slug made its way into a glass hive, where the operations of the bees could be distinctly seen. Having killed the slug, and finding that they were unable to get it out of the hive, they covered it over with the thick resinous substance called propolis, and thus prevented its becoming a nuisance to the colony. Into the same hive one of the common brown-shelled snails also gained admittance. Instead of embedding it in propolis, the bees contented themselves with fixing it to the bottom of the hive, by plastering the edge with that substance. I have now in my possession a regular fortification made of propolis, which one of my stock of bees placed at the entrance of their hive, to enable them the better to protect themselves from the attacks of wasps. By means of this fortification, a few bees could effectually guard the entrance, by lessening the space of admission, which I had neglected to do for them.

THE WASP.

The wasp (*vespa*) may be readily distinguished by having the upper wings longitudinally folded while at rest. Wasps belong to the order hymenoptera of Linnæus; and have a pedunculated abdomen, terminated by a concealed sting. Their larvæ resemble those of the bee, and their history is also similar in most respects. They live together in societies,—the individuals of which share in common their labours and danger. In general, they construct their habitations with a sort of paper, formed of vegetable fibres, agglutinated by a sort of gum. The cells resemble in form those of a honey-comb, and are often disposed in several storeys. They feed on animal substances, on meats exposed to the air, dead insects, over-ripe and sugary fruits; fragments of which they cut off with their mandibles, and carry away for the purpose of feeding their young.

THE ANT.

There are many different varieties and species of ants, which generally take their names from their colour and peculiar habits,—such as, the brown ant, the mason ant, the white ant, the carpenter ant, &c. The principal feature in the character of ants is their living in socie-

ties or communities. In this respect they resemble bees, who cannot live alone, like spiders and many other insects. These societies are composed of three sorts of individuals,—males, females, and neuters, which are the labourers or workers. The males and females have long wings, not so much veined as in other insects of the same section, which are very temporary; the neuters, which are actually females with imperfect ovaries, are destitute of wings. Nature, in providing the male and female ants with wings, must evidently have designed them for migration to distant abodes, where they might become the founders of new colonies. Arrived at the period of maturity, they wait only till the warmth of the atmosphere is sufficiently genial, when busy swarms of these winged insects are seen to issue from their nests, and to cover the neighbouring plants, expanding their wings, which reflect the sun's rays in a thousand brilliant colours. They are escorted in all their steps by the neuters or labourers, which appear to watch them with peculiar solicitude, frequently offering them food. and caressing them with their antennæ. At length they leave their attendants, and commence their flight; and while high in the air, the act of fecundation is generally performed, which is also the case with the bees. The males are then left to perish for want of sustenance, being unprovided with the means of procuring it for themselves, and being separated from those by whose bounty they had hitherto been fed. After impregnation, the females, alighting on the ground, detach their wings by the

aid of their feet, and commence the great work of their existence—the deposition of their eggs. Some of the females are frequently seized upon by the numerous neuters, carried back into the galleries of their dwelling, and detained until they destroy their wings, and lay their eggs; after which they cease to be of consequence, and are driven forth.

The males are much smaller than the females, and have larger eyes, though the head and mandibles are proportionally smaller. The heads of the neuters, on the other hand, are large, their jaws strong, and their corslet compressed or even knotty; their feet proportional. These neuters perform all the labours of the ant-hill; they excavate the galleries, procure food, and wait upon the larvæ, or young ants, until they are fit to leave their cells. In fine weather they carefully convey them to the surface, for the benefit of the sun's heat; and when bad weather is threatened, or the ant-hill disturbed, they as attentively carry them to a place of safety. In like manner they watch over the safety of the nymphs or larvæ about to acquire their perfect growth; some of which are in cocoons, and some uncovered. When the time arrives at which the former are to undergo the final change, they tear open the cocoons to permit them to escape. If the weather be unfavourable, they detain those which have acquired their wings, till a suitable opportunity offers, and then aid them to gain their liberty by the easiest route.

One among the most curious circumstances connected

with the general history of ants, is the exception to the general rule relative to the occupants of nests being individuals of the same species. Huber first observed—and his observations have since been amply confirmed—that the reddish (Amazon or sanguineous) ant resorts to violence to obtain working ants of other species for their own use; thus actually making slaves of those they carry off to their nests. The neuters of these Amazons regularly, about the same hour, when the heat of the day begins to diminish, and for several successive days, advance in a dense mass towards the ant-hill they design to plunder; which, in spite of all the opposition made, they enter, seize on the larvæ and nymphs peculiar to this species, and carry them off to their own nests, where other neuters of the same species, but of full growth, take care of these kidnapped individuals, as well as of the offspring of their vanquishers.

As to the way in which ants procure the means of subsistence, much error long prevailed. The collections of larvæ were long mistaken for magazines of corn and other food, which it was supposed the ants deposited in granaries as provisions for winter consumption. But the truth is, that they are almost wholly carnivorous, and corn is certainly not an article on which they feed. They are total strangers to the art of hoarding; and none of their cells are constructed with this view. The ants whose occupations confine them at home, depend for their food on the labourers who forage for the whole society, and bring to the nest small insects, or portions

of any animal substance that may fall in their way. When the game is too bulky to be easily transported, they fill themselves with nourishment,—the greater part of which they disgorge on their return, for the benefit of those that are hungry. This nutritious food they retain unchanged for a considerable time, when prevented from imparting it to their companions.

The food which they appear to relish above all others, is an exudation from the bodies of several species of aphis,—insects which abound on the plants in the vicinity of ant-hills. This species of honey is absorbed with great avidity by the ants, and apparently without the least detriment to the insect that yields it. Huber informs us, that the liquor is voluntarily given out by the aphis when solicited to do so by the ant, who, for that purpose, strikes it gently, but repeatedly, with its antennæ, using the same motions as it does when caressing its young. He is led to believe from observation, that the aphis retains this liquor for a longer time when the ants are not at hand to receive it. A single aphis is sufficient to supply in this way many ants with a plentiful meal. The aphis becomes torpid at precisely the same temperature as the ant. The winter haunts of the aphis, which are chiefly the roots of trees and shrubs, are well known to the ants; and when the cold is not excessive, they regularly go out to seek the accustomed supply from these insects. Some species of ants have even sufficient foresight to obviate the necessity of these journeys; they bring these animals to their own nests where they lodge

them near the vegetables on which they feed; while the domestic ants prevent them from stirring out, guarding them with great care, and defending them with as much zeal as they do their own young.

But their sagacity goes even much further: they collect the eggs of the aphis; they superintend their hatching, continually moistening them with their tongue, and preserving them till the proper season for their exclusion; and, in a word, bestow on them all the attention which they give to the eggs of their own species. When disturbed by an intruder, they carry off these eggs in great haste to a place of safety. Different species of aphis are to be found in the same nest; several kinds of gall insects, and also of kermes, serve the same purposes to the ants as the aphis, affording them, in like manner, juices possessed of nutritious qualities. All these live in perfect harmony with their masters, who, so far from offering them any molestation, defend them with courage against the ants of other societies who might attempt to purloin them. That the ants have some notion of property in these insects, would appear from their occasionally having establishments for these aphides (or vine-fretters) at a distance from their city, in fortified buildings which they construct for this sole purpose, and where they are confined like cows in a dairy; hence they have appropriately been called the cows of the ants.

Ants are apparently endowed with the power of communicating with each other; but it does not appear that they are capable of emitting sounds for the

purpose. The sense of touch is with them the principal medium of conveying impressions to one another. Some of these impressions are communicated by the one striking its head against the corslet of the other; others, by bringing their mandibles in contact. The former is the signal of danger, which is spread with astonishing quickness through the whole society. During the night, as well as at other times, sentinels are stationed on the outside of their habitations; and on the approach of danger they suddenly descend into the midst of their tribe, and spread the alarm on every side; and while the greater number rush forward to repel the danger, those that have the charge of the eggs and larvæ hasten with them to places of greater security. The males and females, on the other hand, on being warned of the approaching combat, in which they find themselves incapable of taking any active part, fly for shelter to the most retired places in the vicinity. The chief instruments by which other ideas are conveyed, appear to be the antennæ, which, for the purpose, are brought into contact in various ways with different parts of the bodies of the ants addressed.

In their journeys they appear to depend principally on the senses of sight and of touch, aided by the memory of local circumstances. If they should meet with annoyance in their nest, or, from any other cause, find it inconvenient to remain, to seek a more eligible spot to which they may remove, the labourers scatter themselves abroad and reconnoitre in every direction. The ant who has the good fortune to discover a convenient

situation, returns immediately home, and by certain gestures acquaints her comrades with her success, and points out the direction of the place she has chosen.

The migrations of the fallow ants *(fourmis fauves)* are conducted in a very singular manner. The guide carries another ant in her mouth to the place to which she intends the colony to remove. Both then return, and each taking up another ant, bring them in a similar manner to the new settlement. These, when instructed in the way, return and fetch others; and this process is continued by all the guides, their numbers increasing in rapid progression, till the whole has been transported to the new place of abode.

We are informed by D'Ayara, that during the inundations of the flat districts in South America, when the large ant-hills, which are about three feet in height, are completely immersed in water, the ants, by an ingenious contrivance, prevent their being carried away by the flood. They collect themselves into a compact mass, and keep a firm hold of each other, after having first attached one end of their body to some neighbouring plant, or other fixed point, leaving the other extremity free, so that they float on the surface of the water during the continuance of the flood, which usually lasts some days.

The ant is the emblem of industry. Solomon says, "Go to the ant, thou sluggard; consider her ways, and be wise." The following is the method in which they proceed in their work :—

Ants, according to their natures, build their nests or

houses on the ground, under turfs or stones, or on a tree; or erect huge structures above the surface of the earth, composed of particles of sand and dust, which they carry in their mouths to the required spot. In these ant-houses there are different sized rooms, piled storey above storey, communicating with long galleries or passages, the ceilings being supported by pillars or thin walls, as may be necessary to support the weight above. It is told of the brown ant, which is an exceedingly industrious insect, that it forms its nest of storeys four or five lines in height. The partitions are not more than half a line in thickness; and the substance of which they are composed is so finely grained, that the inner walls present one smooth unbroken surface. These storeys are not horizontal; they lie in a sloping direction. They are also arranged on no regular plan, but are suited to circumstances. It has been noticed, that ants are incessant in their labours. They do not seem to require sleep, and work as well during the night, or in darkness, as in the light of day. In working at the building or repairing of their houses, they use their antennæ,—that is, a small projecting point from their head, which serves the purpose of a hand, for feeling or touching anything. After placing the particles of earth in their proper position, they press them lightly down with their fore-feet, which thus answer the purpose of a hammer. As there are thousands engaged at once in these occupations, the labour is not severe upon any individual; while the walls and storeys are raised with amazing quickness.

Dampier, a celebrated English navigator, in speaking of the yellow ant of South America, says, they construct their nests of green leaves upon trees, placed on the trunk between the limbs, and that some of these nests are as big as a hogshead. In the dry season, when they leave their nests, they swarm all over the woodlands. They go out light, but bring home heavy loads of leaves on their backs. Other sorts of ants excavate nests for their abode in the branches of trees, and this they do with no small ingenuity. Some exercise the art of mining or boring wood to a wonderful extent. They will penetrate beneath the foundations of houses—which in warm climates are often composed principally of wood—and cut their way so far, as to render every beam, rafter, and deal in the house, a mere shell; so that the houses so affected sometimes tumble down on the inhabitants. Most of those foreign ants are exceedingly voracious; they are called by naturalists the scavengers of creation, for they clear the fields and woods of all fallen timber, which would choke vegetation, as well as the dead bodies of every animal that fall in their way. They also destroy noxious and loathsome insects, such as beetles and cockroaches, by which they are really useful to man.

We are further informed by naturalists, that some descriptions of ants are remarkable for the wars which they wage against each other. Here is Huber's account of these destructive enterprises:—"If," says he, "we are desirous of beholding regular armies wage war in all its forms, we must visit the forests in which the

wood-ant establishes its dominion over every insect within the neighbourhood of the colony. We shall there see populous and rival cities, and regular military roads diverging from the ant-hill, like so many rays from a centre, frequented by an immense number of combatants of the same species; for they are naturally enemies, and jealous of any encroachment upon the territory which surrounds their capitals. I have witnessed in these forests the inhabitants of two large ant-hills engaged in spirited combat; two empires could not have brought into the field a more numerous or more determined body of combatants. The rival cities were situated about a hundred paces from each other, and alike in extent of population. What occasioned their discord, I cannot pretend to say.

"Let us figure to ourselves this prodigious crowd of insects covering the ground lying between these two ant-hills, and occupying a space of two feet in breath. Both armies met at half-way from their respective habitations, and there the battle commenced. Thousands of ants took their station upon the highest ground, and fought in pairs, keeping firm hold of their antagonists by their mandibles: a considerable number were engaged in the attack, and leading away prisoners. The latter made several ineffectual attempts to escape, as if aware that, upon their arrival at the camp, they would experience a cruel death. The scene of warfare occupied a space of about three feet square; a penetrating odour exhaled from all sides; numbers of dead ants were seen covered with venom. The ants, composing

groups and chains, laid hold of each other's legs and pincers, and dragged their antagonists on the ground. These groups formed successively. The fight usually commenced between two ants, who seized each other by the mandibles, and raised themselves upon their hind-legs, to allow of their bringing their abdomen forward, and spurting the venom upon their adversary. They were often so closely wedged together, that they fell upon their sides, and fought a long time in that situation in the dust, till a third came to decide the contest. It more commonly happened that both ants received assistance at the same time, when the whole four, keeping firm hold of a foot or antennæ, made ineffectual attempts to win the battle. In this way they sometimes formed groups of six, eight, or ten, firmly locked together, the group being only broken when several warriors from the same republic advanced at the same time, and compelled the enchained insects to let go their hold, and then the single combats were renewed. On the approach of night, each party retired gradually to their own city.

"Next morning, before dawn, the combatants returned to the field of battle, the groups again formed, the carnage recommenced with greater fury than on the preceding evening, and the scene of combat occupied a space of six feet in length, by two in breadth. The event remained for a long time doubtful; but about mid-day the contending armies had removed to the distance of a dozen feet from one of the cities, whence I conclude some ground had been gained.

The ants fought so desperately, that they did not even perceive my presence; for though I remained close to the combatants, not one of them attempted to climb my legs, seeming to be wholly absorbed in the object of finding an enemy to wrestle with. During this furious warfare, the common operations of the two colonies were not suspended; for the paths, which led to a distance in the forest, were as much thronged as in time of peace, and all around the ant-hill order and tranquillity prevailed. On that side alone where the battle raged, were seen crowds of the colonists running to and fro, some to join the army, and some to escort the prisoners. This war terminated without any disastrous results to the two republics. In fact, it appeared that its duration was shortened by long-continued rains, which compelled each of the belliger-ants to keep within their walls, and the warriors ceased to frequent the road which led to the camp of the enemy."

FLEAS.

Fleas, it may be worth remarking, are not all of one species. Those which infest animals and birds differ in many particulars from the common bed-flea; and as many as twelve distinct sorts have been found in Britain alone. The most annoying species, however, is fortunately not indigenous, being a native of the

tropical latitudes, and variously named in the West Indies,—chigoe, jigger, nigua, tungua, and pique. The chigoe is a kind of small sand-flea, which gets in between the skin and the flesh without being felt, and generally under the nails of the toes, where, while it feeds, it keeps growing till it becomes the size of a pea, causing no further pain than a disagreeable itching. In process of time its operation appears in the form of a small bladder, in which are deposited thousands of eggs, or nits, and which, if it breaks, produce so many young chigoes, which, in course of time, create running ulcers, often of very dangerous consequence to the patient; so much so, indeed, that I knew a soldier, the soles of whose feet were obliged to be cut away before he could recover; and some men have lost their limbs by amputation—nay, even their lives, by having neglected, in time, to root out these abominable vermin. The moment, therefore, that a redness and itching more than usual are perceived, it is time to extract the chigoe that occasions them. This is done with a sharp-pointed needle, taking care not to occasion unnecessary pain, and to prevent the chigoe from breaking in the wound. Tobacco ashes are put into the orifice, by which, in a little time, the sore is perfectly healed. Old Ligon tells us, that, in this way, he had ten chigoes taken out of his feet in a morning, "by the most unfortunate Yarico," whose tragical story is so well known from the popular drama. Walton mentions, that a Capuchin friar, in order to study the history of the chigoe, permitted a colony of

them to establish themselves in his feet; but before he could accomplish his object, his foot mortified, and had to be amputated. No wonder that Cardan calls the insect "a very shrewd plague."—*Ellis.*

INSECT DURATION

THE lives of some insects are in proportion to the duration of a leaf, some to that of a flower, and others to that of a plant. Earth-worms live three years; crickets ten; bees seven; scorpions from seven to twelve; and toads have been known to arrive even at thirty. Wasps and spiders, on the other hand, live but one year; an ephemeron, in a flying state, only one day. But naturalists speak incorrectly when, on the authority of Cicero and Aristotle, they say, that those which die at nine in the morning, expire in their youth; those at noon, in their manhood; and those at sunset, in their age. For, previous to their winged state, they had existed for two, if not for three years. The flying state is merely a transition which nature has decreed to them for the greater facility of ensuring a succession.

BIRDS,

THEIR HABITS AND HISTORY.

In the structure of animals intended to fly, the union of strength and lightness becomes necessary. The bony substance has, with this view, been rendered very dense; and most of the bones have been made hollow, and their cavities filled with air, in place of marrow. The stems of the feathers, too, are fastened into hollow cylinders, which are very strong in relation to their weight. By these means the skeleton becomes very light,—that of the white pelican, for example, which is five feet long, weighing only twenty-three ounces, while the bird itself often weighs twenty-five pounds. Large air-cells are placed in various parts of the body, in order to supply the cavities of the bones with air; and this air, when rarefied by the ascent of the bird into the upper or lighter atmosphere, finds an exit, by means of canals, into the air passages of the lungs. Notwithstanding this great lightness and delicacy of structure, birds are capable of exerting much strength. The leg of a man may be broken by the flap of a swan's wing; and a blow of the same kind from an eagle has been known to be immediately fatal.

Almost every peculiarity in the external appearance of birds is fitted for the element they inhabit, and conducive to swiftness of motion. Every part of their

frame is formed for lightness and buoyancy; their bodies are covered with a soft and delicate plumage, admirably calculated to protect them from cold or moisture; their wings, although of the lightest materials, are furnished with muscles of such power, as to strike the air with great force, and to impel their bodies forward with astonishing rapidity; whilst the tail acts as a rudder, by which their course can be directed at pleasure. The anterior extremities of birds being solely fitted for the action of flying, are useless either for resting or grasping; hence these animals are biped, and take objects from the ground with their mouth; for which purpose the neck and beak are elongated and very moveable; the body is also inclined forward beyond the feet; the thighs are in advance, and the toes of such a length as to form a sufficient basis. The bill of all birds consists of two mandibles, the upper and lower, the former being generally fixed and immoveable, though in parrots it has the power of motion, to assist them in climbing. None of the feathered tribe have teeth, but the horny case which covers the mandibles supplies the place of these instruments, and is sometimes serrated, so as to resemble them. In some birds, as the falcons, the base of the beak is covered with a skin called the *cere;* and in the turkey, the carrier-pigeon, &c., it is covered with a carneous appendage. The bill is, in some kinds, straight; in others, curved upwards or downwards; in some, flat; in others, conic, wedge-shaped, or hooked, &c. It enables the bird to take hold of its food, to

strip or divide it, to carry materials for building its nest, or food to its young, and is a formidable weapon in the rapacious tribe. The nostrils are usually of an oval form, and placed near the base of the beak. The eyes are so disposed as to distinguish equally well near and distant objects, and their sense of sight is exceedingly acute. The sparrow-hawk discerns small birds from an incredible distance. Besides the ordinary eyelids, there is a third, called the *nictitating* membrane, which is translucent, and defends the eye of the bird from the direct rays of the sun, without obstructing sight. Birds have no external ear, with the exception of the nocturnal tribes; these have a large exterior conch, in the form of a thin leathery piece of flesh. The internal ear, however, is very large, and their sense of hearing very quick.

The coverings or feathers of birds are admirably calculated for security, warmth, and celerity of motion. They are of three kinds,—down, smaller feathers, and quills, (*floccæ, plumæ, et pennæ.*) The feathers which invest the body have small shafts and large vanes, and are placed over each other like shingles, so as, at the same time, to permit the water to run off and to exclude the cold. The down is placed under these, and serves as a further protection against the cold: hence it is most abundant in those species that inhabit the polar regions. The quill feathers are principally found in the wings and tail. The vanes, which in the wing feathers are broad on one side and narrow on the other, consist of a number of small luminæ, which are

connected by the interlacement of a multitude of minute bristles. The largest quill-feathers in the wing, or those nearest the extremity, are termed primaries; those which arrive from the fore-arm are called secondaries; and the weaker feathers attached to the humerus are designated as scapulars. The quill-feathers of the tail are large and strong, having their vanes almost equal in size: they are generally twelve in number, but sometimes, especially in the gallinaceous birds, eighteen or twenty. The feathery covering of birds constitutes their peculiar beauty: on this, nature, particularly in the warmer climates, has lavished the most splendid colours.

The size of the wings is not always in proportion to the bulk of the bird, but is accommodated to its manner of living. Accordingly, birds of prey, swallows, and, in general, such birds as are intended to hover a long time in the air, have much longer wings, in proportion to the size of their bodies, than quails, domestic hens, &c. In the ostrich, the cassowary, and the penguin, the primaries are wanting entirely. The flight of birds differs very much from that of bats, insects, and other volant animals. Many birds, as falcons, soar boldly above the clouds, whither no eye can follow them, and hover for many hours, without perceptible exertion, in the air. Likewise, swallows, larks, and some other kinds of birds, sail to considerable distances with little effort; others, as sparrows, have a fluttering flight. Some, as the owls, fly without any noise; others, as the partridge, &c., with a loud whirr.

From their food, manner of life, and locomotive powers, birds would seem destined to become inhabitants of every part of the globe; and, in fact, the cold and barren regions of the north, and the sultry plains of the tropical climates, become the alternate residence of the same birds at different seasons of the year. At particular times in the year, most birds remove from one country to another, or from inland districts to the seaside. The periods of these migrations are observed with wonderful accuracy, though they are somewhat regulated by the temperature of the seasons. Some species, however, are stationary, as many of the birds of prey.

In mental capacity, birds fully equal quadrupeds, and, in some respects, surpass them. Parrots, starlings, &c., retain in memory many words and phrases which they have been taught, and many singing birds, whole melodies. Their powers of memory seem also to be evinced by the fact, that birds of passage, after an absence of six months, or even a longer time, and after travelling thousands of miles, return to their former home; the swallow to her beam, the finch to the tree where last year she reared her young, or where she herself was hatched. The difference between such birds as love to dwell in uninhabited places, secure from persecution, and such as are found in the neighbourhood of men, surrounded by dangers, is a proof that their prudence, cunning, and docility, can be awakened and improved. The field-sparrow is less cunning than the house-sparrow, which has

daily opportunity to observe the hostile intentions of man. In desert countries birds will alight upon the barrel of the hunter's gun when he levels it against them, whilst with us a mere stick borne upon the shoulder excites the suspicions of the wild goose.

The voice is a peculiar gift of nature, by which the greater part of birds are distinguished from all the rest of the animal world. The windpipe of birds is composed of entire rings of cartilage, with an exception in the case of the ostrich. At its bifurcation is a glottis supplied with appropriate muscles, called the lower or inferior larynx. It is here that the voice of birds is formed; the vast body of air contained in the air-cells contributes to the force, and the windpipe, by its form and movements, to the modification of the voice. The superior larynx is very simple and unimportant. The gift of song is given to the male birds only, and their notes are mostly an expression of love; hence they are heard singing chiefly at the time when they are pairing. The birds sing only when they are cheerful. In sadness, during rough weather, and in bodily disorders, they are silent. It is commonly said that the gift of song is confined to the birds in northern climates, and that nature, in the warmer regions, has endowed them, instead, with more brilliant colours; but Foster relates, that in Otaheite the birds sing with charming sweetness; and Cook, on his first voyage, found the forests of Queen Charlotte's sound, in New Zealand, filled with little birds, whose voices sounded like silver bells. To no other animal have such

various tones been granted for giving utterance to different feelings;—hunger, fear, the dread of imminent danger, desire for society, or longing for his mate, love, melancholy, &c., are expressed by a variety of notes, which make a language intelligible not only to birds of the same species, but often to the other tribes. When one of the songsters of the wood perceives a bird of prey, the whole forest grows silent at his warning voice.

Their places of abode are suited to their wants and peculiarities, and embrace rocks and dens, trees and shrubs, earth and water. Whilst woodpeckers and parrots pass all their time upon trees, partridges, quails, &c., remain on the ground; storks and herons visit the marshes; swans and water-fowl live in rivers and ponds. Birds are, in general, very long-lived, although their growth is rapid, and their period of procreation very early.

During the continuance of moulting, or the operation of changing their plumage, they are sickly and disordered, and many die. This process, which occurs every year, appears to be performed in the following manner:—When the feathers have attained their full size, the pen part, nearest the bird, grows harder, and shrinks in its diameter, thus gradually compressing, and finally obliterating the vessels which supply it with nourishment, and thus becomes an extraneous body, which is at last loosened in its socket, and falls off. Whilst these changes are taking place, the rudiments of the new feather are forming beneath, which

rapidly attains its natural size after it has been protruded through the skin. This process, it will be seen, is very analogous to the annual shedding of the horns in the deer tribe. Most birds pair at certain seasons, and continue this conjugal union whilst the united efforts of both are necessary in the formation of their temporary habitations, and in the rearing and maintenance of their offspring. Some birds, however, especially among those of prey, continue their attachment to each other for a much longer period; sometimes even for life. In general, birds are more prolific than quadrupeds, and their productiveness is visibly increased by domestication. There is a remarkable circumstance connected with this subject, and which is peculiar to the feathered race;—a bird, when she has produced her usual number of eggs, ceases, in ordinary cases, to lay. If, however, by any accident, these eggs are destroyed, she will again lay the same number. This is strongly marked in the common hen, who, if her eggs are constantly taken away, does not begin to hatch, but goes on producing eggs to an almost indefinite extent.

Rapacious birds, or birds of prey, are, the eagle, hawk, vulture, and horned and screech owl kinds. Birds which, from their great size and their inability to fly, "do not well range in any system," are, the ostrich, the cassowary, the emu, and the solitaire.

NESTS OF BIRDS.

Each species of bird constructs an abode differing in form, adaptation, and situation, from that of any other. Birds of prey reside on the summit of high rocks, or on the pinnacle of an old tower. Their dwellings are fortified by enormous pieces of wood, which nature has given them the power of carrying through the air. Their muscular strength is so great, that the transportation of weighty substances is attended with little difficulty. A habitation of this kind, when once finished,—it may be at the expense of much time and trouble,—serves for a long line of descendants from the first builders; for it is seldom that these abodes are deserted until decay has altogether unfitted them for the required purpose; and they are so firmly constructed, that many revolutions of the seasons must take place before they are utterly uninhabitable.

Birds of prey are the only members of the feathered creation which take upon themselves to erect nests of this enduring kind; for the greater number of birds are content with dwellings of a less substantial nature. —on the branch of a tree, against the side of a house. on the turf, or amongst the reeds. Some make use of bits of straw, small sticks, moss, down, cotton, or a hundred little things picked up here and there with great pains, and arranged in order in the selected locality. Their claws and beak are the only instru-

ments used in combining and knitting together the matters which form the nest. Other species hang their nests from flexible branches, which are put in motion by every wind. Others collect gravel and leaves, which they cement by means of their saliva, and thus form a piece of masonry, impenetrable both by air and moisture. This nest, thus marvellously fashioned, is usually placed in the angles of a chimney or a rock. Within it is just as curiously constructed: a partition is devised by which the male is separated from the young ones. Here he nestles, looks abroad like a sentinel for enemies, and then sleeps in his own little apartment when the time for rest comes. Surely in works like these there is food for admiration! To complete a work of this kind, think of the pains required; what persevering industry! what exhaustless patience!

Some birds establish themselves on the ground between hillocks of earth, which protect them from the wind, and from an overflow of water. These nests are, perhaps, not so carefully wrought as other kinds; yet here ingenuity is displayed in weaving twigs and down into a protecting entrenchment. Other species content themselves with digging a hole in the sand, and there depositing their eggs, which they leave the sun to hatch during the day, but to which they return at night.

It may be amusing to mention some of the most interesting specimens of bird architecture; and we will begin with the nest of the long-tailed titmouse.

This bird is not much larger than the wren; its head, neck, and breast, are white; the rest of its body is chiefly black; its tail, from which it derives its distinctive appellation, is very long and wedge-shaped. Tennant, after remarking that the young are in the habit of following their parents for the whole winter, says, that "from the slimness of their bodies and great length of tail, they appear, while flying, like so many darts cutting the air." Its nest is closed over, both above and below; only one little circular opening at the side is left, serving for door and window. It is made completely round; and as the cold might enter by the orifice, the bird makes use of door curtains, similar to those which some of our rooms possess; the entrance to its habitation being furnished with a hanging of flexible and transparent feathers. Thus it is protected from rain, and from the gaze of casual passers-by. Through this it goes out and comes back just as it pleases, without causing the least disarrangement. This is not all; the titmouse is so small a bird that it has much to fear from foes of many kinds; and therefore, to conceal the place of its abode, it has recourse to a subterfuge. It fixes its nest to the trunk of a tree, and then covers it up with such parasitical plants as grow on the bark, so as not in the least to disturb the natural appearance. Sometimes the nest is placed in the centre of a thick bush; and so firmly is it seated, that if we desire to procure it, no ordinary method of dislodgment will do; it must be cut out. The nest is made by the female, who is occupied two

or three weeks in building it. There is another member of the tit tribe which takes still greater precautions. It is one that builds in watery places, and it stands in danger of being attacked by reptiles. Accordingly, it suspends its nest from a flexible branch over the water. The entrance to the nest is formed by a sort of pipe, through which it would be impossible for a snake to penetrate. Another kind of titmouse adds to its nest a little cell, in which the male and female rest after tending their young. The birds are very small, delicate, and weak, yet the nest they build is very large; indeed, wonderfully so, when the diminutive size of the architect is considered. The labour is begun in the middle of winter, and is not completed until spring. The hatching is a long process, twenty-two being the customary number of eggs; and the female takes all the trouble of sitting on them to herself.

The reed-warbler, so named from the places it frequents, is also endowed with a wonderfully adaptive instinct. To escape the dangers of the element over which it hatches its young, it builds at once a house and a boat. The nest is slightly attached to the reeds, and is coated with a gummy substance, which effectually precludes the water from entering, in case the nest should slip down, or the water should rise. We have seen a nest of the tailor-bird so artfully constructed, that to view its interior it was necessary to unrip the stitches, and cut off the tightly-drawn knots. Several leaves had been brought together, and their

edges connected by means of cotton or fibrous plants. There you had the thread; but can you guess the needle? It was no other than the beak, an instrument admirably adapted for the purpose by its strength and sharpness.

As examples of exquisite art, we might adduce the nests of the thrush, the witwall, and, above all, of the grosbecks, who erect an immense dwelling-place, to contain five or six hundred inhabitants, all living together on good terms. A great number of these birds form a building society, and unite their efforts to erect a little town of nests. Having selected a large tree proper for the purpose, they first construct a roof, woven out of large plants, close enough to be rain-proof. This labour ended, they distribute the interior space amongst the members of this bird-partnership, and the nests are attached side by side to the roof, all being of the same size. Each bird has generally his private entrance; but sometimes it happens, that one door gives access to two or three nests. Each nest is about three inches in diameter, and is made of plants, but is of a less coarse kind than those used for the roof. They are equally securely fastened together, and within there is a lining of down.

As the community increases new nests are placed upon the old ones; and some of the latter are left by their occupants, and converted into a public pathway conducting to the new dwellings. The traveller Vaillant brought one of these little towns in an entire state to Europe, roof as well as nests. It contained three

hundred and twenty cells; now, if one pair occupied each nest, the whole would comprise a population of six hundred and forty birds. It would form an interesting employment to trace the domestic life of any one pair of birds for a year. We cannot, however, see the labourers at their work, and we must remain in ignorance of what we would most like to know. It is probable that the nests are deserted when the young broods have taken wing, until the females return to deposit their eggs again. One is at a loss to guess how these associations are constituted at first, and how they are re-formed when once dissolved.

The fauvette of St. Domingo builds a nest that cannot but fix the attention of the most careless observer. Put together with an industry that passes description, we find it composed of dry herbs, leaf-fibres, and flexible roots, which are woven, with great art, into a substance shaped like a ball, compact, and not to be penetrated by the wet. It is hermetically closed at the top and all round, except an opening at the bottom, so that the bird has to ascend in order to get into its nest. One particular part, divided from the rest by a partition, is reserved for the brood. It is ornamented with lichen, and made very comfortable with a lining of silky down. The adroitness with which the fauvette defends its young from their many enemies, and conceals the cradle where they commence a life full of uncertainties to them, as well as to beings higher in the scale of creation, should not be without its meed of applause. A cane, short and fluctuating,

between two trees above water, is taken possession of; and the prudent mother fastens her nest to it by a band, at the same time strong and pliant. The wind may shake this aerial habitation, and beat it to and fro, but it is completely protected against the invasion of rats, and such like vermin. But should a bird of prey, more formidably adapted for rapine, approach the little dwelling, its attention is diverted by the male or the female hopping as if wounded, only a short distance in advance of the enemy, until the danger is removed from the neighbourhood.—*Sharpe's London Magazine.*

A NEST ON A RAILWAY CARRIAGE.

At the railway station in Giessen, Hesse Darmstadt, in May 1852, it was found that a bird had built its nest on the collision spring of a third-class carriage which had remained for some time out of use. The bird was the black redstart, (*salvia tithys,*) and the nest contained five eggs. The discovery was made by the "wagenmeister," Jacob Stephanÿ, who humanely desired his men to avoid as long as possible the running of that carriage. At length, when it could no longer be dispensed with, the carriage was attached to a train, and sent to Frankfort-on-the-Maine, distant between thirty and forty English miles. At Frankfort it remained for thirty-six hours, and was then brought back to Giessen, whence it went back to Löllar, distant four or five English miles, and subsequently again came back to Giessen, having been kept a while at Löllar; so that four days and three nights

elapsed between the bringing of the carriage into use and its last return to Giessen. Stephanÿ now finding the nest not to have been abandoned by the parent birds, and to contain young ones, which he describes as feathered, he removed it from the carriage to a secure place of rest which he had prepared, saw the parent birds visit it, and visited it from time to time himself, until at first three, and then the other two young birds had flown, none remaining at the end of four or five days. Now, while the carriages were travelling, where were the parent birds? It will hardly be said they remained at Giessen awaiting its return, having to examine, by night as well as by day, hundreds of passing carriages in order to recognize it, the young birds in their nests quietly awaiting food. There seems little doubt that, adhering to the nest, one at least of the parent birds travelled with the train. Nor, when it is remembered how gently and how slowly an enormous railway carriage is pushed into connexion with a train, how gradually a train is brought into full speed, and how equable the movements are upon a railway, will it appear incredible that at such a time a parent bird should continue with its nest, that nest being quite concealed, and containing young. While the carriage in question was at Frankfort, as well as during its short stay at Friedeberg, on the way to Frankfort, the conductor of the train saw a red-tailed bird constantly flying from and to the part where the nest was situated in that particular carriage.

THE EAGLE.

Of the eagle kind, that termed the golden eagle, for size and strength, ranks first. From the extremities of tail and beak, it has been found to measure nearly four feet. Its body is of a dark colour, sprinkled with spots of a livelier shade. Like other predatory birds, it makes its dwelling in rocks, and other lonely elevations. Its natural fierceness is so great, that it has seldom been employed for the purposes of the chase, as it never can be rendered sufficiently tractable to obey its keeper. The eagle soars to a greater height than any other bird. Its sense of sight is exquisite. It lives for a great length of time even in a captive state. Mr. Pennant mentions one which had been forty-one years in the possession of two persons. It is said to reach the age of sixty, eighty, and even a hundred years.

The principal species are the ring-tailed eagle, (now known to be the young of the golden eagle, though mentioned by Goldsmith to be distinct from it,) the common eagle, the bald eagle, the white eagle, the rough-footed eagle, the erne, the black eagle, the osprey, the sea eagle, the crowned eagle, and the great eagle of Guiana. Eagles are found in various parts of Europe and North America. The golden eagle, in particular, is very often met with in the Highlands and western isles of Scotland.

The same nests are made use of by eagles for a succession of years. These nests are of great bulk, and of such durable materials as to be almost indestructible. They are built in dry and inaccessible situations, of large twigs, lined with several layers of reeds or brambles, of a flat form, several feet in breadth, and of such strength as to support not only the eagle and her young, but likewise the large quantity of food she provides for them. This is so great, that it is related by Smith, in his *History of Kerry*, that a peasant procured a comfortable subsistence for his family, during a summer of famine, by robbing the eaglets of the food provided for them by the old birds.

Several instances have been recorded of children being seized and carried off by eagles to their young. In the year 1737, in the parish of Norderhouss, in Norway, a boy, somewhat more than two years old, was running from the house to his parents, who were at work in the fields, at no great distance, when an eagle pounced upon, and flew off with him, in their sight. In Anderson's *History of Iceland*, it is stated, that in that island children of four or five years of age have been sometimes taken away by eagles; and Ray relates, that in one of the Orkneys, a child of a year old was seized in the talons of an eagle, and carried about four miles to its nest. The mother, knowing the place, pursued the bird, found her child in the eyry, and took it away unhurt.

SCRIPTURAL ALLUSION TO THE EAGLE.

In the book of Deuteronomy we have a very animated and beautiful allusion to the eagle, and her method of exciting and teaching her eaglets to attempt their first flight, in that sublime composition called "The Song of Moses;" in which Jehovah's care of His people, and methods of instructing them to aim at and attain high and heavenly objects, are compared to her proceedings upon that occasion: "As an eagle stirreth up her nest, fluttereth over her young, spreadeth abroad her wings, taketh them, beareth them on her wings; so Jehovah alone did lead them," (Deut. xxxii. 11-12.) The Hebrew Lawgiver is speaking of their leaving their eyry. Sir Humphrey Davy had an opportunity of witnessing the proceedings of a pair of eagles after they had left it. He thus describes them:—"I once saw a very interesting sight above one of the crags of Ben Nevis, as I was going, on the 20th of August, in the pursuit of black game. Two parent eagles were teaching their offspring, two young birds, the manœuvres of flight. They began by rising from the top of a mountain in the eye of the sun. It was about midday, and bright for this climate. They at first made small circles, and the young birds imitated them. They paused on their wings, waiting till they had made their first flight, and then took a second and larger gyration, always rising towards the sun, and enlarging their circle of flight, so as to make a gradually extending spiral. The young ones still slowly fol-

lowed, apparently flying better as they mounted; and they continued this sublime kind of exercise, always rising, till they became mere points in the air, and the young ones were lost, and afterwards their parents, to our aching sight." What an instructive lesson to Christian parents does this history read! How powerfully does it excite them to teach their children betimes to look toward heaven and the Sun of Righteousness, and to elevate their thoughts thither more and more on the wings of faith and love; themselves all the while going before them, and encouraging them by their own example!—*Kirby's Bridgewater Treatise.*

A WHITE HARE AND AN IMMENSE EAGLE.

A gentleman connected with the Administration des Eaux et Forêts, in France, in the department of the Vosges, once went with some friends to shoot in the mountains. They started a hare of snowy whiteness, and the dogs pursued it. After awhile it came back to nearly the same place; and just as it arrived, a large eagle pounced on it with a sharp hissing noise, and, seizing it in its talons, carried it off. A gun was discharged at both, and the hare fell dead. The eagle, which was wounded, beat the air with its wings for a few moments, and then fell to the ground. The dogs rushed towards it, but it threw itself on its back, and prepared to defend itself with its talons and beak. But when the sportsmen approached it, it got on its feet, and raised its head proudly. A spiked staff, such as are used for ascending mountains, was employed to

pinion its head to the ground, and its legs were then tied with a string. Whilst this was being done, the eagle's eyes flashed fire, and it made a noise as if in anger. At length its throat was cut, and just at the last gasp it struck out with its wings, inflicting a wound on the hand of one of the gentlemen. It appeared that the discharge had broken its wing, and that five or six shot had entered its body. It measured, from the extremity of one wing to that of the other, two yards, and weighed nine pounds. It was of the species called the great royal eagle of the Alps.—*Galignani.*

THE CONDOR.

THE condor, or Peruvian eagle, is a majestic bird, of a large size, and beautiful form. How picturesque, motionless, and statue-like, it sits on the wing, high in the air, and possessed of a most piercing eye! It resembles the golden eagle in feather and colour, and is found in many places in the chain of the Andes. Like all of its class throughout the world, its power of sight and scent is remarkable. Let there be a dead mule or other carcase on the road or in the fields, and in the course of a very short time the condor will be lured to the spot, and be found busily engaged dis-

secting it; first attacking the eyes and tongue, and then the bowels and kidneys, which seem to be tit-bits with them. It soars generally at a great height, and is sometimes to be seen like a mere spot on the sun, descending when it has descried afar off some chance quarry. As many as five of them have been seen together feasting upon a dead mule, with buzzards innumerable about them; but these come in only for the second course of the entertainment, and dare not intrude while his majesty, the condor, whets his royal appetite. On such occasions they are easily shot, as they gorge themselves to such a pitch that they can with difficulty get away.

Mr. Temple, in his *Travels in Peru*, says that he once had an opportunity of shooting a condor. "It was so satiated with its repast on the carcase of a horse as to suffer me to reach within pistol-shot before it extended its enormous wings to take flight, which was to me the signal to fire; and having loaded with an ample charge of pellets, my aim proved effectual and fatal. It may be difficult to believe, that the most gigantic animal which inhabits the earth or the ocean can be equalized in size by a tenant of the air; and those persons who have never seen a larger bird than our mountain eagle, will probably read with astonishment of a species of that same bird, in the southern hemisphere, being so large and strong as to seize an ox with its talons, and to lift it into the air, whence it lets it fall to the ground, in order to kill it and prey upon the carcase. But this astonishment must in a

great measure subside when the dimensions of the bird are taken into consideration, and which, incredible as they may appear, I now insert from a note taken by my own hand. When the wings are spread they measure sixteen paces, forty feet in extent, from point to point. The feathers are eight paces, twenty feet, in length, and the quill part, two palms, eight feet in circumference." Humboldt was the first naturalist to furnish correct statements of the habits and peculiarities of this wonderful bird; and his careful measurements establish the fact, that it is not generally larger than the lammergeyer, or bearded vulture of the Alps.

THE VULTURE.

THE vulture, or buzzard of Peru, is very like the turkey in general appearance, and some have the same red head of the male turkey. They are foul, loathsome feeding animals. Every kind of carrion or filth seems to be eagerly devoured by them. In the city of Lima they are respected and protected for their usefulness, in acting as scavengers. Most of the streets have a small stream of water running down their centres, and into this brook all the offal is thrown from the houses of the indolent Spaniards. The buzzard, with its quick eye, sits watching from the house-

top the course of the stream, and is ever and anon darting down upon the stray waif that passes along, clearing away what else would become putrid and insupportable to live among in so warm a climate; for the lazy Spaniard would never take the trouble of doing for himself what this bird volunteers to do for him. The commonality of them are not a whit less filthy than the dirty Portuguese.

TENACITY OF LIFE IN A VULTURE.

We killed a vulture this morning at Laodicea. It was shot at about nine o'clock, and at the time was washing itself in a stream after its hearty meal upon the dead camel. It was wounded in the head and neck, and dropped immediately; but, upon taking it up, its talons closed on the hand of my servant, making him cry out with pain. He placed it on the ground, and I stood with my whole weight upon its back, pressing the breast-bone against the rock, when its eye gradually closed, its hold relaxed, and to all appearance life became extinct. It was then packed up in my leather hood, and strapped behind the saddle. The day was oppressively hot, for we trode upon our shadows as we rode across the plain. Until this evening (at eleven o'clock) the vulture remained tightly bound behind the saddle. My servant, on unpacking, threw the bundle containing it into the tent, while he prepared boiling water for cleaning and skinning it. Intending to examine this noble bird more carefully. I untied the package, and what was

my surprise to see it raise its head and fix its keen eye upon me! I immediately placed my feet upon its back, holding by the top of the tent, and leaning all my weight upon it; but with a desperate struggle it spread out its wings, which reached across the tent, and, by beating them, attempted to throw me off. My shouts soon brought in Demetrius, who at length killed it by blows upon the head with the butt end of his gun. My ignorance of the extreme tenacity of life of this bird must exculpate me from the charge of cruelty.—*Fellow's Asia Minor.*

THE ADJUTANT.

This singular bird, though of most disgusting appearance, is of essential service in those climates where animal corruption goes on rapidly, which would generate contagion if not speedily removed. The adjutant, with its congeners in carrion, the vultures, may be looked upon as the scavengers of the East. In Calcutta these birds are quite common in the streets, where they patiently wait throughout the day for any refuse that may be thrown out to them,—each bird invariably affecting one particular spot. In the colder months there are some hundreds of these birds

in and about Calcutta; but towards the rains they all retire, perhaps for the purpose of nidification, into distant parts, and are heard of no more until the end of the season, when they again revisit the town. It has never yet been correctly ascertained where they breed. In so high estimation are these birds held for their great utility in the riddance of all foul and filthy nuisances in and about Calcutta, that a fine of one gold mohur is imposed upon any person who shall be proved guilty of destroying an adjutant within the limits of the presidency.

FALCONS.

THEIR command of the air is truly wonderful. A few strokes of their powerful wings will send them up till they are hardly visible, or bring them from the top of their flight to within a short distance of the ground. At times they will ride motionless, as if they were anchored in the sky; and anon, with scarcely any perceptible motion of the wings, they will shoot with the rapidity of a meteor and the certainty of an arrow, —aye, more certainly, and at a farther range, than ever shaft that human archer set on the string. The collision of their pounce is terribly effective. If the

falcon misses, we need not wonder that the quarry escapes before it can again rally; and if the falcon comes upon the bayonet charge of the quarry, as is sometimes the case when it stoops at the heron, we need not wonder that it is transfixed. The ballistic pendulum used in experimental gunnery, though suspended on hinges, gives way to the cannon shot: what, then, shall we say of the stroke of the falcon, which breaks bones flying away in the air, and defended by feathers? The keen point of the claw—of that terrible claw on the hinder toe, which concentrates the whole momentum of the bird, and always strikes perpendicularly and penetrates—is the main instrument of the effect.—*Mudie's British Birds.*

THE SEA-FALCON.

This bird is the largest and strongest of the falcon kind, and is found in Russia, Norway, and Iceland, and in the Highlands of Scotland, and the Orkney isles. In the days of falconry, it was trained to take wild geese, cranes, and other large game. Its breast and belly are white, with darkish spots; the neck white also, and similarly spotted. The upper part is dark brown inclining to black, with light spots and bars. The tail is barred white and brown; the legs yellow; the claws black. The head is flat, and of an ashen hue; and the bill is a bluish grey.

THE PEREGRINE FALCON.

The Peregrine falcon is the same bird, in a state of maturity, as that which has been termed the common

falcon. It is found in the same localities as the sea-falcon, which it resembles. Like others of its congeners, it is remarkable for its daring disposition.

HAWKS.

Birds of the hawk kind are very numerous. From the different species and endless varieties which some naturalists have given of this bird, it is almost impossible to classify them properly. This is owing to the change in the colour of their plumage during the first three years of their life. The kestrel is a well-known and widely diffused species. The hobby is a bird migratory in England. It preys upon small birds, preferring the lark to all others. In general colour it is a greyish black. Like the swallow, it travels with the sun; always seeking warm regions as soon as winter begins to be felt. The merlin is the smallest of the hawk kind, being little bigger than a blackbird; but it equals any of its congeners in courage.

FEROCITY OF HAWKS.

We stopped one very sultry day, about noon, to rest our horses, and enjoy the cooling shade afforded

by a clump of sycamore trees, with a refreshing draught from an adjoining spring. Several large hawks were flying about the spot,—two of which we brought down. From their great size, immense claws, and large hooked beaks, they could have easily carried off a common-sized duck or goose. Close to our resting-place was a small hill, round the top of which I observed the hawks assemble; and judging that a nest was there, without communicating my intention to any of the party, I determined to find it out. I therefore cautiously ascended the eminence; on the summit of which I perceived a nest larger than a common-sized market basket, formed of branches of trees, one laid regularly over the other, and the least of which was an inch in circumference. Around it were scattered bones, skeletons, and half-mangled bodies of pigeons, sparrows, humming birds, &c. Next to a rattlesnake and a shark, my greatest aversion is a hawk; and on this occasion it was not diminished by observing the remains of the feathered tribe, which had, from time to time, fallen a prey to their voracious appetite. I therefore determined to destroy the nest, and disperse the inhabitants; but I had scarcely commenced the work of demolition with my dagger, when old and young flew out, and attacked me in every direction, but particularly about my face and eyes; the latter of which, as a punishment for my temerity, they seemed determined to separate from their sockets. In the meantime, I roared out lustily for assistance, and laid about me with the dagger. Three men promptly

ran up the hill, and called out to me to shut my eyes, and throw myself on the ground, otherwise I should shortly be blinded,—promising, in the meantime, to assist me. I obeyed their directions; and just as I began to kiss the earth, a bullet from one of their rifles brought down a large hawk, apparently the father of the gang. He fell close to my neck, and, in his expiring agonies, made a desperate bite at my left ear, which I escaped, and in return gave him the *coup de grace*, by thrusting about four inches of my dagger down his throat. The death of their chieftain was followed by that of two others, which completely dispersed them; and we retired after breaking up their den.—*Ross Cox's Adventures on the Colombia River.*

THE GOSHAWK.

Of the short-winged hawks, this bird ranks first for the purposes of falconry. It is rare in England, but very common in some of the wild districts in Scotland, and also in Russia and North America. It is called by Linnæus, *falco palumbarius*. The goshawk is twenty-one inches in length; the bill and cere are blue; crown, black, bordered on each side by a line of white, finely speckled with black; upper parts, slate, tinged with brown; legs, feathered half-way down, and, with the feet, yellow; tail, feathers, with pale bands. It feeds on mice and small birds, and eagerly devours raw flesh. It plucks the birds very neatly, and tears them into pieces before it eats them, but swallows the pieces entire. Goshawks are said to be used by

the emperor of China in his hunting excursions, when he is usually attended by his grand falconer, and a thousand persons of inferior rank. Every bird has a silver plate fastened to its foot, with the name of the falconer who has charge of it, that, in case it should be lost, it may be restored to the proper person.

The other short-winged hawks are, the sparrow-hawk, the kite, and the buzzard. Of these, it will only be necessary to give an account of the first.

THE SPARROW-HAWK.

This beautifully marked bird, so very destructive in its wild state, may be easily tamed, and is capable of strong attachment. The female exceeds the male in size, beyond the proportion usual among rapacious birds. The former is eleven inches long; the stretch of the wings twenty-three inches: the latter about nine and a-half or ten inches long. The cere and legs are yellow; the head, bluish ash; crown, rufous. The upper parts are reddish bay, striped transversely with dusky brown; the lower parts, pale yellowish white, marked with longitudinal spots of brown; the claws, black. The nest is built in a hollow, shattered, or decayed tree, at a considerable elevation. The eggs are said to be four or five, of a light brownish yellow, and spotted with brown. The food of this bird is sparrows and other small birds, also mice, grasshoppers, and lizards. It is found in many parts of Europe, also in the warmer parts of the United States. It is particularly abundant in the winter through-

out South Carolina, Alabama, Georgia, and Florida, whither the birds assemble from the remote interior of the northern states; wandering in summer as far as the Rocky Mountains. They are also found in the West Indies; also south of the equator, even in Cayenne and Paraguay.

A remarkable instance of the boldness and ferocity of the sparrow-hawk, was witnessed at Market Deeping, a town in England, one Sabbath. Just as the congregation was returning from divine service in the afternoon, a hawk of this species made a stoop at a swallow which had alighted in the centre of the church; and, notwithstanding the surrounding spectators, and the incessant twitterings of numbers of the victim's friends, the feathered tyrant succeeded in bearing his prey triumphantly into the air.

NOVEL HAWKING.

The attention of not a few good folks, who were wending their way to church one Sabbath forenoon in the spring, 1850, was attracted by a large flock of crows, who hovered over a newly-ploughed field near Shawlands, in the neighbourhood of Glasgow, and seemed, by their clamorous cawing, to be in a state of great alarm and excitement. This was caused by the unwelcome presence of a hawk, around whom they closely clustered, while some of the more daring made an occasional swoop at the intruder, which, however, the latter easily and adroitly avoided, being swifter in wing; and he continued sportively to annoy them with

his company. At length, however, the hawk desired to take leave of the noisy throng, and flew from among them; but now, in turn, the crows seemed not disposed to part with him, and they joined in a hot and noisy pursuit, while two or three of the foremost, soaring above the hawk, made some fine swoops at him, which would have satisfied and delighted the Queen's falconer himself, or any other more humble admirer of the ancient and noble art of falconry. At times, the hawk kept a straight course in his flight, followed by the crowd of crows in full cry, while as if in derision of them, he occasionally slackened his speed, when one and another of the crows vainly attempted by a swoop to strike him down. This continued for a considerable distance, and until the hawk at last took leave of his pursuers by taking refuge among the close branches of an old sycamore tree; and the crows then, with a loud caw of triumph, flew away. The appearance of the crowd of crows, when first seen flying in circles around the hawk, the length of the chase, the manœuvring of the birds, when attacking, and their fine swoops, the noisy flight of hundreds of crows in pursuit, afforded exciting amusement, and gave some idea, however imperfect, of a sport once keenly followed, by the magnates of old Scotland,—although here the tables were turned upon the nobler bird, who, instead of hunting his quarry, was himself pursued and nearly victimized by a vulgar throng of crows.

THE ALBATROSS.

THE albatross is the largest of ocean birds,—of the goose form, and a whitish-grey colour. There is no bird that seems to have such complete command of the air as this Goliath of the feathered tribe. It soars along with outstretched pinions with the greatest ease and grace imaginable, never appearing to exert itself by force of wing, but merely inclining its huge body upwards or downwards, and away it swims, rather than seeming to fly. These birds are said to measure fourteen and even sixteen feet from the tip of one wing to the other. In a calm day they have great difficulty in rising from the water, and have frequently been seen to attempt it unsuccessfully. The skin of their feet makes an excellent purse, and is in very common use with the natives on the shores of the Pacific. They are very plentiful about the Falkland Islands and Cape Horn, in company with thousands of the Cape pigeon and stormy petrel, and follow in the wake of a vessel to pick up whatever is thrown overboard. When a bucketful of refuse is thrown out, it is not a little amusing to witness the scramble that takes place; and to the voyager round Cape Horn it is one of his chief pleasures to watch them. "The first albatross that I saw," says a traveller, "was resting upon the water in a very calm day, and was surrounded by a whole flock of other water-fowl, varying in size

from itself down to the smallest sea-bird,—Mother Carey's chicken. At first I thought it must be a boat, and called the captain's attention to it. After he had examined it through the glass, he told me it was only a bird, and was called the albatross. But it was not until we had neared it, and could distinguish it plainly with the naked eye, that I believed him, not knowing that a bird of such magnitude existed either on land or water."

THE MAN-OF-WAR BIRD FEEDING.

THE wavelets chase each other in undulating lines, the sunbeams glitter on the smooth surface of the sea, and the gentle breeze tempers the heat of the noontide. The sea-birds are on the wing, wheeling and hovering all around, vociferous in their enjoyment, their screams mingling into one harsh noise, not less pleasing for a time than the song of the lark or blackbird. Every now and then, a tern dips into the water, and emerges with a little fish in its bill, which it swallows without alighting. In the midst of all this bustle and merriment, there comes gliding from afar, with swift and steady motion, a dark and resolute-looking bird, which, as it cleaves a path for itself among the white terns,

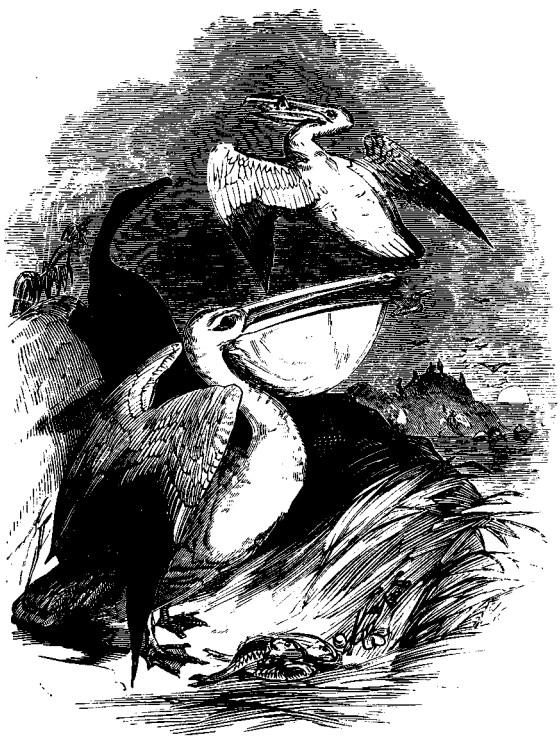
seems a messenger of death. But a few minutes ago, he was but a dim speck on the horizon, or, at least, some miles away—and now, unthought of, he is in the very midst of them. Nay, he has singled out his victim, and is pursuing it. The latter, light and agile, attempts to evade the aggressor. It mounts, descends, sweeps aside, glides off in a curve, turns, doubles, and shoots away, screaming incessantly the while. The sea-hawk follows the frightened bird in all its motions, which its superior agility enables it to do with apparent ease. At length the tern, finding escape hopeless, and, perhaps, terrified by the imminence of its danger, disgorges part of the contents of its gullet, probably with the view of lightening itself. The pursuer, with all his seeming ferocity, had no designs upon the life of the poor tern; and now his object is evident, for he plunges after the falling fish, catches it in its descent, and presently flies off to attack another bird. In this way the marauder makes his rounds, exacting tribute from all that he thinks capable of paying it and not sturdy enough to resist oppression. The tern, the brown-hooded mew, and the kittiwake, he harasses; but the black-backed, yellow-footed, and herring gulls, are not his tributaries. They pay no taxes to governors, nor black-mail to protectors. The teaser never fishes for himself on such occasions, although his organization seems to fit him for aquatic rapine even more than that of the tern or gull. He is lord of the shores; and they who fish by them must yield up a portion of the produce of their industry. When satis-

fied with food, he retires to the distant bosom of the deep, or to some islet or unfrequented part of the sand; but his awakening appetite soon forces him to return, and, for hours together, he may be seen on the wing, singling out a bird here and there, and pursuing it, or gliding swiftly, as if on urgent business, from one group to another.—*Macgillivray's History of British Birds.*

THE CORMORANT.

THE cormorant belongs to a genus of aquatic birds of which there are about fifteen varieties. The distinctive characteristic of the order consists in the peculiar formation of the foot. The outer toe is the longest, and edged externally by a small membrane; the webbing membrane is broad, full, and entire; the hind toe is half as long as the middle, and all are provided with broad curved claws, but not sharp; and the middle toe is serrated, so as to retain with security the slippery prey on which this bird feeds. The cormorant is an excellent swimmer and diver, and also flies well, and the voracity for which it is proverbially famed calls into constant activity the peculiar faculties with which nature has enabled it to satisfy its craving

appetite. As soon as the cormorant perceives its prey, it darts upon it with destructive rapidity, and soon retains it in security by means of the saw-like indentations of its middle toe. With the aid of the other foot the fish is brought to the surface of the water, and then tossed upwards by an adroit motion so as to be seized by the head. By this means it is swallowed without the fins offering any resistance. The throat of the cormorant is susceptible of considerable expansion, should any obstacle occur in taking its prey. Cormorants are fond of society, and, except in the pairing season, they are generally found in flocks, and often in company with other waterfowl, which are unmolested, except when the greediness of the cormorant tempts it to snatch from them their prey. Owing to its activity and success in fishing, the services of the cormorant have been made use of in another element, in the same manner as the falcon. Faber has described the manner in which these operations were carried on. He says,—"When they carry them out of the rooms where they are kept to the fish-pools, they hoodwink them, that they may not be frightened by the way. When they are come to the rivers, they take off their hoods, and having tied a leather thong round the lower part of their necks, that they may not swallow down the fish they catch, they throw them into the river. They presently dive under water; and there for a long time, with wonderful swiftness, pursue the fish; and when they have caught them, rise to the top of the water, and press-



Pelicans are large birds, which reside on the banks of rivers and lakes, and upon the sea-coasts.—p. 103.

ing the fish lightly with their bills, swallow them; till each bird hath, after this manner, devoured five or six fishes. Then their keepers call them to the fist, to which they readily fly; and, one after another, vomit up all their fish, a little bruised with the first nip given in catching them. When they have done fishing, setting the birds on some high place, they loose the string from their necks, leaving the passage to the stomach free and open; and, for their reward, they throw them part of their prey; to each one or two fishes, which they will catch most dexterously as they are falling in the air."

The practice described by Faber has long been extinct in England, but it is in use in China at the present day. The Chinese cormorant is of a blackish brown on the upper part of its body, the lower parts are whitish, spotted with brown, and the throat is white.

THE PELICAN.

Pelicans are large birds, which reside on the banks of rivers and lakes, and upon the sea-coasts. They habitually feed on fish, although they will sometimes devour reptiles and small quadrupeds. They are

capable of rapid flight, and have an extraordinary power of ascending on high. This power is called into action by their mode of fishing. When they perceive, from their elevated position, a fish or fishes on the surface of the water, they dart down with inconceivable rapidity, and flapping their large wings so as to stun their prey, fill their gular pouch, or bag, and then retire to the shore to satisfy their voracious appetites. The fish thus carried away in the pouch undergo a sort of maceration before they are received into the stomach; and this grinding process renders the food fit for the young birds. No doubt the sanguinary traces which this operation leaves upon the plumage of the mother, have given birth to the fable, that she feeds her young with her blood.

The following is the scientific description of the pelican: Bill long, straight, broad, much depressed; upper mandibles flattened, terminated by a nail or very strong hook, the lower formed by two bony branches, which are depressed, flexible, and united at the tip; from these branches is suspended a naked skin, in form of a pouch or bag; face and throat naked; nostrils basal, in the form of narrow longitudinal slits; legs short and strong; all the four toes connected by a web; wings of moderate dimensions.

The pelican, as well as the cormorant (properly corvorant) sometimes perches upon the branches of a tree. It always selects for its nest the fracture of a rock as near as possible to water. The male and female both labour to construct this nest, which is

large and deep, and lined with moss and downy feathers. The female lays from two to four eggs, upon which she sits with unwearied patience for forty-three days, receiving sustenance from the male during the whole time. The young birds are at first grey; but their feathers attain their splendid white colour after the third moulting.

There are several species of pelican, of which the white or common bears the scientific name of *pelicanus onocrotalus*. They are found either in flocks or singly, principally in Asia, Africa, and South America, and sometimes in the south of Europe. They are rare in France, and unknown in Great Britain.

This bird has its specific name from its cry, which is loudest during flight. A single pelican will, at one repast, despatch as many fish as would suffice for six men. Though remarkable for their voracity, some of the species have been trained to fish in the service of man. In external appearance the male and female very nearly resemble each other.

When a number of pelicans and cormorants get together, they are said to practise a singular method of taking fish; for they spread into a large circle, at some distance from land, the pelicans flapping on the surface of the water with their extensive wings, and the cormorants diving beneath, till the fish contained within the circle are driven before them towards the land; and, as the circle contracts by the birds drawing closer together, the fish are at length reduced within a narrow compass, when their pursuers find no difficulty in securing

them. In this exercise they are often attended by various species of gulls, which participate in the spoil.

THE BYAH, OR INDIAN GROSBEAK.

The byah perhaps excels the whole feathered tribe of India for its curious instinctive economy. It is a very lively handsome bird, about the size of a linnet. It has a yellow bill, with legs of the same colour. The head, the hind part of the neck, and the back, are dusky-green, dashed with yellow. The throat and breast are of a pale yellow, and the belly approaching to white. The quill feathers are brown, with yellowish edges.

The nest of the byah, which is only to be found on the highest trees of the forest, is truly one of the wonders of the animal world. It consists of the finest filaments of the finest grass, which are interwoven and compressed into a texture as smooth and compact as those patent hair-soles worn by elderly gentlemen inside their boots in rainy weather. The external shape of the nest is oval, measuring nine inches in length, and half as much in thickness. A number of small fibres are twisted together at the upper end, whereby it is suspended from the outward or more slender branches of the tree to which it is attached. The entrance is

by a trap-door at one edge of the bottom part or floor, which, like that admitting to the swallow's clay-built domicile, is only left sufficiently large for the bird to squeeze itself through. The interior of the nest is divided into two separate apartments or stories by means of a horizontal partition in the centre, composed in like manner of the above mentioned fine grass, and wherein an opening, similar to that in the lower floor, is made on the opposite side of the nest. This upper room is appropriated to the use of the hen. Here she deposits her eggs and hatches her young. Meanwhile, the cock, in the lower apartment, guards the outer gate, and awaits the commands of his mistress above. It is a curious instance of wisdom and watchfulness in this bird, and totally at variance with the habits of all others in this respect, that, during the period of incubation and feeding her young, she never willingly remains in the dark. The means adopted to procure a nocturnal light—the duty of furnishing which devolves upon the male—is equally ingenious with its wonderful economy in other particulars. After sunset he selects a small lump of moist clay, which he brings into the nest and sticks against the wall of the higher apartment, rather above the level of the floor, and exactly over the inner trap-door. He now departs in quest of a fire-fly, and, it being the hour at which these insects come abroad, he seldom returns unsuccessful. The unfortunate fire-fly is then thrust, head foremost and up to the middle, into the wet clay before provided. Here, in consequence of the judicious position chosen for it, and the

continued struggles of the poor insect to release itself, whereby the igneous principle situated under the belly are more fully developed, it affords an excellent light to both chambers of the nest during the night, and a corresponding security against the intrusion of ants, wasps, or other unauthorized visitors.

Naturalists have deservedly extolled the North American beaver for skill and sagacity. In constructing for itself houses, two stories in height, that animal certainly emulates man in the art of architecture. But the scientific instinct of the byah is still more surprising when we come to consider the single material of which its aerial mansion is composed, the single tool used in its formation, and the strength and beauty conjoined in its workmanship.

The beaver is a large and powerful quadruped, whose fore-paws have all the dexterity of those of a monkey, and whose tail possesses considerable powers of flexibility. With these united he rears his dwelling on the convenient bank of a river.

The byah, on the contrary, is a small timorous bird, that weaves its nest by means of its bill alone, without either a foundation for its work, or a resting-place for itself, during the operation. This nest, besides, while it is so very light as to be agitated by the gentlest breeze, is, at the same time, so admirably adapted to the safety and comfort of its inmates, that the most boisterous wind cannot blow it down, nor the heaviest rain penetrate its tiny ceiling.

But the wonderful instinct of the byah is not its

only attribute. When domesticated by man, its manners are equally interesting. Docile in an eminent degree, it is the aptest of all feathered scholars, and may be taught the art of fetching and carrying, varied *ad infinitum*, at the beck of its master. A well-trained byah is frequently taken by its owner to the mouth of a deep well, and while it is quietly perched on one hand, it is shewn a finger-ring in the other. The ring is then thrown down the well, when the ever-watchful bird darts after it with the rapidity of an arrow leaving the bow, pounces upon it ere it reaches the water, and brings it up in apparent triumph to its master.

Among the many feats performed by this intelligent little bird, there is one which, while it has rendered him famous, has often given rise to quarrels, and sometimes, alas! even caused the shedding of blood. It is generally practised in large cities, where mischief abounds in proportion to their size. Here the young and idle of the Mohammedan population instruct the pliant byah to fly at the foreheads of the wives and daughters of wealthy Hindus, and snatch away their golden *teekas*. This libertine sport can only be pursued in the morning, before and about sunrise, when the women are going to and returning from the bathing *ghats*. Moreover, the *teeka-shikaree's* only chance of exercising the talents of his winged co-adjutor is the culpable negligence of some coquettish quarry, who leaves her eyes and forehead exposed to view; for an adherence to the rules of *shastur* etiquette, on occasions when necessity compels their appearance

in public, would oblige the younger belles to contract the *ghoonghut* over their head and face, in such a manner as to form a conical air-hole in front, through which the tip of the nose, like a *durwan* in the middle of a gateway, is alone perceptible. The elder dowagers—namely, those too old and too ugly to attract the glance of a masculine eye—enjoy an immunity from this dress regulation.

But to return to the byah. The scarcity of game is ever a grand stimulus to your true sportsman. The moment, therefore, he obtains a glimpse of any sinciputal ornament, he gives his feathered auxiliary a signal he understands. Away flies the unconscious messenger, and, rudely despoiling the unwary fair of her frontal decoration, carries it exultingly to his mischief-making master. The confusion and distress of the poor damsel are now richly enjoyed by the unfeeling plunderer. Indeed, they constitute the sole gratification aimed at in this species of hawking,—a gratification, however perverse and insane as it is, not always acquired with impunity. It will sometimes happen that one or more of the male relatives of the injured party may be within call; and, as the Hindus never relish practical jokes on their women, in that event, the owner of the byah will scarcely escape with less than a severe cut of a *tulwar*, or, perhaps, the loss of a hand, or an ear, for his intruded folly.

I believe that the byah is not so common in Bengal as in the upper provinces. At least I do not remember having observed their nests to be so numer-

ous in the former country. Everything, however, is to be had in Calcutta for the money. Accordingly, I once happened to procure one from the nest, just fledged. I succeeded in rearing him, though I was deficient in the knowledge of training him to perfection. I, nevertheless, contrived to teach him to fetch a bottom of thread, about the size of a pistol bullet, from any distance. As he grew up he became exceedingly tame and familiar. He was also very playful, and would sport and hop about with the children in a most amusing way. At the same time, he possessed the intuitive skill of avoiding their rude grasp. He always kept carefully out of their reach; while, if an adult but chirupped to him, and held out his hand, he would immediately perch upon it.

At this time I had another pet, an *ubluqu*, a species of starling; and great was the friendship between the two. They were inseparable. The byah evidently placed reliance on the protection of the *ubluqu*, and would invariably follow wherever his more powerful friend led the way. They had the house, the yard, and a small flower-plot behind, to range in. Theirs was an easy bondage; and I could not perceive that either ever formed a wish, if animals may be said to have wishes at all, to roam beyond those bounds. Often of a morning I amused myself in weeding the above mentioned flower-plot. On such occasions the *ubluqu*, accompanied by his *Fidus Achates*, the byah, always attended my steps, watching every clod of earth I turned up, in search of worms. Though

these were not the aliment of the byah, he was altogether as eager in their pursuit as his vermivorous companion; and whenever two were exhumed at once, he would adroitly prevent the retreat of one, until his friend, having bruised and swallowed the other, relieved him of the charge. One day, as I sat reading in the back verandah, and my little favourite was hopping about close to me, a strange cat, that had come clandestinely over the wall, made a sudden spring upon him. I followed her instantaneously, but was too late to effect a rescue. Ere I could reach the wall, the carnivorous jade had leaped over it, bearing away in her devouring jaws my unfortunate and much lamented byah.—*C. W. Stuart.*

THE NIGHT-JAR.

This bird was formerly called the goatsucker, or *caprimulgus*,—it being at one time supposed, that goats, when left on lonely heaths in summer, were sucked by a certain migratory bird, to which was ascribed this name. During the dry months of summer, it often happened, naturally enough, that the goats yielded little milk; but a bird was then frequently seen, in the faint twilight, flitting with a

singular motion over the lonely moors, and even amongst the browsing goats themselves; and the ignorant goatherd fancied that this harmless bird came there to suck the goats; and naturalists, sanctioning the delusion, gave it the learned name of caprimulgus.

The bird of which we speak has a variety of names besides that of goat-sucker. Some call it the night-hawk; but this is wrong, for the bird has no hawk-like propensities, and has never been known to kill another bird for prey. Some eminent naturalists apply the name of fern-owl, which is a decided misnomer, the bird bearing no relation to the owl family. It certainly makes its home amongst patches of fern, and might, therefore, with more propriety, be called the fern-bird. Jenyns and Gould think night-jar a more appropriate designation for so singular a bird; and they are right, as this name does really express the peculiar habits of the bird. It comes abroad after sunset, and utters a singular jarring or buzzing sound, which may be said to jar or grate upon the ear, in the evening stillness.

Thus the name of night-jar is not altogether inappropriate, though jar is not the word which truly expresses the musical hum uttered by this bird.

Whilst flying, a sound resembling the hum of a spinning-wheel is given out, from which circumstance come the names, night-jar, night-churn, churn-owl, and wheel-bird,—all of which appellatives refer to the beetle-like hum uttered by the bird. The sound does

not arise, as some suppose, from the resistance of the air against the wide open mouth of the bird as it flies; for this peculiar note is most frequently heard when the night-jar is sitting quietly on a branch. It is most probably produced by some peculiar organization of the mouth, and may be called the bird's song. The usual sound during flight is a sharp squeak; the deep musical hum being reserved for its solace, when, shrouded in a mass of foliage, the night-jar sees the quiet approach of eve. The bird appears to wait for the dip of the sun below the horizon, as attentively as the flag-keeper of a royal castle, who watches the moment for lowering the standard of his prince.

White says: "This bird is most punctual in beginning its song exactly at the close of day; so exactly, that I have known it strike up more than once or twice just at the report of the Portsmouth evening gun." This song sounds pleasantly in the stillness of a summer's night, when it is often heard rising from a copse, and arresting the traveller's attention by its strange vibratory notes.

But to what family of birds does the night-jar, or, if you will so name it, the fern-owl, belong? It is, strictly speaking, a *swallow*, differing from the rest of the Hirundinidæ, by coming abroad at night instead of during the day, and is the only nocturnal bird of this large family. It might, therefore, be properly called the *night-swallow*. Like the swallows, it is an insect-feeder; like them, it visits us during summer, comes from the same region, Africa, and returns thither on the approach of winter.

The middle of May witnesses the arrival of this interesting bird; and before the end of August, it has left the woods and moors of England, for the valleys of Egypt, and the rocky wilds of Abyssinia. It is the only *nocturnal* bird amongst all our summer feathered visitors, which usually love the brightness and cheerfulness of daylight. Thus, whilst the day-swallows check the too rapid increase of those insects which appear by day, this night-swallow diminishes the number of those which fly abroad at night. Therefore the night-jar holds the same relation to the swallow tribes that the owls do to the Falconidæ; for, as the owl begins to prey when the hawk and eagle retire to their homes, so this bird continues the work of the martin, swift, and swallows, during the time when such feathered hunters are inactive. Hence, no class of insects is without a check; and man may be thankful that it is so ordered, as there are myriads of insects which only fly during the faint glimmer of twilight. These would increase, until every heath and copse swarmed with hosts of stinging and fierce little tormentors. The night-jar prevents this; and is the only bird, save the bat, which contributes to this end. The chafers and beetles, with many insects injurious to man's works, form the food of the night-jar, which is thus not only a harmless, but an actively useful visitant.

This bird measures about ten inches in length, and is therefore easily seen in the twilight, as it flits to and fro round some old tree.

The flight is generally low, as the insects it pursues are usually found at a low elevation. The motion is soft and gentle, resembling that of the owls; and the sight is acute, enabling the bird to detect the smallest insect in the faintest light; whilst their rapid flight and sudden evolutions, render the capture of the most swift-winged flies and moths easy. But the most remarkable peculiarities of the bird are its mouth and feet. The upper part of the beak is furnished with nine or ten stiff bristles along its edge, which increase its power of capturing insects, as these bristles hang like a net over the open mouth, preventing the escape of the prey. Their power is further increased by a glutinous substance attached to these bristles, which trammels the captured insects in their attempts to escape. The mouth is thus a kind of living trap, fit both for seizing and holding the prey.

The owl, though a nocturnal bird, is not provided with such a capturing apparatus; for the owl does not, like the night-jar, prey on insects, but on larger animals, which such a network of bristles would be of little use in taking. A nocturnal insect-hunter can, however, make most effective use of such a mouth-net. The day-swallows do not need this addition to their powers, as the full light, during which they fly, enables them to strike the insect with the greatest certainty.

Another peculiarity of the night-jar, is the toothed-claw on the centre of each foot, the use of which is, to this day, a mystery among naturalists. Wilson thinks it is given as a means of clearing the bird's feathers

from vermin, thus regarding it as a *comb;* other eminent ornithologists take the same view, and contend that the whole structure of the leg and claws is specially adapted for cleansing the plumage. But some suppose this toothed-claw designed to assist the bird in seizing its prey.

White makes the following statement in reference to the night-jar: "I saw it distinctly, more than once, put out its short leg while on the wing, and by a bend of its head, deliver something into its mouth. If it takes any part of its prey with its foot, as I have now the greatest reason to suppose it does these chafers, I no longer wonder at the use of its middle toe, which is curiously furnished with a serrated claw." Audubon, with philosophical hesitation, says, "I wish I could have discovered the peculiar use of the pectinated claw, which this bird has on each foot; but, reader, this remains one of the many desiderata in ornithology, and I fear, with me, at least, it will continue so."

The young of the night-jar are often mistaken for cuckoos, and a similarity has been detected in the structure of the two birds by anatomists; in both, the crop, instead of being in front of the breast-bone, lies behind, which produces a peculiar fulness in the lower part of the bird's body. This circumstance has been used to disprove some assertions respecting the cuckoo, which has been supposed incapable of sitting on its eggs, in consequence of the fulness of the crop over the intestines. But as the night-jar is formed in the same

manner, and is proved to hatch its own eggs, the above argument respecting the incubation of the cuckoo fails in conclusiveness. Although the night-jar does not, like the cuckoo, deposit its eggs in the nests of other birds, it does not certainly take much pains with its own nest, being content with a hole in the ground amongst fern roots, or at the foot of some dwarf shrub. The eggs are often found, in July, in such places; though a person must look closely to detect them, in consequence of their markings giving them the appearance of the oblong rounded stones found on commons.

The night-jar is rarely seen perching in the day-time, as the deep foliage in which it rests conceals the bird from observation. When seen, it is generally sitting on the bough with its body in a line with the branch; the head towards the trunk, and tail pointing to the extremity of the branch, of which it almost appears a part. All the habits of the night-jar are useful to the agriculturist, its food consisting wholly of insects; but it has been charged by some with inflicting a disease called "puckeridge" on cattle. This is a swelling along the backs of animals, which becomes infested with maggots, and sometimes destroys calves and cows. The night-jar is supposed to produce this malady by piercing the skin of beasts with its beak; but the real author of the evil is an insect which lays its eggs in the skin of animals, where the worms breed and eat into the flesh. It was formerly supposed that only one species of this bird existed in

Europe; but a distinct species is said to have been discovered in Spain, in 1817, which the people call the lamala; but Remminck has named it the caprimulgus ruficollis, or red-necked goat-sucker. If this be really a distinct species, it is exceedingly rare, as specimens are not found in any of the European museums, except that of Vienna. If Europe presents but one or two species of the night-jar, the other parts of the globe exhibit nineteen or twenty, of which fifteen are American; two limited to India; one to Africa; and one to Australia. Of the American species only three are found in the United States,—two of which are known by the odd names of "Whip-poor-will," and "Chuck-will's-widow." These syllables are said to resemble the notes uttered by the birds; and if so, the appellations are as appropriate as singular. The following is a brief description of the three species existing in the United States:—

THE WHIP-POOR-WILL.

Both Wilson and Audubon describe this bird. It assembles in hundreds, making the woods resound with their prolonged booming song, which, when uttered by such a flock at once, sounds gloomily in the stillness of night; and requires long usage ere the woodman can compose himself to sleep with such melancholy notes ringing around his solitary hut. The bird is regarded with much dread by the superstitious Indians, probably on account of its voice, which may seem to the wandering red man like the

cries of his forefathers' ghosts lamenting over the lost glory of their ancient hunting grounds.

The same peculiarity of the mouth and claw which distinguishes the European night-jar, belongs to this American species, in which the bristles of the upper mandible are half-an-inch in length.

CHUCK-WILL'S-WIDOW.

The name is derived from the resemblance between the bird's notes and the above syllables; but its Latin appellation, Caprimulgus Carolinensis, refers to its locality, the bird being chiefly found in Carolina, and is therefore properly designated the Carolina night-jar. Each syllable of the singular name is distinctly heard proceeding from the bird; the sound resembling the distinct slow utterance of the words "chuck-will," with the part "widow" more emphatically pronounced. These notes may often be heard at the distance of a mile, when the evening is still, and the forest silence undisturbed by any of the thousand cries and screams of nocturnal animals, which come with such startling effect from the deeps of solemn woods.

THE AMERICAN NIGHT-HAWK.

The third species under this name differs from the proper night-jars in wanting the net-work of bristles along the bill, but resembles them in its habits of feeding, and mode of flight. The sound uttered by this bird is compared to that produced by blowing into the bung-hole of an empty cask; and as this cannot be

represented by any diagram, or by the most ingenious collocation of syllables, the curious reader had better try, with the first empty cask he sees, what kind of sound such a feat will produce.

A more prolonged notice of the caprimulgidæ is not required; and I can but recommend our country readers to watch for these birds, during those beautiful walks which they are able to enjoy in the calm evenings of summer. Such as reside near heaths, woodlands, or parks, cannot fail to find the night-jar in their neighbourhood; and frequently, when the swallow has retired to its nest, and the owl sails silently over the fields, will this night-swallow be seen sweeping, with powerful flight, round bushes or trees where insect colonies dwell.—*Sharpe's London Magazine.*

THE THRUSH.

THE birds of this genus are hardly distinguishable from the warblers, except by their superior size. They are, however, more frugivorous, living on berries, insects, and worms. The bill is strong, compressed at the sides, and the upper mandible is slightly notched near the point. Their colours in general are not brilliant, and many of them have spots on the breast. Several are distinguished for their powers of song, or for the delicacy of their flesh.

CUNNINGNESS OF THE THRUSH.

There is much more intellect in birds than people suppose. An instance of that occurred one day at a slate quarry, belonging to a friend from whom we have the narrative. A thrush, not aware of the expansive properties of gunpowder, thought proper to build her nest on the ridge of the quarry, in the very centre of which they were constantly blasting the rock. At first she was very much discomposed by the fragments flying in all directions, but still she would not quit her chosen locality. She soon observed that a bell rang whenever a train was about to be fired, and that, at the notice, the workmen retired to safe positions. In a few days, when she heard the bell, she quitted her exposed situation, and flew down to where the workmen sheltered themselves—dropping close to their feet. There she would remain until the explosion had taken place, and then return to her nest. The workmen observed this, narrated it to their employers, and it was also told to visitors who came to view the quarry. The visitors naturally expressed a wish to witness so curious a specimen of intellect; but, as the rock could not always be blasted when visitors came, the bell was rung instead, and for a few times answered the same purpose. The thrush flew down close to where they stood, but she perceived that she was trifled with, and it interfered with the process of incubation; the consequence was, that afterwards, when the bell was rung, she would peep over the ledge to

ascertain if the workmen did retreat, and if they did not, she would remain where she was.—*Sir W. Jardine.*

THE STORK.

A FATAL COMBAT.

On the roof of the cathedral at Colmar there had been placed a wheel, laid crossways, as an inducement to the storks to build their nests there. This is the custom throughout Alsace, it being a popular opinion in that part of the country that these birds are harbingers of good luck. The storks had not failed to come, and from the windows of our inn we saw the sombre profile of a parent bird standing out in strong relief against the evening sky, then reddened by the setting sun. A brood of young storks was grouped around the parent, that stood upright upon its great claws. None in the nest slept. It was evident that they awaited an absent one, some straggler, perhaps; and from time to time we heard their wild and disagreeable cry. At length we perceived, on the verge of the horizon, a stork, with outspread wings, cleaving the air with arrowy swiftness, and closely pursued by a bird of prey of prodigious size, probably a vulture from the neighbouring mountains. The stork was frightened, wounded, perhaps; and the cries of those in the nest responded to the parent's cry. We saw

the poor frightened bird arrive straight over its nest, and fall there exhausted either by fatigue or pain. The other stork then took her companion's place, and sprang towards the enemy. A fierce combat commenced. The two champions rushed upon one another, uttering terrific cries. But the glorious instinct of paternity displayed itself with incredible strength and energy in the stork. Whilst defending herself, or attacking her gigantic adversary, she never for an instant lost sight of her little ones that lay trembling and terrified in the nest beneath, but tried continually to cover them with her wings. At length, too weak to sustain an unequal combat, by a desperate effort she approached her branch-formed nest, where lay her expiring mate, and the young ones, yet unable to take wing. She caught the nest in her bill, shook it forcibly, and turned it over, dashing from the top of the tower the objects of her affection rather than see them fall a prey to their enemy; then devoting herself singly, a resigned victim, she fell upon the wheel, where, with a blow of his beak, the vulture terminated her existence. We were all touched to the heart by the sight of this combat and this defence. To use an expression then in fashion, it was a real family tragedy. —*Memoirs of the Baroness d'Ober Kirch.*

QUADRUPEDS.

THEIR DISTINCTIONS, DIVISIONS, ETC.

THE mammalia, or quadrupeds, stand at the head of the vertebrated animals. They are immediately and eminently distinguished by the peculiarity of the female giving suck to her young. They are further known by having the body covered with hair or fur, in possessing four legs, warm blood, and living upon the ground. Not one of these characters, however, is properly absolute; for the armadillos and Indian ant-eaters are covered with scales; the whales have fins instead of feet; and the bats fly, and rest suspended. Taken collectively, however, these marks of distinction are sufficient to discriminate a quadruped from all other animals at present in existence. Their young are produced under the form in which they are destined to remain; and hence quadrupeds, more than all other vertebrated animals, are the farthest removed from that tendency towards undergoing some metamorphosis which we observe in other animals. Without them, all the laborious occupations of preparing and tilling the ground must have been performed by manual labour. All those which derive their sustenance from vegetables, or from the produce of the earth—uniting at the same time great physical strength, superior sagacity, natural gentleness, and social propensities—nearly all these animals are set apart by our beneficent Creator, more

especially for our use. Nor are these the only benefits we derive from these docile races. They furnish man, in every part of the world, with those coverings necessary to protect him from the vicissitudes of the weather, and support his life by furnishing the most nutritious food; nay, some even perform the office of a friend, guard his person, and protect his property. The history of the ox, the horse, the sheep, and the dog, combine to verify these remarks.

Quadrupeds, observes Cuvier, above all other animals, enjoy the most numerous faculties, the most delicate sensations, and the most varied powers of motion; and a combination of all their properties appear to produce in them the greatest intelligence. Hence, they are more fertile in resources; less subjected, perhaps, to the influence of instinct, and altogether more capable of improvement. As the quantity of respiration in these animals is noderate, so, generally speaking, they are formed for walking on the earth; but, at the same time, with great force and permanence of exertion. To this end, all the articulations of their frame have strictly defined conformations, which determine all their motions with rigorous precision. Some, indeed, as the bats, by having the limbs considerably lengthened and connected by extensible membranes, are able, not only to raise themselves, but even to fly in the air. Others again, like the seals, have their limbs so short that they can only move with facility in the water; while a few, like the whales, are completely aquatic, and have their feet assuming

both the shape and the office of fins. Living, for the most part, on the earth's surface, quadrupeds are less exposed to the alternations of heat and cold; and their clothing is proportionate to the average temperature of the climate they inhabit. In those of tropical latitudes, the hair is always thin, although it may be long, as in the monkeys; or almost wanting, as in the elephant and rhinoceros: while in the northern quadrupeds—such as the bears, foxes, hares, musk oxen, and deer—we perceive a warmth of clothing sufficient to repel the rigours of an Arctic winter.

The characters by which quadrupeds appear to be naturally arranged in their primary groups, will be found to have immediate reference to their nature and their food, and to their different powers of locomotion; accompanied, of course, by peculiarities of internal, no less than of external, organization. The feet, as the organs of motion, and the teeth, as those by which the nature of the food may be determined, naturally claim our first attention. By the first, we can trace every degree of locomotion, from the painful and creeping pace of the sloth to the fiery speed of the horse, and even onward to the aërial volutions of the bat. These different structures are again modified by variations in the form of the toes or fingers. It is obvious that an animal which lives by rapine must have extremities very differently constructed from one which habitually climbs lofty trees; while another, remarkable for speed, would require a foot differently formed from either. The teeth, again, as the organs of mastication, deserve

the greatest attention; and they have, accordingly, been considered of sufficient importance to constitute, almost exclusively, the basis of a system for the arrangement of this class.

The more perfect quadrupeds have three sorts of teeth, termed *incisors, canines,* and *molars.* The incisors are placed in front, and are only employed to cut the food, in the first instance, before the tongue conveys it for further preparation to the grinders; hence, they are called, also, cutting teeth. The canines follow the incisors, and occupy an intermediate station between them and the molars; they are only employed in tearing, or in holding; hence, they are chiefly confined to those quadrupeds which live upon animal matter, and are wanting in the herbivorous ruminants, to whom, in fact, they are unnecessary. The third sort of teeth are the molars or grinders, which are peculiarly formed for reducing or masticating the food to such a state that it is fit for being swallowed. It would seem, therefore, to follow, that all quadrupeds, whose food is not taken into the stomach in an entire state, must, of necessity, possess incisors and molars. Nevertheless, in the aquatic quadrupeds, as the dolphins and porpoises, we find the teeth so modified that they cannot be referred, with any precision, to any one of these determinate forms. Those few animals, also, which swallow their food entire, are unprovided with any organs of mastication. The modifications which the different sorts of teeth exhibit, both in their relative size, and even in their structure, are very remarkable,

and afford certain indications of the description of food upon which they are exercised. Thus, in the carnivorous tribes, the true incisors are very small, the grinders being employed both for cutting and masticating; while the canines are of a most formidable size, and of great strength. In the herbivorous genera, on the contrary, the grinders are blunt and nearly flat; and this structure, added to the horizontal motion of the jaws possessed by these animals, grinds the food as if it had been prepared between two millstones. Some inequality, however, is of course necessary; and therefore, these teeth are composed of parts of unequal hardness, some of which, by wearing away soonest, produce those inequalities essential to trituration.

The primary types under which all quadrupeds appear to arrange themselves, may be thus concisely defined:—In the first, the extremities of all the four limbs perform the office of hands; one of the toes being opposable to the others, and acting as a thumb, capable of a free motion; hence, they have been judiciously named by Cuvier, quadrumana. In the second, this prehensile structure of the foot is not seen,—the thumb being upon the same plane with the other toes; the claws, also, are mostly retractile. Like the quadrumana, they possess all the three sorts of teeth well developed; but the canines are particularly large, and, from this character, which indicates their carnivorous habits, Linnæus has termed the order, feræ, and Cuvier, carnivora. The third, or aberrant group, is chiefly distinguished by its imperfect and variable dentation;

the under jaw is without, generally, canine teeth, properly so called, or they exist merely in an abortive or rudimentary state. Like all other aberrant groups in the animal kingdom, this likewise contains three subordinate divisions, thus named :—1. the Ungulata, or hoofed order; 2. the Glires, or gnawing order; 3. the Cetacea, or aquatic order. These divisions evince a strong tendency to unite into a separate circle of their own, by the *hippopotamus*, or river cow, in the first; and the *manatus*, or sea cow, in the last.

The analogies of the orders with the class of birds have been variously stated. That the rapacious quadrupeds represent the rapacious birds, is too obvious a fact to be questioned. The *quadrumana*, on the same principle, have been rightly compared to the insessorial order of birds; for both, in their respective classes, are the most highly organized. The *ungulata*, the type of which is the ruminating tribe, containing the oxen, sheep, and deer, were compared by Linnæus to the *gallinacea*, or poultry; and the analogy, until very lately, has never been questioned. The *glires*, like the grallatorial birds, have the muzzle remarkably lengthened, and, for their size, are the swiftest runners in the whole class; witness the hare, the rabbit, cony, &c. Finally, the analogy of the aquatic *cetacea* to the feathered swimmers has been admitted by every one. —*Swainson on the Natural History and Classification of Quadrupeds, in Cabinet Cyclopedia.*

THE HORSE.

BUFFON says, "Of all quadrupeds the horse possesses, along with grandeur of stature, the greatest elegance and proportion of parts. By comparing him with the animals above or below him, we find that the ass is ill made, and that the head of the lion is too large; that the limbs of the ox are too slender, and too short in proportion to the size of his body; that the camel is deformed; and that the grosser animals, as the rhinoceros, hippopotamus, and elephant, may be considered as rude and shapeless masses. The great difference between the head of man and that of the quadruped, consists in the length of their jaws, which is the most ignoble of all characters. But although the jaws of the horse be very long, he has not, like the ass, an air of imbecility, nor, like the ox, of stupidity. The regularity and proportion of the parts of his head, give him a light and sprightly aspect, being gracefully attached to his finely arched neck, which is well supported by the beauty of his chest. He elevates his head, as if anxious to exalt himself above the condition of other quadrupeds. In this noble attitude, he regards man face to face. His eyes are open, lively, and intelligent; his ears handsome, and of a proper height, being neither too long, like those of the ass, nor too short, like those of the bull. His mane adorns his graceful neck, and gives him the appearance of

strength and courage. His long bushy tail covers, and terminates with advantage, the extremity of his body. His tail, very different from the short tails of the deer, elephant, and hippopotamus, and from the naked tails of the ass, camel, and rhinoceros, is formed of long, thick hairs, which seem to rise from his crupper, because the trunk from which they proceed is very short. He cannot, like the lion, elevate his tail; but, though pendulous, it becomes him better; and, as he can move it from side to side, it serves him to drive off the flies, which incommode him; for though his skin is very firm, and well garnished with close hair, it is, nevertheless, very sensible."

The horse, it should seem, is an inhabitant of the eastern continent only; no trace of it having been met with as showing that it existed in any part of America, until it was carried thither by the European settlers. But in the wide plains of South America, which resemble in many respects those places of the eastern continent in which wild horses are still met with, the imported ones are more abundant than in any part of the East. These are descended from the Andalusian breed, which were originally conveyed from Spain by the first conquerors, and are most frequently found in the southern districts of the river Plata, as far as Rio Negro, the country of the Patagonians, and the districts immediately adjoining, in great numbers, —some of the herds amounting to not less than ten thousand animals, each troop comprising many families.

The great tracks of desert country around the Sea of Arel, and the Caspian Sea, have been supposed to be the native residence of the horse; but if this conjecture be correct, he must have widely extended his geographical range, for he is found in a wild state in Asia, as far north as the sixtieth degree, and to the utmost southern extremes of that vast continent, and also in many parts of Africa; but we must suppose, that those of the former country emigrated as the species multiplied. So late as the seventh century of the Christian era, when the prophet Mohammed attacked the Koreish not far from Mecca, he had but two horses in his train; and although, in the plunder of this horrible campaign, he carried with him in his retreat twenty-four thousand camels, forty thousand sheep, and twenty-four thousand ounces of silver, there is no mention of horses being part of the booty. We are informed that the Arabians had but few horses, and those not at all valued; so that Arabia, where are now the most celebrated coursers in the world, is but comparatively of modern date as a breeding country.

History tells, that in the second century they were exported from Egypt to Arabia, as presents to their kings; from which we may conjecture, that their finest horses were originally the produce of Egyptian steeds, whence they were also exported to Ethiopia, India, Persia, Parthia, Armenia, Scythia, &c. But, however, it is there alone where he is to be found, in a domesticated state, in his greatest beauty and sym-

metry of form,—there that he is preserved without any foreign admixture, possessing all the qualities for which this noble animal is so justly famed: exquisite proportions, elegant structure in every part of the body, fleetness, and docility of disposition, are his genuine characteristics; and these he seems to have preserved from his earliest introduction.

The horse, when properly trained, and treated with kindness, shews much attachment to man; and his moral qualities are, like that of other animals in a state of domestication, extremely varied. Some possess great courage, others are extremely timid; some have great memory, others are devoid of it; some are lively, obedient, intelligent, playful, and generous; while others are dull, stupid, obstinate, and vicious.

THE ARAB HORSE.

Dr. Layard doubts whether the very purest Arab has ever yet appeared in England. He says, "The Arab horse is more remarkable for its exquisite symmetry and beautiful proportions, united with wonderful powers of endurance, than for extraordinary speed. I doubt whether any Arab of the best blood has ever been brought to England. The difficulty of obtaining them is so great, that they are scarcely ever seen beyond the limits of the desert. Their colour is generally white, light or dark grey, light chesnut, and bay, with white or black feet. Black is exceedingly rare, and I never remember to have seen dun, sorrel, or dapple. I refer, of course, to the true-bred

Arab, and not to the Turcoman, or to Kurdish and Turkish races, which are a cross between the Arab and Persian. Their average height is from 14 hands to 14¾, rarely reaching 15; I have only seen one mare that exceeded it. Notwithstanding the smallness of their stature, they often possess great strength and courage. I was credibly informed, that a celebrated mare of the Manekia breed, now dead, carried two men in chain armour beyond the reach of their Aneyza pursuers. But their most remarkable and valuable quality is the power of performing long and arduous marches, upon the smallest possible allowance of food and water. It is only the mare of the wealthy Bedouin that gets even a regular feed of about twelve handfuls of barley, or of rice in the husk, once in twenty-four hours. During the spring alone, when the pastures are green, the horses of the Arabs are sleek and beautiful in appearance. At other times they eat nothing but the withered herbs and scanty hay gathered from the parching soil, and are lean and unsightly. They are never placed under cover during the intense heat of an Arabian summer, nor protected from the biting cold of the desert winds during winter. The saddle is rarely taken from their backs, nor are they ever cleaned or groomed. Thus, apparently neglected, they are but skin and bone; and the townsman marvels at seeing an animal which he would scarcely take the trouble to ride home, valued almost beyond price. Although docile as a lamb, and requiring no other guide than the halter, when the

Arab mare hears the war-cry of the tribe, and sees the quivering spear of her rider, her eyes glitter with fire, her blood-red nostrils open wide, her neck is nobly arched, and her tail and mane are raised and spread out to the wind. The Bedouin proverb says, that a high-bred mare, when at full speed, should hide her rider between her neck and her tail."—*Dr. Layard's Discoveries in the Ruins of Nineveh and Babylon.*

THE CAMEL.

This, the most serviceable animal of Arabia, is emphatically called by the natives, "the living ship of the desert." All its habits and instincts are adapted to its singular condition, and the region which it inhabits. It has great endurance of hunger, thirst, and fatigue, and can perform a journey of several days without requiring drink. Its feet are large and spreading, and covered at the lower part with a rough flexible skin, well adapted to a dry, gravelly soil, but not to wet or muddy ground. It dislikes a loose, sandy soil, but delights in a hard, arid plain; and steep and rugged paths it can ascend with the same facility and secureness of footing as a mule. From the spongy nature of its foot, its tread is nearly noiseless. Its eye resembles that of the gazelle,—large, dark, soft, and

prominent; and being well guarded by an overhanging brow, it retains its peculiar brilliancy under the fiercest glare of the sun and sand. Its nostrils are in the form of slits, which it can open or close at will; and thus, by respiring gently and gradually, it has the power of excluding the suffocating winds and sands of the desert. The great length of its neck enables it, without stopping, to nip the thorny shrubs which it may fall in with in the desert; and the cartilaginous formation of its mouth enables it to feed on them without difficulty, in spite of their sharp and prickly spines. The Bedouin, also, collects the succulent plants and herbs which cross his path, and feeds his camel with them. These, on a long journey, with a cake of barley, a few dates, or a handful of beans, form its ordinary food; but while encamped, it is fed on the green stalk of the jowaree, and the leaves and tender branches of the tarfa, (*tamarix orientalis,*) heaped on circular mats, and placed before the animal, who kneels while partaking of them. The young and fresh leaves of the acacia trees are peculiarly grateful to the camel. In southern Arabia, it is fed on salt, and even fresh fish. It does not attain its full growth till the age of twelve years, though it is fit for use at a much earlier period. It will live till it is forty years old; but loses much of its activity by the time it is thirty, and then it is no longer capable of enduring great fatigue. The flesh of the young camel is tender, and in taste similar to veal, and the milk of the female is copious and nourishing. Diluted in water, it is the common drink of the Arabs.

The Arabian camel is distinguished from the Bactrian species by having only a single hump. When the animal is in good health, this hump is round and fleshy; but it is observed to diminish during long abstinence, and to increase again when it gets abundance of food. The Bedouin never sets out on a long journey without examining the hump of his camel. If it be large, he is well assured of the animal's power to endure fatigue and hunger; but if it be small, he knows that his camel will soon give way under its load, and become unfit for further exertion. A long journey will cause the hump to disappear almost entirely; but rest and nourishment soon restore it.

The camel is employed for carrying burdens. Its load varies very considerably. A large camel, when supplied with abundance of food, is capable of carrying a thousand pounds, and even twelve hundred weight; but the usual burden in a caravan journey is from two hundred and fifty to five hundred pounds weight. The camel voluntarily kneels when about to be loaded, —a position which its great height renders necessary. Kneeling is its natural state of rest; but, when heavily laden, on flinty or stony ground, this cannot be accomplished without pain. The animal then drops at once on both front knees; and to establish room for its hinder legs, it is compelled, in that condition, and whilst encumbered with the whole weight of the burden, to plough them forward. It has been thought that the callosities on the joints of these useful animals prevent them from being hurt by kneeling while re-

ceiving their load; but Wellsted, who had very favourable opportunities of obtaining correct information on the subject, says, that although nearly of a horny nature in the aged camels, these callosities seem insufficient to defend them; on which account a Bedouin never makes his camel kneel to mount himself, but either causes the animal to drop its neck to receive his foot,—and, on its raising it, he is enabled to gain his seat,—or he climbs up behind.

During a journey, it is customary to halt about four o'clock in the afternoon, remove the loads, and permit the camels to graze around. To prevent them from straying too far, the Arabs tie their fore-legs together, or bind the fetlock to the upper joint by a cord. The head is never secured except whilst travelling, when the Arabs unite them in single file by fastening the head of one to the tail of his predecessor. Towards night, they are called in for their evening meal, and placed in a kneeling posture round the baggage. They do not browse after dark, and seldom attempt to rise; but continue to chew the cud throughout the greater part of the night.

In all parts of Arabia camels are esteemed a gift of inestimable value; but, according to Wellsted, those of the province of Oman enjoy a deserved celebrity for strength and swiftness. The province of Nejed, he says, is equally the nursery of the camel as of the horse; but the Omany in all ages is celebrated in the songs of the Arabs as the fleetest. Their legs are more slender and straight, their eyes more prominent and

sparkling, and their whole appearance denotes them to be of higher lineage than the ordinary breed.

At the birth of a camel, it is joyously welcomed by the Arabs, with the exclamation, "Another child is born unto us!" Should this event take place on a journey, the Bedouin receives the little stranger in his arms, and, for a few hours, places it on the mother's back; but at the first halting-place, it is put down to receive the parent's caresses, and ever after, continues, unassisted, to follow her footsteps.

When young, camels are pretty-looking animals; but when aged and overworked, they generally lose their hair, and become very unsightly objects. In general, they have a clean, sleek coat, usually of a light brown colour, with a fringe of dark hair along the neck; but this covering in the Arabian camel is less profuse than in that of upper Asia, which is better adapted to the climate of those regions. The hair or fleece of the camel falls off entirely in the spring. It is superior to that of any other domestic animal, and is manufactured into clothes, coverings, tents, and the like.

Authorities differ as to the period the camel can sustain thirst. Four complete days form the general extent to which Arabian camels can endure the want of water during summer. The Darfur camels bear thirst much longer, often for nine or ten days. Buffon mentions five days as an extraordinary instance; Tavernier, a good authority, nine; but it appears that camels, like several other ruminating animals, when fed on succulent herbage, do not require water. Well-

sted was assured by a friend of his, that he once travelled from Bagdad to Damascus—a journey of twenty-five days—without the camels once drinking; a sufficiency of moisture being afforded by the abundant vegetation found at every stage. It is a commonly received notion, that travelling Arabs, in their distress for want of water, are frequently reduced to the necessity of killing their camels, for the sake of finding a supply in the stomach. This, however, is an expedient which never came under the observation of Burckhardt, and which he is inclined entirely to discredit. A supply of water could only be found on the stomach of a camel on the same day on which it had drank.

With regard to pace, Volney calculates that of the camels of Syria at three thousand six hundred yards per hour; and Captain Burnes found it in Turkistan to be nearly the same. In Oman, Wellsted ascertained their average rate of caravan travelling to be considerably more—from two and a-half to two and three-quarters geographical miles an hour,—the same as that reckoned by Burckhardt. But the usual pace of the Oman camels, when the Bedouins mount them for a desert journey, is a quick, hard trot, of from six to eight miles an hour. They will continue this from twenty to twenty-four consecutive hours; but on occasion requiring it, they will increase their speed to thirteen and fifteen miles an hour. The female is esteemed swifter than the male; but in consequence of its greater spirit, the Bedouins not unfrequently prefer the latter.

The Arabs adorn the necks of their camels with a band of cloth or of leather, upon which are strung or sewn small shells, called cowries, in the form of half-moons. To these the sheikhs add ornaments of silver. In protracted desert journeys, the camel appears fully sensible that his safety consists in keeping close to the caravan; for, if detained behind, he never ceases making strenuous efforts to regain it. Wellsted represents the camel as a quarrelsome brute, gifted but with little sagacity, and seemingly incapable of forming any strong attachment to its master, although it frequently does so to one of its own kind with which it has long been accustomed to travel. The animal is usually treated with care and kindness by its owner. Mr. Macfarlane says: "I have been told that the Arabs will kiss their camels in gratitude and affection, after a journey across the desert." His opinion of its attachment to its master, is somewhat different from that of Wellsted. "The camels appeared to me," he says, "quite as sensible to favour and gentle treatment as a good bred horse is. I have seen them curve and twist their long, lithe necks, as their driver approached, and often put down their tranquil heads towards his shoulder," (*Macfarlane's Constantinople in* 1828.)

When the camel on a journey refuses to rise, the Arabs universally leave him to perish in the desert. It is seldom that they get on their legs again, though instances have occurred where they have done so, and completed a journey of several days. If the Arab is

upbraided with inhumanity, because he does not at once put a period to the animal's sufferings, he answers, that the law forbids the taking away life, save for food; and even then, pardon is to be implored for the necessity which compels the act. When death approaches the abandoned camel, it becomes a prey to vultures and other rapacious birds, which commence their repast even before life is extinct. Mr. Fraser relates, that in his route from Teheran to Sultanieh, in Persia, he overtook a poor camel that had fallen down in the snowy plain, unable to proceed, and been abandoned to its fate; but had so far recovered as to sit up, though not to rear itself upon its legs, and a host of ravens and crows had already pitched upon its back, and had begun to eat the creature, though not yet dead. They had picked great holes in its hump and back, and the glitter of its eyes, probably, had alone prevented these from being scooped out; yet it could scarcely move its head, and seemed insensible to what was going on, though still alive. "Had I had a gun," he adds, "I should have bestowed a charge upon the poor creature, to put it out of its misery; not having one, I abandoned it to its fate, which, no doubt, would be soon consummated, as the night approached, by the wolves and the jackals," (*Fraser's Koordistan and Mesopotamia*, vol. ii., p. 305.)

The average price of camels in Arabia is from thirty to fifty dollars. In Oman they bear a high charge; and the large sum of a hundred and forty

dollars has been known to be paid for one. Depth of chest and largeness of barrel, constitute their chief excellence and recommendation.

THE DROMEDARY.

The dromedary differs from the camel, not in species, but in breed. Of a light and slender frame, it is used for riding, on account of its speed. It is called by the Arabs, Maherry, or "el Heirie." "When thou shalt meet a *heirie*, and say to the rider, *Salem alic*, 'Peace be between us!' ere he shall have answered thee, *Alic salem*, 'There is peace between us!' he will be far off, and nearly out of sight, for his swiftness is like the wind,"—is the figurative language of the Arab to indicate the fleetness of the dromedary. Wellsted relates, on reliable testimony, that one of the Imam of Muscat's favourite dromedaries carried a courier from Sib to Sohar—an ordinary journey of six days—in thirty-six hours, (*Wellsted's Arabia*, vol. i., p. 293.)

DROMEDARIES' BONES IN THE DESERT.

The accustomed route (M. Dumas says) is marked by a white line of bleached bones extending to the horizon. This extraordinary circumstance, it may

well be supposed, aroused all my attention. I called to Bechara, who, however, did not wait for my question, for he at once read my desire in my obvious astonishment. "The dromedary," said he, coming to my side, and commencing his story without preface, "is not so troublesome and importunate an animal as a horse. He continues his course without stopping, without eating, without drinking; nothing about him betrays sickness, hunger, or exhaustion. The Arab, who can hear from such a distance the roar of a lion, the neigh of a horse, or the noise of men, hears nothing from his *haghin* but its quickened or lengthened respiration; it never utters a complaint or a groan. But when nature is vanquished by suffering, when privations have exhausted its strength, when life is ebbing, the dromedary kneels down, stretches out its neck, and closes its eyes. Its master then knows that all is over. He dismounts, and, without an attempt to make it rise,—for he knows the honesty of its nature, and never suspects it of deception or laziness,—he removes the saddle, places it on the back of another dromedary, and departs, abandoning the one that is no longer able to accompany him. When night approaches, the jackals and hyenas, attracted by the scent, come up and attack the poor animal, till nothing is left but the skeleton. We are now on the highway from Cairo and Mecca; twice a-year the caravans go and return by this route; and these bones are so numerous, and so constantly replenished, that the tempests of the desert can never entirely disperse

them. These bones, which, without a guide, would lead you to the oases, the wells and fountains where the Arabs find shade and water, and would end by conducting you to the tomb of the Prophet,—these bones are those of dromedaries which perish in the desert. If you look attentively, you will see some bones smaller in size, and of a different conformation. These, too, are the wrecks of wearied bodies, that have found repose before they reached the goal. They are the bones of believers who desire to obey the Prophet's command, that all the faithful shall once in their lives perform this holy journey; and who, having been too long deterred from undertaking it by cares or pleasures, commence their pilgrimage so late on earth, that they are obliged to finish it in heaven. Add to these, some stupid Turk or bloated eunuch, who, sleeping when he ought to have had his eyes open, has fallen and broken his neck; give the plague its share, which often decimates a caravan, and the simoon, which often destroys one, and you will readily see that these funereal guide-posts are planted with sufficient frequency to preserve the road in good order, and to point out to the children the road pursued by their fathers."—*Quinze Jours au Sinai*, by M. Dumas.

THE VICUGNA.

The vicugna is a variety of the llamas of South America,—a species which is connected by many affinities with the camel. Both the camel and the llama are adapted for living in an arid country; but the conformation of the camel fits it for the sandy plains of Asia, while the llama is evidently intended as an inhabitant of mountainous regions; and in South America, of which it is a native, it is never found in its wild state below a certain elevation of the Cordilleras. If a depression below a certain point occur in this extensive chain of mountains, there the llama is unknown.

The foot of each animal is admirably adapted to the surface which they are respectively accustomed to tread. That of the camel is covered with an elastic sole, joining the two toes together, and it, therefore, on the same principle as the snow-shoes of an American Indian, is made to present a broader surface to the yielding sand. In the llama, on the contrary, the toes are divided; and each toe is provided with a strong nail, which assists it in ascending to its elevated haunts, enables it to retain its footing more surely, and to make the most of the uncertain ground on which it treads.

The llama has not a hump on its back like the camel; but this dissimilarity is merely external, the

skeleton of each animal presenting the same arrangement of the bones. They are each of them beasts of burden. The stomach of the llama, although it does not resemble precisely that of the camel, is yet enabled, by some internal means, to obtain the necessary supply of fluid in the midst of a region without springs. Sir Everard Home has described the stomach of the llama, so far as its economy in this respect is concerned. He says: "The stomach has a portion of it, as it were, intended to resemble the reservoirs for water in the camel; but these have no depth, are only superficial cells, and have no muscular apparatus to close their mouths, and allow the solid food to pass into the fourth cavity, or truly digesting stomach, without going into these cells."

The form of the llama is much more elegant than that of the camel. The legs are slender; the neck erect, and head small; the ears long and flexible; and the eyes full and brilliant. When South America was first visited by the Spaniards, the llama and several other animals were incorrectly described, in general terms, as belonging to the same species. Linnæus divided them into two species, at the head of which he placed the llama, useful as a beast of burden; and the vicugna, equally valuable for its flesh and wool. Cuvier definitely placed the llama and vicugna in the rank of a distinct species, and regarded the others simply as varieties having affinities to them.

The vicugna is shaped very like the llama, but is much smaller and lighter. Its wool is extraordinarily

fine, and much valued. These animals are often hunted in the following manner:—Many Indians gather together, and drive them into some narrow pass, across which they have previously extended cords about four feet from the ground, having bits of cloth or wool hanging to them at short distances. This so frightens them that they dare not pass; and they gather together in a string, when the Indians kill them with stones tied to the ends of leather thongs. In Kerr's *Collection of Voyages* it is stated, that in Chili and Peru about eighty thousand of these animals are killed every year for the sake of their wool, and that their numbers are never diminished.

THE BUFFALO.

THE following instance of courage, sagacity, and attachment in the buffalo, rivals what we read in the pages which Mr. Jesse and other naturalists devote to holding up the canine species to our admiration:—In the month of March 1851, an occurrence took place in the division of Modjerkerto, (residence of Sourabaya,) which deserves to be brought to general notice as a new and striking proof of the attachment of animals towards their purveyors. The local authorities of the division

have inquired into the truth of the facts mentioned below, and there cannot therefore be the least doubt about the matter. On the 14th of that month, a boy, eight years of age, in the Dessa Gilang, was herding some buffaloes in a wood not very distant from the village, when he was unexpectedly seized and dragged away by a tiger. At the cries of anguish uttered by the boy, two buffaloes immediately came running up, one of which attacked the tiger with such success that he released the boy and seized the buffalo above the knee-joint, on which a short fight ensued between the buffalo and the tiger, which ended in the flight of the latter. In the meantime, the other buffalo had placed himself above the body of the boy, which was lying on the ground, in such a way as to cover it entirely, and to protect it against a second attack of the tiger. The life of the boy, although he was severely wounded by the tiger on the right thigh-bone, is not yet despaired of. The peculiar attachment which the two buffaloes, in this case, shewed towards their herdsman, is explained by the circumstance, that, for the most part, the young natives who take care of the pasturage of these animals bestow extraordinary attention on one or more of their flock, generally remaining in their vicinity, and sometimes passing a large portion of the day on their backs.—*Singapore Free Press.*

THE RHINOCEROS AND ITS SENTINEL.

THE black rhinoceros, unlike the timid white one, is a dreadful adversary to meet with in hunting, and "is often accompanied by a sentinel to give him warning, a beautiful green-backed and blue-winged bird, about the size of a jay, which sits on one of his horns. When he is standing at his ease among the thick bushes, or rubbing himself up against a dwarf tree, stout and strong like himself, the bird attends him, that it may either feed on the insects which either fly about him, or which are found in the wrinkles of his head and neck. The creeping hunter, stealthily approaching on the leeward side, carefully notes the motions of the sentinel bird; for he may hear, though he cannot see, the rhinoceros behind his leafy screen. If the monster moves his head slightly and without alarm, the bird flies from his horns to his shoulder, remains there a short time, and then returns to its former strange perch; but if the bird, from its elevated position and better eyes, notes the approach of danger, and flies up in the air suddenly, then let the hunter beware; for the rhinoceros instantly rushes desperately and fearlessly to wherever he hears the branches crack."—*Alexander's Expedition into Africa.*

THE HIPPOPOTAMUS, OR RIVER-HORSE.

This most interesting and comparatively little known animal is only met with in the great continent of Africa, where it inhabits rivers, lakes, and inlets of the sea in the vicinity of the mouths of rivers. Though of moderate height, it attains, when full grown, an incredible size, both in length of body and in circumference; and I have seen twenty powerful draught oxen exert their utmost strength to drag a full grown male out of the river on to dry land. From tusks and skulls which I have examined, it appears to me that the hippopotamus of the White Nile and Northern Africa attain to even greater dimensions than their congeners of the southern hemisphere, which is the reverse with most other African animals. Nature has formed this animal with short legs, and of low stature, for facility in swimming, and to enable it more easily to conceal itself in water of moderate depth, and to pass unnoticed over the shallows or fords connecting the deep still pools which constitute its strongholds and haunts by day. By its colossal size it has nothing to fear from its amphibious neighbour, the crocodile, which would no doubt otherwise quickly annihilate the race; and it is gifted with a hide of extraordinary thickness, like the elephant and rhinoceros, to defend it from the various formidable thorns which clothe the dense jungles that form an almost impenetrable barrier

around their mid-day haunts. Their thick skins are also an indispensable protection to their bodies against the formidable tusks of their opponents, in the desperate fights which occur between both males and females; and it is common to see both sexes, but particularly the males, so fearfully lacerated in some recent fight, as to remind the beholder of a crimped salmon, or of an animal affected with some leprous malady. They probably attain maturity at about fifteen years of age; and from my knowledge of the animal, and its regular and undisturbed, and consequently calm, unruffled, and indolent habits, I have no hesitation in believing that it lives to at least one hundred and fifty years of age. In secluded regions, where the hand of man has wrought no change or innovation since the creation of the world, the hippopotamus is found in considerable herds, varying from twenty to even fifty individuals. During the day they are generally found reposing themselves on their sandy beds, either on some reed-clad bank or island of the river, or, perhaps, huddled together upon some sunken ridge or mass of rocks in the centre of some deep still pool, where they lie resting their broad lower jaws upon the sides or rumps of their comrades, with only the upper half of the body appearing above the water. When disturbed, the whole herd plunge headlong into the deep water, setting the river in a commotion, which may be more easily imagined than described; after which they at first protrude their heads to breathe, and inspect the cause of their alarm; but, presently becoming shyer, they

remain at the bottom for periods of from seven to ten minutes at a time, and, when necessitated to come to the surface for respiration, they only expose their nostrils, which, by their peculiar position, enables them to breathe without shewing any other portion of the head. It sometimes happens, that when a herd of hippopotamoi are surprised in a pool which they do not consider sufficiently safe, owing to its want of depth or extent, after being fired at for a short time, they will make a determined rush for a safer position; and, on these occasions, if the *tail* or *neck* of the pool be very shallow and rocky, they will come out of the river, and trot along their usual nightly footpath, on the margin of the stream. When the sun goes down, the hippopotamoi at once become more lively, and swim swiftly through the pool in playful sport with one another, occasionally uttering their deep and powerful snorting music, which has a wild and pleasing effect; they now, for awhile, leave the river, and betake themselves to open and thinly wooded glades, in the adjacent forests, for the purpose of pasturing on certain varieties of grass to which they are partial; here they remain feeding during the greater part of the night; and at earliest dawn of day they return to their beloved element, into which they joyfully plunge, and evince their pleasure by deep-drawn notes of joy. The favourite resorts of the hippopotamoi are at once discovered by the broad and well beaten paths leading from the water to their pasturage. These paths differ from those of all other game, in having a broad ridge

or elevation in the centre; since, from the enormous breadth of their colossal bodies, so great a distance intervenes between their left and right feet, that they form, as it were, a double footpath. Besides grass, the food of the hippopotamus consists of the roots of the tall reeds, and other water plants, which abound along the banks of the rivers they frequent. When feeding on these roots, they are generally entirely concealed from view beneath the water, occasionally protruding the nostrils for the purpose of respiration. It is for this peculiar mode of feeding that the extraordinary teeth of this strange animal are so admirably adapted. By means of the two long, straight, horizontal teeth in the centre of the lower jaw, they root out and separate from the rich alluvial soil the tangled roots of the various water plants; and then, with their enormous, sharp, semicircular tusks, which play upon one another like a pair of scissors, they cut them into the necessary size, preparatory to receiving them into their capacious mouths, to undergo mastication between their ample grinders. The circular tusks of the hippopotamus constitute the most beautiful and hardest ivory in the world; they are very valuable, and are chiefly used for the manufacture of artificial teeth. Of the skin, which is two inches in thickness, the colonists of South Africa manufacture a sort of whip, termed "jambok," for the benefit of oxen; and in Britain it is of great value, being used in certain machinery for washing. A thick layer of fat occurs immediately beneath the skin, which, along with the flesh, forms an excellent

and wholesome food for man. Formerly, when the hippopotamus was abundant in the colony of the Cape of Good Hope, the Dutch boers were in the habit of salting portions of the animal, which they brought in their waggons to the Cape Town market, and sold at a very high price; and it appears that the delicate flavour of its flesh has already reached the ear of the English epicure, for, on a recent occasion, when visiting the fine young specimen in the Regent's Park Zoological Gardens, I heard, to my utter horror, one gentleman remark to another, "*What good soup it would make!*"—The above graphic description of the hippopotamus is taken, with Mr. Gordon Cumming's kind permission, from one of his interesting notes published in the Catalogue of his South African Exhibition.

GIRAFFES.

These gigantic and exquisitely beautiful animals, which are admirably formed by nature to adorn the fair forests that clothe the boundless plains of the interior of Southern Africa, are widely distributed throughout that region; but are nowhere to be met with in great numbers. In countries unmolested by the intrusive foot of man, the giraffe is found generally in

herds varying from twelve to sixteen; but I have not unfrequently met with herds containing thirty individuals, and on one occasion I counted forty together;—this, however, was owing to chance, and about sixteen may be reckoned as the average number of a herd. These herds are composed of giraffes of various sizes, from the young giraffe of nine or ten feet in height, to the dark chesnut-coloured old bull of the herd, whose exalted head towers above his companions, generally attaining to a height of upwards of eighteen feet. The females are of lower stature, and more delicately formed than the males,—their height averaging from sixteen to seventeen feet. Some writers have discovered ugliness and a want of grace in the giraffe; but I consider that he is one of the most strikingly beautiful animals in the creation; and when a herd of them is seen scattered through a grove of the picturesque, parasol-topped acacias which adorn their native plains, and on whose uppermost shoots they are enabled to browse by the colossal height with which nature has so admirably endowed them, he must indeed be slow of conception who fails to discover both grace and dignity in all their movements. There can be no doubt that every animal is seen to the greatest advantage in the haunts which nature destined him to adorn; and amongst the various living creatures which beautify this fair creation, I have often traced a remarkable resemblance between the animal and the general appearance of the locality in which it is found. This I first remarked, at an early

period of my life, when entomology occupied a part of my attention. No person following this interesting pursuit can fail to observe the extraordinary likeness which insects bear to the various abodes in which they are met with. Thus, among the long green grass we find a variety of long green insects, whose legs and antennæ so resemble the shoots emanating from the stalks of the grass, that it requires a practised eye to distinguish them. Throughout sandy districts, varieties of insects are met with of a colour similar to the sand which they inhabit. Among the green leaves of the various trees of the forest, innumerable leaf-coloured insects are to be found; while, closely adhering to the rough grey bark of these forest-trees, we observe beautifully coloured grey-looking moths of various patterns, yet altogether so resembling the bark, as to be invisible to the passing observer. In like manner, among quadrupeds, I have traced a corresponding analogy; for, even in the case of the stupendous elephant, the ashy colour of his hide so corresponds with the general appearance of the grey thorny jungles which he frequents throughout the day, that a person unaccustomed to hunting elephants, standing on a commanding situation, might look down upon a herd, and fail to detect their presence. And further, in the case of the giraffe, which is invariably met with among venerable forests, where innumerable blasted and weather-beaten trunks and stems occur, I have repeatedly been in doubt as to the presence of a troop of them, until I had recourse to my spyglass;

and on referring the case to my savage attendants, I have known even their optics to fail,—at one time mistaking these dilapidated trunks for camelopards, and again confounding real camelopards with these aged veterans of the forest.—*Cumming's South African Adventures.*

THE ELEPHANT.

THIS well-known and sagacious quadruped belongs to the order of thick-skinned animals, styled by naturalists *pachydermata.* There are only two recognized species,—the Asiatic and the African; the former inhabiting Cochin China, Pegu, Siam, and Hindostan, with the adjacent islands, especially Ceylon; while the latter is found chiefly in the regions of the Senegal and Gambia, and the countries north of the Cape Colony. The Asiatic is the largest, most easily domesticated, and best known. The African is distinguished from it by the immense size of its ears, and by a difference in the character of the teeth, and in the shape of the head.

The average height of the male elephant is from eight to ten feet; that of the female, seven or eight. There have been instances known of their being twelve

feet high. Naturalists consider the elephant the largest animal at present extant on the earth.

In common with other animals, the elephant is subject to variations. Difference of the general colour, which is a brownish-black, is often seen; some of reddish hue are met with; and some, though of rare occurrence, are white. These are held in high veneration, and always produce an extraordinary price. The different direction of the tusks has occasioned different names; those the most esteemed have the tusks nearly horizontal, and by the native princes they are ornamented, and have suspended from them rich and valuable trinkets. The most singular portion of the structure of the elephant, and the one which distinguishes it from all other living animals, is the proboscis or trunk, probably an elongation of the nose, and used as an organ of prehension. With the exception of the human hand, and the express organs of feeling in animals that have to grope for their way and their food, there are few contrivances in nature in which the sense of touch appears to be more delicate and acute, especially in that part of the trunk which answers the purposes of a hand.

Notwithstanding its immense strength, and the formidable weapons in its trunk and tusks with which nature has furnished it, the elephant is found to be a harmless and even retiring animal, rarely waging war upon other creatures, unless alarmed for its own safety. A herd of these majestic animals, browsing in tranquillity amidst the thick and extensive forests of India,

travellers record as a most interesting sight. They are gregarious, living in flocks of a hundred or more. They prefer succulent matter, and especially such as are sweet, or possess an agreeable flavour; but in their vast native woods, being probably unable to procure such supply, they subsist chiefly upon the coarse grasses in the openings of the forests, and the leaves and young branches of tender shrubs and trees.

The old and the young associate without the slightest animosity: in their vast herds they are invariably conducted by the eldest pair, and go readily where they lead the way.

Through the dense groves and jungles of the forest they pursue their route along tracks impenetrable to man, and over which his foot, perhaps, has never passed. They tear immense groves of trees from the ground; and, so that the females and young may browse at their ease on the soft and juicy roots, which form a favourite part of their food, they place the branches in an inverted position. Passing on, they clear the road like military pioneers, until they reach some open space or ford of a river: here, in the swampy spots and marshes, they luxuriate and spend their forenoon heats, roll their gigantic bulks in the oozy soil and mud, thus producing a crust upon the body impervious to their tormentors—the flies—and spout the water over them with their flexible trunks. They do not, however, wallow in the mud, or walk upon the surfaces of deep morasses, for they would sink into them without the power of extricating them-

selves. On issuing from a woody defile, and reaching a spot clothed with succulent plants, they take up, as it were, their residence; and here they may be observed scattered in groups along the sides of the valleys, extending many miles in length,—some browsing on the various ferns, others culling the brushwood, young stems, and evergreens, sprinkled over the meadows, mutually assisting each other in pulling down the taller branches. Some of these clusters consist of separate families,—the male, female, and young, of different sizes,—sporting about, bounding around each other, and leaping from side to side, with all the playfulness and gambols of lambs and kittens. Contrasted with these, are the dignified leaders of the troop, the male elephants, whose deportment indicates much stateliness and tranquillity.

THE TIGER.

THE following extraordinary tiger story is from the *Graham's Town Journal.* The adventure is said to have taken place on the 25th of March 1850:—"Mr. Charles Orpen has just returned from the interior, after having had a most narrow escape from death, in an encounter with a tiger that had been wounded. The

furious animal leaped upon him, struck his gun and whip out of his hands with the first blow of his paws, and wounded his head very severely with his teeth in several places. All the wounds on his head are on the scalp, except a severe one on his right temple, leaving a large scar, and a slight one on the forehead, just above the nose. The flow of blood from these wounds prevented his seeing, as it ran into his eyes; but, nevertheless, he continued to grapple with the animal, and finally to throw it down, and kneel upon it. During this struggle, Mr. Orpen endeavoured to seize the tiger by the throat; but, not succeeding in this, he grasped it by the under jaw. Thus situated, he continued for about an hour struggling with the animal, until, at length, gradually relaxing its hold, it sank down, and died from loss of blood. At the same moment, Mr. Orpen, unable to hold any longer, fell fainting upon the beast. His hands and arms were shockingly mutilated,—there being thirty-three wounds on one, and twenty-five on the other. Many of the wounds are down to, and even into, the bone; some quite through the hand, and across veins, arteries, and nerves. Besides other wounds, he was scratched in numerous places by the animal's claws, and his clothes were nearly torn from his back. The head and skin of the tiger have been preserved, measuring nine feet from the nose to the tip of the tail. Mr. Orpen was laid up for two months and a-half, often fainting from weakness. His wounds frequently bled afresh, the blood being so thin as to be almost colourless. At

the time of this encounter, Mr. Cumming (his travelling companion) lay ill of fever in his waggon. He had, however, with him, four Kafirs, with assagais, one Hottentot, with a gun, and two dogs. The latter were useless, merely springing about and yelping, while the Kafirs, throwing away their assagais, ran off at once. The Hottentot leaped into the river close by, and, in a fright, fired off his gun in the air. Mr. Orpen suffered greatly by the jolting of the waggon, and the want of proper medical assistance. He is now gradually getting better, though it is feared he will never recover the proper use of his left hand."

THE WOLF.

THE first settlers in the State of Maine, in America, found, besides its red-faced owners, other and abundant sources of annoyance and danger. The majestic forests which then waved where now is heard the hum of business, and where a thousand villages stand, were the homes of innumerable wild and savage animals. Often at night was the farmer's family aroused from sleep by the noise without, which told that Bruin was storming the sheep-pen, or the pig-sty, or was laying violent paws upon some unlucky calf; and often, on a

cold winter evening, did they roll a larger log against the door, and, with beating hearts, draw closer around the fire, as the dismal howl of the wolf echoed through the woods. The wolf is one of the most ferocious, blood-thirsty, and cowardly of all animals, rarely attacking man, unless driven by severe hunger, and then seeking his victim with the utmost pertinacity. The incident which I am about to relate occurred in the early history of Biddeford. A man, who then lived on a farm in the neighbourhood, was, one autumn, engaged in felling trees at some distance from his house. His little son, eight years old, was in the habit, whilst his mother was busy with household cares, of running out into the field and woods around the house, and often going where the father was at work. One day, after the frost had robbed the trees of their foliage, the father left his work sooner than usual, and started for home. Just by the edge of the forest he saw a curious pile of leaves; and, without stopping to think what had made it, he cautiously removed the leaves, when what was his astonishment to find his own darling boy lying there sound asleep! It was but the work of a moment to take up the little sleeper, put in his place a small log, carefully replace the leaves, and conceal himself amongst the nearest bushes, there to watch the result. After waiting a short time he heard a wolf's distant howl, quickly followed by another and another, till the woods seemed alive with the fearful sounds. The howls came nearer, and, in a few minutes, a large, gaunt, savage-looking wolf leapt into the

opening, closely followed by the whole pack. The leader sprang directly upon the pile of leaves, and, in an instant, scattered them in every direction. As soon as he saw the deception, his look of fierceness and confidence changed to the most abject fear. He shrank back, cowered to the ground, and passively awaited his fate; for the rest, enraged by the supposed cheat, fell upon him, tore him in pieces, and devoured him on the spot. When they had finished their comrade, they wheeled round, plunged into the forest, and disappeared. Within five minutes from their first appearance not a wolf was in sight. The excited father pressed his child to his bosom, and thanked the kind providence which had led him there to save his dear boy. The boy, after playing till he was weary, had lain down and fallen asleep; and in that situation the wolf had found him, and covered him with leaves, until he could bring his comrades to the feast; but he himself furnished the repast.

THE BEAR.

I HAD before this been in at the death of several bears, but had never seen one charge, and, consequently, had no very clear idea of its style of executing this per-

formance, beyond a notion which I had picked up from books and pictures, that, on approaching within a moderate gunshot, it would rear itself on its hind legs, and waddle up to me after the fashion of a tipsy man, with the intention of hugging, thereby giving me every leisure and convenience for taking a cool shot. Fortunately I was not so persuaded of this fact as to neglect to cock all barrels, and to keep my finger on the trigger of my rifle, and my eyes rather anxiously fixed on the turn of the path. I heard two savage grunts round the corner; still, for a second or two—two very long unpleasant seconds—I saw nothing. All at once my shikarry, in no end of a fright, sang out "Mar, mar, sahib!—fire, fire, sir!"—and a great bear dashed on to the path, at a hard gallop, grunting furiously. She came so suddenly, and charged so savagely, that I had barely time to fire my rifle and fling it down before she was close on me: another spring or two would have brought her to close quarters, when I snatched my second gun from my shikarry, and took a regular snap shot at her head. One does not very clearly know how things happen on such occasions, but I do not believe that I even had the butt of the gun to my shoulder, but just threw it out like a great horse-pistol and fired; and, at the same time, making a step sideways to carry me clear of her charge, I lost my footing, and went scrambling and tumbling into the bushes which fringed the lower side of the path. In the midst of my downfall, however, I just cast a glance at the bear; saw her, on receiving

the shot, contract herself convulsively into a ball, and, with loud grunts, go rolling, head-over-heels, down the slope, bounding from one projection to another, like a great bundle of dirty clothes, till she went clean out of sight. My next glance was at my shikarry, who had preceded me in the tumble into the bushes. I caught a glimpse of his face before the delightful expression had worn off,—his great cavernous mouth wide open in huge horror, the long bristles of his moustache standing straight on end, and his little eyes nearly starting out of his head,—he looked like the frightful hairy Jack-in-a-box, all mouth, teeth, and bristles, that they sometimes sell in London toy-shops. We lost no time in getting into the ravine below, to ascertain the fate of the bear, and found her quite dead, just where she had fallen, with her upper jaw smashed by the concussion. Both my bullets had struck; the first had been too low, had raked her along the belly, and lodged under the skin; the second had entered behind the head, and gone completely through the neck, coming out at the throat. She had two cubs they said; one we caught, a little savage beast, about as big as a terrier dog, who made the forest echo again with squalls that would have beaten out of sight the united screams of all the parrots in the Zoological Gardens.—*Fraser's Magazine.*

TRAP TO CATCH A POLAR BEAR.

The natives of the polar regions have a most ingenious method of trapping bears. A thick and strong

piece of whalebone, about four inches broad, and two feet long, is bent double. While in this state, some pieces of blubber are wrapped around it, and the contrivance placed in the open air, where a low temperature renders it hard and compact; it is now ready for use. The natives, being armed with bows and arrows, and, taking the frozen mass with them, depart in quest of their prey; and as soon as the animal is seen, one of them deliberately discharges an arrow at it. The bear, feeling the insult, pursues the party, now in full retreat; but meeting with the frozen blubber dropped expressly for it, swallows the lump. The chase, the exercise of running, and the natural heat of the inside, soon cause the dissolution of the blubber. The whalebone, thus freed from the incumbrance, springs back to its old position, and makes such havoc with the intestines that the beast discontinues the chase, and soon dies.

PANTHERS.

PANTHERS are said to be abundant in the woods of Red River; nor are they uncommon on the banks of the Arkansas. The following curious anecdote of one of these animals is related:—"A party of hunters in the

morning missed one of their dogs from the encampment, and, after a fruitless search, were proceeding on their route, when one of the other dogs obtaining a scent, discovered to the hunters, dead beneath a tree, the dog which had strayed, together with a deer and a wolf in the same condition. It appeared that the panther having killed a deer, and eaten his fill, got into a tree to watch the remainder, and had, in his own defence, successively fallen upon the wolf and the dog as intruders on his provision."

FOXES.

Foxes have frequently been known to run along the top of a hedge or a wall to secrete themselves amongst ivy,—to go into all kinds of buildings,—to climb up amongst the branches of trees, and enter into the hollows of oaks,—in short, into any places likely to afford temporary security, or for the purpose of foiling scent, and baffling hounds. The Heythorp pack, some years since, ran a fox to Hampton Poyle, where he ascended from a pig-sty to the roof of a barn, closely followed by an old leading hound, who dodged him along the thatch, then over the roof, and back again, for a few

minutes, when at last she made a plunge forward, and seized reynard in the rear quarters, and, both grappling together, they rolled over and over, down the roof, and dropped over on the other side, where the whole body closed round and put an end to reynard's career, amongst a number of milk buckets. On one occasion, a vixen fox was chased by the Warwickshire hounds to Wroxton Abbey, where, rising from one elevation to another, she gained the roof of the mansion, and ultimately sheltered herself by the dinner bell. Here she was captured, but suffered to escape, from the policy that she seemed likely soon to become the mother of a hopeful progeny. They once hunted a fox into a lone cow hovel, near Farnborough, which would have escaped if a countryman had not happened to be there, and observed the animal warily climb up the rack, and enter an orifice in the thatch; and when dislodged therefrom, he was accompanied by three more of his companions, and undoubtedly all of them were bred there. The same hounds last season ran a fox into a village in that hunt, and killed him in a cottage under a tailor's shopboard. The knight of "bodkin, shears, and thimble," had gone out that morning to see the "meet," and arrived at home just in time to be "in at the death." There is a lecture at Bodminton to commemorate an extraordinary incident which occurred in a village in that neighbourhood. A hunted fox, having entered a cottage, jumped into and endeavoured to conceal himself in a cradle, where an infant lay asleep;—from which he was im-

mediately afterwards ousted and worried by the hounds, who overturned the cradle, and yet the child remained uninjured. Once a very artful fox eluded the pursuit of hounds in our neighbourhood nearly a dozen times, under singular circumstances. He was always brought to within a little distance of a bridge, and there the hounds failed to wind him any farther. However, his fatal turn came at last; and one day he made his old point as usual;—the hounds threw up their heads as before, and the field were about to abandon the place in despair, when a labourer came forward and offered to discover reynard's place of retreat to the gentlemen if they would give him a sovereign,—but not otherwise. The money was soon forthcoming, and, as he received it with a chuckle, he exclaimed, "There; look up in that tree, and see his tail hanging out o' that magpie's nest." To the surprise and joy of the field, such was the fact; having jumped from the parapet of the bridge into the tree, and ascending from bough to bough, entered the old and thorny habitation of the magpie, leaving his brush dangling outside; his first visitation to which, or to similar nests, may have been to effect the robbery of its owners in the summer. It is almost needless to add that he was fetched from his retreat, and though deserving an extension of life for his cunning, and the fun thus occasioned, he died that death which myriads of his tribe had died before him. A short time since a sinking fox ran into Charlbury town, tried the doors and windows of the grammar school whilst the children

were at school; and, when observed, he retraced his steps, and entered a farm-yard, where he was assaulted by an ugly cur, whom reynard instantly pinned to the ground by the throat; and while both thus lay locked in close embrace, the fox was nearly killed by a person pressing a hedgestake across his neck, to force him to relinquish his deadly gripe on the dog. Life was nearly extinct when the hounds arrived.—*Sporting Magazine.*

CUNNING OF THE FOX.

More foxes are lost when dead-beaten than at any other time; and here they shew their superior cunning by the wonderful tricks they play the hounds. For instance, when the pack is close at him in covert, and he goes through the outside fence of the covert only, instead of going into the field, he drops down into the ditch, every hound going over him. The pack then make a swing outside, during which he crawls up the bank again into the covert, and gets probably to the other side before they cast back. By that time the scent, owing to the ground he has stained, gets bad, and he has probably time to get fresher. He often steals away without being seen, as all the men are close to the hounds, with the belief that they will kill him the next minute. But on these occasions, if the huntsman is awake, he will always order one of the whippers-in to remain at the opposite side of the covert. An old fox had been found several times by the pack belonging to the writer of this, and as

invariably ran a ring of about three miles, making a round of small coverts, by which he generally moved other foxes, and saved himself. Application was made, late in the season, to try one more day this fox, as he was suspected of doing mischief amongst the game. He was found as usual, and ran the same ring twice. When running it a third time the hounds were stopped, and quietly walked back, to the surprise of a large field of sportsmen. On reaching an open part, as was expected, the hunted fox was seen coming the same line as before, directly towards the hounds, which got a view. This so astonished him that he went straight away, and was killed twelve miles, as the crow flies, from where he was found.—*Ibid.*

THE CHAMOIS.

THERE is perhaps no animal so peaceful, and at the same time so timid, as the chamois. Nature, therefore, besides endowing it with a facility of climbing into the most inaccessible places, and thus avoiding pursuit, has enabled it to guard against the approach of danger, by the great acuteness of its senses of sight, smell, and hearing. It is this which makes it so very difficult to get near them. A rolling stone, or a spoken

word, at once attracts their attention; and they will look and listen to discover whence the sound has come that breaks the silence of their mountain solitude. For an incredibly long time they will then stand gazing fixedly in one direction, quite immoveable; and if it happen to be towards something in your neighbourhood that their attention has been attracted, you must lie still and close indeed to escape their observation. The eyes of the whole herd will be fixed on the spot in a long steady stare; and as you anxiously watch them from afar, they almost look like fragments of rock,—so motionless are they while they gaze. You begin to hope they have found no cause for alarm, when, "Phew!" the sharp whistle tells they have fathomed the mystery, and away they move to the precipitous rocks overhead: unless panic-stricken, they stop from time to time to look behind; and then, suddenly uttering the peculiar shrill sound, again move on. It is true, that on the mountains, where an awful silence ever broods, the slightest noise breaking the stillness is heard with wonderful distinctness a great way off; but even making allowance for this, there is sufficient evidence that the senses of these animals are particularly acute. If but the gentlest wave be moving in the air, coming from you to them, they at once become aware of your presence, long before you perceive them, or they see you.—*Bower's Chamois Hunting.*

LEAP OF THE CHAMOIS.

The agility of the chamois has become almost proverbial; but to have any idea what it is, one must be an eye-witness of the bounds they make, and see the places they will race down at full speed when pursued. A smooth surface of rock, so smooth that a footing there seems impossible, and of nearly perpendicular steepness, is no obstacle to their flight. Down they go, now bounding, now gliding, with a velocity which seems to insure their being inevitably dashed to pieces. The chief strength of the animal is in its hind-legs, which, if extended, would be longer than the others. On this account it springs upwards with more ease than it descends the mountain, and on level ground its walk is clumsy and ungraceful. It is not made to run, but bounds along over the ground. The hoof is cloven, long, and pointed; and the slot of the chamois resembles that of the sheep. When standing, the hind legs are almost bent, as if the animal were preparing to lie down; which no doubt helps considerably to break the fall when leaping from a great height. Notwithstanding this, the croup is still somewhat higher than the forepart of the body. The elastic force which the hind-legs possess is immense. With a sudden bound the chamois will leap up against the face of a perpendicular rock, and, merely touching it with its hoofs, rebound again in an opposite direction to some higher crag, and thus escape from a spot where, without wings, egress seemed impossible. When reaching upwards

on its hind-legs, the fore-hoofs resting on some higher spot, it is able to stretch to a considerable distance, and, with a quick spring, will bring up its hind-quarters to a level with the rest of the body; and, with all four hoofs close together, stand poised on a point of rock not broader than your hand.—*Bower's Chamois Hunting.*

OXEN.

I WAS well mounted on an old ox, and really liked his walking pace very much. I think I can sit more hours on oxback than on horseback, supposing in both cases the animals to walk. An ox's jog-trot is not very endurable, but anything faster abominable. The peculiarity of the creature is, that he will not go alone, from his disposition being so very gregarious. He is distressed beyond expression when any attempt succeeds for a time in separating him from the herd. It is with great difficulty that an ox can be found willing to go ahead of the others, even though he knows that his fellows are just behind him. Whipping and spurring has hardly any effect on the animal: he feels every cut most sensitively, as the rider cannot but be aware of; but the obstinacy of his nature is so wonderfully

great, that pain has little or no influence upon his determination. His character is totally different from that of a horse; and, very curious to observe, he is infinitely the more sagacious of the two, but never free from vice. The gregariousness of oxen and of sheep is of great advantage to the traveller,—for it is not necessary to be perpetually counting the animals, to see if any have strayed; and at night, when the oxen are all loose about him, a constant anxiety is taken off the owner's mind by knowing, that if he sees one, all are there.—*Galton's Narrative of an Explorer in Tropical South Africa.*

THE SHEPHERD'S DOG.

THE performances of this useful animal depend much upon the way in which he is trained. The lazy shepherd is often said to have the most active dog, because he teaches him to do a great deal of work to save himself; but he often overdoes the thing, and allows his dog, by continual wide ranging, to disturb the sheep, and unnecessarily break their rest, so that they will not settle for a long time after. The temper of the shepherd may be pretty truly guessed from the way his dog goes about his business. When we see him

constantly worrying at them, and needlessly attacking them at every turn, we may suppose that the sudden sallies of the master's temper force him to restless activity; and, as in the pointer, all depends upon early training,—which is equally necessary in the sheep dog, though often much neglected, as the shepherds all fancy they understand the making of their dogs, and will not set systematically to study it. This is very short-sighted; for the sheep shew, even in a few minutes, whether the dog has the proper art of controlling them, and the superiority once established, there is little trouble after; while, with an ill-trained or ill-bred dog, all is confusion, and a constant struggle goes on, most irritating and injurious to the flock.

Some dogs have the faculty of discovering sheep when covered by a considerable depth of snow. The value of such a dog is very great in hilly pastures, and many scores of sheep have been recovered by this means. This is termed "marking" in Cumberland; and an interesting proof of its effect occurred in the great snow-storm of 1807, (by far the heaviest in that county in the present century,) when about four hundred sheep on one farm had been turned out in the evening, and were caught by the snow before they reached their usual lying ground. They took shelter under any projection they could find; but the wind veering round, they were completely scattered and buried, without the slightest trace of their position. Next morning, by means of long snow poles, a few were discovered; but the owners began to despair of recovering the bulk of the flock.

The old dogs were quite non-plussed and useless, when a puppy, not quite a year old, was observed to take great interest in the holes made by the poles, going from one to the other, and snuffing eagerly at them. He was purposely left to himself, and at last the meaning of the operation seemed to strike him; and, after much attention, he fixed himself at a hole which the people had left on feeling nothing like the sheep at the bottom, and began to scratch and work busily. Of course they returned, and on encouraging the whelp, and digging down seven or eight feet, they released a cluster of five or six sheep. It is almost needless to say how the work went on; the dog became quite confident and keen in his useful occupation, and for a while insisted on scratching and working, but soon understood the whole matter, and merely followed the searcher, indicating where there was something worth while—like a terrier at a rabbit's hole—and waiting quietly till the bottom was reached and the expected sheep released. The peril of delay being so great, and the dog so keen, there was no cessation of labour till evening, and the first day above two hundred sheep alive, and twenty smothered, were disinterred. The same course was pursued the following day,—the old dogs still keeping aloof from the work; and a much larger proportion of those recovered were found dead. The last living sheep was found on new year's day, having been buried on 18th November, near a whin bush, where it had a space of about five feet square in which to move. It had nibbled the prickly branches

close, of course; and, when liberated, appeared nearly blind. The sheep were generally in groups of four or five, and often, when more numerous, a part had been trodden to death by the rest, and their bodies even flattened by the pressure above them. The loss on this farm was about two hundred sheep, besides several bullocks; and on the farm of Messop, a bull was buried at a depth of thirty-eight feet, and not got out to be skinned till the 1st of May following. Other instances of the sagacity of these dogs are told;—as, for example, one who, in the salt marshes of Cumberland, learned to hound up the sheep who often lingered, and were lost as often during daylight as the tide rose;—another, which gained such ascendency over a savage bull that he alone could take him to the water; and he regularly sat upon a stone in the burn till the bull had his fill, and the moment he raised his head, drove him up again. The intelligence displayed in these particular instances was, no doubt, equally conspicuous in general usefulness. The usual price of a good sheep dog (about £3) is a trifle compared with such services and security to property; but they are generally highly valued, and it is dire necessity alone which will force a well-conditioned shepherd to part with a good dog. It is often impossible to replace them. An old shepherd, a rheumatic cripple, in the north of England, used to make his rounds among a large stock on an ass, and, with the help of his two faithful dogs, he could pick up any sheep he wanted, and carry it home before him on his ass.

THE COATI.

Cuvier, in his arrangement of the animal kingdom, has instituted a group or tribe, in itself very natural, under the title of *plantigrade carnivora*, consisting of such carnivora as apply, in walking, the entire sole of the foot to the ground,—the sole being naked and callous. Compare, for example, the foot of the dog and of the bear. The dog is *digitigrade*,—that is, it rests upon its toes, (which are furnished beneath each with a callous pad,) and a "ball" or cushion placed immediately behind them. Its wrist before and its heel behind are not brought in contact with the ground,—it is raised upon its limbs in order that its movements may be light and rapid. In the bear, we find that the fore-paws are pressed flat, and have beneath, a large, broad, callous palm;—while the hind feet, with a large sole from heel to toe, are also brought in contact with the ground. This difference in the structure of the feet, slight as it may appear, is accompanied by a marked difference as respects the movements of the animals. All plantigrade animals move with a firm, heavy, and almost a clumsy step, destitute of lightness and elasticity. They cannot bound along,—their limbs are too thick and short, and their footfall too decided, for such a mode of progression. Not that they are necessarily slow—for the bear rushes along with considerable speed—

but their pace, when exerted to rapidity, partakes of the heavy character so conspicuous in their ordinary mode of walking. The structure of the soles of the hind-feet, for entire application to the earth, enables them to sit up on their haunches and use the fore-paws, either for holding food between them, as we see in the racoon, or for defending themselves when attacked. We know how the bear raises himself when assailed, and hugs his adversary with an iron gripe, while he fears his enemy with his teeth. The plantigrade carnivora are all, or nearly all, climbers; but their mode of climbing does not resemble that of the cat, or the squirrel, or of any of the light-limbed and sharp-clawed animals;—they do not run up a tree, and bound from branch to branch, but proceed in the same heavy manner as on the ground;—and it is because they can apply the palm of their paws, or the sole of their hind-feet fairly to any object, (not, however, grasping it,) that they are enabled thus to climb. They use their feet, in fact, in the same manner as man; and their mode of climbing resembles his, except that their paws do not grasp. In descending, they generally come down hind-quarters foremost, carefully availing themselves of every projection. The bear always does so, and, so far as we have observed, the racoon also.

With a modification of the organs of progression, unfitting them for the chase, or for bounding, like the tiger, from a covert upon their prey, their appetite is, accordingly, less essentially carnivorous; it is modified

to meet their powers of locomotion. Hence, their diet is of a mixed nature; their food consists of roots, berries, and fruits, as well as of flesh; and their teeth indicate that vegetable aliment is perfectly congenial. Some, however, are more carnivorous than others, and have better opportunities of obtaining prey. Among these may be placed the *coatis*, (of which there are three species,) animals peculiar to the warmer portions of the American continent.

The coatis, or coati-mondis, are very remarkable, and cannot be confounded with any other animals. They may be known at once by the peculiar elongation of their snout, which projects considerably beyond the lower jaw. This snout is not, as in the hog, supported by a continuation of the nasal bone, but is a cylindrical and flexible proboscis, with a truncated extremity, forming a sort of disc where the nostrils open, and, altogether, giving a singular character to their physiognomy. They turn it about in various directions while in search of food, and root with it in the earth in quest of worms and insects. The eyes are small but quick; the ears moderate and rounded; the body long, deep, and compressed; the tail long; the limbs short and stout; the toes, five on each foot, and armed with large powerful claws, well adapted for digging. The fur is rather coarse, but long, full, and close; the tail is ringed with alternate bands of dark and pale tints,—in the red coati, of rufous; in the brown coati, of dusky brown. The canine teeth are remarkable for their size and sharpness, especially

those of the upper jaw, which are compressed, and have a cutting edge both before and behind.

In captivity these animals sleep much during the day; and, like the kinkajou, are most active as the evening advances, at which time they traverse their cage, turn their snout from side to side, and pry into every corner. They do not, however, pass the whole of the day in sleep, but are active for hours together, retiring to rest only at intervals. Their temper is capricious. Some are tolerably good tempered; but most are savage, and their bite is very severe.

In their native climate they tenant the woods, living, for the most part, in small troops, among the trees, which they climb with great address, and prey upon birds, which they surprise, rifling also their nests of eggs or unfledged young. Worms, insects, and roots, form also part of their diet.

The colours of the brown coati are very variable, the brown being more or less tinged with yellow, and sometimes shaded with black. The under surface is yellowish grey; the snout is generally black; and several spots or marks of greyish yellow encircle the eye. It is a native of Brazil, Guiana, and Paraguay.

D'Azara, who describes this species in his *Essay on the Quadrupeds of Paraguay*, states, that it lives exclusively in the forests, going either singly, in pairs or in small troops; and climbing with the utmost facility, although its tail is not prehensile, like that of the kinkajou. It is an amusing thing, he observes, to see a troop of these animals fall, as if dead, from the top

of a tree, when they perceive, by the blows, that the hatchet is at work upon it, or when a pretence of cutting it down may be made. From this manœuvre, and most probably from their cunning, and not from their activity or destructive propensities, they have been compared to the fox, though in reality they have nothing fox-like at all in their habits and manners. In Paraguay, the coati is commonly kept in a state of semi-domestication, but always tied up or caged; because it cannot otherwise be prevented from climbing about the house, and overturning glass, china, and every other light piece of furniture.

In drinking, the coati laps like a dog; but as its long snout would be in the way during this operation, it turns it up so as to prevent its being submerged.

In size, the brown coati is equal to a large cat, its body being twelve or fourteen inches long, and its tail as much. There is, however, a larger species than either the rufous or the brown coati, which seems hitherto to have been confounded with the latter. It seems more gentle than the others; but none are remarkable for intelligence or docility. This larger species was not unknown to D'Azara, though he confounded it with the brown coati, as will appear from the following passage:—"It is said," he observes, "that there are certain coatis which are solitary; these are called *haegno-mondé*; (*haegno*, an American word, signifying to go alone;) but many persons consider them to be specifically distinct from the coati. The differences which they assign do not consist in colours, nor in figure, nor in anything but this,—

namely, that the former animal is solitary, and altogether larger than the common coati, though, as regards myself, I am persuaded that this difference of size depends on age or sex, and that their solitary mode of life depends upon incidental circumstances." The large brown species, however, is truly distinct from the smaller brown coati, and from the rufous coati,—which two latter are of about an equal size, and never attain to anything like the dimensions of the former, which has, moreover, its peculiar style of colouring.

In conclusion, it may be observed that these animals are highly gifted with the sense of smell. They examine everything with their long nose, which is in almost perpetual motion. Their temper is so irritable that they cannot be trusted even by those with whose persons they are the most familiar, and, consequently, are not to be touched without great caution. Their voice, seldom exerted, is, under ordinary circumstances, a gentle hissing; but when irritated or alarmed, they utter a singularly shrill cry, something like that of a bird. They defend themselves vigourously when attacked by a dog, or any animal, and inflict desperate wounds. Like the racoon, they are said to be fond of the juice of the sugar-cane. In climbing, they descend head foremost, being, in this respect, unlike the bear, which animal they far surpass in activity; they are better climbers than even the cat, and are exceeded among their own tribe only by the kinkajou, whose prehensile tail gives it a great advantage.—*Penny Magazine.*

MONKEYS.

THE imitative properties of the monkey tribe are well known. Two monkeys of the larger sort, kept by a naturalist, became perfectly tamed, and were the familiar companions of the gentleman's household. One of these, the female, used to enter the kitchen at a certain time of day, take the broom down and sweep the kitchen, put coals on the fire, and set the tea things in as good order as any servant maid could do. This exceeds the sagacity of the dog or elephant; and, as the monkey tribe have large developments of the organs of imitation, it is also in accordance with the principles of phrenology. Another small monkey, kept by a British consul in this country, once, at a large consular dinner party, entered the room, and, jumping on to the consul's shoulder, took off his wig and put it into the fire, to the great amusement of the company.—*Brussels Herald.*

BABOONS.

THEY are usually found in herds or troops together, varying in size and number, and, if attacked or molested, are very savage. A strange rencontre with one

of these troops once occurred to the author. Whilst on an excursion to Perrie bush, about sixteen miles from King William's Town, he started from the village alone, for the purpose of visiting the saw-pits, which were about a mile or more towards the midst of the forest. Having reached these, and transacted the business in hand, he was informed of a small rivulet, at a little distance farther on among the woods, forming some very picturesque cascades, and the banks of which were covered with a beautiful and rare kind of flower. He therefore started alone upon a ramble in search of it, and succeeded, at length, after some little difficulty, in making it out. Seduced by the wild loveliness of the scene, he advanced farther on at the other side of the stream, along what is called a Caffre path; but, soon getting out of this, he became entangled in the bush and underwood. The foliage overhead being so thick as to exclude the sun, a small pocket compass was the only safe guide; and, whilst trying to adjust and steady this, he was saluted by a volley of broken sticks and berries from overhead. Never dreaming of such an attack, and not being able to see the slightest vestige of animals near, he still continued his occupation, when a second similar salute made him gladly pocket the compass, and make towards the low ground in hopes of finding the stream. This he soon reached, and, when on its bank, more easily recovered the lost path. During his perplexity, however, the chattering overhead soon betrayed the assailants to be a large herd of baboons,

whom he now thought, when clear of the thicket, he might tease in his turn. Accordingly he commenced throwing stones at such as were within reach: when, instead of taking to flight, (as he expected they would,) to his great consternation he beheld from every tree near him five or ten of the great mis-shaped creatures, swinging from branch to branch, and making towards himself and the ground. Having no gun and no whip with him, he now thought it full time to decamp, which he immediately did, running faster, probably, than ever he did before or since, and pursued at full cry (if cry the dreadful noise could be termed) by fifty or sixty ugly, awkward wretches, that seemed to mock at the courage of their adversary, and certainly despised his ill-judged plan of attack and defence. At the saw-pits, however, they sounded the halt, fearing that he would find a reinforcement there among the sawyers. But this, to his great dismay, was not forthcoming, as they had gone home to the village for dinner. He therefore tried to increase his speed, and finally succeeded in getting well away from them and back to Perrie, very glad, indeed, to escape so easily.—*Fleming's Caffraria.*

REPTILES,

THEIR ORDERS, DISTINCTIONS, HABITS, AND HISTORY.

ONE of the most remarkable of the vertebrate classes of the animal world, is the class reptilia, (from the Latin word *repto*, to creep along,) which naturalists have divided into the four following orders,—namely, 1. Chelonia, tortoises; 2. Sauria, crocodiles, lizards, &c.; 3. Ophidia, snakes; and 4. Amphibia, frogs, newts, proteus, &c.

A greater variety of form prevails among reptiles than is found among the mammalia and birds, and it is in the production of these forms that nature seems to have imagined shapes of the most fantastic description, and modifying in every possible manner the general plan which she has prescribed to herself in the vertebrata, and in the oviparous class in particular. "The hotter regions of the globe," says the excellent introduction to a *Popular History of Reptiles*, published by the London Religious Tract Society, "are the great nursery of the reptiles; they teem within the tropical latitudes; there they swarm, in sandy deserts, among dense and tangled brushwood, in humid forests, and wide spread and pestilential swamps; they colonize the mouldering ruins of ancient towns and cities, temples and palaces; and often lurk in the abodes of man, unsuspected till discovered by accident. It is in

these regions that the largest, the most terrible, and the most deadly of their race abound. Tortoises and turtles of huge bulk there crawl on the land, or row themselves through the water. Crocodiles and alligators dart through the broad river, or skulk, waiting for their prey among the luxuriant herbage of its banks; there the boa and the python are ever ready to entwine the unwary victim in their sinewy folds; there the cerastes lies concealed in the sand, the lance-headed viper lurks in the plantations of sugar-cane, and the cobra, with its hooded head and fiery eyes, startles the wanderer among the ruins of antiquity, and hisses threats and defiance. But if the most terrific abound in these regions, the elegant and the beautiful abound also; tortoises with painted shells; harmless little lizards, enamelled with glossy green and gold, and active as the bird; innoxious snakes, freckled, ringed, and spotted with the most lively tints in exquisite contrast; tree frogs, dyed with azure, green, and rosy red, springing—all life and activity—from leaf to leaf; and flying lizards, sweeping on expanded parachutes from tree to tree.

"As we approach the more temperate latitudes of the globe, we observe a gradual diminution in the number of the reptile part of its animal population. We find none terrible from their size, and but a small number to be dreaded for their poison. As we pass still farther northwards, a few species which are harmless, and one or two besides, furnished with poison fangs, but capable of destroying creatures of small

size only, or of a weak frame, constitute the representatives of the fierce, the gigantic, and the deadly, which revel in the thronged regions of the intertropics.

"The viper, for example, of England, and northern Europe, is the representative, in our latitude, of the numerous deadly snakes which infest the countries of the hotter latitudes; and the common ringed snake, a harmless animal, takes the place of the mighty python of Bengal and Java. Advancing to the countries of the polar circles, we no longer find the snake, the lizard, the toad, or the frog; the low state of the temperature, the condition of the land and the water, and the deficiency of such creatures as constitute their food,—namely, snails, insects, and small animals,—combine to exclude them from these desolate regions.

"Reptiles are cold-blooded animals,—that is, their natural temperature is not much, if at all, above that of the atmosphere or water in which they dwell. Their power of producing animal heat is very limited, so that the system is immediately affected by the lowering of the temperature of the medium they inhabit."

The heart in reptiles is so constructed that, at each of its contractions, only a portion of the blood which it receives is transmitted to the lungs. The remainder of this fluid is returned to circulate again, without having passed into the lungs, and, consequently, without having been subjected to respiration; hence, as respiration causes the heat in the blood, and gives to

the muscular fibre its susceptibility for nervous irritation, the temperature of reptiles is much lower, and their muscular power greatly weaker, than that of the mammalia and birds. Therefore they are said to be cold-blooded animals. Their general habits are also much less energetic, almost all their motions consisting of crawling and swimming; and although several species run or leap at times with considerable facility, yet, upon the whole, their actions are sluggish, and their sensations obtuse, with a slow digestion; and, in temperate countries, they pass the winter in an almost constant state of torpidity.

"A high temperature," says the work already quoted, "is, indeed, most congenial to their system. The viper in Italy and Spain is more formidable than the same animal in England and Sweden; and the common ringed snake there attains to longer dimensions.

"A large group of reptiles, the amphibia, at an early stage of their existence, are furnished with gills, and, like fishes, respire water; the gills, in due time, becoming obliterated, and lungs developed, as in the frog, the newt, &c. Others, however, of this group, though they acquire lungs, never lose their gills, and are, at the same time, both aquatic and aërial in their respiration. Such are the proteus, the siren, and the axolotl. The circulation of the blood in the frog and newt changes, by a wonderful transition, from that of a fish to that of a perfect reptile; while in the proteus and its allies, it continues to be

that of the fish, with the addition of a modified state of pulmonary circulation, approaching that of the perfect reptile structure.

"Reptiles have either four limbs, two, or none; the ribs are sometimes very numerous, sometimes wanting; there is no true distinction between the chest and abdomen; no diaphragm or muscular expansion, dividing, as in quadrupeds, these two cavities. As the blood is of a low temperature these animals need neither fur nor feathers, for the retention of the vital heat; they are therefore covered either with horny plates, or with scales, or have the skin entirely naked. They possess the senses of hearing, sight, taste, smell, and touch. Their sight is, in general, extremely acute; for on this sense depends their pursuit of food, and their perception of the approach of enemies. In some few, however, as the proteus, which inhabits subterraneous waters, the eye is extremely minute, appearing like a black dot, covered by the transparent skin, and is in a rudimentary condition. The senses of taste, smell, and touch, in reptiles, are comparatively feeble. With regard to hearing, there appears to be considerable variation in different groups. In serpents, this sense is very acute; and these animals evidently derive pleasure from musical notes, as is well known to the serpent-charmers of the East. In lizards, also, the sense of hearing appears to be quick; but in tortoises, and in the amphibia, it is probably much more obtuse. In most cases the internal organs of hearing are entirely covered by

the scaly investment of the head, or by the naked skin. In lizards generally, the tympanic or drum-like membrane is stretched over the external orifice of the ear, and is on a level with the scaly covering of the rest of the head; but in the crocodile, the external orifice, instead of being thus permanently closed, is provided with a firm, hard, moveable lid, or speculum, by means of which the aperture may be either stopped or kept open. Thus, while basking on the margin of the river, or lying there in ambush for prey, the crocodile has the power of raising the earlid, in order to listen attentively to every noise; but when he dives beneath the water, either for safety, or to drown the victim he has seized, the entrance of water into the auditory cavities is prevented by the firm shutting of the lid, which accurately fits the orifice. Reptiles are ordinarily oviparous; they bury their eggs in the sand, deposit them in warm places of concealment, or leave them floating on the water, exposed to the rays of the sun; in due time the young are hatched. In some few instances, the eggs are hatched immediately previous to their exclusion, as in the case of the viper, and the young are taken under the mother's protection.

"Most reptiles are carnivorous; some, however, (and these belong to the first group,—namely, the tortoises,) are vegetable feeders; a few feed both on small animals—as slugs, insects, &c.—and on leaves and fruits."

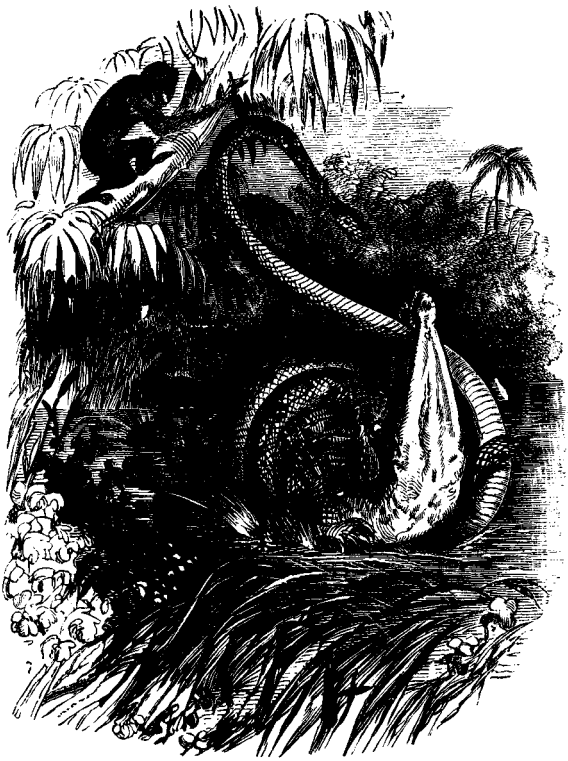
They have no delicacy of taste, for almost all the

species swallow their food entire; and with those in which the tongue is soft and flexible, this organ serves chiefly as an instrument for the seizure of their food. None of them have true fleshy lips; and some, such as the tortoises, are provided with a horny bill, like that of a parrot; others have teeth of various forms, which are not, however, formed for mastication, but to assist in holding their prey. Various serpents have hollow fangs, which they can erect at pleasure, when they open their mouths to bite; and these fangs have apertures, from which they inject into the wounds made by them an active and deadly poison.

THE BOA CONSTRICTOR.

The velocity with which the boa darts on his prey, not only overturns it, but hurls his own body in advance of his head, and thus forms the first coil,—the rest of his length being rapidly turned at the same time. Lieut. Hutton introduced a full-grown buck-rabbit into the den of the largest snake. The rabbit eyed the monster in evident uneasiness, with his ears thrown back, and nose elevated, and stamping firmly with his hind feet on the floor. The snake, in the meantime, was incessantly brandishing his long-forked tongue,

and gradually opening out the close-drawn coils of his body, in order to give himself room for the deadly spring. His head then slowly and almost imperceptibly glided forward over the upper coil towards the rabbit, which intently eyed every movement of his foe. In an instant, and with a suddenness which made me start, the snake dashed forward; but, to my surprise, the rabbit eluded his grasp, by springing over him. With a loud and threatening hiss, the boa suddenly gathered himself into his corner, where he lay still for an instant, with his head still pointing towards the rabbit. Not liking his position, the poor buck turned to move away, and that movement decided his fate; for, with the speed of lightning, both snake and rabbit rolled, in a fast embrace, with a heavy crash against the side of the cage. The boa had seized his victim by a fore leg, with one coil round the throat, so closely drawn that the eyes seemed starting from their sockets; a second coil was thrown around the body, immediately below the shoulders, and another round the loins. So instantaneous was the spring, that not even one cry escaped the rabbit; and though the last convulsive motion of the hind legs was strong enough to shake the boa, it lasted but a few minutes, and all was over. For some seconds after life had, to all appearance, fled, the snake still held his firm position, as if to allow no chance of escape, and proceeded first to disengage his teeth from the hold he had taken, and then to uncoil from the neck; with the remaining coil he still held fast.—*Asiatic Journal.*



The serpent, grasped in the middle by the crocodile, made the water boil by his furious contortions.—p. 199.

BATTLE WITH A CROCODILE.

The following account of an engagement between a boa constrictor and a crocodile in Java, is given by an eye-witness:—"It was one morning that I stood beside a small lake, fed by one of the rills from the mountains. The waters were as clear as crystal, and everything could be seen to the very bottom. Stretching its limbs close over this pond was a gigantic teak-tree; and in its thick, shining, evergreen leaves lay a huge boa, in an easy coil, taking his morning nap. Above him was a powerful ape, of the baboon species,—a leering race of scamps, always bent on mischief. Now, the ape, from his position, saw a crocodile in the water rising to the top, exactly beneath the coil of the serpent. Quick as thought, he jumped plump upon the snake, which fell, with a splash, into the jaws of the crocodile. The ape saved himself by clinging to a limb of the tree; but a battle royal immediately commenced in the water. The serpent, grasped in the middle by the crocodile, made the water boil by his furious contortions. Winding his fold round the body of his antagonist, he disabled his two hinder legs, and, by his contractions, made the scale and bones of the monster crack. The water was speedily tinged with the blood of both combatants; yet neither was disposed to yield. They rolled over and over, neither being able to obtain a decided advantage. All this time the cause of the mischief was in a state of the highest ecstacy. He leaped up and

down the branches of the trees, came several times close to the scene of the fight, shook the limbs of the tree, uttered a yell, and then frisked about. At the end of ten minutes, a silence began to come over the scene. The folds of the serpent began to be relaxed, and, though they were trembling along the back, the head hung lifeless in the water. The crocodile also was still, and, though only the spines of his back were visible, it was evident that he, too, was dead. The ape now perched himself on the lower limbs of the tree, close to the dead bodies, and amused himself for ten minutes in making all sorts of faces at them. This seemed to be adding insult to injury. One of my companions was standing at a short distance, and, taking a stone from the side of the lake, hurled it at the ape. He was totally unprepared, and, as it struck him on the side of the head, he was instantly tipped over, and fell upon the crocodile. A few bounds, however, brought him ashore, and, taking to a tree, he speedily disappeared among the thick branches."

A SNAKE HOOP.

An English sportsman, when in America, being one day in pursuit of game, observed a snake lashing about after a small animal, which he could not readily capture; it was near a declivity, of which the animal took advantage, and down hill he ran, beating his pursuer in speed, to a distance. The snake's reserved power soon became conspicuous, by placing his tail in his mouth, and, forming a perfect circle,

down the hill he *trundled*, and, after a very extraordinary chase, captured his prey! The Englishman's astonishment was put forth in the first village he came to. Yankee told him "It was nothing new or rare he had discovered; as a little boy, a few days ago, in our village," said Jonathan, "having picked up one, and, mistaking it for a hoop, sported with it for some time, until the lad attempted to tie a few bells to his plaything; but the snake, not liking a *rattle* of music as an appendage, modestly thinking, no doubt, it would appear in imitation of one of a superior grade, and not pleased with the compliment intended, let slip his tail, and glided away, to the great regret and dismay of the astonished playmate."—*Sporting Magazine.*

SNAKES AT THE CAPE.

I was going quietly to bed one evening, at Somerset, wearied by a long day's hunting, when, close to my feet, and by my bedside, some glittering substance caught my eye. I stooped to pick it up; but, ere my hand had quite reached it, the truth flashed across me,—it was a snake! Had I followed my first natural impulse, I should have sprung away; but, not being able clearly to see in what position the reptile was lying, or which way his head was pointed, I controlled myself, and remained rooted breathless to the spot. Straining my eyes, but moving not an inch, I at length clearly distinguished a huge puff-adder, the most deadly snake in the colony, whose

bite would have sent me to the other world in an hour or two. I watched him in silent horror; his head was from me, so much the worse; for this snake, unlike any other, always rises and strikes back. He did not move, he was asleep. Not daring to shuffle my feet, lest he should awake and spring at me, I took a jump backwards, that would have done honour to a gymnastic master, and then darted outside the door of the room. With a thick stick, which I procured, I then returned and settled his worship. Some parts of South Africa swarm with snakes; none are free from them. I have known three men killed by them in one harvest, on a farm in Oliphant's Hock. There is an immense variety of them, the deadliest being the puff-adder, a thick and comparatively short snake. The bite of this snake will kill occasionally within an hour. One of my friends lost a favourite and valuable horse by its bite, in less than two hours after the attack. It is a sluggish reptile, and therefore more dangerous; for, instead of rushing away, like its fellows, at the sound of approaching footsteps, it half raises its head and hisses. Often have I come to a sudden pull up on foot and on horseback on hearing their dreadful warning. There is also the cobra capello, nearly as dangerous, several black snakes, and the boem lang, (or tree snake,) less deadly, one of which I shot, seven feet long. The Cape is also infested by scorpions, whose sting is little less virulent than a snake bite; and the spider called the tarantula, which is extremely dreaded. -*Bentley's Miscellany.*

FASCINATION OF SERPENTS.

In the hot season of the year 1816, while sitting reading in the verandah of the house, then occupied by me on the esplanade, at Trinkomalé, in the island of Ceylon, my attention was attracted by the plaintive cries of a small bird, and, on looking in the direction of the noise, I observed sitting on the top of a low wall which divided the court-yard from a tobacco field, at the distance of perhaps ten yards, a large *iguana*, *lacerta iguana*, a reptile probably about three feet in length, with "the dorsal suture dentated, with a denticulated sac at the throat,"—that is to say, with sharp spikes, like a cheveaux-de-frise, on his neck and back, and on the bag beneath the throat; and, altogether, a formidable looking creature. A very small bird, of what family I do not know, was flying at a short distance above and about the head of the reptile, which sat with extended jaws, and eyes fixed upon its poor little intended victim, whose circles of flight became less and nearer the mouth of its *basilisk* enemy every instant. Being satisfied of what would be the result, and unwilling to see the catastrophe completed, I suddenly descended the steps of the verandah, took up a large clod of earth, threw it at the reptile, which had not been disturbed from its purpose by the movement made, hit and knocked it over into the field, where it lay stunned for an instant,

and then ran away among the plants. The poor bird, apparently little larger than the humming-bird, of course, flew away, after its escape from a cruel death. —Correspondent in the *Medical Times.*

LAKE OF ALLIGATORS.

This curious place is about eight miles from Karachi, and is well worth inspection by all who are fond of the monstrous and grotesque. A moderate ride through a sandy and sterile track, varied with a few patches of jungle, brings one to a grove of tamarind trees, hid in the bosom of which lies the grisly brood of monsters. Little would one ignorant of the *locale* suspect, that under that green wood, in that tiny pool, which an active leaper could half spring across, such hideous denizens are concealed. "Here is the pool," I said to my guide, rather contemptuously; "but where are the alligators?" At the same time I was stalking on very boldly, with head erect, and rather inclined to flout the whole affair, *naso adunco.* A sudden hoarse roar or bark, however, under my very feet, made me execute a pirouette in the air with extraordinary adroitness, and perhaps with more animation than grace. I had almost stepped on a young crocodilian imp about

three feet long, whose bite, small as he was, would have been the reverse of pleasant. Presently the genius of the place made his appearance, in the shape of a wizard-looking old Fakir, who, on my presenting him with a couple of rupees, produced his wand,—in other words, a long pole,—and then proceeded to "call up his spirits." On his shouting, "Ao! Ao!"—"Come! Come!"—two or three times, the water suddenly became alive with monsters. At least threescore huge alligators, some of them fifteen feet in length, made their appearance, and came thronging to the shore. The whole scene reminded me of fairy tales. The solitary wood, the pool with its strange inmates, the Fakir's lonely hut on the hill side, the Fakir himself, tall, swart and gaunt, the robber-looking Biluchi by my side, made up a fantastic picture. Strange, too, the control our showman displayed over his "lions." On his motioning with the pole they stopped, (indeed, they had already arrived at a disagreeable propinquity,) and on his calling out "Baitho"—"Sit down"—they lay flat on their stomachs, grinning horrible obedience, with their open and expectant jaws. Some large pieces of flesh were thrown to them, to get which they struggled, writhed, and fought, and tore the flesh into shreds and gobbets. I was amused with the respect the smaller ones shewed to their overgrown seniors. One fellow about ten feet long, was walking up to the feeding ground from the water, when he caught a glimpse of another much larger just behind him. It was odd to see the frightened look with which he sidled out of the way, evi-

dently expecting to lose half a yard of his tail before he could effect his retreat. At a short distance (perhaps half a mile) from the first pool, I was shewn another, in which the water was as warm as one could bear it for complete immersion; yet even here I saw some small alligators. The Fakirs told me these brutes were very numerous in the river about fifteen or twenty miles to the west. The monarch of the place, an enormous alligator, to which the Fakir had given the name of "Mor Sahib,"—"My Lord Mor,"—never obeyed the call to come out. As I walked round the pool I was shewn where he lay, with his head above water, immoveable as a log, and for which I should have mistaken him but for his small savage eyes, which glittered so that they seemed to emit sparks. He was, the Fakir said, very fierce and dangerous, and at least twenty feet in length.—*Dry Leaves from Young Egypt.*

THE SIKSAK.

"Sir James Brooke informs me that the alligators of Borneo will kill men and swallow them whole; and he says that his people, on ripping one open, found in his stomach a poor Dyak very little the worse for keeping,

who, with his vest and canvas trousers on, had lain in that strange cemetery for upwards of a fortnight. The crocodiles of Egypt are more delicate in their tastes, for though they will devour children, or even women, they seem to entertain an objection to eating men, whom they probably find difficult of digestion. Just before our arrival, an Arab girl, who had descended to the Nile for water, was just stooping to fill her pitcher, when a crocodile struck her with his tail, and, tumbling her into the river, walked off with her into his den, where he devoured her at his leisure. Out of revenge for such practices, we endeavoured to get some crocodile steaks for breakfast; but, after firing at them incessantly, found it to be of no avail, and, ultimately, we departed from the land of the Pharaohs without having once tasted that delicacy. But, *en revanche*, as our neighbours say, we shot and ate a siksak,—the trochilos of Herodotus, a sort of gentleman-in-waiting on the crocodile, about which history and tradition tell strange stories. What they say is this, that the crocodile being too much addicted to live in water with his jaws open, allows a number of leeches to creep down his throat, where, vigorously sucking his blood, they prove extremely troublesome. Against these enemies, however, he finds a faithful ally in the siksak, which, as soon as he perceives, he opens his delicate mouth, and the bird, rendered bold by instinct, leaps, like another Curtius, into the gulf, not to be swallowed up however, but to swallow. He kills and devours the leeches, and then, hopping out,

receives the thanks of the crocodile. Sometimes this lumbering animal, getting sleepy during the process, mechanically closes his jaws so as to deprive his little friend of air; upon which, extending his wings, furnished with sharp spikes on the tops of the shoulders, he wounds the crocodile's throat, and reminds him that it is his business to be civil. For the truth of the story I will not answer; but certain it is, that all these birds have the sharp spike on the wings, and that I seldom, perhaps never, saw a crocodile without a siksak standing close beside him on the sand, evidently within his reach, but without his exhibiting the slightest desire to molest or injure it. The bird is about the size of a dove, beautiful of plumage, and very good eating."—*St. John's "Isis."*

THE RATTLESNAKE.

This terrible reptile is a native of America. Its name is derived from the loose bony structure at the extremity of its tail, called the rattle, and which, by the sound of its movements, gives timely intimation of its vicinity. Fortunately, its disposition is exceedingly sluggish, and it invariably sounds its rattle when irritated or disturbed. Its bite is inevitably mortal, and death always ensues within a few hours after. The length of this snake has seldom been known to

exceed seven feet. Bartram says that he has seen some rattlesnakes as thick as a man's thigh, and more than six feet long. The tail is short, cylindrical, and somewhat thick. The number of the little bells or rattles, which terminate it, increases with age,—an additional one being formed at every casting of the skin. Rattlesnakes are viviparous, and can live a long time. Some have been mentioned as having forty or fifty pieces in their rattles. They have great tenacity of life.

THE BLACK SNAKE.

It is said that the speed of the black snake is so great that it sometimes equals a horse. These snakes are very amusing in the various evolutions which they perform. They sometimes climb trees in quest of tree frogs; or glide along the ground in search of other prey. Sometimes they assume a half-erect posture, on which occasions their head appears to great advantage; and their eyes, assuming a fiery brightness, enable them to fascinate birds and the smaller quadrupeds, in the same manner as the rattlesnake. This snake is so bold as even to attack a man; but an active defence with a stick will generally drive it off.

FISHES,

THEIR HABITS, VARIETIES, ETC.

Fishes are placed by Cuvier in the fourth class of organized beings, after beasts, birds, and reptiles. This class is divided into two sub-classes,—viz., cartilaginous fishes, and osseous fishes. In the former, the bones are gristly; and in the latter, firm, though less so than those of land animals, the matter of which they are composed being differently proportioned.

The cartilaginous fishes are divided into three orders:—1. Cyclostomi, having the jaws fixed, and the gills adhering, with numerous openings, as the lamprey. 2. Selachii, having teeth instead of jaws, and the gills toothed like a comb, as the ray. 3. Sturiones, having the gills free, as the sturgeon.

The osseous fishes are divided into six orders:—1. The Plectognathi have fibrous bones and fixed jaws, as the sun-fish. 2. The Lopobranchii have gills in the form of small round tufts, as the hypocampus. 3. The Malacopterygii Abdominales have the rays of the fins generally soft, and the ventral fins placed far behind, as the salmon. 4. The Malacopterygii Subbrachiati have gills resembling the tooth of a comb, and the ventral fins are placed either before the pectoral fins, between them, or a little behind them, as the whiting. 5. The Malacopterygii Apodes are footless, or without ventral fins, as the eel. 6. In the Acanthop-

terygii the first rays of the fins are supported by a spinous process, and pointed like a thorn, as the sword-fish.

The fins exercise considerable influence on the habits of fishes, and are the substitutes for limbs. The pectoral or breast-fin assists in supporting the upper part of the body, and gives a direction to its motion; the dorsal or back-fin steadies it; the ventral or belly-fin acts as an oar, and impels it along; the vent or hind-fin, with the pectoral fin, keeps the fish in a horizontal position; and the tail or caudal fin is the great organ of progressive motion, acting like a scull. It has been found, that if the pectoral and vent-fins are cut off, fishes lose the power of controlling the direction of their movements.

The nerves of fishes are weaker than those of the higher animals; some of them, however, are such powerful exciters of electricity that they can give violent shocks; but the power ceases as soon as the nerves are cut. The torpedo, the gymnotus, the electric eel, the Indian-needle, and the electric porcupine fish, are five fishes which appear to be living voltaic piles; for they have two muscular piles, separated from each other by a membrane resembling a net, and which, at least in the torpedo, lie under the curved cartilages of the large side-fins, and are regulated by particular nerves. As to the organs of sense in fishes, those of smelling and seeing appear to be the most perfect. Fishes smell the bait farther than they can see it, and the shark perceives at an incredible distance

the odour of a negro. Their organs of smell have no connexion with those of respiration; and the water apparently conveys the effluvia affecting the sense of smell much less perfectly than the air; but they have very large olfactory nerves, the ends of which were for a long while taken for the true brain. As to their organs of sight, they have very large eyes, and generally no eyelids; but the epidermis goes directly over the eye, and, in the blind-fish, appears to have only a slight transparency. The organs of hearing are less perfect, although this sense cannot be entirely denied to fishes. Only cartilaginous fishes have an external auditory passage, as the shark and the ray; the fishes with bones are without this external ear. All of them have three winding tubes in their head, which terminate in a bag filled with nervous marrow, and containing three hard bones. This constitutes the whole organ of hearing. That of taste seems to be still more imperfect. Their tongue has not even the *papillæ*, and the nerves are branches of those which go to the gills. In cartilaginous fishes, the gills are within the body like bags, and a determinate number of external openings lead to them; the lampreys, and that kind called the nine-eyes, have seven, rays and sharks, five of these openings. Several fishes have also a peculiar covering for the gills, and frequently a membrane over them, which can be contracted or extended. It encloses a number of winding cartilages, which are called its rays. The gills, as is very evident, can only receive the air which is mixed with the water. What

is called the air-bladder is, in most fishes, joined by an air-pipe, to the stomach or throat. This is thought to contain nitrogen; but it is certain that it assists their rising in the water. Several fishes, as the loach and gudgeon, breathe also through the excretory duct, as is fully proved. The ling are even discovered when at the bottom of the sea, by the rising of air bubbles. Fishes commonly have no voice; but the father-lasher, the loach, the trout, and some others, give, when pressed, a murmuring sound, in doing which they seem to make great efforts, and tremble all over their body. It is very probable that this sound is produced by the air, violently pressed out of the bladder. The circulation of the blood in fishes is, as might be expected, different from that of the higher class of animals. The heart consists only of one auricle and one ventricle; it receives the blood from the body, and sends it, by a single artery, directly to the gills; it is here provided with oxygen by contact with water and the air contained in it, and is again received by a number of small vessels that flow together into the aorta, which distributes the blood over the whole body. The motion of the heart is, in fishes, much more independent of the brain and spinal marrow than in the higher orders, and, for this reason, can continue several hours after the brain and spinal marrow have been destroyed. Although most fishes lay eggs, which are matured and hatched out of their body, there are cartilaginous fishes which are viviparous. The productive power of fishes is greater than that of any higher animal. In the

spawn of the tench, there have been counted 38,000 eggs at once; in that of the mackerel, 546,000; and in that of the cod, 1,357,000. The twelfth sign of the Zodiac is called *Pisces*, or, "The Fishes."

ATTACHMENT OF FISHES.

I once had occasion to observe the strength of friendship which can exist even between fish. I was accustomed to keep some gold fish in a large glass globe. I do not think that I should do so now, for whatever care I might take of them, still it was a state of imprisonment to which I was dooming them. It so happened that, from some cause, the nature of which I do not recollect, my stock was diminished to two. I gave away one of them. The other, from that moment, refused to eat; he lay motionless at the bottom of the water, and, as I thought, was evidently pining away. It struck me that he was mourning the loss of his companion. I shall never forget the evident joy and strange antics to which he abandoned himself when his companion was restored to him.—*Youatt on Humanity to Brutes.*

THE FLYING FISH.

Those writers who describe the life of the flying fish as a constant succession of alarms, and rendered

miserable by fear, have never, says Bishop Heber, seen them in their mirth, or considered those natural feelings of health and hilarity which seem to lead all creatures to exert, in mere lightness of heart, whatever bodily powers the Creator has given them. It would be just as reasonable to say that a lamb leaps in a meadow for fear of being bitten by serpents, or that a horse gallops round his pasture only because a wolf is at his heels, as to infer from the flight of these animals, that they are always pursued by the bonito.

An American writer gives the following account of the flying fish :—" While sailing along with a beautiful 'trade wind,' after all our fresh provisions had been finished, and we were faring upon salt junk, pork, and sea biscuit, the latter apparently made of sawdust, it was a subject of both astonishment and delight that, one morning I found presented at breakfast a dish of beautiful fresh fish, just out of the water; and what was more wonderful still, they had actually come on board of their own free will and accord. This was the flying fish, that I had so often heard spoken of, but, to tell the truth, had always supposed to be a sailor's story, to gull a landsman with, and never believed that there actually was such a fish. However, the proof of the pudding, &c. I not only tasted them, but made a hearty meal of them; and felt more inclined to return thanks than for anything I had eaten for many weeks. During night, the breeze had been fresh; and as these fish rise out of the sea in immense shoals, many of them were carried against the side chains and

rigging of our vessel, and there remained, unable to extricate themselves, while others fell on the deck, an easy prey to those on board. I never studied Isaac Walton, nor can I say that I ever had a taste for the gentle craft; yet, on this occasion, I do confess the sport was excellent, and the excitement great, when these fish appeared on the table, nicely fried, and well browned. This fish is not unlike the whiting; it is from seven to nine inches long, and differs in its appearance from other fish, from having two very long fins, reaching from its shoulders nearly the whole length of its body, which, when spread out, catch upon the wind, and bear the fish sometimes to a very great distance. It has no control, however, in shaping its course when flying, and skims along just where the breeze carries it. It is when pursued by the dolphin that these fishes leave their native element, and seek for safety in the upper region; but their enemy is not to be foiled in this manner; and while they are making their way above, he dashes along 'like greased lightning' below, keeping a sharp eye on his flying prey, and the moment they drop into the water are devoured. I have observed little things, not above two inches long, attempting to fly, but they made little more of it than a leap."

THE SHARK.

This villanous fish is to be met with everywhere, but most frequently within the tropics. During our whole voyage out they never seemed to leave us, and in calm weather, might be seen constantly in the wake of the vessel, usually preceded by the pilot-fish, a beautiful little creature, striped like a zebra. Whenever these "lion-providers" appear playing about the rudder of the ship, the shark is sure to be within hail. On one bright sunshine day, as we lay like a log on the water, quite becalmed, whistling for a breeze that would not come at our wooing, and wearying our lives out for something to break the monotony of our situation, a shark hove in sight, approaching with its back fin above water, quietly and cautiously making its survey. It came in good time, and brought with it a gentle breeze. In a twinkling the word was passed, and all was animation and life, where lethargy and drowsiness, a moment before, had prevailed. The ordinary tackle was produced, and a large piece of pork was fastened to a hook of enormous size, as bait. The hook was attached to an iron chain, about two yards long, and that again to a cable, which was run through a block aloft, and brought down with a few turns round the capstan on deck. The preparations having been completed, away went the hook with its fillet of pork overboard, right astern. By this time

we had just enough of wind to move us along, so as to drag the bait gently; and in the pure sea water we saw every movement of the fish with perfect distinctness. When the bait was thrown out, the shark made a rapid dart forward, and came close up to it, eyeing it with the eye of an epicure. After examining it for a little time, he appeared suspicious that all was not right, and gradually dropt astern, till nearly lost sight of; indeed, I thought he had felt insulted, and had made off altogether. But no; here he comes again! All at once, he sprung forward, and coming up to the bait, dropped his tail downward, turning over, as it were, upon his back, and with one glorious gulp, bolted the whole machinery, pork and all. Off he went with terrific fury, but was soon brought up, with a round turn; and finding himself hooked, floundered about, lashing the water to a perfect tempest around him. The men at the capstan sung out cheerily, and bowsed him alongside, when they soon had their mortal foe on deck, but not in their grasp. Jack is too knowing to come into such close quarters with him as that. There he commenced a polka such as I had never seen danced before nor since, and I took good care to give him plenty of tail-room; for such was the force with which he struck out and lashed the deck, that I thought he would have started the planks. After floundering on for some time, the carpenter came forward with a hatchet, and struck off about a foot of his extreme end, which put an end to his tail, and his tale together

This fish measured twelve feet in length, and had a mouthful of teeth such as any flax-dresser would have envied, long and sharp, and no less than five distinct rows of them. What a heckling poor Jack would have got had he been substituted for the pork! It is a common practice with sailors to tie their coloured flannel shirts to a rope, and tow them through the water, as a patent mode of washing them; and it happened one day that a shark made a bolt at one, and carried it off, while the owner was standing looking on. The poor fellow came aft laughing like to split his sides at the supposed disappointment of the shark when it found out that he, the proprietor, was absent. During the same voyage we caught another under similar circumstances, which measured only nine feet. Sailors are in the habit of eating the tail part of this fish; and in order to know what sort of relish it had, I took a mouthful, but it was so rancid that I was glad to part company with it without notice given or required.

It is a common practice in the tropics, when becalmed, to scrape the sides of the vessel, which accumulates a quantity of vegetable matter about water-mark, and retards its sailing. One of our men was slung overboard for this purpose, and was earnestly engaged scraping away, when a large shark was observed right under him, preparing for a grab at his feet. He was, of course, instantly hauled on board, or he would very soon have been not worth the trouble. Ever after there was a regular watch kept to avoid accidents.

Upon the body of the sharks that we caught there were some ugly creatures sticking fast to them, called "suckers." They were nearly all head together, with a little trifling tail attached, not unlike in shape to a watch, with a bit of string tied to it.

ENCOUNTER WITH A SHARK.

On the 29th of April 1853, whilst five young soldiers, stationed at Corfu, were sailing along at a rapid rate, the boat, in which they were, received a sudden shock, as if it had run upon a rock, which nearly capsized her. One of the men, having looked over the side, perceived a large shark swimming close to the boat. A number of porpoises were also about; and one of these being harpooned by a soldier, the line became entangled round the arm of a companion, who was dragged into the water. The shark immediately made towards him, when a brave fellow, named Flowers, seized a knife which stuck in the side of the boat, plunged head first into the water, and, diving underneath the shark, turned himself on his back, and thrust the knife into the belly of the monster in several places; but it was of little use, the shark having seized upon his comrade, and taken his leg off near the knee. Flowers succeeded, however, in getting him into the boat, and bound up the wound with his shirt. When they reached the hospital, the unfortunate man was nearly dead from exhaustion, but after a short time recovered. Whilst on their way they

captured the wounded shark, and towed it on shore. It weighed 234 lbs., and, when opened, the leg was found in its throat, the bone mangled to bits.

THE TROUT.

THE varieties of the common trout are almost infinite; from the great lake trout, which weighs above sixty or seventy pounds, to the trouts of the little mountain brook, or small mountain lake, or tarn, which is scarcely larger than the finger. The smallest trout spawn nearly at the same time with the larger ones, and their ova are of the same size; but in the large trout there are tens of thousands, and in the small one, rarely as many as forty,—often from ten to forty. So that in the physical constitution of these animals, their production is diminished, as their food is small in quantity; and it is remarkable that the ova of the large and beautiful species which exist in certain lakes, and which seem always to associate together, appear to produce offspring, which, in colour, form, and power of growth and reproduction, resemble the parent fishes; and they generally choose the same river for their spawning. Thus, in the lake of Guarda, the Benacus of the ancients, the magnificent trout, or *Salmo fario*,

which, in colour and appearance, is like a fresh run salmon, spawns in the river at Riva, beginning to run up for that purpose in June, and continuing to do so all the summer; and this river is fed by streams from snow and glaciers in the Tyrol, and is generally foul: whilst the small spotted common trouts, which are likewise found in this lake, go into the small brooks, which have their sources not far off, and in which, it is probable, they were originally bred. I have seen taken, in the same net, small fish of both these varieties, which were as marked as possible in their characters; one silvery, like a young salmon, blue on the back, and with small black spots only; the other, with yellow belly and red spots, and an olive-coloured back. I have made similar observations in other lakes, particularly in that of the Traun, near Gmüden, and likewise at Lough Neagh, in Ireland. Indeed, considering the sea trout as the type of the species *trout*, I think all the other true trouts may not improperly be considered as varieties, where the differences of food and of habits have occasioned, in a long course of ages, differences of shape and colours, transmitted to offspring in the same manner as in the variety of dogs, which may all be referred to one primitive type.—*Davy*.

THE WHALE.

The common Greenland whale (*Balæna mysticetus*) is not unusually fifty-eight or sixty feet in length, by thirty or forty in circumference. This implies a weight of about seventy tons, being equal to that of two hundred fat oxen. Many naturalists have spoken of such as had attained their full growth measuring sometimes one hundred and fifty, or two hundred feet. Referring to the *Balæna mysticetus*, Captain Scoresby informs us, that of three hundred and twenty-two individuals, in the capture of which he had been personally concerned, no one, he believes, exceeded sixty feet in length. A few instances may have occurred in which eight or ten feet more had been attained; but there is no evidence that the animal was ever seen of a greater length than seventy feet. Sixty feet is the length commonly assigned to it even by the older writers, when they speak from their own observation.

There is, however, another variety, the *Balæna physalis* of Linnæus, or that known by the name of *Razorback* among the whalers, which reaches a larger size, being sometimes found one hundred or one hundred and five feet long. "It is probably," as Captain Scoresby remarks, "the most powerful and bulky of created beings." The Razorback, however, which derives its name from a small horny protuberance or fin running along the ridge of the back, is no great favourite with the whale-fishers, being both more

active and difficult to capture than the common whale, or what they call the *right fish*, and very far from being so valuable a prize when obtained.

Naturalists have been only able to determine two species of whale,—that of the north, and that of the south. These species were for a long time confounded; and their differences were first pointed out by M. Delalande. The following description of the northern or Greenland whale will apply to the southern, in all essential points:—

The whale is popularly considered as a fish; but, except that it lives in the water, it has little or no similarity to the class of animals properly so designated. It is viviparous,—that is to say, it brings forth its young not enclosed in an egg, but alive and full formed; it has usually but one at a time, which it suckles with milk drawn from its teats. It is therefore considered as belonging to the class of the mammals, the same under which man is comprehended. It is also, like man, a warm-blooded animal; the blood, however, being of considerably higher temperature than in the human species. Finally, it is provided, like the human being, with lungs, and can only breathe by putting its head out of the water.

The skin of the whale is dark coloured, smooth, and without scales. Its form in the middle part is cylindrical, from which it gradually tapers towards the tail. This part of the animal is usually only five or six feet in length; but its width, or extent from right to left,—its position being horizontal, or flat upon the water,—

is sometimes twenty-five or twenty-six feet. The power of this bony fin, with which it lashes the sea with tremendous fury, is prodigious. It is the instrument by which the animal principally makes its way through the water, and also its most effective weapon of defence. Towards the head it likewise possesses two fins, or swimming paws, as they have been termed, attached to the under part of the belly; but the chief use of these seems to be to balance it, or keep it steady, as it moves along. About a third part of its whole length is occupied by its enormous head, which is cleft in two by a mouth, the opening of which extends to the neck. The head of the whale is the most peculiar and remarkable part of its structure. The species we are now describing, although it has both upper and lower jaws of porous bone, has no teeth; but in their room two fringes, as they may be called, consisting each of a series of blades, of an elastic substance, covered on their interior edges with hair, attached to the upper gum. This is the substance known by the name of whalebone. The blades are broadest at their upper extremity, where they are inserted in the gum, and are of greatest length in the middle of the series or row on each side of the mouth. The greatest length varies from ten to fifteen feet; and the breadth at the gum is usually, in a full-grown fish, from ten to twelve inches. There are upwards of three hundred blades in each series, or side of bone, as the whale-fishers term it. The use of this part of its structure to the animal is to serve as a net or sieve in which to collect its

food. As it proceeds with distended jaws through the ocean, the water rushes through this seive; but even the minutest living creatures are detained by it, and are made, in so many successive accumulations, to form mouthful after mouthful to the mighty destroyer.

The eyes of the whale are placed almost immediately above the corners of the mouth. They are singularly disproportionate to the size of the animal, being scarcely larger than those of an ox. No trace of an ear is to be discerned till after the removal of the skin; and the hearing of the whale is, accordingly, very imperfect. On the most elevated part of the head are the nostrils or blow-holes, being two longitudinal apertures of six or eight inches in length. Through these, when the creature breathes, a jet of moist vapour is snorted forth to the height of eighteen or twenty feet, and with a noise which may sometimes be heard at the distance of several miles.

The open mouth of a whale is a capacious cavern, capable of containing a ship's jolly-boat full of men. Captain Scoresby describes its dimensions as being commonly six or eight feet wide, ten or twelve feet high in front, and fifteen or sixteen feet long. The throat, however, is very narrow.

With all its enormous physical strength, the whale is singularly gentle and harmless; so remarkably so, indeed, that it has been characterized by those who have had the best opportunities of observing it, as a stupid animal. It exhibits, however, the usual instinctive sense of danger when it perceives the approach of

its natural enemy, man; and both before and after it has been struck with the harpoon, it most commonly adopts the very best expedients open to it for a chance of escape. If a field of ice be near, for instance, it makes for the water under it, whither it cannot be followed by the boat; and even when it tries to release itself merely by a precipitate plunge downwards into the sea, it would be difficult to say how it could act more wisely, with a view to snap the line to which it has got attached. If these efforts were not met, on the part of the crew in the boat, with the most energetic application of those resources of art, dexterity, and decision, which are peculiarly at the command of man, it would probably be in every case successful. But if the whale be not allowed to be a very intellectual animal, its affections, at least towards its own kind, appear to be deep-seated and strong. The fishers, indeed, are in the habit of taking advantage of the love of the old whale for its offspring to entice it into their snares, and the artifice often succeeds when, probably, no other would. The cub, though of little value in itself, is struck to induce the mother to come to its assistance. "In this case," says Captain Scoresby, "she joins it on the surface of the water whenever it has occasion to rise for respiration, encourages it to swim off, assists its flight by taking it under her fin, and seldom deserts it while life remains. She is then dangerous to approach; but affords frequent opportunities for attack. She loses all regard for her own safety in anxiety for the preservation of her young, dashes through the

midst of her enemies, despises the dangers which threaten her, and even voluntarily remains with her offspring, after various attacks on herself from the harpoons of the fishers."

SPERMACETI WHALE.

THE cachelot, or, as it is usually called, the spermaceti whale, is more slender, and possesses much more activity than the common whale. It is commonly from fifty to sixty feet long, although individuals eighty feet in length may be met with. The body has the form of an immense cylinder, of which the head, separated by a slight depression from the back, constitutes a large portion, and is terminated anteriorly by a square mass. The spout-hole is at the anterior extremity of the head, in the middle of a round prominence formed of thick fibres, which serve to close it. The body gradually diminishes towards the tail, which expands into an immense fin, composed of two lobes, deeply notched in the middle, and fourteen feet in its transverse diameter. The pectoral fins are small, of an oblong form, and placed near the commissure (joint, or place where one part is joined to another) of the mouth. The back, which is round and smooth, is surmounted by a false fin, or rather a bump, formed

entirely of cellular tissue, in a thick fold of the skin. Sometimes there are two or three of these prominences. The eyes are very small, black, and, what is singular, the right eye is much larger than the left. The general colour is bluish black, deeper on the back, and lighter on the sides and belly. Sometimes the under part of the body is whitish. The epidermus is so thick and insensible, that it is commonly covered with large shells like a rock. The spermaceti whale swims very slowly, and shews at the surface only the great arch of its back, and the fleshy eminence which surrounds the spout-hole. It often remains at rest for some seconds, and then sinks slowly into the sea. At certain seasons, however, it becomes more active, raising its shapeless head far out of the water, and plunging perpendicularly, so as to display the huge lobes of its tail.

This animal is supposed to be found in the seas of all parts of the world. Davis' Straits, the temperate seas of Europe, the coasts of Patagonia, those of Madagascar, the west coast of New Holland, the Moluccas, Caroline and Marian Islands, the Galapagos, New Zealand, and the Japanese archipelagoes, are the places most frequented by them. It appears to live principally on cuttle-fish and other molluscous animals, fishes, and, as is said, sharks.

Two valuable substances are extracted from this whale,—spermaceti and ambergris. It also affords oil, but in less quantity than the Greenland whale. The whole oil of the fish is easily converted into spermaceti, and the ambergris is formed in a bag three

or four feet long, in round lumps, from one to twenty pounds weight; but it is only in the oldest and largest cachelots that these drugs can be extracted.

The spermaceti whale remains a much longer time under water when struck by the harpoon than the common one. The Greenlanders make coats of its intestines, and ropes of its tendons. The teeth are employed for numerous domestic uses, and are held in the highest estimation by the natives of many of the South Sea islands.

THE KILLER.

One of the most remarkable varieties of the finny tribe found in the antarctic waters is the "killer," a fish about twenty feet long, of a brownish colour on the back, and white on the belly, having a long dorsal fin, and possessing immense strength. It often attacks one of the largest whales, catching him by the throat, and worrying him to death; but, as the whalers say, it contents itself with devouring the tongue of its victim,—thus indicating, savage and ferocious as it may be, the possession of a most refined epicurean taste.

The killer often attacks one of the largest whales, catching him by the throat.—p. 230.

THE SWORD-FISH.

At the sight of this little but active enemy, the whale seems to be frightened and agitated in a most extraordinary degree, and attempts to fly from his pursuer. The whale has no instrument of defence but its tail, and with that it endeavours to strike its adversary; but the sword-fish is as active as the whale is strong, and easily avoids the stroke; then bounding into the air, it falls upon its enemy, and endeavours not to pierce it with its pointed beak, but to cut it with its toothed edges; and succeeding in this, the sea is all round dyed with blood, proceeding from the wounds of the whale.

The sword-fish tribe, the scientific name of which is xiphias, belong to a genus of fishes remarkable for having the upper jaw prolonged, somewhat in the form of a sword, and constituting at least one-third of the total length. It is placed by Cuvier in the same family with the mackerel. The body is elongated, almost destitute of scales, and is carinate on each side at the base of the tail. There are no proper teeth.

The common sword-fish (*xiphias gladius*) is sometimes more than twenty feet long, the beak included. It swims with greater swiftness than almost any inhabitant of the deep, and is possessed of vast muscular strength. It attacks and generally puts to flight the smaller cetaceous animals, notwithstanding

its food is usually vegetable. Its flesh is good, and, in some countries, the fishery is an object of importance. It is taken with the harpoon, and usually tears the net if enclosed. The female approaches the shores in the latter part of spring, or beginning of summer. The sword-fish is found in almost all seas.

THE HERRING.

THE herring, with the pilchard, sprat, shad, anchovy, and whitebait, belongs to the clupea genus. It weighs about five ounces and a-half. The upper part of the body is blue and green, and the lower parts of a silvery white. The gill-lids are very loose, and open wide, in consequence of which the herring dies as soon as it is taken out of the water; hence the saying, "as dead as a herring."

The most interesting point connected with its natural history is its annual migration, of which Pennant, in his *British Zoology*, gives the following account:—

"Herrings are found from the highest northern latitudes yet known, as low as the northern coasts of France. They are met with in vast shoals on the coast of America, as low as Carolina. In Chesapeak Bay is an annual inundation of those fish, which

cover the shore in such quantities as to become a nuisance. We find them again in the seas of Kamtschatka; and probably they reach Japan. The great winter rendezvous of the herring is within the Arctic circle. There they continue for many months, in order to recruit themselves after the fatigue of spawning, the seas within that space swarming with insect food in a far greater degree than those of our warmer latitudes. This mighty army begins to put itself in motion in spring. They begin to appear off the Shetland Isles in April and May. These are only the forerunners of the grand shoal, which comes in June; and their appearance is marked by certain signs, such as the number of birds, like gannets and others, which follow to prey on them; but when the main body approaches, its breadth and depth is such as to alter the appearance of the very ocean. It is divided into distinct columns of five or six miles in length, and three or four in breadth; and they drive the water before them with a kind of rippling. Sometimes they sink for the space of ten or fifteen minutes, and then rise again to the surface; and, in fine weather, reflect a variety of splendid colours, like a field of the most precious gems.

The first check this army meets in its march southward, is from the Shetland Isles, which divide it into two parts. One wing takes to the east, the other to the western shores of Great Britain, and fill every bay and creek with their numbers. The former proceed towards Yarmouth, the great and ancient mart

of herrings; they then pass through the British Channel, and after that in a manner disappear. Those which take towards the west, after offering themselves to the Hebrides, where the great stationary fishery is, proceed to the north of Ireland, where they meet with a second interruption, and are obliged to make a second division. The one takes to the western side, and is scarcely perceived, being soon lost in the immensity of the Atlantic; but the other, that passes into the Irish sea, rejoices and feeds the inhabitants of most of the coasts that border on it. These brigades, as we may call them, which are thus separated from the greater columns, are often capricious in their motions, and do not shew an invariable attachment to their haunts.

This instinct of migration was given to the herrings that they might deposit their spawn in warmer seas, that would mature and vivify it more assuredly than those of the frozen zone. It is not from defect of food that they set themselves in motion; for they come to us full of fat, and on their return are almost universally observed to be lean and miserable. What their food is near the pole, we are not yet informed; but in our seas they feed much on the *oniscus marinus*, a crustaceous insect, and sometimes on their own fry.

They are full of roe in the end of June, and continue in perfection till the beginning of winter, when they deposit their spawn. The young herrings begin to approach the shores in July and August, and are

then from half-an-inch to two inches long. Though we have no particular authority for it, yet, as very few young herrings are found in our seas during winter, it seems most certain that they must return to their parental haunts beneath the ice. Some of the old herrings continue on our coasts the whole year."

THE FLAT FISH.

THE turbot, the brill, the sole, the flounder, the halibut, and several others, belong to an order of flat fish, called *pleuronectidæ*, from their swimming sideways. The halibut is the largest of this class, weighing sometimes two hundred pounds and more; but it is of inferior value as food. The sole is the smallest; its average weight being about two or three pounds. The turbot is the second in size; its ordinary weight being from five pounds to ten pounds; but some are occasionally taken weighing thirty pounds.

The turbot is common on nearly all the coasts of Britain; but in Ireland it is chiefly confined to the south-western coasts. It has its favourite localities; and the sandbanks between Dover and the French coast, and those between the English and Dutch

coasts, as well as the coast from the North Foreland to the Land's End, abound with this much-esteemed fish, which never makes its appearance on the shores of America.

Not possessing the power of rapid motion, it is so formed as to be quick in perceiving danger. It constantly remains near the bottom; and while one half of it is nearly white, the other half is similar to the muddy colour of that part of the water in which it resides. Instances now and then occur of turbot being dark coloured on both sides. The position of the eyes is also singularly adapted for securing its safety. They are not placed on each side of the head, but only in that side which is uppermost when it is in motion. This fish is most active in the night-time. In the day-time it lies at the bottom, with its dark side uppermost; and when apprehensive of danger, it is said to remain perfectly still. It is taken in deep water by lines, some of which are three miles in length, and are furnished with more than two thousand hooks. This is the mode generally practised in the north-east coast; but trawling is used to a greater extent on the north-western coasts. Great care is necessary in having a suitable bait; for though voracious, it is delicate in its choice of food. A piece of herring or haddock is commonly used for a bait; but if it has been twelve hours out of the water, though not tainted, turbot will not take it.

The flesh of the turbot is exquisitely flavoured and nutritious, though rather difficult of digestion. That

on the dark-coloured side is considered the best. Being justly esteemed one of the greatest luxuries of the table, turbot always bears a high price.

THE SALMON.

This well-known fish (*salmo salmar*) belongs to the trout genus, and inhabits the northern seas. It is a migratory fish, annually leaving the sea—its proper residence—and proceeding for many miles up rivers, for the purpose of depositing its spawn. This done, it returns to the sea in the spring. A cold climate and clear water seem to be most congenial to its constitution.

The salmon grows to the length of four, five, or six feet, and usually weighs twelve or fifteen pounds. The body is elongated and compressed; the colour silvery-grey, with spots; the head of moderate size, and the upper jaw rather the longest. Almost all parts of the mouth, and even the tongue, are furnished with pointed teeth, as in the other trouts; and, like them, it has an adipose fin upon the lower part of the back. All the trouts are voracious and carnivorous, and, in general, seek the purest water. As soon as the ice melts, the salmon enter the mouths of rivers and, as has been ascertained, almost always of those

which gave them birth. They swim usually in immense bodies, in the middle of the stream, and near the surface; their progress is slow, and they make a great noise in sporting, if the weather be fine. They are easily frightened, either by a sudden noise, or floating timber; and, on such occasions, sometimes turn aside from their course and return to the sea. When further advanced, they make the most determined efforts to surmount rapids, and cascades, and will leap a fall of twelve or fifteen feet in perpendicular height. If alarmed, they dart away with such rapidity, that the eye can scarcely follow them. The velocity of this motion has been proved to equal twenty-five to thirty miles per hour. They penetrate far into the interior of the continents, and deposit their spawn in the lakes, &c., about the head-waters of the longest rivers. When the young are about a foot in length, they descend the rivers, and take refuge in the ocean. Late in the following spring, or in the beginning of summer, and after the old ones have ascended, the young again enter the rivers, and are then about eighteen inches in length. They again seek the ocean on the return of frosts. At two years old, the salmon weighs six or eight pounds, and requires five or six years to attain the weight of ten or twelve.

The salmon-fishery is one of the most important branches of business in the north of Europe. Immense quantities of this fish are taken every year, and form a considerable accession to the general mass of nutriment. The flesh is bright orange; but, though

delicious to the taste, and very much sought after, is difficult of digestion.

Madame Ida Pfeiffer, in her "Visit to Iceland," gives the following account of the salmon-fishery about two miles from Reikjavik, which takes place every week, from the middle of June to the middle of August:—"It is conducted in a very simple manner. The fish come up the river in the spawning season; the stream is then dammed up with several walls of stone, loosely piled to the height of some three feet, and the retreat of the fish to the sea is thus cut off. When the day arrives on which the salmon are to be caught, a net is spread behind each of these walls. Three or four such dams are erected at intervals of from eighty to a hundred paces, so that even if the fishes escape one barrier, they are generally caught at the next. The water is now made to run off as much as possible; the poor salmon dart to and fro, becoming every moment more and more aware of the sinking of the water, and crowd to the weirs, cutting themselves by contact with the sharp stones of which they are built. This is the deepest part of the water; and it is soon so thronged with fish, that men, stationed in readiness, can seize them in their hands, and fling them ashore.

"The salmon possess remarkable swiftness and strength. The fisherman is obliged to take them quickly by the head and tail, and to throw them ashore, when they are immediately caught by other men, who fling them still farther from the water. If

this is not done with great quickness and care, many of the fishes escape. It is wonderful how these creatures can struggle themselves free, and leap into the air. The fishermen are obliged to wear woollen mittens, or they would be quite unable to hold the smooth salmon. At every day's fishing from five hundred to a thousand fish are taken, each weighing from five to fifteen pounds. This salmon stream is farmed by a merchant of Reikjavik."

FRESH WATER FISHES.

THE BARBEL, so called from its four barbs, two of which are at the corners of its mouth, and the other two at the end of its snout, is a heavy dull fish, seldom eaten, except when food is scarce. Like most fishes with thick tails, it affords good sport to the angler, by swimming swiftly away when he feels the hook in his lips. In their usual haunts, among weeds, &c., barbels are fond of rooting with their nose like the pig. In summer, they frequent the most powerful and rapid currents, and settle among logs of wood, piles, and weeds, where they remain for a long time apparently immoveable. During winter they return to deep bottoms.

The BLEAK or BLAY, a common river fish, so called

from its green and silver appearance, is fond of many of the baits for trout. It seldom exceeds six inches in length, and its flesh is much eaten; but it is more valued for the beautiful silvery pigment found beneath its scales, which is introduced into glass-beads. It is sometimes called the mad bleak, from the violent contortions it often makes, and its high leaps out of the water, caused by the irritation of worms which get into its brain.

The BREAM, with its angular shape, and broad flattened sides, though occasionally met with in slow running rivers, is reckoned a pond fish, where they will thrive in the greatest perfection, and have been known to weigh from eight to ten pounds.

The BULL'S HEAD, or MILLER'S THUMB, is a small ugly fish, which hides itself in brooks and rivers under a gravelly bottom. It obtains its first name from its large head; and its second one from its resemblance to a miller's thumb, which is broad and flat, from the practice of always testing the meal in process of grinding, by rubbing it with his thumb. Like the crayfish, and the roach, when boiled, its flesh turns red.

The CARP, by its frequency of spawning and quickness of growth, is greatly used in stock ponds, where it thrives better and lives longer than in rivers. From its subtlety, it is often called the water-fox. Carp are said to live two hundred years; but when large their flesh is coarse. They can be kept a long time out of water; when tied to the ceiling of a cellar, enveloped in a net lined with wet moss, now and then watered,

and fed with bread steeped in milk, they will not only exist, but get fat, and have an improved flavour.

The GOLD and SILVER fishes are a species of carp, and were originally brought from China.

The CHUB, or CHEVIN, a heavy fish, the average length of which is from ten to fourteen inches, has a thick head, and, like the perch, is a bold biter.

The DACE, DART, or DARE, of delicate look and elegant form, is a very active and cautious fish, which abounds in the Thames. The GRAINING of the Mersey is thought to be a variety of the same species.

The LOACH, or GROUNDLING, a delicious little fish, about three inches in length, is principally found under the stones of most rivers, and particularly frequents the streams of the mountainous parts of Scotland. It is so sensitive about the tail, that "to tickle the tail of a loach" is a favourite pastime with idle boys.

The PERCH, a bold biting fish, is distinguished by the beauty of its colours, and by a large erection on its back, strongly armed with stiff and sharp bristles or spikes, defended by which it bids defiance to the attacks of the ravenous and enormous pike. Its flesh is white and firm; it will learn to take food from the hands of any that will give it, and will swallow almost anything.

The PIKE, LUCE, or JACK, is the most voracious and greedy of all fish, and has gained the name of the river shark. It will devour all the fish in the same pond with itself; and when it is the only remaining inhabitant of the water, it thrives and becomes fat and

plump, feeding then, no doubt, upon the slime and vegetable matter which it finds in the pond, and which, previously, had been shared with its fellow fish. The finest pike are those which feed in clear rivers; those of fens or meres being of inferior quality. They grow to a vast size in these last mentioned places, where they feed principally on frogs, and such like nutriment. They are reckoned to be the most remarkable for longevity of all fresh water fish; are solitary and melancholy in their habits, generally swimming by themselves, and remaining alone in their haunts until compelled by hunger to roam in quest of food.

The POPE, or RUFFE, is similar in its nature and appearance to the perch, and so extremely voracious, that it will devour a minnow, which is almost as big as itself. In their favourite haunts of gentle deep streams, overhung by trees, they swim in shoals together. It is a yellow fish, with black spots, fringed scales, and green spots; average length from six to seven inches. It often snaps at the bait intended for the gudgeon; and as it is not good to eat, the angler lets it go again, sticking a bit of cork on the strong spikes of its dorsal fin, setting it swimming on the top of the water.

ROACH are considered a simple and foolish fish. The compactness of their flesh gave rise to the proverb, "As sound as a roach." This fish haunts shallow and gentle streams, and the mouths of small streams which run into larger ones.

The RUDD, a scarce fish, found only in the river Charwell in Oxfordshire, and a few of the lakes of

Lincolnshire and Yorkshire, is closely allied to the roach. Its colour is a kind of yellowish brown, and its average length from nine to fifteen inches.

The GRAYLING, or UMBER, the average length of which is from sixteen to eighteen inches, is found in some of the rivers of Europe and lakes of North America; but is unknown in Ireland and Scotland. Its shape is particularly elegant, and its dorsal and ventral fins are so beautifully spotted with red and black, that they alone would render it beautiful. St. Ambrose called the grayling the flower of fishes. When fresh from the water it emits the fragrant odour of the plant thyme.

The GUDGEON is so very simple, that its name is applied to any person who is easily imposed upon. It is an excellent little fish, not too full of bones, and of dainty flavour. It is generally from five to six inches long, frequents gentle streams with a gravelly bottom, and is allured with almost any kind of bait.

The CHARR, a beautiful fish, dark-brown and rose colour, with a blue light all over it, and, in the spawning season, assuming the richest gold and flame coloured tints, is found in Wales, the Rothay and Brathay, two rivers which flow into the lake of Windermere, and in the lake of Geneva.

The VENDACE, an exquisite little fish, is only found in the lakes of Lochmaben in Dumfriesshire. It is of the brightest silver, green, and lilac, and its fins are of a pale primrose colour

The TENCH has acquired in some parts of the

country the name of doctor, from being said to heal its wounded companions by shedding over them the mucous secretion with which it is so abundantly provided. It is a long-lived fish, full of flesh, and at the approach of danger hides itself under mud.

The STICKLEBACK, a little spiny fish, is of a most pugnacious disposition. Sticking up the prickles of its back, as a larger fish swallows it, it chokes the latter, and is either disgorged, or dies with its enemy.

The gay little MINNOWS of our brooks and rivers seldom exceed two inches in length. They swim in shoals in shallow waters, and are in the habit of gathering together with their heads in the centre, and then look like a starry flower. They form excellent baits for larger fishes.

The MULLET is found in great perfection in the river Arun, Sussex; but is never seen in Scotland.

The PARR, or SAMLET, is known by different names in different parts of Great Britain. On the river Wye, it is usually called a skirling; in Yorkshire, a brandling; in Northumberland, a rack-rider; and in some parts of England, a fingering, from the resemblance of its spotted streaks to the human fingers. Parr, or Samlet, is its Scottish name, and in that part of Britain it is best known. Some have affirmed that it is the blended spawn of the trout and the salmon. This opinion is strengthened by the circumstance of its usually frequenting the same haunts with the salmon and sea-trout, and its being forked in the tail like the former.

That delicious little fish the WHITE-BAIT, with which we shall conclude our enumeration of river fish, only lives in brackish water. It is caught from April till September by nets in the river Thames, and "the Humble, which runs into the Southampton water." It probably exists in other rivers of England, and some are captured on the Kent and Essex coasts during the sprat season. The white-bait dinners at Blackwall and Greenwich have rendered the name of this fish familiar to most readers of the newspapers; and from their usually being partaken of by the ministers of state just previous to the prorogation of parliament, a white-bait dinner may be said to have acquired something of an official character.

MIGRATION OF FISHES.

THE migration of fishes is even a more curious matter than that of birds, especially in those that alternately visit salt and fresh water.

The water is their atmosphere; the element from which they elaborate the air necessary for their life and growth; and any change of the air even nearly as great as the change from salt water to fresh, would be fatal to any land animal with which we are acquainted. Change of temperature in the element which they

breathe, is that which land animals can endure best; while fishes are adapted to bear a change in the composition. The former are protected against variations of temperature by the heat of their bodies being in general greater than that of the air; for when the air is warm, they suffer and pant, probably because they have no excess of heat to enable them to decompose the air, and mix the oxygen with the blood, and the superfluous carbon. Fishes do not bear their changes so easily. A salmon, when caught in the open sea, dies if put into fresh water; and if one that has been for some months in fresh water be put into salt, it also dies. It is the same with almost every fish. Hence the breathing apparatus of a fish must undergo a change every time that it passes from the sea to fresh water, or from fresh water to the sea. These changes are not immediate; and, therefore, the fish linger awhile in the estuaries upon every journey, in order that, by the brackish water, and by that alternate play of fresh and salt water which is occasioned by the tides, they may prepare themselves gradually for their new element. Though, generally speaking, the sea pasture tends more to promote the growth, vigour, and fatness of the fish than the river pasture, yet it also demands the stronger organization; and thus those fish that enter the rivers for the purpose of spawning, are all of delicate descriptions; and the young often linger so long about particular parts of the estuaries, that they are not unfrequently mistaken for distinct species.

SIGNS EXHIBITED BY ANIMALS

INDICATING CHANGES OF THE WEATHER.

When bats remain longer than usual abroad from their holes, fly about in great numbers, and to a greater distance than usual, it announces that the following day will be warm and serene; but if they enter the houses, and send forth loud and repeated cries, it indicates bad weather.

If the owl is heard to scream during bad weather, it announces that it will soon become fine.

The croaking of crows in the morning indicates fine weather.

It is an indication of rain and stormy weather, when ducks and geese fly backward and forward, when they plunge frequently in the water, and fly about noisily.

If bees do not remove to a great distance from their hives, it is a sign of rain; if they return to their hives before the usual time, it may be concluded that rain will soon fall.

It is a sign of rain or wind when the sparrows chirp a great deal, and make a noise to each other to assemble.

When fowls and chickens roll in the sand more than usual, it announces rain; and the case is said to be the same when cocks crow in the evening, or at unusual hours.

It is a sure sign of bad weather when the swallows fly in such a manner as to brush the surface of the water, and to touch it frequently with the wing and breast.

When gnats (midges) collect themselves before the setting of the sun, and form a sort of vortex in the shape of a column, it indicates fine weather.

If frogs croak more than usual; if toads issue from their holes in the evening in great numbers; if the earth-worms come out of the earth; if the moles throw up the earth more than usual; if the cows look towards the heavens, and turn up their nostrils, as if catching some smell; if the oxen lick their fore feet; and if dogs lie on their right side,—all these are signs which announce rain. The case is the same when animals crowd together.