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A

# CATECHISM

OF

# ZOOLOGY,

OR

## NATURAL HISTORY OF THE ANIMAL KINGDOM.

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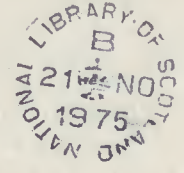


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# PREFACE.

In drawing up, at the request of the Publishers, the following Elementary View of the Animal Kingdom, I have followed the arrangement adopted by Cuvier in his great work on this subject. I have endeavoured, in as far as was consistent with my limits, to give a view of animal life in general, and its various peculiarities, as exemplified in the different orders of existence, from man down to the lowest stage of being; and have selected such examples of the different species as were most remarkable for their habits and structure, as well as most familiar and interesting, from their daily presenting themselves to observation. In the execution of this design, I have consulted the most eminent authors in the various departments, and have also availed myself of the friendly suggestions of several distinguished naturalists.

The natures and habits of animals seem very early to have attracted the attention of man; and, indeed, it is very obvious to suppose so,—for, even in extreme youth, the living creatures that happen to come under our observation are the first objects to call forth our admiration and delight; and, in after life, to investigate their habits, has, with many, been a favourite pursuit. Among the ancients, Aristotle is the first whose zoological descriptions have come down to us, and he was followed by several other Greek writers. Pliny, the Roman naturalist, also treats of the same subject in different parts of his writings; but from his time little advance was

made in the science until a comparatively modern period. In Britain, the distinguished naturalist Ray made considerable progress in the classification and accurate description of animals; in Sweden, the labours of the celebrated Linnæus still farther extended the science; and, in France, the formation of the Garden of Plants, including an extensive Menagerie for the exhibition of animals, introduced a new era in the study of Zoology. It was here, amidst living specimens collected from all parts of the globe, that Buffon produced his great work on this interesting branch of Natural History; and here that Cuvier, prosecuting his minute investigations into the anatomical structure of the various species, has founded his philosophical system of the Animal Kingdom according to the resemblances and peculiarities of structure prevailing in the different classes.

A Glossary of such Scientific Terms as occur in the following pages has been added at the end of the volume; and also a list of Authors who have produced systematic works on the various departments of Zoology. The latter, it is deemed, will be a useful guide to those students who wish to enlarge their acquaintance with this fascinating and instructive subject.

The group of animals in the frontispiece contains, in the centre, the elephant;—to the right, in front, the lion and tiger,—the orang-outang seated on a branch of a tree, around the trunk of which winds the boa constrictor. On the left is the giraffe;—in the distance, the polar bear;—above, the golden eagle;—and in the foreground the ostrich, the kangaroo, and the tortoise.

EDINBURGH, *December*, 1830.

# CATECHISM OF ZOOLOGY.

*Q.* What does the study of Natural History embrace?

*A.* Natural history, properly so called, embraces a very wide field of study, consisting of a description of every object on the surface of the globe and in its internal cavities; in the ocean which encompasses the earth; and in the air or atmosphere by which our world is surrounded.

*Q.* What are the branches into which it is usually divided?

*A.* Into Geology and Mineralogy, which describe the formation of the earth, and the various rocks, and fossils, and minerals, of which the inanimate or unorganized parts of the globe are composed; Botany, or a description of vegetables; and Zoology, or a description of the animal kingdom.

*Q.* Wherein do bodies possessing life differ from dead or inanimate matter?

*A.* Bodies possessing life have a regularly-organized structure, by which they can prepare nourishment for their growth, and produce other beings of their own kind: they have also the power of motion and sensation.

*Q.* Are plants and vegetables living bodies?

*A.* Yes; they have a certain degree of life, and a structure by which they extract nourishment from the earth, the air, and the water; and thus become the chief source whence animals are nourished: they possess what is called irritability in their fibres, but have no sensation like animals.

*Q.* What are the conditions of bodies necessary to preserve life?

*A.* A certain degree of moisture or fluidity seems necessary to life; for a snail that has been dried in its shell will remain torpid for months, and when again moistened will resume its existence. A certain degree of heat, too, seems essential; for many animals remain

in a torpid state during the cold of winter, and revive with the warmth of summer; and fish, that are rendered perfectly insensible and stiff by extreme frost, recover their life on being thawed.

*Q.* Are there many kinds of animated beings?

*A.* Yes, an immense variety; from the worm, whose structure is so simple as to consist of only a bag or stomach with an outlet corresponding to a mouth, up to man, whose body is so complicated and admirably framed.

*Q.* How many different kinds of animals are there?

*A.* Naturalists have described at least 80,000 known and distinct kinds, and it is probable many more remain yet to be discovered.*

*Q.* Why should there have been so many different kinds of animals formed?

*A.* The beneficent Creator has so willed that life and enjoyment should pervade every part of the world which he has called into existence. He has, therefore, formed animals differently, in order to enable them to inhabit the different elements; and thus we find the earth, the air, and the water, swarming with their respective myriads.

*Q.* But what is the use of such an immense variety of form as we find, not only among the various classes of animals, but among the different kinds belonging to the same class or great division?

*A.* If animals are to be different at all, it is necessary that this difference should be such as to keep the various races perfectly distinct, else we should otherwise have a complete confusion and blending of species. Yet even in all the diversities of kinds we find a general resemblance running through the whole, which evidently shows that they all come from the same hand, and indicates a beautiful fitness and propriety in the grand scheme of general creation.

* By the indefatigable industry of naturalists of late years, the number of species has been increased prodigiously. About the middle of last century, 6137 species were enumerated as the amount then known. At present, Kirby and Spence reckon 40,000 known species of insects alone. Stephens says even 100,000.

*Q.* In what particular instances is this similarity remarkable?

*A.* In the general form of the skeleton, in man, in quadrupeds, and in birds, there is a remarkable similarity. The fins of the whale have nearly the same number of bones and a similar form to those of the human hand; the fore-paws of the mole are exceedingly like the hands of man; in the turtle there is a near resemblance to the thumb. There are the same number of bones in the neck of the camelopard, the seal, and in man; and the fore-paws of the seal, the claws of the bat, and the human hand, though formed for different uses and different elements, are in structure nearly similar.

*Q.* What is the general structure of animal bodies?

*A.* All animals have a muscular structure, which is their flesh or principal substance. By the power of these muscles, which act by a contraction and relaxation of their fibres, they move, walk, fly, seize their food, and defend themselves from enemies. All animals have a stomach likewise, into which they receive substances that are converted into nourishment for the support of their bodies. There is also a nervous system, by which animals have sensation and irritability; and in the higher animals, a brain, a heart for the circulation of blood through the body, lungs for the breathing of air which contributes to the support of the system, and a frame-work of bones which gives the body solidity and strength.

*Q.* Is there any thing else to be remarked in the general appearance of animals?

*A.* Most animals have some external covering, as of hair, feathers, down, scales, &c. and also weapons of defence, as teeth, claws, horns, stings, which will be more particularly mentioned in treating of the various kinds.

*Q.* How are animals arranged and classified by naturalists?

*A.* They are arranged according to the similarity which they bear to each other in the form and structure of their bodies: First, into classes containing the

great distinguishing characteristics of the tribes,—second, into orders and genera,—and, third, into species.

*Q.* What are the great divisions of the animal kingdom?

*A.* It is divided into, I. *Vertebrated* animals, or those having a spine or back-bone; such as quadrupeds and birds.—II. *Molluscous* animals, or those having a soft texture; such as slugs and the inhabitants of shells.—III. *Articulated* or jointed animals; such as crabs and insects.—IV. *Zoophytes*, animal plants or radiated animals; such as star-fish and medusæ.*

## Division I.

## VERTEBRATED ANIMALS.

*Q.* What distinguishes the first division of animals?

*A.* The first division is distinguished by all the animals composing it having a bony spine, or series of bones, which give firmness and support to the soft or fleshy parts of the body. It includes man, quadrupeds, birds, reptiles, and fishes.

### Class I.—MAMMALIA.

*Q.* What distinguishes the *Mammalia* or first class of animals?

*A.* The animals of this class bring forth their young alive, and suckle them with milk till they are of a certain age. This class, although the least numerous, is the most important in the animal kingdom, and comprehends those animals which are of the most perfect form and of the greatest use.

* The above is the arrangement of Cuvier. Linnæus divides the animal kingdom into six great classes:—I. *Mammalia*, animals with warm red blood, and bringing forth their young alive, and suckling them. II. *Aves*, Birds with warm red blood,—feathered, and producing their young from eggs. III. *Amphibia*, animals with cold red blood, breathing by lungs. IV. *Pisces*, fishes with cold red blood, breathing by gills. V. *Insecta*, insects with cold white blood, having antennæ on the head, and jointed horny organs of motion. VI. *Vermes*, or worms, with cold white blood, without antennæ; but generally with projecting feelers, or arms, never with jointed organs of motion.

## ORDER 1.—BIMANA, OR TWO-HANDED.

*Q.* What is the first order of animal existence?

*A. Man* is the first in the order of created beings, not only as possessing a body of the most perfect kind and of the most symmetrical proportions, but as being endowed with a rational and intelligent mind, which elevates him far above the brute creation.

*Q.* Wherein does man differ from other animals in bodily structure?

*A.* The body of man stands erect, with his countenance directed to the heavens; he has two hands and two legs, his nose and chin are prominent, his lips regularly defined, his teeth set close to each other, the cutting teeth of the lower-jaw placed perpendicular; he is also endowed with speech and reason, is unarmed, defenceless, and without any natural covering.

*Q.* Is man superior to other animals in bodily structure and powers?

*A.* Yes; taking him altogether, man is superior to all other animals. He may be surpassed by some of the inferior tribes in a few qualities, such as swiftness, agility, the acuteness of smelling and of sight, but in the general exercise of the corporeal faculties he is decidedly superior. Man, too, can endure every variety of climate, and live on every variety of food, while other animals are confined to one particular quality of food, and can only exist in the climates to which they are suited.

*Q.* But do not some animals, as the horse and the dog, bear a variety of climate as well as man?

*A.* They do to a certain extent; yet in extremes of climate they degenerate so much as almost to change their original nature. It has been found that the white fox will not live in the torrid zone; neither can reindeer exist in the climate of Britain, although the experiment has been repeatedly tried.

*Q.* What other qualities distinguish man from the brutes?

*A.* The use of reason and speech, by which he

can think and reflect from the resources of his own mind, and communicate his ideas and experience to those around him; thus knowledge is accumulated, and transmitted from one generation to another, —so that there is a continual progressive improvement in man, while other animals, that are solely guided by impulse or instinct to perform the actions necessary for their circumscribed existence, remain stationary without any deviation in the successive races.

*Q.* Are there any varieties in the human species?

*A.* Yes; although mankind have all sprung from one single pair, yet the circumstances of climate, of civilization, and of the hereditary transmission of particular forms and features, have in the course of ages produced a great many varieties in the human race.

*Q.* Is it likely that the effects of climate should have produced the fair skin of the northern European and the jet-black hue of the African?

*A.* We find, with a very few exceptions, on examining the inhabitants of the globe, that under the torrid zone, where the heat is greatest, the colour of the inhabitants is black; in the more temperate regions the colour is of a brownish or copper hue; and gradually as we approach the colder regions the fair complexion and white skin prevail.

*Q.* What is the cause of the black colour in the skin?

*A.* The black colour, properly speaking, is not in the skin, but between the outer and inner skin, and consists of a black pigment spread over a membrane called the *rete mucosum.*

*Q.* What purpose does the black skin of the negro serve?

*A.* It seems to be connected with the vessels of perspiration, and serves to keep the skin cool and moist under the burning tropical sun. It is found that negroes can live in the fields under the most intense heat, and yet feel cool and comfortable.

*Q.* Is the primitive or savage state one of simplicity and innocence?

*A.* It is so only in the dreams of the poets. The

savage state is, on the contrary, the lowest grade of human existence. The passions are gross and unrestrained, the mind superstitious and credulous, improvident of the present and thinking nothing of the future. It is only when illumined by the light of knowledge, and the refinement of civilization, that man asserts his true dignity of lord of the creation.

*Q.* How many varieties are there in the human race?

*A.* Almost every tribe and nation present some marked peculiarities of features or form, so that it is not easy to arrange mankind into definite varieties. Blumenbach has enumerated five different kinds.

*Q.* What are they?

*A.* The Caucasian, the Mongolian, the Ethiopian, the American, the Malay.

*Q.* Describe the Caucasian variety.

*A.* The Caucasian variety is so called, from the country around Mount Caucasus being supposed to be the abode of the first race of mankind. The Georgians and Circassians are the most perfect specimens of this variety, and it includes every different shade of the white race. The head is large, and the forehead expanded; the features symmetrical; the hair and eyes of various shades of colour. All the European nations, except the Laplanders, are of this variety, and it includes that portion of mankind most eminent for refinement, civilization, and the exercise of mental talents and ingenuity.

*Q.* What is the description of the Mongolian race?

*A.* The Mongolian variety, or Moguls, is a numerous tribe inhabiting Central and Northern Asia, and includes the Calmucks, Chinese, and Japanese, the inhabitants of Thibet, Ava, and Siam, the Laplanders, and the Esquimaux. They are of a yellow colour, something like dried lemon-peel, have black eyes, black straight thin hair, little beard, square head, with low and narrow forehead, and broad flat face, round projecting cheeks, thick lips, and eyes placed obliquely.

*Q.* What is the next variety?

*A.* The Ethiopians form the third division. They have a jet-black skin, with black woolly and curly hair, the forehead low and retreating, and the head narrow and compressed at both sides. The jaws are narrow and projecting, the lips thick, and the chin receding. This division includes all the inhabitants of Africa that are not comprehended under the Caucasian variety.

*Q.* Can you describe the fourth or American variety?

*A.* It is characterized by a dark-red skin, black straight hair, and little beard; the forehead is low, with the eyes deep sunk, the cheeks round and projecting, and the face broad; mouth rather large and lips thick: it includes all the native tribes of America except the Esquimaux, who, as has already been mentioned, preserve the features and form of the Mongolian division.

*Q.* What is the fifth and last variety?

*A.* The fifth variety is called the Malay, and includes the inhabitants of Malacca, Sumatra, Java, and most of the Asiatic islands; and of the Philippine and neighbouring groups, New Holland, New Guinea, and New Zealand. The colour varies from a brown and light tawny to black, the hair is black and occasionally curly, the head narrow, bones of the face prominent, the nose full and broad towards the point, the mouth large.

*Q.* Is it not likely that, in the intercourse of nations, the different races should be blended and intermixed with each other?

*A.* They are so in many instances; yet it is astonishing how local situation, warfare, prejudices, and many other causes, concur to keep nations and races for many generations entirely distinct and separate.

### ORDER II.—QUADRUMANA, OR FOUR-HANDED.

*Q.* What is the second order of animals in the class Mammalia?

*A.* The second order is called the *Quadrumana*, or four-handed, and includes the orang-outang, and the different species of apes or monkeys and baboons.

*Q.* Wherein do they differ from man in structure?

*A.* They differ widely from man in the form of the lower limbs, and especially the feet. They are incapable of walking erect, except with great constraint, and the side of the paw only touches the ground instead of the broad sole of the human foot. They are, as the name of the order implies, furnished with four hands, to enable them to climb from branch to branch of trees, their natural mode of progression, and to grasp nuts and fruit, which form their food.

*Q.* Are not the face and head somewhat like the human?

*A.* There is a faint resemblance; yet they want the capacious forehead, the raised and prominent nose, and the elevated and well-defined lips of the human head; above all, they want the intelligent expression and the governing mind, which gives man the great superiority over all the other branches of the animal creation.

*Q.* Are there many species of these animals?

*A.* Yes; there are a great variety of the monkey tribe of all sizes and forms, some having tails and others wanting that appendage. The orang-outang varies from three to five or six feet in length. His natural mode of walking is on all-fours; and it is only when under the restraint of confinement that he assumes the erect attitude,—he is docile, fond of the society of man, and shows some degree of sagacity.

### ORDER III.—CARNIVORA, OR FLESH-EATING ANIMALS.

*Q.* What is the next order of animals?

*A.* The third order comprehends those animals which live upon flesh; and, first, the *insectivora*, or those which live upon insects; as the bat, the hedgehog, shrew-mouse, mole, &c.

*Q.* Is not the bat a flying animal?

*A.* Yes; it has a thin membrane stretched over its fore-legs or hands, and extending between these and its hinder extremities, which serves the purpose of wings, by which it imitates the flight of birds,—but

otherwise it is an animal belonging to the class of those which suckle their young, and its body resembles a mouse. It lives upon insects, which it catches in the summer evenings,—in winter it lies coiled up in a state of torpidity, suspended from roofs or rafters by the claws of its hind-feet.

*Q.* What does the mole feed on?

*A.* The mole burrows under ground, and feeds upon slugs and the larvæ of insects. It is furnished with a strong snout for making its way through the earth, and four broad paws, resembling the human hand, by which it displaces the earth from its hole,—it has two small eyes likewise, but so deeply sunk in its head as to have led some naturalists to assert that they were altogether wanting. It possesses the senses of smell and hearing in an acute degree.

*Q.* What is the next division of flesh-feeding animals?

*A.* The next division consists of the carnivorous animals, properly so called, or those which live entirely on the flesh of the larger animals.

*Q.* Is there any peculiarity about the teeth of the carnivorous animals?

*A.* Yes; the canine or side-teeth are large and pointed, being thus adapted for tearing the food to pieces, and the grinders have pointed and sharp prominences, in order to masticate the food. The jaws, too, have a strong muscular motion upwards and downwards, but no lateral movement, as in the herbivorous animals, to be afterwards described.

*Q.* How many sections are the carnivorous animals divided into?

*A.* They are divided into four sections; the first are those which walk on the soles of their feet, which, being large, admit of their standing on their hinder extremities; such as, the bear, racoon, badger, &c. This division is denominated the *Plantigrade.*

*Q.* Can you describe the bear?

*A.* There are several different species of the bear, as the brown bear, the black, and the white or Greenland

bear. The brown bear is an inhabitant of mountainous countries, and is a savage, solitary animal. The black bear is found in Canada, where its flesh is esteemed a luxury; and the great white bear, with his shaggy coat, is found on the coast of Greenland.

*Q.* What kind of animal is the badger?

*A.* The badger is about the size of a common dog,—is a slovenly stupid animal, and is seldom seen out of his hole, where he lies torpid during the winter: he feeds on snails and other small animals, and also on roots.

*Q.* What is the second division of carnivorous animals called?

*A.* They are called *Digitigrade*, or those which walk principally on their toes, including the weasel, the dog, wolf, fox; cat, lion, tiger, leopard. &c.

*Q.* What sort of animal is the weasel?

*A.* The weasel is a small animal, with a slender body, about seven inches long and one and a half inches in height, and covered with a smooth brownish-coloured fur; its body is long and slender, and admirably adapted for entering narrow passages and holes, where it procures rats and mice, which, together with poultry, birds' eggs, &c., form its natural food.

*Q.* Are there other similar animals of this division?

*A.* Yes; the ferret, which is employed by rabbit-catchers to go into holes and drive out the rabbits,—the polecat, ermine, civet, skunk, and several others.

*Q.* What sort of animal is the ermine?

*A.* The ermine resembles in size the weasel, and is of a brown colour in summer, which changes to a pure white in winter; and its skin forms a valuable article of dress.

### *Canis, or Dog Kind.*

*Q.* What is the wild state of the dog?

*A.* This is a very difficult question to answer, for the dog is almost universally found as a domestic animal, the companion of man; yet the wolf, jackall, fox, and dog, bear such a strong resemblance to each other,

that some naturalists are inclined to believe them of the same species.

*Q.* Are there many kinds of dogs?

*A.* Yes; the species is divided into a number of varieties; the shepherd's dog being by many supposed the primitive kind, from whence all the others have sprung and branched out into their different forms, from training, breeding, food, climate, and other causes.

*Q.* What are the different varieties of the dog?

*A.* There is the shepherd's dog, the harrier, the beagle, the pointer, the greyhound, the bull-dog, pug-dog, Newfoundland dog, terrier, and several others.

*Q.* One would suppose that there was a sufficiently marked dissimilarity between the different kinds of dogs, as the greyhound and bull-dog, the terrier and Newfoundland, and many others, so as to constitute them a different species?

*A.* They differ certainly in outward form of the body and in size, yet their structure throughout is exactly the same,—the form of the teeth and jaws is the same, the periods of going with young, the free intermixture of breeds, and all other circumstances which go to constitute one and the same species.

*Q.* Can you describe the wolf?

*A.* The wolf is an animal of a grayish-yellow colour, with a black oblique stripe on the fore-legs, in height about two feet six inches, in length three and a half feet from the muzzle to the tail; the female goes with young sixty-three days, and has eight or nine at a litter: the cubs are born blind. In all these respects exactly resembling the dog.

*Q.* Does the wolf differ in disposition from the dog?

*A.* Yes; the wolf is of a ferocious but cowardly disposition, and not easily tamed; retaining rather a fear than a love for man.

*Q.* What countries does the wolf inhabit?

*A.* The wolf is to be found principally in the northern parts of the continent of Europe. At one time wolves were prevalent in Britain: they were early extirpated from England; but in Scotland, so late as the

year 1577, they were found in great numbers; and in Ireland they were extirpated only about the beginning of last century.

*Q.* What sort of animal is the jackall?

*A.* The jackall is very similar to the dog and wolf, of a dirty yellow colour, with a bushy tail. He is an inhabitant of Africa, from the Cape of Good Hope to Barbary, and is found in Syria, in Persia, and in Southern Asia. Jackalls associate together, and pursue their prey in large packs, by which they are enabled to hunt down the antelope and flocks of sheep.

*Q.* Is not the jackall called the lion's provider?

*A.* Yes; but erroneously so, the two animals having no connexion in their depredations. It is true the lion, when he hears the midnight cry or howl of the jackall resounding through the forests, arouses himself, being thus warned that his prey is at hand; but the two animals never hunt in conjunction. The jackall does not confine himself to living prey, but will scent out and devour putrefying carcasses; thus, in warm climates, doing an essential service, by ridding the air of animal matter in a state of decomposition.

*Q.* Can you describe the fox?

*A.* The fox is a greedy, cunning, and deceitful animal, that procures his prey by every sort of artifice, and is in consequence universally disliked. He carries off poultry, devours eggs, honey, &c., and has been a spoiler of the vineyards from the earliest ages.

*Q.* Is the fox easily tamed?

*A.* No; he is very difficult to tame, and can never be trusted in a state of domestication. The female fox produces four and five whelps at a litter, and their average life is fourteen or fifteen years.

*Q.* What countries does he inhabit?

*A.* The fox is found in Europe, Asia, and America, under different varieties of form. White foxes are not uncommon in northern countries. In Britain, the race of foxes is very much diminished with the increased cultivation of the country; yet still a sufficient number is preserved for the purposes of the chase.

*Q.* What sort of animal is the hyena?

*A.* The hyena is a fierce, untameable animal, of a ferocious and ungainly look: there are two varieties, the striped and the spotted. The striped hyena is of a brownish gray colour, with dark-brown bands across the body. It is an inhabitant of Egypt, Nubia, and Persia, and was known to the ancients. The spotted hyena is a native of Southern Africa; in shape it resembles the striped, but is smaller, of a dirty yellow colour, interspersed with brownish spots. The hyena devours dead carcasses, but will also boldly attack every other animal, and even man: his howl and the sullen glare of his fierce eye are a source of terror to the traveller.

*Felis, or Cat Kind.*

*Q.* Is the cat of the same kind of animals as the lion, tiger, panther, &c.?

*A.* Yes; and we shall begin with the cat, as being the most familiar of the tribe. The cat is an admirable specimen of a beast of prey; quick in its motions, with strong muscular paws, hooked talons, and a mouth furnished with sharp-pointed teeth, for the purpose of tearing its prey to pieces. Its eyes are also quick and glaring, and formed in such a manner as to enable it to distinguish objects in the dark. The cat is exceedingly lively and playful when a kitten, but exchanges this temper as it grows older, for a retired, cunning, and solitary disposition. The cat displays less personal attachment than the dog, but seems to have a strong liking to the particular house or place where it has been domesticated. When enraged, it quickly shows its mischievous and angry propensities; and in this respect is widely different from the meek, and long-suffering, and affectionate dog. Cats live on mice and small birds, which they spring on unawares from some secret covert.

*Q.* What other animal resembles the cat?

*A.* The tiger is in every respect very like the cat, but of much larger size. The royal tiger is a native of Bengal, of China, Sumatra, and of all the southern

countries of Asia,—in length about six feet, and three feet in height; his skin is of a yellowish colour, marked with various regular bars of black. He is possessed of great strength, and is of a ferocious disposition: lying in wait for his prey, he springs fiercely upon it from his ambush, and carries off even the largest animals with apparent ease.

*Q.* Is he easily tamed?

*A.* Yes; notwithstanding his native fierceness, he can be tamed so as to become gentle and obedient, and even a playful animal.

*Q.* Can you describe the lion?

*A.* The lion has generally been called the king of the forest; and there is certainly something of majesty in his commanding countenance, his well-proportioned and muscular form, and his long flowing mane, which curls around his neck.

*Q.* What is the size of the lion?

*A.* His body, exclusive of the tail, is about six feet long, his height three feet. He is of a uniform, pale, tawny colour, and has a peculiar long tuft of hair at the end of his tail. The female has no mane.

*Q.* What is the natural disposition of the lion?

*A.* The lion has been celebrated, from the earliest times, for courage and magnanimity. Like all other animals of prey, however, he is cunning, fierce, and unrelenting. He is easily tamed, and, though in the possession of prodigious strength, is as patient and obedient as the weakest animal.

*Q.* What other animals belong to this class?

*A.* The leopard, the panther, the ocelot, the lynx, the puma, and several others, are of the cat tribe.

*Q.* Are their habits similar?

*A.* Yes; and there is a great similarity in their shape. The panther and the leopard have beautifully spotted skins, which form a favourite and valuable article of dress.

### *Marsupial, or Pouched Animals.*

*Q.* What distinguishes the marsupial, or pouched animals?

*A.* The females have a large pouch in the belly, at the bottom of which the teats are placed. The young are born exceedingly small, and are carried about in this pouch till they arrive at a certain bulk and are perfectly formed.

*Q.* Can you describe the kangaroo?

*A.* This animal is a native of New Holland, and is of a mouse-gray colour; when sitting upright he is as high as a man, and weighs 140 lbs. Kangaroos live together in herds of fifty or more, and feed on herbage. The female has but one young, which, when born, is not larger than a mouse, but is carried in the mother's pouch three quarters of a year, until it weighs nearly 14 lbs.

*Q.* What is the opossum?

*A.* The opossum is similar in shape to the kangaroo, of a whitish colour, with black legs: it is a native of the warmer parts of North America.

### ORDER IV.—RODENTIA, OR GNAWERS.

*Q.* What distinguishes the fourth order of the Mammalia?

*A.* The animals of the fourth order are distinguished by the peculiar form and sharpness of the fore-teeth, and are called *Rodentia*, or gnawers, from the power they possess of gnawing wood. It comprehends beavers, rats, mice, hares, rabbits, and squirrels.

*Q.* Can you describe the beaver?

*A.* The beaver is an animal which takes up its abode in the banks of streams and rivers. It is about two feet in length, and one foot in height. The fore-feet it uses as hands, and the two hind-feet are furnished with a membrane connecting the toes, by which it paddles through the water: it has a broad flat tail, covered with scales, which serves as a rudder to guide its course through the water.

*Q.* Is there any thing remarkable in the habitation of the beaver?

*A.* Yes; it is a sort of dam formed in rivers, and consists of several apartments, constructed of pieces

of wood fixed into the ground, and wattled together with smaller pieces of twigs,—the whole plastered up with clay and mud,—which is the summer labour of these ingenious and industrious animals.

*Q.* What sort of animal is the hare?

*A.* The hare is an extremely timid animal, and, being furnished with no means of defence, depends for safety on its extreme fleetness. It burrows in the open fields and meadows, and its eyes are so placed in its head that it can look backwards even while running.

*Q.* What is the food of the hare?

*A.* The hare lives upon juicy vegetables, but especially on the bark and tender buds of trees. It usually brings forth two young at a litter. The flesh of the hare is much esteemed, and its fur is used in the manufacture of hats.

*Q.* Does not the rabbit very much resemble the hare?

*A.* Yes; but yet they are distinct species. The rabbit is of less size than the hare, has shorter ears and hind-legs, and the flesh is of a white colour, whereas that of the hare is of a dark red. Rabbits, too, are much more prolific than hares.

*Q.* What sort of animal is the squirrel?

*A.* The squirrel is a lively, active, little animal, that lives principally among the branches of trees, and feeds on nuts and seeds. Its body is small, but beautifully formed: it is of a brownish colour, and has a large bushy tail.

*Q.* What other animals belong to this order?

*A.* The marmot, which is found among the Alps, and forms curious burrows among the mountains; the jerboa; the porcupine, which is furnished with long quills upon the back and hind parts of the body; and the timid animal called the Guinea pig.

*Q.* Are not rats and mice included under the same order?

*A.* Yes; these animals have the front or cutting teeth of a chisel form, by which they, in a very short time, gnaw through thick pieces of wood, and thus become unpleasant visitors in our houses and larders.

*Q.* What are the varieties of the mouse?

*A.* The field-mouse is of a reddish brown colour; in some years it multiplies to a great extent, and does much injury to the corn. There is a variety of this and the domestic mouse of a pure white colour with red eyes.

*Q.* Are there not several kinds of rats?

*A.* There is the large brown rat, the black rat, and the water-rat. They are all voracious and cunning animals.

### ORDER V.—EDENTATA, OR TOOTHLESS ORDER.

*Q.* What does the fifth order comprehend?

*A.* The fifth order consists of the *Edentata*, or toothless class, from the animals comprising it being deficient in some or all of their teeth. It comprehends the sloth, armadillo, pangolin, and the animal from New South Wales, called the *ornithorynchus*, or duck-billed animal.

*Q.* Can you describe the sloth?

*A.* The sloth is an animal formed to move about among the branches of trees; and, therefore, when placed on the ground, is almost unable, from the formation of its claws, to crawl along. It is an inactive, gluttonous animal, and generally strips a tree of its whole verdure; when impelled by hunger it visits another tree, and strips it bare in like manner.

*Q.* What are the characters of the pangolin and armadillo?

*A.* They are animals incased in a covering of horny scales or plates, and have the power of rolling themselves up, as a protection from injuries. They feed on vegetable substances.

*Q.* What is the nature of the ornithorynchus?

*A.* The ornithorynchus is distinguished from the rest of the class Mammalia by not suckling its young; and by the singular form of its jaws, which resemble the close, flat bill of a duck. It has four feet, which are webbed like a waterfowl. This wonderful animal is found in the marshy grounds of New Holland. It is supposed to lay eggs, like a bird.

## ORDER VI.—PACHYDERMATA, OR THICK-SKINNED ORDER.

*Q.* How is the sixth order denominated?

*A.* The sixth order is called *Pachydermata*, or thick-skinned, and includes the elephant, hippopotamus, hog, rhinoceros, hyrax, or Cape marmot, horse, ass, dziggtai, zebra, and quagga.

*Q.* Can you describe the elephant?

*A.* The elephant is the largest of animals, being often found from 10 to 12 feet high. It is covered with a thick, ash-gray coloured skin, with very few hairs. The upper parts of the head and tail are something like a hog. It is furnished with a long, flexible proboscis, with which it can perform a variety of actions,—from tearing up a tree by the roots to picking a pin from the floor. Its sagacity and docility are very astonishing. It forms a valuable beast of burden,—in eastern countries is often made use of in war,—and, though apparently stiff and unwieldy, it goes at a tolerably quick pace on journeys. The large tusks of the elephant are formed of ivory, and constitute a valuable article of commerce.

*Q.* Is the rhinoceros like the elephant?

*A.* He is somewhat like, but smaller. The skin is of a very tough description, which resists balls and the darts of assailants. One species is furnished with a single horn projecting in front on his nose, and another with two; these are not attached to the bone, but merely rest upon it.

*Q.* Where is the hippopotamus found?

*A.* The hippopotamus, or river-horse, inhabits the rivers of Africa, and feeds chiefly on roots and other vegetable substances. He is a large, thick-skinned animal, with a capacious head and mouth, in which are two curved tusks in each jaw, and two horizontal, projecting outwards. They are formed of ivory.

*Q.* Does the hog belong to this class of animals?

*A.* Yes; the hog, the wild boar, and several other animals of similar forms. They have all thick skins

covered with bristles, a projecting snout, calculated to plough up the soil, in order to find the roots and nuts, on which they feed, and large projecting tusks in the fore-part of the jaw. The hog is a sluggish, inactive, and gluttonous animal.

*Q.* How is the horse tribe distinguished?

*A.* The horse tribe is distinguished by having the hoof single and undivided. The tail also is covered with long hair.

*Q.* Can you describe the horse?

*A.* The horse, in all ages, has been admired for the symmetry of his form. His swiftness, strength, and docility have made him a favourite and indispensable animal to man. Although the horse is an herbivorous animal, he does not chew the cud like oxen and sheep, neither has he a multiplicity of stomachs.

*Q.* Are there not many varieties of horses?

*A.* Yes; the species is divided into a number of varieties; but the probability is, they all sprang from one original stock, and that climate, training, and breeding, have effected the changes in their appearance in the same manner as occurs in the domestic dog.

*Q.* What are the principal varieties?

*A.* There are several striking varieties; as, the Arabian, the Persian, the Barb, the Dongola, the Andalusian, the Dutch, the Highland sheltie, and the English race-horse. The latter are famed for speed, being the finest race-horses in the world.

*Q.* What kind of animal is the ass?

*A.* The ass is inferior in size and beauty to the horse; but is, nevertheless, a patient, hardy, and useful animal. Its head is large in proportion to the body, and is surmounted with two long ears; the tail has much less of the flowing hair which distinguishes the horse.

*Q.* What is a mule?

*A.* A mule is a breed between a horse and ass. Mules, in general, never have young, and this is one provision which nature makes to preserve the different species of animals unmixed. Mules in Spain and the southern parts of Europe are of a large size, and

are much esteemed for their services as beasts of burden.

*Q.* Can you describe the zebra?

*A.* The zebra is a beautifully-formed animal, resembling the horse, but of smaller size. Its body is regularly striped with brown and white colours.

*Q.* Is it capable of being tamed?

*A.* An opinion long prevailed that it was not; but recently several zebras have been exhibited in menageries quite tame and docile. They can scarcely, however, be used either for commercial or agricultural purposes.

## ORDER VII.—RUMINANTIA, OR RUMINATING ANIMALS.

*Q.* What constitutes the seventh order?

*A.* The seventh order is composed of those animals that ruminate or chew the cud, hence called *Ruminantia,* or ruminating animals. It includes the camel, deer, antelope, goat, sheep, cow, and buffalo.

*Q.* What is meant by ruminating animals?

*A.* Ruminating animals are those which, feeding upon grasses and other vegetables imperfectly chewed, after they have filled the first stomach and satisfied their appetite, retire to rest, and then bring up the contents of the first and second stomachs by successive portions, chew it a second time, and pass it into the third, from thence into the fourth or true stomach, where the process of digestion goes forward.*

*Q.* Is there any difference between the teeth of those animals that live on grasses and those that live on flesh?

* The cloven-hoofed ruminating animals have four stomachs. Into the first, or *paunch,* the food is received slightly and imperfectly chewed; from this it goes into the second, or *honey-comb* stomach, in small portions, where it is farther macerated. By an inverted motion of the coats of this bag, the food is forced up into the mouth, where, after having been duly chewed, it is again swallowed into the third stomach, or *many-plies;* from whence it passes into the fourth, or *read,* where it is properly digested. From the gullet, or passage from the mouth to the stomach, there is a groove, or canal, with full projecting lips, which communicates with the three first stomachs. When these lips, or flaps, are contracted, the chewed food can be passed directly from the mouth to the third and fourth stomachs, without entering the two first; but, by relaxing these flaps, the animal can, at pleasure, open the communication with the first and second stomachs, and take up their contents into the mouth.

*A.* Yes; the grinding teeth of herbivorous animals are broader, and divided into ridges or furrows, and more deeply supplied with the hard enamel, for the purpose of bruising their food into a pulp. In the horned herbivorous animals there are no front cutting teeth in the upper-jaw.

*Q.* Can you describe the camel?

*A.* The camel exhibits an admirable instance of the adaptation of animals to particular countries and climates, and to the necessities of man. Formed for inhabiting the dry, sandy, and desert plains of the East, its nostrils are made so as to shut out the gales of drifting sand. It is furnished with an apparatus connected with the stomach, capable of containing a supply of water for many weeks; and its feet are so constructed as to enable it to tread lightly upon a dry and yielding sand.

*Q.* Is the camel easily domesticated?

*A.* Yes; it is a pattern of patience and obedience,—kneeling down to receive its accustomed load,—obeying the voice of its drivers, and sustaining the toil and fatigue of long and tedious journeys under a burning sun.

*Q.* Does the dromedary resemble the camel?

*A.* Yes; only the dromedary is of less size and feebler make. It is also distinguished by having only one hump on its back, whereas the camel has two. The hair of both animals is made into garments, and they also supply their owners with milk.

*Q.* What kind of animal is the llama?

*A.* The llama is allied to the camel, only smaller, and wanting the characteristic hump on the back. It is employed in South America as a beast of burden.

*Q.* Can you describe the camelopard?

*A.* The camelopard, or giraffe, is an animal with a body about the size of a horse, and a spotted skin. Its fore-legs are large in proportion to the hind, its shoulders are raised, and its neck is of a great length in proportion to its body. Its head reaches the height of 18 feet, by which means it is enabled to browse on the leaves of tall trees, which are its usual

food. The giraffe has two small horns on the head, and a peculiarly sharp-pointed tongue.

*Q.* What kind of animals are antelopes?

*A.* Antelopes are elegantly-formed animals, possessing great swiftness, and of a gentle and social nature. Their sight, hearing, and smell, are of great delicacy. Antelopes generally feed together in herds. The gazelle is a species of antelope, of a small size, but beautiful proportions. There is also the gnu, a species of antelope found in South Africa, with many others.

*Q.* What are the peculiarities of the deer kind?

*A.* The deer are admirably formed for swiftness, and are of elegant proportions. They have large, branching horns, that grow out from the head every summer, and which fall off in the spring to be again renewed. They are not the same as the horns of other animals, but real bones without any covering of skin. Deer also are furnished with two breathing holes on each side of the head, immediately below the eye, by which they can respire when their mouth is plunged into water for the purpose of drinking.

*Q.* Are there many different kinds of deer?

*A.* Yes; there is the stag, the fallow-deer, the roe, and the rein-deer; the elk, musk, &c.

*Q.* What kind of animal is the stag?

*A.* The stag, or red deer, is about three and a half feet in height, of a brownish colour, and beautifully formed, with high-branching horns. The female goes with young eight months, and produces one at a birth.

*Q.* What is the size of the roe?

*A.* The roe is about two and a quarter feet high, and not so elegant an animal as the stag. The female goes with young five months, and produces two at a birth.

*Q.* Can you describe the fallow-deer?

*A.* The fallow-deer are those with which our parks are usually stocked. They are of a timid, gentle nature. The female goes with young eight months, and produces two and sometimes three at a birth.

*Q.* Where is the rein-deer chiefly found?

*A.* The rein-deer is an inhabitant of the northern parts of the continent of Europe and America. In Lapland it is the only beast of burden, and forms the chief support of the inhabitants of that northern region. It is yoked into a sledge, and goes at a fleet pace along the snows. Its flesh affords the natives nourishment, its skin clothing, and during summer there is an abundant supply of milk from the herds.

*Q.* Can you describe the sheep?

*A.* The sheep is a meek, peaccable, and defenceless animal. It is of essential use to man, its flesh furnishing the most nutritious food, and its woolly covering the most comfortable clothing.

*Q.* Are there many varieties of sheep?

*A.* Yes; they vary very much according to climate. In very hot countries their wool changes into long coarse hair. The Spanish or Merino wool is most prized with us.

*Q.* What is the moufflon?

*A.* The moufflon is reckoned the wild sheep, and is very common in Tartary and the mountainous parts of Greece.

*Q.* Wherein does the goat differ from the sheep?

*A.* The goat is covered with a coarse long hair, has differently-shaped horns, and a long flowing beard, or tuft of hair below the chin. Goat's flesh is tough and fibrous, and of a redder colour than that of the sheep. The goat is a lively, playful, and picturesque animal, with more spirit and stratagem in his disposition than the sheep. He is fond of climbing rocks and mountains, and picking his food from among the aromatic herbs on their summits.

*Q.* Is the skin of the goat useful?

*A.* The skin of the goat is made into Morocco leather, and that of the young kid furnishes materials for gloves; while the skin of the sheep is made into parchment and a coarser sort of leather.

*Q.* Are there not several varieties of the goat?

*A.* Yes; there is the white goat, or Angora goat, the Thibet or Cashmere goat, whose fine wool supplies

year 1577, they were found in great numbers; and in Ireland they were extirpated only about the beginning of last century.

*Q.* What sort of animal is the jackall?

*A.* The jackall is very similar to the dog and wolf, of a dirty yellow colour, with a bushy tail. He is an inhabitant of Africa, from the Cape of Good Hope to Barbary, and is found in Syria, in Persia, and in Southern Asia. Jackalls associate together, and pursue their prey in large packs, by which they are enabled to hunt down the antelope and flocks of sheep.

*Q.* Is not the jackall called the lion's provider?

*A.* Yes; but erroneously so, the two animals having no connexion in their depredations. It is true the lion, when he hears the midnight cry or howl of the jackall resounding through the forests, arouses himself, being thus warned that his prey is at hand; but the two animals never hunt in conjunction. The jackall does not confine himself to living prey, but will scent out and devour putrefying carcasses; thus, in warm climates, doing an essential service, by ridding the air of animal matter in a state of decomposition.

*Q.* Can you describe the fox?

*A.* The fox is a greedy, cunning, and deceitful animal, that procures his prey by every sort of artifice, and is in consequence universally disliked. He carries off poultry, devours eggs, honey, &c., and has been a spoiler of the vineyards from the earliest ages.

*Q.* Is the fox easily tamed?

*A.* No; he is very difficult to tame, and can never be trusted in a state of domestication. The female fox produces four and five whelps at a litter, and their average life is fourteen or fifteen years.

*Q.* What countries does he inhabit?

*A.* The fox is found in Europe, Asia, and America, under different varieties of form. White foxes are not uncommon in northern countries. In Britain, the race of foxes is very much diminished with the increased cultivation of the country; yet still a sufficient number is preserved for the purposes of the chase.

*Q.* What sort of animal is the hyena?

*A.* The hyena is a fierce, untameable animal, of a ferocious and ungainly look: there are two varieties, the striped and the spotted. The striped hyena is of a brownish gray colour, with dark-brown bands across the body. It is an inhabitant of Egypt, Nubia, and Persia, and was known to the ancients. The spotted hyena is a native of Southern Africa; in shape it resembles the striped, but is smaller, of a dirty yellow colour, interspersed with brownish spots. The hyena devours dead carcasses, but will also boldly attack every other animal, and even man: his howl and the sullen glare of his fierce eye are a source of terror to the traveller.

*Felis, or Cat Kind.*

*Q.* Is the cat of the same kind of animals as the lion, tiger, panther, &c.?

*A.* Yes; and we shall begin with the cat, as being the most familiar of the tribe. The cat is an admirable specimen of a beast of prey; quick in its motions, with strong muscular paws, hooked talons, and a mouth furnished with sharp-pointed teeth, for the purpose of tearing its prey to pieces. Its eyes are also quick and glaring, and formed in such a manner as to enable it to distinguish objects in the dark. The cat is exceedingly lively and playful when a kitten, but exchanges this temper as it grows older, for a retired, cunning, and solitary disposition. The cat displays less personal attachment than the dog, but seems to have a strong liking to the particular house or place where it has been domesticated. When enraged, it quickly shows its mischievous and angry propensities; and in this respect is widely different from the meek, and long-suffering, and affectionate dog. Cats live on mice and small birds, which they spring on unawares from some secret covert.

*Q.* What other animal resembles the cat?

*A.* The tiger is in every respect very like the cat, but of much larger size. The royal tiger is a native of Bengal, of China, Sumatra, and of all the southern

countries of Asia,—in length about six feet, and three feet in height; his skin is of a yellowish colour, marked with various regular bars of black. He is possessed of great strength, and is of a ferocious disposition: lying in wait for his prey, he springs fiercely upon it from his ambush, and carries off even the largest animals with apparent ease.

*Q.* Is he easily tamed?

*A.* Yes; notwithstanding his native fierceness, he can be tamed so as to become gentle and obedient, and even a playful animal.

*Q.* Can you describe the lion?

*A.* The lion has generally been called the king of the forest; and there is certainly something of majesty in his commanding countenance, his well-proportioned and muscular form, and his long flowing mane, which curls around his neck.

*Q.* What is the size of the lion?

*A.* His body, exclusive of the tail, is about six feet long, his height three feet. He is of a uniform, pale, tawny colour, and has a peculiar long tuft of hair at the end of his tail. The female has no mane.

*Q.* What is the natural disposition of the lion?

*A.* The lion has been celebrated, from the earliest times, for courage and magnanimity. Like all other animals of prey, however, he is cunning, fierce, and unrelenting. He is easily tamed, and, though in the possession of prodigious strength, is as patient and obedient as the weakest animal.

*Q.* What other animals belong to this class?

*A.* The leopard, the panther, the ocelot, the lynx, the puma, and several others, are of the cat tribe.

*Q.* Are their habits similar?

*A.* Yes; and there is a great similarity in their shape. The panther and the leopard have beautifully spotted skins, which form a favourite and valuable article of dress.

### *Marsupial, or Pouched Animals.*

*Q.* What distinguishes the marsupial, or pouched animals?

*A.* The females have a large pouch in the belly, at the bottom of which the teats are placed. The young are born exceedingly small, and are carried about in this pouch till they arrive at a certain bulk and are perfectly formed.

*Q.* Can you describe the kangaroo?

*A.* This animal is a native of New Holland, and is of a mouse-gray colour; when sitting upright he is as high as a man, and weighs 140 lbs. Kangaroos live together in herds of fifty or more, and feed on herbage. The female has but one young, which, when born, is not larger than a mouse, but is carried in the mother's pouch three quarters of a year, until it weighs nearly 14 lbs.

*Q.* What is the opossum?

*A.* The opossum is similar in shape to the kangaroo, of a whitish colour, with black legs: it is a native of the warmer parts of North America.

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*A.* A mule is a breed between a horse and ass. Mules, in general, never have young, and this is one provision which nature makes to preserve the different species of animals unmixed. Mules in Spain and the southern parts of Europe are of a large size, and

are much esteemed for their services as beasts of burden.

*Q.* Can you describe the zebra?

*A.* The zebra is a beautifully-formed animal, resembling the horse, but of smaller size. Its body is regularly striped with brown and white colours.

*Q.* Is it capable of being tamed?

*A.* An opinion long prevailed that it was not; but recently several zebras have been exhibited in menageries quite tame and docile. They can scarcely, however, be used either for commercial or agricultural purposes.

### ORDER VII.—RUMINANTIA, OR RUMINATING ANIMALS.

*Q.* What constitutes the seventh order?

*A.* The seventh order is composed of those animals that ruminate or chew the cud, hence called *Ruminantia,* or ruminating animals. It includes the camel, deer, antelope, goat, sheep, cow, and buffalo.

*Q.* What is meant by ruminating animals?

*A.* Ruminating animals are those which, feeding upon grasses and other vegetables imperfectly chewed, after they have filled the first stomach and satisfied their appetite, retire to rest, and then bring up the contents of the first and second stomachs by successive portions, chew it a second time, and pass it into the third, from thence into the fourth or true stomach, where the process of digestion goes forward.*

*Q.* Is there any difference between the teeth of those animals that live on grasses and those that live on flesh?

* The cloven-hoofed ruminating animals have four stomachs. Into the first, or *paunch,* the food is received slightly and imperfectly chewed; from this it goes into the second, or *honey-comb* stomach, in small portions, where it is farther macerated. By an inverted motion of the coats of this bag, the food is forced up into the mouth, where, after having been duly chewed, it is again swallowed into the third stomach, or *many-plies;* from whence it passes into the fourth, or *read,* where it is properly digested. From the gullet, or passage from the mouth to the stomach, there is a groove, or canal, with full projecting lips, which communicates with the three first stomachs. When these lips, or flaps, are contracted, the chewed food can be passed directly from the mouth to the third and fourth stomachs, without entering the two first; but, by relaxing these flaps, the animal can, at pleasure, open the communication with the first and second stomachs, and take up their contents into the mouth.

*A.* Yes; the grinding teeth of herbivorous animals are broader, and divided into ridges or furrows, and more deeply supplied with the hard enamel, for the purpose of bruising their food into a pulp. In the horned herbivorous animals there are no front cutting teeth in the upper-jaw.

*Q.* Can you describe the camel?

*A.* The camel exhibits an admirable instance of the adaptation of animals to particular countries and climates, and to the necessities of man. Formed for inhabiting the dry, sandy, and desert plains of the East, its nostrils are made so as to shut out the gales of drifting sand. It is furnished with an apparatus connected with the stomach, capable of containing a supply of water for many weeks; and its feet are so constructed as to enable it to tread lightly upon a dry and yielding sand.

*Q.* Is the camel easily domesticated?

*A.* Yes; it is a pattern of patience and obedience,—kneeling down to receive its accustomed load,—obeying the voice of its drivers, and sustaining the toil and fatigue of long and tedious journeys under a burning sun.

*Q.* Does the dromedary resemble the camel?

*A.* Yes; only the dromedary is of less size and feebler make. It is also distinguished by having only one hump on its back, whereas the camel has two. The hair of both animals is made into garments, and they also supply their owners with milk.

*Q.* What kind of animal is the llama?

*A.* The llama is allied to the camel, only smaller, and wanting the characteristic hump on the back. It is employed in South America as a beast of burden.

*Q.* Can you describe the camelopard?

*A.* The camelopard, or giraffe, is an animal with a body about the size of a horse, and a spotted skin. Its fore-legs are large in proportion to the hind, its shoulders are raised, and its neck is of a great length in proportion to its body. Its head reaches the height of 18 feet, by which means it is enabled to browse on the leaves of tall trees, which are its usual

food. The giraffe has two small horns on the head, and a peculiarly sharp-pointed tongue.

*Q.* What kind of animals are antelopes?

*A.* Antelopes are elegantly-formed animals, possessing great swiftness, and of a gentle and social nature. Their sight, hearing, and smell, are of great delicacy. Antelopes generally feed together in herds. The gazelle is a species of antelope, of a small size, but beautiful proportions. There is also the gnu, a species of antelope found in South Africa, with many others.

*Q.* What are the peculiarities of the deer kind?

*A.* The deer are admirably formed for swiftness, and are of elegant proportions. They have large, branching horns, that grow out from the head every summer, and which fall off in the spring to be again renewed.. They are not the same as the horns of other animals, but real bones without any covering of skin. Deer also are furnished with two breathing holes on each side of the head, immediately below the eye, by which they can respire when their mouth is plunged into water for the purpose of drinking.

*Q.* Are there many different kinds of deer?

*A.* Yes; there is the stag, the fallow-deer, the roe, and the rein-deer; the elk, musk, &c.

*Q.* What kind of animal is the stag?

*A.* The stag, or red deer, is about three and a half feet in height, of a brownish colour, and beautifully formed, with high-branching horns. The female goes with young eight months, and produces one at a birth.

*Q.* What is the size of the roe?

*A.* The roe is about two and a quarter feet high, and not so elegant an animal as the stag. The female goes with young five months, and produces two at a birth.

*Q.* Can you describe the fallow-deer?

*A.* The fallow-deer are those with which our parks are usually stocked. They are of a timid, gentle nature. The female goes with young eight months, and produces two and sometimes three at a birth.

*Q.* Where is the rein-deer chiefly found?

*A.* The rein-deer is an inhabitant of the northern parts of the continent of Europe and America. In Lapland it is the only beast of burden, and forms the chief support of the inhabitants of that northern region. It is yoked into a sledge, and goes at a fleet pace along the snows. Its flesh affords the natives nourishment, its skin clothing, and during summer there is an abundant supply of milk from the herds.

*Q.* Can you describe the sheep?

*A.* The sheep is a meek, peaceable, and defenceless animal. It is of essential use to man, its flesh furnishing the most nutritious food, and its woolly covering the most comfortable clothing.

*Q.* Are there many varieties of sheep?

*A.* Yes; they vary very much according to climate. In very hot countries their wool changes into long coarse hair. The Spanish or Merino wool is most prized with us.

*Q.* What is the moufflon?

*A.* The moufflon is reckoned the wild sheep, and is very common in Tartary and the mountainous parts of Greece.

*Q.* Wherein does the goat differ from the sheep?

*A.* The goat is covered with a coarse long hair, has differently-shaped horns, and a long flowing beard, or tuft of hair below the chin. Goat's flesh is tough and fibrous, and of a redder colour than that of the sheep. The goat is a lively, playful, and picturesque animal, with more spirit and stratagem in his disposition than the sheep. He is fond of climbing rocks and mountains, and picking his food from among the aromatic herbs on their summits.

*Q.* Is the skin of the goat useful?

*A.* The skin of the goat is made into Morocco leather, and that of the young kid furnishes materials for gloves; while the skin of the sheep is made into parchment and a coarser sort of leather.

*Q.* Are there not several varieties of the goat?

*A.* Yes; there is the white goat, or Angora goat, the Thibet or Cashmere goat, whose fine wool supplies

*Q.* Can you describe the *pintado*, or Guinea hen?

*A.* It is a large bird, of a grayish colour, singularly spotted with white. It is a native of the north and west of Africa, but has long been naturalized in Europe and many parts of America.

*Q.* Whence did the species *gallus*, or domestic fowl, come from?

*A.* That which is probably the original stock is found wild in Hindoostan: the species now dispersed over almost every part of the globe is a most useful bird, forming an extensive article of food.

*Q.* Can you describe the pigeon?

*A.* The rock-dove, the progenitor of our common pigeon, is a native of almost the whole of the old world. The female in the wild state breeds twice; but, when domesticated, nine or ten times in the year; so that a single couple would in four years produce 14,762.

## ORDER V.

*Q.* What is the next order?

*A.* The next order, *Grallæ*, includes the stilted birds, or waders, characterized by cylindrical bills, long stilt-like legs, and for the most part long necks and short tails. They mostly live in moist marshy grounds, feed on reptiles, insects, fishes, and water-plants, build on the ground or among reeds, and are chiefly valuable on account of the delicate flavour of their flesh and eggs.

*Q.* What are the principal birds which belong to this order?

*A.* The flamingo, spoonbill, heron, bittern, plover, crane, stork, woodcock, snipe, coot, rail, &c.

*Q.* Can you describe the flamingo?

*A.* The body of the flamingo is about the size of a goose; but its neck and legs are so long as to make it equal the height of a man. The plumage is of a beautiful red colour. It is found on the margins of lakes and rivers in warm regions, and feeds on small fish, birds, and eggs.

*Q.* Whence has the spoonbill its name?

*A.* It is so called from the peculiar shape of its long

bill, which, at the point, is rounded and flattened out in the shape of a spoon. The common species is of a white colour, about the size of the flamingo, but with shorter neck and legs. There is also one of a beautiful rose-colour. It feeds on the spawn of fish, frogs, and worms, and is a native of warm climates.

*Q.* Are there many species of the *ciconia*, or stork?

*A.* Yes; there are several; as the *pavonia*, or royal crane, an inhabitant of South Africa, remarkable for a beautiful crown, or crest of feathers wound round spirally on its head; the common crane, found in considerable numbers in the north of Europe and Asia; and the stork, which lives on amphibious animals and reptiles.

*Q.* Can you describe the heron?

*A.* The heron is of a grayish or ash colour, with long slender legs, a long neck, and its head surmounted by a tuft of black feathers. It is a solitary bird, and frequents marshes and rivers; it wades a small way into the stream, and stands motionless for hours, watching intently any small fishes which may come within its reach, when it instantly darts upon them with its sharp-pointed beak. Herons build their nests in high trees, and a number of such nests crowded together is called a heronry.

*Q.* What is the ibis?

*A.* It is the animal so famed among the ancient Egyptians as the symbol of the overflowing of the Nile. It has been frequently represented on their monuments, and prepared, like their human bodies, in the form of mummies, great numbers being placed in certain vaults. Its plumage is white, with a bare dark-coloured neck, and the tips of the wings black.

*Q.* Is the bittern a common bird?

*A.* Yes; it is very common in fens and marshes. Its body is variegated with dark spots of various sizes; its food consists of small fish and frogs, and its loud scream is peculiarly wild as it skims along the air previous to a hurricane or storm.

*Q.* Can you describe the woodcock?

*A.* The *scolopax rusticola*, or woodcock, is about the size of a pigeon, of a brown mottled colour, with long bill. It is generally plump and fat, and its flesh is reckoned a great delicacy. Woodcocks come to this country in winter, and are found in woods and sheltered coverts; in summer they migrate to colder regions.

*Q.* Are snipes common in this country?

*A.* Yes; they are found frequenting marshy grounds. They have a small delicately-formed body, with a bill three inches long. They fly in a zigzag manner, and are difficult to shoot. They emit a peculiar cry in the summer twilights, which, from the similarity of the sound to that made by sheep, has been called the *wether bleat*.

*Q.* What is the plover?

*A.* The plover is a bird with greenish spotted plumage, and is very common on heaths and moors. It has a shrill whistling note. The dottrel is a bird of the same species, which visits this country in April and September. The food of these birds consists of worms, insects, and snails.

*Q.* Can you describe the common coot?

*A.* The coot is a bird with black plumage, with short thick bill, short tail, and flat and large toes. It lives about the banks of lakes and rivers, and builds its nest among the reeds. Its food consists of small fish, spawn, and insects.

*Q.* What is the water-hen?

*A.* It is an elegantly-formed bird, with plumage of a violet and glittering green. It inhabits the banks of rivers in the warmer and temperate parts of Europe, and is easily tamed.

*Q.* Can you describe the water-rail?

*A.* The wings of this bird are of a grayish colour, the body dark brown, tail short, and legs long. It frequents the banks of rivers, and is seldom seen to fly.

*Q.* What is the *crex*, or land-rail?

*A.* The land-rail is a bird very common in grass and corn fields; and, from its peculiar and incessant cry in the summer evenings, it has got the name of corn-

craik. Its plumage is of a reddish brown colour, beautifully mottled with black. It is a migratory bird, and leaves this country early in autumn. It very seldom flies, but runs swiftly among the grass or corn; hence, although often heard, it is rarely seen. Its flesh is very delicate eating.

*Q.* What other birds are ranged under this order?

*A.* The ostrich, cassowary, and dodo.

*Q.* Can you describe the ostrich?

*A.* The *struthio,* or ostrich, is the largest of all birds, reaching the height of eight feet and upwards, and is now confined to Africa and Arabia. It is incapable of flying, but runs with exceeding speed, its wings aiding its fleetness: each of its eggs, of which it lays about 30, contains as much as 24 hens' eggs. It is principally valuable on account of its feathers.

*Q.* What is the cassowary?

*A.* The cassowary is a large bird found in the East Indies. Its feathers are horny, and look like horsehair, two of them being attached to each quill.

*Q.* Can you describe the dodo?

*A.* The dodo is a large, clumsy, and stupid-looking bird. The head is hooded, the bill thick and hooked at the point, the mouth extends on each side beyond the eyes, the plumage is of an ash colour. It was discovered in the Isles of France and Bourbon, but, from the accounts of late travellers, exists there no longer. Its history is in part fictitious.

### ORDER VI.

*Q.* What is the next order?

*A.* The next order is the *Palmipedes,* or web-footed. They are distinguished by their webbed feet, which are placed far back on the body, and are thereby better suited for rowing, but less so for walking. The upper bill generally ends in a little hook, and, together with the lower, is covered with a membrane supplied with the nerves of taste, which is not the case in most other birds. They live on the seashore, or beside lakes and marshes; generally lay a small number of eggs, and are

useful for their flesh, feathers, &c. This order comprehends the pelican, albatross, swan, goose, duck, diver, gull, and many others.

*Q.* Can you describe the pelican?

*A.* The pelican is distinguished by a large bag-like membrane hanging from the lower bill, so extensive as to be capable of containing 20 pounds of water. It is found in the warmer parts of all the five divisions of the world.—The Greeks named it pelican from its ass-like voice.

*Q.* Can you describe the cormorant?

*A.* The cormorant is of a dingy-green colour on the back, with some white on the belly. It feeds on fish, and is a voracious animal. It is common in all parts of the world. There is a species of the cormorant trained in China to take fish.

*Q.* Where is the gannet or solan-goose found?

*A.* The solan-goose is found chiefly in the Western Islands of Scotland, and on the Bass Rock near Edinburgh. It feeds on herrings, and its flesh forms the chief subsistence of many of the islanders.

*Q.* What is the albatross?

*A.* The albatross is a bird the size of a swan, and when the wings are expanded measures eleven feet across. It is to be found many hundred miles from land;—it seldom flies more than 10 or 20 feet above the surface of the ocean. The flying fish forms its principal food.

*Q.* Can you describe the swan?

*A.* The *anas cygnus*, or wild swan, is a graceful-looking bird with a long curved neck. The mute or tame swan (*anas olor*) has a black membrane at the root of the bill; the wild swan a yellow membrane. The colour of the swan is pure white. Black swans are found in Botany Bay.

*Q.* Are there many species of geese?

*A.* Yes; the common goose, the Chinese goose, the Canadian, the barnacle, Brent goose, &c.

*Q.* Are there many species of the *larus*, or gull?

*A.* Yes; there are several. The common gull is found in great numbers about the shores of friths and

bays. Gulls skim about the surface of the ocean, and feed on fishes. They also occasionally visit the inland parts of the country, and feed on the insects turned up in the newly-ploughed fields.

*Q.* Is the *boschas*, or wild duck, a common animal?

*A.* The wild duck is found in almost the whole of the northern world. It is termed the mallard, and is the stock from whence sprang the domestic duck, now to be met with in very beautiful varieties. The eider-duck is particularly numerous in Iceland and Greenland. Its flesh and eggs are very well flavoured. Its skin, which is used for lining clothes, and the well-known eider-down, are of great value.

*Q.* What is the puffin?

*A.* The puffin is another sea-bird commonly found on our shores. It is of a black and white colour, and takes possession of rabbit-burrows, where it forms its nest.

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## Class III.—REPTILES.

*Q.* What distinguishes the class of reptiles?

*A.* They breathe by means of lungs, but less perfect ones than the class Mammalia. They can remain a considerable time without air, or live in air of a quality which would be noxious to other animals. They are cold, red-blooded animals. Many of them are of an amphibious nature.

*Q.* What is the form of the amphibia?

*A.* They have either four feet, as turtles, frogs, &c.; or two feet, as the syrens. Serpents, which, however, are not strictly amphibious, have a long cylindrical body, without any external members. Some are protected by a bony shell; others have horny rings, or plates, scales, &c.; and many have simply the skin, with a slimy covering. The great proportion change their skins from time to time; and various lizards (but particularly the cameleon,) can produce a sudden change of colour.

*Q.* What is the food of reptiles?

*A.* Many live on vegetable substances; others on insects; some serpents prey upon animals and birds. Many reptiles can live without food for an astonishing length of time. A salamander has been kept for eight months without food; a tortoise can exist for one year and a half without eating.

*Q.* What else is remarkable about this class of animals?

*A.* They are extremely retentive of life. A frog will leap about after its heart has been taken out, and a tortoise live for months after the brain has been removed. They can also renew members which have been destroyed, as legs, a great portion of the eye, &c.*

*Q.* Are they long-lived?

*A.* Yes; a tortoise in captivity has lived for 100 years. They are also slow of coming to maturity. Frogs, in this climate, are incapable of producing young till their fourth year.

*Q.* Of what use is this class of animals to man?

*A.* Tortoises and their eggs afford food; their shells are used in the manufacture of various articles. The alligator's skin, when dressed, makes a superior kind of leather for saddles. On the other hand, many of them are noxious to man; as, the crocodile, and several species of serpents.

*Q.* How are reptiles divided?

*A.* They are divided into four orders; the first comprehending the tortoises; the second the lizard tribe, as the crocodile, lizard, gecko, and cameleon; the third the serpent tribe, including the boa constrictor, and the venomous and harmless serpents; the fourth order is the frog tribe, including frogs, toads, salamanders, the proteus, and syren.

*Q.* Can you describe the tortoise?

*A.* The tortoise is covered with a firm, arched shell, divided into many pieces. There are usually thirteen

* Blumenbach witnessed the reproduction of the whole head of a snail with its four horns, which was accomplished in six months' time. Four-fifths of the eye of a water-newt, extirpated by the same naturalist, was completely renewed in ten months, so as scarcely to be distinguished from the other eye.

plates in the middle, and twenty-four round the edges. The under shell, covering the belly, is smaller than the upper, with openings for the head, the tail, and the feet. Thus protected, the animal can bear, unhurt, even a loaded waggon to pass over it.

*Q.* Is the turtle of the same genus as the tortoise?

*A.* Yes; but a larger species. There is the hawk's-bill turtle, found in both Indies and in the Red Sea, which yields the best tortoise-shell; and the green turtle, which sometimes weighs eight hundred weight, and feeds solely on sea-weed; whence its flesh is so well-tasted and so much prized by epicures.

*Q.* Can you describe the crocodile?

*A.* The crocodile is the largest animal inhabiting fresh water, attaining to full thirty feet in length; notwithstanding which its eggs are scarcely the size of those of a goose. It is very common in the rivers of Africa, in the Nile and the Niger; and, when full grown, attacks men and other large animals. The cayman, another smaller species, is an inhabitant of the central parts of America.

*Q.* Can you describe the other species of lizards?

*A.* The common lizard is an active, little animal, which glides along swiftly, and is found over all Europe and in India,—its eggs shine for a time in the dark. The gecko is found in Egypt and the East Indies, and has a poisonous fluid between its toes, that it communicates to the substances over which it passes.

*Q.* What kind of animal is the cameleon?

*A.* The cameleon is a species of lizard, found in the East Indies, in Africa, and in Spain. It is indolent, and slow in its motions, lives among trees and hedges, and feeds on insects. Its lungs are very large, and, by expanding them, the animal can at pleasure make itself appear large or small; hence probably arose the saying that it feeds on air. Its eyes have this peculiarity, that they can be directed in different ways, the one upwards, the other backwards, and that with great rapidity. Its natural colour is greenish gray, which changes at times, particularly when it is

irritated. The reflection of coloured objects in its vicinity on the glittering scales of the living animal, probably gave origin to the fable that its colour is regulated by that of the bodies near which it is placed.

*Q.* What are the general properties of serpents?

*A.* Serpents have not any external members for motion, but move their long bodies, which are covered with scales, plates, or rings, in a waving manner. Many live in water, where they can swim easily on account of their very long and bladder-like lungs; others live on the ground, and some principally in trees. Their eggs are commonly connected together. They have large jaws, capable of swallowing entire animals larger than themselves. They have a slender, cloven tongue. Many are furnished with little bags in the front of the upper jaw, which pour out, along a groove in the teeth, an active poison.

*Q.* Can you describe the rattlesnake?

*A.* The rattlesnake is a venomous serpent, about six feet long, and of the thickness of a man's arm. It is distinguished from all others by a horny jointed rattle at the end of its tail, the number of pieces in which increases with the age of the animal. It is very inactive, and seldom climbs trees; but with its rattle it is said so to terrify birds, squirrels, and other animals, as to make them fall from the branches; hence they become its prey.

*Q.* What is the boa constrictor?

*A.* The boa is a large snake, above thirty feet long, but not poisonous. It breaks the ribs and other bones of antelopes, smears them over with its saliva, and then swallows them.

*Q.* Can you describe the adder?

*A.* The adder or viper is of a brownish colour, and a native of the principal countries of Europe. Its bite causes violent inflammation, but is rarely fatal. The horned adder is also a venomous snake; and the cobra de capello, with a large neck, which, when expanded, appears from behind like a pair of spectacles, is one of the most venomous of the tribe.

*Q.* Are there many species of the *rana*, or frog?

*A.* Yes; there are several, of which the *temporaria*, or common frog, is the most familiar. It lives in grassy meadows, among bushes and moist places. The common tadpoles are the young of frogs, which, after living for some time in water, acquire four legs, and then take to the land. After a warm shower, these young ones come forth in such vast numbers as to have given rise to the old tales of the raining of frogs.

*Q.* Can you describe the *esculenta*, or eatable frog?

*A.* They are of a greenish colour, and frequent ponds and marshes. The males croak very loud, particularly on fine evenings, and in so doing expand two large bladders placed at the angles of the mouth.

*Q.* What is remarkable about the *pipa*, or Guiana frog?

*A.* In this species the young spawn is hatched on the skin of the back of the female, where they grow into tadpoles, and, at the end of three months, having acquired four legs, they quit the mother's back.

*Q.* What is the tree-frog?

*A.* The *hyla arborea*, or tree-frog, is common in America, and in most parts of Europe except England. The clammy slime, with which it is covered like serpents, serves to support it among the leaves of the trees in which it lives. The males, which are distinguished by their brown throats, have a loud voice, and are heard croaking when the weather is about to change. In making this sound they expand the throat like a large bladder.

*Q.* Can you describe the *bufo*, or toad?

*A.* The toad is similar in shape to the frog, but a more loathsome-looking animal, with a brown, mottled, dusky, and shrivelled skin. There is no truth in the common assertion of the toad being poisonous. It is very retentive of life; and many well-authenticated cases have been mentioned, where living toads have been found in cutting through blocks of stone, wood, and other substances.

*Q.* What other animals belong to the frog tribe?

*A.* The newt, a small animal, with four feet and a

long tail, common in this country. The salamander, about a span long, the thickness of a man's thumb, and spotted with black and yellow; it is not poisonous, nor can it live in fire, according to the vulgar tradition.

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## Class IV.—FISHES.

*Q.* What are the characters of fishes?

*A.* Fishes inhabit the water; have fins, by which they move about in this element; are for the most part covered with scales; have red cold blood, and breathe by means of *gills*, or a series of flaps on each side of the mouth.

*Q.* Do they breathe air?

*A.* Not the air directly; but, by the particular construction of their gills, the air contained in water is absorbed into their blood, and thus answers the same purpose as the lungs of terrestrial animals.

*Q.* What is the general form of the body of fishes?

*A.* The form varies very much, but in general it is thick in the middle and gradually tapers towards the head and tail, being thus admirably adapted for cutting through the water with smoothness and facility.

*Q.* What is the form of the fins of fishes?

*A.* The fins are cartilaginous substances connected together by skin, and capable of being expanded or compressed something like a common fan. Flying fish have large and stiff fins, which serve the purpose of wings, and enable them to mount from the water up into the air.

*Q.* How are the different fins named?

*A.* They are named according to their position on the body;—such as the back or *dorsal* fins, the breast or *pectoral;* those on the belly or *abdominal* fins; those behind or the *anal;* and, lastly, the tail or *caudal* fins.

*Q.* Is there any thing else that aids the swimming of fishes?

*A.* They have an air-bladder contained within the

body, and communicating with the stomach, by filling or emptying which with air they can mount up or sink themselves downwards in the water.

*Q.* Are there not fish peculiar to fresh and to salt water?

*A.* Yes; but the salt-water fish are the most numerous. They are very active, and feed during the night; hence fishers choose the night for catching them.

*Q.* Do not fish often change their places of abode?

*A.* Yes; many kinds of fish change their haunts at certain seasons of the year. Various sea-fish, as the salmon, ascend the mouths of rivers and creeks to spawn; others, as the herring, migrate in immense numbers at particular seasons of the year, between the coasts of the west of Europe and north-east of America.

*Q.* What is the food of fishes?

*A.* Fishes live upon insects, worms, and also prey upon each other, the larger devouring the smaller, and the young fry even of the same species.

*Q.* What senses do fish possess?

*A.* The sense of smelling must be strong in fish, from the distance at which they discover a bait; but its mode of action is not well understood. Their hearing is also acute, and their eyes are peculiarly suited for vision in the element of water.

*Q.* How do fishes propagate their young?

*A.* By means of spawn, which they deposite among sand, weeds, &c. which in time, by the warmth of the sun, is vivified into innumerable small fishes.

*Q.* Are fishes prolific?

*A.* Yes, wonderfully so; the herring will produce in one season from 20 to 30,000 young, the carp 200,000, the flounder upwards of a million!

*Q.* To what uses are fish applied?

*A.* Fish form a valuable article of food to man, and a great trade is afforded by the herring and cod fisheries. Oil is also obtained from fish in abundance; isinglass is made from the sturgeon.

*Q.* How are fishes divided?

*A.* There are two great divisions of fishes,—the cartilaginous and bony.

*Q.* What are the peculiarities of the cartilaginous fishes?

*A.* Cartilaginous fishes have no bones, but a soft substance or gristle gives support to the body. They have also a peculiarity of the gills, many having no external gill-flap, but a number of breathing holes on each side. Under this division are ranged the lamprey, shark, skate, thornback, sturgeon.

*Q.* Can you describe the lamprey?

*A.* The lamprey in shape resembles the eel, and is about three feet long; the mouth is situated on the under side of the head, and it generally remains at the bottom of the water, fixed by its mouth to a rock or large stone. It is extremely tenacious of life.

*Q.* What sort of fish is the shark?

*A.* The *squalus*, or shark, is an extremely voracious animal, particularly numerous in the Atlantic Ocean. It weighs sometimes 10,000 lbs., and large animals have been found entire in its stomach. It has several rows of teeth in the jaws.

*Q.* Are the species of the *raia*, or ray, numerous?

*A.* Yes; there is a considerable variety. The ray is a broad fish which swims flat upon the water; it is furnished with spines sticking out from the body for its defence. These fish appear to have contributed, in a certain degree, to the fables of Syrens, by a likeness which the lower part of their head has to the human face. Although they produce but one egg at a time, they increase so rapidly, that the ocean in some spots actually swarms with them. Their eggs have a horny covering with four points, and are called sea-mice. To this genus belong the skate, thornback, &c.

*Q.* Can you describe the sturgeon?

*A.* The sturgeon is a very large fish, often weighing 1000 lbs.: its flesh is of excellent flavour, and the roe furnishes caviare. These fish, in swimming, often follow each other in a row, which has given rise to the fables of monstrous sea-serpents in the north.

*Q.* How are the osseous, or bony fishes, divided?

*A.* The bony fishes are divided, according to the form and position of the fins, and the structure of the gills, into four orders:—I. The *Plectognathi*, as the sun-fish.—II. The *Lophobranchi*, as the pipe-fish, pegasus, and trunk-fish.—III. The *Malacopterygii*, as the salmon, herring, sein-fish, pike, carp, loche, silurus, cod, turbot, sole, remora, eel.—IV. The *Acanthopterygii*, as the perch, mackarel, dolphin.

*Q.* Can you describe the sun-fish?

*A.* The sun-fish is of a very large size, often weighing five hundred weight; and has a broad deep body, with the lower half as it were cut away. It has its name from the phosphorescent light of its belly and sides, and is found in great numbers in the Atlantic and Mediterrancan.

*Q.* Can you describe the species of fish included under the denomination of *gadus?*

*A.* There is the *gadus æglefinus*, or haddock, found in all the northern European seas, but particularly on the coast of England and Scotland.—The *gadus morrhua*, or cod, a most valuable fish, found in the northern parts of the Atlantic and Pacific Oceans, and forming a most important fishery on the coasts of Labrador, Newfoundland, and the north of Great Britain; and the *merlangus*, or whiting, also found in the northern seas.

*Q.* What are the habits of the salmon?

*A.* It enters the fresh-water rivers from the sea, and ascends with great perseverance towards the source of the streams, where it deposites its spawn, and again returns to the ocean. The young fry are produced in great numbers during the early part of spring, and soon after also make their way to the sea. The *fario*, or trout, is found in the mountain-streams of the temperate regions of Europe and Asia: it seldom weighs more than two pounds, and varies much in colour and taste.

*Q.* Is the *clupea harengus*, or herring, an important fish?

*A.* Yes; it forms a most valuable article of diet in

the northern world. Though caught in vast numbers by man, and many animals, as the grampus, gull, and solan-goose, it multiplies with astonishing rapidity. Its great and regular migrations during summer along the coasts of Europe, particularly the Orkneys, Norway, &c. have given employment to many thousands of people since the twelfth century.

*Q.* What is the *gasterosteus aculeatus?*

*A.* It is the stickleback, or small fish, so common in our ponds and rivers. It is a pretty little active fish, and preys upon insects, worms, and the spawn of other fish.

*Q.* What are the peculiarities of the *anguilla*, or eel?

*A.* The eel is extremely tenacious of life; its heart, when removed fom the body, retaining its motion and irritability for 100 hours. The *gymnotus electricus*, or electric eel, is about six feet long, found in Surinam and Cayenne: it has the wonderful power of communicating an electric shock, which for the time overpowers its enemy.*

*Q.* Can you describe the dolphin?

*A.* The dolphin is a beautiful fish, very common in the Atlantic Ocean. It is remarkable for displaying a variety of colours when dying, as yellow, blue, purple, and red.

*Q.* What sort of fish is the mackarel?

*A.* The mackarel is a beautifully-coloured fish, and of a high flavour. It is found sometimes in large shoals in the Northern and Atlantic Oceans. The ancients made the dish called *garum* from this fish and the boneto.

*Q.* Can you describe the perch?

*A.* The perch is a finely-coloured fish, frequently found in our ponds; it is also common throughout Europe and the north of Asia.

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* Humboldt relates that in South America these eels are taken in the following manner:—Into the pools and rivers where the *gymnotus* frequents, the natives drive their horses and mules. On these animals the eels discharge their electric matter in repeated shocks, till, having completely exhausted themselves, they become the easy prey of their captors.

*Q.* Can you describe the flying fish?

*A.* The flying fish is an inhabitant of the tropical seas. The head is scaly, and it has no teeth; it is of a whitish colour, and the pectoral fins are so expanded as to enable it to mount up from the water and fly for a short distance. It can only fly as long as the fins keep moist; for when they become dry it has to dip into the water to moisten them before taking another flight.

## Division II.

## MOLLUSCA.

*Q.* What is the nature of molluscous animals?

*A.* Molluscous animals have a soft, jelly-like structure, without vertebrae, many having simply a covering of skin,—while others are incased in shells. They inhabit the land, fresh waters, and the ocean.

*Q.* Are these animals useful to man?

*A.* Some of them are eatable; as the oyster, limpet, muscle; while the shells of many afford the mother-of-pearl so much used in ornaments, and the pearls used in jewellery. The celebrated Tyrian purple dye was extracted from animals of this class.

*Q.* How are these animals divided?

*A.* They are divided into six classes, distinguished principally by their organs and their mode of progression.

*Q.* Can you enumerate these classes?

*A.* Class I. The *Cephalopoda;* as the cuttle-fish and nautilus.—Class II. The *Pteropoda;* as the clio, cleodore, and hyalea.—Class III. The *Gasteropoda;* as the slug, snail, and limpet.—Class IV. The *Acephala* (without heads); as the oyster and muscle.—Class V. The *Brachiopoda;* as the lingula and terebratula.—Class VI. The *Cirrhopoda;* as the barnacle.

*Q.* Can you describe the cuttle-fish?

*A.* The *sepia,* or cuttle-fish, is an animal with eight projecting arms or suckers, by which it adheres to any substance, and with which it grasps its prey. The

number of processes on these arms increases with the age of the animal, and, in some species, amounts to upwards of 1000. When any of these arms are cut off, or otherwise destroyed, it has the singular power of reproducing them. It is also furnished with a bag in the hind part of the body, containing a blackish fluid, which it can throw out at pleasure, and thus darken the water all around, and conceal itself from pursuers.

*Q.* Is this black fluid of any use?

*A.* It formed the ink of the ancient Romans, and is probably the principal ingredient of the Chinese or Indian ink.

*Q.* What sort of animal is the nautilus?

*A.* The nautilus is an animal which is furnished with a shell that resembles somewhat the hull of a galley or boat. It has also arms, somewhat resembling the cuttle-fish, and can elevate these with a thin membrane expanded between them, which serves the purpose of a sail; in this way it can sail along the surface of the ocean. The shell is divided into chambers, in the front one of which the animal lives, and it can make itself heavier or lighter at pleasure, by pumping water into or out of the others.

*Q.* What is the clio?

*A.* The clio is a small oblong animal, found in great numbers in the northern seas. The animals of this species form part of the food of the whale.

*Q.* Are there many species of the snail?

*A.* Yes; there are many. The *helices*, or shell snails, are protected by a light spiral shell, which they carry about with them, and are very common in gardens. The *helix pomatia* is eaten on the continent; and in many places, particularly Switzerland, a considerable trade is carried on in these snails about the period of Lent. In the same country there are also gardens in which they are fed in many thousands together.

*Q.* What are the varieties of the *limax*, or slug?

*A.* There is the black snail, the reddish brown, the *limax maximus*, or gray spotted, and the *limax agrestis*, or small gray without spots. They are all, particu-

larly in wet years, injurious to the produce of the earth, as they feed on the roots and young shoots of grain.*

*Q.* Can you describe the oyster?

*A.* The oyster is a well-known shell-fish, and is found in great abundance on the north-west coasts of Europe. It is contained within two oblong shells, which move on a hinge, and are opened or kept shut by the muscular fibres of the animal. An oyster has no head, and consists of a large stomach and intestines. It produces its young alive, which are also enclosed in shells. Oysters are in season in this country during all the months which contain the letter R. They are reckoned nutritious and very delicate food.

*Q.* What is the muscle?

*A.* The muscle is another animal with a two-valved shell. It is found in the ocean, and in fresh water also, and is used as an article of food.

*Q.* Is there any thing remarkable in the barnacle?

*A.* The barnacle is contained in a five-valved shell, which, with its inhabitant, hangs by one or more fleshy gut-like tubes or twigs attached to rotten wood, pieces of wreck, or similar substances. From some resemblance which these bear to the wings of a bird, the absurd fable arose, that the barnacle geese were not produced from eggs but from shells.

*Q.* Are there many other animals which inhabit shells?

*A.* Yes; a great variety of species, which are covered by shells of various forms, often beautifully spotted, and tinted with various colours. *Conchology*, or the classification and arrangement of shells, forms a distinct study of itself.

## Division III.

## ARTICULATED ANIMALS.

*Q.* What is the third great division of the animal kingdom?

*A.* The third division consists of those animals which

* Snails have not eyes at the points of the horns, as has been erroneously supposed.

have *articulated* or jointed bodies, and contains four classes:—I. The *Annelides,* or worms.—II. *Crustacea,* or shell-jointed animals.—III. The *Arachnida,* or spider tribe.—IV. The insect tribe.

*Q.* Can you describe the earth-worm?

*A.* The *lumbricus terrestris,* or earth-worm, has its body composed of numerous circular rings connected together, and moves along by the alternate contractions of these. It forms holes in the soft earth, where it remains during the day, and, after a shower in a mild evening, comes forth in search of food, which chiefly consists of young vegetables. These worms may be cut into many parts, and each separate part will preserve life and become another worm.

*Q.* What is the *lumbricus variegatus?*

*A.* It is a beautifully-coloured animal, about an inch and a half long, and lives in ditches, graves, &c. It, as well as the common earth-worm, has great powers of reproduction. A twenty-sixth part of the animal cut off is formed, within a few months, into a perfect one of its original length. Its natural increase is effected either by producing young ones, or casting them off like buds.

*Q.* Can you describe the leech?

*A.* The *hirudo,* or leech, is an animal whose internal structure consists of a number of cells, divided by a thin membrane, but all communicating together, and forming one large stomach. Its mouth is furnished with three sharp-pointed darts, with which it pierces the skin, and sucks out the blood till it is completely filled. Leeches are found in pools and lakes, and can subsist for a long period on water alone. From their great use in medicine, they are an object of considerable trade. The common leech, found in the pools of this country, is called the horse-leech, and will only fasten on horses and cattle.

*Q.* What are the most remarkable animals in the crustaceous class?

*A.* The lobster, crab, shrimp, monoculus, &c.

*Q.* Can you describe the lobster?

*A.* The lobster is an animal incased in a shell, or outward covering, like a coat of mail, of a dark-brown colour, which changes to red on being boiled. Lobsters are found in great plenty in the northern seas, and inhabit deep clear water at the foot of rocks which hang over the sea. They have the power of springing backward in the water to a most astonishing distance into their haunts in the rocks. Their food consists of dead animal matter, and it is said also of sea-weed.

*Q.* Are they prolific?

*A.* Amazingly so; they breed during the early summer months, and produce upwards of 12,000 eggs.

*Q.* Are crabs similar to lobsters?

*A.* Yes; in their habits, though differing somewhat in the form of their bodies.

*Q.* What are the habits of the crab?

*A.* The crab is commonly found under deep ledges of rocks, and is frequent in the northern seas, on the coasts of Scotland and Norway. It lives to the age of twenty years, and changes its shell yearly.

*Q.* What else is peculiar about the crab?

*A.* It contains teeth in its stomach, which, together with the stomach itself, are also annually renewed. The two calcareous substances, found in summer at both sides of its stomach, and commonly called *crab's eyes*, are the principal materials from which the new shell is produced. The accidental loss of legs and claws is speedily repaired in this species of animals by their surprising power of reproduction. They, even of themselves, cast off their claws and legs, if they are bruised or touched with a hot iron. The lobster occasionally does the same thing after heavy thunder.

*Q.* What is the land-crab?

*A.* The *cancer ruricola*, or land-crab, is found in the West Indies and neighbouring parts of the world. These animals live in holes under bushes, but, in spring, collecting in great numbers, they make an annual journey to the seashore to lay their eggs.

*Q.* Where is the sand-crab found?

*A.* The *cancer vocans*, or sand-crab, is an inhabit-

ant of the East Indies and North America. The male is remarkable for the inequality of its nippers, of which one is not much larger than one of the animal's legs, whilst the other, on the contrary, is so heavy that, when about to move, the animal is obliged to place it on his back.

*Q.* Can you describe the shrimp and prawn?

*A.* The shrimp and prawn very much resemble the lobster in form, but are much more diminutive animals. They are found in great numbers, sporting among the rippling waves, on the sandy beaches of the northern seas. They are reckoned a great delicacy, and are sent in considerable quantities to the London market.

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## Class III.—ARACHNIDA, OR SPIDER TRIBE.

*Q.* What is comprehended in the class arachnides?

*A.* The spider genus, of which there are numerous species, pertains to this class. They prey upon insects, and even upon each other. For entangling flies, the most of them weave webs of a very curious structure, produced from a gummy substance contained in their bodies. The *aranea domestica*, or house-spider, with its circular web, is well known. The *aranea obtectrix* is the small field-spider, or gossamer, whose light silken threads are so frequently seen glittering in the fields of a sunshiny day. And some of the spiders of warm climates are of such a size as, when the legs are extended, to cover the hand.

*Q.* What is the tarantula?

*A.* The tarantula is a spider which is found in Apulia, and lives in small holes in the ground. The stories of its extremely poisonous nature, and of the cure of patients bit by it by means of music, are entirely fabulous.

*Q.* Can you describe the scorpion?

*A.* Scorpions have a considerable resemblance to crabs in their form and mode of life,—and, like them, they cast their shell yearly. They feed on insects.

In tropical climates their sting is dangerous,—in Europe rarely so.

*Q.* What is the mite?

*A.* The *acarus domesticus*, or mite, is a very small animal, found in cheese, flour, ham, &c. It is born with three pairs of legs, a fourth pair appearing afterwards. It is very retentive of life,—a mite having remained for three weeks glued to the point of a pin without food.

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## Class IV.—INSECTS.

*Q.* What is the next class of articulated animals?

*A.* Insects form the next class, and constitute a very numerous division of animated existence. By the labours of entomologists, upwards of 40,000 distinct species have been enumerated and described.

*Q.* Whence comes the denomination of insect?

*A.* These animals are so called, because, in the greater proportion of the class, the body of the animal seems divided or cut into a number of parts.

*Q.* What other peculiarities occur in the form of insects?

*A.* They have no bones; but, as a substitute for these, many insects have a shell-like covering, which protects and gives firmness to the body,—and jointed scales on the legs, resembling a coat of mail. Insects, too, have seldom less than six legs, and some have from fifty to one hundred.

*Q.* Have insects the external senses?

*A.* Yes; they appear to have the senses of hearing and smell. The *antennæ*, or feelers, which project in front of the head, serve as sensible organs of touch, and they are well supplied with eyes, for the purpose of seeing.

*Q.* Is there any thing peculiar in the eyes of insects?

*A.* Most winged insects have large, round eyes, curiously constructed, and divided into thousands of minute points or angles, by which, it is probable, they see objects much magnified, and at a considerable dis-

tance. Other insects again have numerous small eyes or points, which are calculated to view near objects. The eyes of a few insects are capable of being moved in several directions.

*Q.* Is there any thing peculiar in the internal form of insects?

*A.* Insects have no heart, but a large canal running along the back, supposed by some naturalists to circulate a colourless blood. They are devoid of lungs, and inhale the air by means of numerous small tubes, which open on the sides, called *spiracles.*

*Q.* Where are the general abodes of insects?

*A.* Insects are found in almost all situations,—in the air, in the water, on the earth, and on the bodies of other animals.

*Q.* How are insects produced?

*A.* Insects are generally produced from eggs deposited by the parent insect.

*Q.* Do not insects often change their forms?

*A.* Yes; many insects undergo remarkable changes.

*Q.* What are these changes?

*A.* When the insect is first hatched from the egg, it is called a *larva*, or grub. In this state it feeds voraciously for some time, and acquires speedily a great increase of size; from this state it changes into the *pupa* or *nympha*, which is generally covered with a hard horny slough; after remaining in this condition for a stated period, it bursts its covering, and comes forth a winged insect, called *imago*. It then lays eggs for a future offspring, and having enjoyed life in this new form for a brief period, dies.

*Q.* What are the habits of insects?

*A.* Many insects live solitary; while others, again, assemble into communities, as bees, wasps, and ants, and join together in labour for the public benefit.

*Q.* Do insects show much ingenuity in their habits?

*A.* Yes; they are endowed with very surprising instincts, which is exemplified in the care that they take in providing for their future young, in the singular manner in which they build their nests,

and in the large cities, as it were, which the hive-bees, the wasps, and the ants, construct with wonderful labour.

*Q.* How are the various sounds of insects produced?

*A.* The humming sound of insects is produced by a quick vibration of their wings; the chirping of crickets, grasshoppers, &c., by the beating of their feet, or mandibles, against their hard bodies. No sounds proceed directly from the mouth, as in the more perfect animals; for insects, not breathing by the mouth, cannot have any proper voice.

*Q.* What are the uses of insects?

*A.* The immediate use of insects to man is not very great; but they, nevertheless, form an important part in the economy of Nature. Among the useful articles they afford to man may be enumerated the honey and wax of bees; cochineal and galls from two insects that live in trees; silk from the silk-worm, gum-lac from an Indian species of insect; and Spanish flies for the formation of blisters used in medicine.

*Q.* What are the other uses of insects?

*A.* Insects form the principal food of many useful animals, as birds, fishes, &c.; they also devour carrion and innumerable other substances, which, if allowed to turn putrid on the surface of the earth, would prove highly noxious to man.

*Q.* Do not insects also produce injury?

*A.* Yes; locusts sometimes eat up the whole vegetation of a country, causing great famine; various grubs and caterpillars destroy corn, trees, and other useful plants; moths eat into woollen cloths and furs; and many kinds of insects infest cattle, horses, and other animals.

*Q.* How are insects divided?

*A.* They are divided into 12 orders, distinguished principally by the number of their feet and wings.

*Q.* Enumerate the first four orders.

*A.* The 1st is the *Myriapoda*, having numerous feet, as the centipede, julus, &c.—The 2d, the *Thysanoura*, having appendages to their tails; as the *Lepis-*

*ma produra.*—The 3d, the *Parasites ;* as the louse.—The 4th, the *Suckers ;* as the flea.

*Q.* Is the *pediculus*, or louse, a common insect ?

*A.* It is perhaps the most extensively diffused of all animals. Most of the larger animals and birds have lice of a peculiar kind, and even fishes and insects are infested with them.

*Q.* Is the *pulex*, or flea, also common ?

*A.* Besides man, it is found on the dog, fox, cat, hare, squirrel, hedge-hog, &c. It is not met with in the extreme north of America, and but rarely in certain West India islands. It lives at least six years.

*Q.* What is the fifth order ?

*A.* The fifth order is the *Coleoptera*, or beetles, insects which have a horny covering or case for the wings, called *elytra*. The larvæ, or young, are generally hatched in holes under ground, or in wood.

*Q.* Are there many species of beetles ?

*A.* Yes ; among the principal are, the Hercules beetle found in Brazil, of a greenish colour and large size, the larva being as thick as the thumb. The stag beetle, the largest British species. The *scarabæus sacer*, or sacred beetle, venerated by the Egyptians, and found frequently represented on the stones of their temples. The *lunaris* and *stercorarius*, beetles commonly found in our meadows, and heard humming about in the summer evenings, and that roll up pellets of dung, which they place in holes, wherein they deposite the eggs of their future offspring. The cock-chafer, a common insect, though rare in Scotland, which, remaining in its larva state for years, so frequently destroys the roots of corn. The *vespillo*, or carrion-beetle, six of which will drag a mole, or other small animal, to a hole for the purpose of depositing their eggs in the carcass. The *coccinella*, or lady-bird, a gay and pretty insect ; with many others.

*Q.* Can you describe the glow-worm ?

*A.* The glow-worm is a brownish oblong insect, found in woods, heaths, and grassy banks, in the months of June and July. The female is without

wings, but has the power of emitting a luminous phosphoric light, which seems intended to attract the male.

*Q.* What is the sixth order?

*A.* The sixth order is the *Orthoptera*, having straight wings, as the locust, grasshopper, mole-cricket.

*Q.* Can you describe the locust?

*A.* The locust is a most destructive insect, which has sometimes appeared in vast numbers in Europe, and caused general scarcity and famine by consuming every species of vegetation. It is a native of Asiatic Tartary, and also of America. In Arabia and North Africa locusts are used as food by the natives.

*Q.* What is the grasshopper?

*A.* The *gryllus*, or grasshopper, is a well-known insect, found in meadows and corn-fields, of which there are many species. It feeds on leaves and grass; has great muscular power of the hind legs, by which it takes long leaps, and produces a chirping sound by beating its legs and wings against the horny covering of its sides.

*Q.* Is the cricket of the same genus?

*A.* Yes; the *gryllus domesticus*, or cricket, is found in crannies about the hearth, and about ovens: its chirping evening cry is well known.

*Q.* What is the seventh order?

*A.* The seventh order consists of the *Hemiptera*, or half-winged; among which is the *fulgora laternaria*, or lantern-fly, remarkable for its large round head, which shines in the dark so bright that the natives of Guiana use them as lanterns. The *cicada spumaria*, or froth-worm, seen on the leaves of willow and other shrubs, surrounded by a frothy juice, within which it lies hid, vulgarly called cuckoo's spittle. The *cimex*, or bug, found in houses, a most troublesome animal; and the *aphis*, or plant-louse, a small greenish-coloured insect, found among the leaves and buds of plants in great numbers.

*Q.* What is there remarkable about the aphis?

*A.* These insects, which feed in great numbers

on the succulent stems and leaves of rose-bushes and many other plants, are often found in the same species with wings and without wings. All the young produced throughout the season are females, and it is only towards the end of the summer that male young are produced.

*Q.* What is the eighth order?

*A.* The eighth order is called *Neuroptera*, having net-work wings, as the dragon-fly, a large fly which is often seen hovering in the air, with broad glittering wings, and which preys upon other smaller insects; and the *ephemera*, or day-fly, which lives in the water some years as a grub, but, leaving that element, only enjoys existence for a few hours as a perfect fly. Myriads of these slender-made insects, with four brownish wings, make their appearance in the middle of summer, hovering above rivers and streams.

*Q.* What are the caddis-worms?

*A.* The genus *phryganea*, or caddis-worms, in the larva state, live in the water, generally in running streams, and construct curious habitations, by attaching to their bodies, by means of a gluey substance, small stones, shells, and pieces of straws and rushes. Thus defended from their enemies, they crawl about at the bottom of the streams, and, by throwing off or adding additional stones and shells, they can render themselves heavier or lighter in the water at pleasure.

*Q.* What is the ninth order called?

*A.* The ninth order is called *Hymenoptera*, consisting of insects having membranous wings, and including a very curious and interesting class, as the bee, wasp, ant, &c.

*Q.* Can you describe the economy of bees?

*A.* Bees are insects which assemble together and join their labours for the common good. A hive of bees generally contains 10,000 individuals or upwards, and consists of a queen, or female bee, who is the common parent of the whole,—of a certain number of drones, or male bees,—and the remainder of neuters, or working bees, that do all the labour of the hive, build up the

combs, collect honey, and attend upon and feed the young grubs with suitable nourishment.

*Q.* What is the form of the honey-comb?

*A.* The honey-comb is a six-sided prism, and is found to be the most suitable form to save room and materials, at the same time combining sufficient strength. These combs both serve to contain the young bees in their state of grubs or nymphæ, and also to store up honey for a winter provision.

*Q.* What substances do bees collect from plants?

*A.* They collect *pollen*, or bee-bread, which is the yellow dust from the anthers of flowers, and which they carry home in little pellets on their thighs;—wax, which is produced from food, the bees take into the stomach and digest;—honey, which is the natural product of the flowers;—and *propolis*, a gummy substance, which they use as a sort of plaster in their hives.

*Q.* What is the meaning of the swarming of bees?

*A.* When the community of bees become too numerous, the old queen, with a certain number of followers, quits the hive, and founds a new community. A young queen succeeds to the sovereignty of the hive; and if there be more than one queen, a fierce battle ensues till victory decides in favour of the most powerful. In these battles the common bees take no part, although on all other occasions they are most loyal subjects, paying the utmost respect to their queen.

*Q.* Is the wasp similar to the bee?

*A.* Yes, in many respects; wasps also live in communities, and construct nests containing many cells of a paper-like substance, composed of the gums of trees: both these insects are provided with stings for their protection.

*Q.* Can you describe the ant?

*A.* Ants, of which there are several species, as the red, the black, the white, or *termites*, are singularly active and industrious animals, living like bees in a social community. They are extremely careful of their young; and whenever their abodes are disturbed,

each one seizes a young maggot in its mouth and runs to conceal it. Ants construct habitations of mud, clay, and pieces of wood and straw; they live chiefly on animal matter and the juices and fruits of plants, and do not lay up a winter store, as has been erroneously supposed. Ants often have furious battles, when prisoners are taken, and kept afterwards as slaves.

*Q.* What are the *termites*, or white ants?

*A.* They are a species found in Africa; they assemble in immense numbers, and build conical habitations of clay ten or twelve feet high. The queen, or female ant, is of immense size, and can lay 80,000 eggs within 24 hours.

*Q.* What is the ichneumon?

*A.* The ichneumon is a fly furnished with a long piercing apparatus, by which it penetrates the flesh of other insects and larger animals and deposites its eggs; these eggs being hatched into living worms, prey upon the bodies in which they are enveloped,—and, in the case of caterpillars and other insects, totally consume them. In this way they are the means of preventing the prodigious increase of some insects.*

*Q.* What distinguishes the tenth order?

*A.* The tenth order, *Lepidoptera*, or those having scaly wings, includes the various moths and butterflies, and constitutes the gayest and most showy class of insects.

*Q.* Are there many species of the *papilio*, or butterfly?

*A.* Yes; a great variety, distinguished principally by the colour and form of the wings, which are white, blue, golden and silver coloured, and often beautifully variegated. The butterfly is first a grub or caterpillar, then it changes into the *nympha* state, and lastly becomes a winged insect; in this stage it lays its eggs for a future progeny, and then dies. Butterflies fly about during the day.

*Q.* What are the moths?

* It is remarkable that the larva of the ichneumon-fly carefully avoids eating into the vital parts of the animal on which it feeds, until the very last period when it requires such food; by this means its victim is kept alive, and affords nourishment until the ichneumon passes into its pupa state.

*A.* Moths somewhat resemble butterflies; the caterpillars from which they proceed are mostly hairy. In their *pupa* state they are enveloped in a *cocoon*, or covering of gummy matter, or of silk: moths generally fly during the evening and night.

*Q.* What is the *phalæna mori?*

*A.* It is the silk-worm, first introduced into Europe in the time of Justinian. It remains in the caterpillar state six or seven weeks, and feeds on the leaves of the mulberry-tree; after changing its skin four times, it spins its cocoon of a white or yellow colour, weighing 2½ grains, and consisting of a thread 900 feet long. It remains three weeks in this cocoon, and then makes its escape as a moth. The female is very bulky, and lays about 500 eggs, which are hatched in the spring, about the time that the white mulberry comes into leaf. This insect is originally a native of China, but thrives well in Europe, and also in North America.

*Q.* Can you describe the *phalæna vinula*, or puss-moth?

*A.* This larva, or caterpillar, has a remarkable appearance, on account of its short thick head, and two prickles at the tail. When attacked, it defends itself by ejecting an acrid fluid from an opening on the under part of the neck. It feeds on the leaves of the poplar and willow; and is found sometimes of the size of the little finger, beautifully spotted yellow and green.

*Q.* Where is the larva of the *cossus ligniperda* found?

*A.* It lives on the elm and oak, but principally on the willow, which it perforates in such a way as to cause the tree to break over with a moderate wind. The injury it produces is rendered greater by its existing as a caterpillar three years before changing to the pupa state,—an unexampled circumstance in this class of animals.

*Q.* Are there many other species of moths?

*A.* Yes, a great many; one of the most destructive is the clothes-moth, found so frequently in our houses, the larva of which feeds on woollen stuffs, eating out large holes in clothes, &c.

*Q.* What are the remaining orders of insects?

*A.* The eleventh order, or *Rhipiptera*, have fan-like wings, as the *xenos* and *stylops;* the twelfth order, or *diptera*, have two wings, as the gnat, house-fly, &c.

*Q.* Can you describe the gnat?

*A.* The gnat exists in its larva state in rivers and pools, and may be seen in warm summer weather floating about like a small worm, with a tail and numerous threads spreading out from its body. After a certain time it comes to the surface of the water, bursts the slough which envelopes it, and mounts up into the air a light and slender fly. It enjoys life in this state for a brief period, deposits its eggs in the water for future young, and then dies, or becomes the prey of fishes and other animals.

*Q.* What is the mosquito?

*A.* Mosquitoes are the gnats of warm climates: their stings produce violent inflammation and pain, and from their vast numbers they form a real plague.

*Q.* Is the house-fly a very prevalent insect?

*A.* The *musca domestica*, or house-fly, is found in almost every part of the world; and in some places, as Otaheite, New Holland, and the Cape, in vast and troublesome numbers. The female lays upwards of 80 eggs. The flesh-fly brings forth living maggots, which arrive at maturity in an incredibly short space.

*Q.* What are the uses of these flies?

*A.* They serve an important purpose in ridding the earth of putrid matter; and their so suddenly coming to maturity is a beautiful provision in nature, otherwise the food on which they live would be dissipated by putrefaction. One fly alone will produce 20,000 young maggots; these in 24 hours will feed so as to increase their bulk and weight two hundred times; in five days they arrive at their full growth and size, and are ready again to deposite eggs for future young in the first carcass that presents itself. Such is the rapidity of the production of these flies, and their voracity, that Linnæus has remarked that three of them will devour a dead horse as quickly as would a lion.

*Q.* Can you describe the gad-fly?

*A.* The *œstrus*, or gad-fly, resembles somewhat the hive-bee, and forms a source of great annoyance to horses and cattle. It deposites its eggs about the shoulders and legs of the horse, from whence that animal licks them with his tongue, and they then pass into the stomach; here they remain fastened in great numbers to the inner coat of the stomach, until arriving at maturity, they pass out as maggots, and afterwards become flies.

## Division IV.

## ZOOPHYTA.

*Q.* What is the fourth great division of animals?

*A.* The fourth and last division of animals consists of those in the lowest grade of organization, having a structure so simple as to raise them little above plants which simply vegetate, and descending to such a diminutive size in some species as not to be perceptible to ordinary vision.

*Q.* How are the zoophytes divided?

*A.* They are ranged into five classes;—I. The *Echinodermata*, or spine-skinned; as the *star-fish* and *cchinus*.—II. The *Intestina*, or intestinal animals; as the *tœnia ascaris* and *hydatid*.—III. The *Acalephœ*; as the sea-anemony and *medusa*.—IV. The *Polypi*, or many-feeted; as the *hydra*, *coralline*, and sponge.—V. The *Infusoria*, found in animal and vegetable infusions; as the wheel-animal and *proteus*.

*Q.* Can you describe the *echinus*, or sea-hedgehog?

*A.* The shell of the sea-hedgehog, which in texture resembles that of the crab, is of a round figure, and studded with a number of moveable prickles. Besides these it is also furnished with a number of radii, or organs of motion, which it shoots out and retracts at pleasure.

*Q.* What is the *asterias*, or sea-star?

*A.* The body of the asterias is depressed or flattened, with the mouth in the middle, and the organs of mo-

tion similar to those of the echinus. It moves, however, much more slowly, like the snail. The radii, or rays, spreading out from the body, have suggested the name of sea-star. Many of the species are noxious to oysters, and others to cod-fish.

*Q.* What is the *medusa?*

*A.* The medusa is a very inactive and singularly-formed animal, on the body of which 82,000 extremities have been reckoned. It is found in many of the northern seas, and also in the Caspian Sea.

*Q.* What are the animals which form the corals?

*A.* There are a variety of these animals, which are of minute size and simple structure, but which, by their vast numbers and great powers of reproduction, in time accumulate immense reefs of coral substance, ramified together like the branches of trees. In the southern seas large rocks and islands extending for many miles have been raised out of the deep by these little animals.

*Q.* What is the sponge?

*A.* The sponge is a marine production, supposed also to be formed by minute animals.

*Q.* What is meant by intestinal animals?

*A.* They are a class of worms which inhabit the bodies of other animals, and are found in the intestines, livers, and even the brain of many creatures.

*Q.* Are these a distinct kind of animals, or are they to be found inhabiting the earth?

*A.* They are quite distinct, and only to be found living in the bodies of other animals: they are a most numerous class also, and there are species peculiar to man, to quadrupeds, birds, fishes, and even to the most diminutive reptiles; for such is the wonderful fertility of nature, that not only the earth, the air, and the water are fully peopled, but even the bodies of animals become the haunts of other living beings.

*Q.* Can you describe the *hydra,* or animals of the polypus kind?

*A.* These celebrated animals are of a jelly-like and semitransparent structure. In their natural state the body and arms are extended; but when disturbed and

taken out of the water they contract into a shapeless mass, and are therefore not easily detected. They are found in ponds and gently-running streams, from the commencement of spring until autumn, attached to water-plants, shells, and other substances. They are of extremely simple form, the body being merely a hollow bag or stomach, and provided with arms for taking its prey.

*Q.* How do they produce their young?

*A.* They propagate during summer by shooting out living young ones like buds, which buds frequently detach others previous to their separation from the parent stem. There is, however, a beautiful provision made for the continuance of the species during the cold of winter; at the approach of this season they have the power of laying eggs, whence a new progeny is brought forth in the spring.

*Q.* What else is remarkable in these animals?

*A.* When divided into six or even more pieces, each piece is within a few days converted into a perfect animal. By dividing the head or hind part of the body lengthwise, the number of animals may be increased at pleasure. Several may be stuck together, and in this, or other ways, formed into singular and monstrous groups. They may be turned inside out like a glove; when included in a noose of hair, in proportion as the loop cuts its way through them, the divided parts are reunited.

*Q.* What is the meaning of infusory animals?

*A.* It is found that in many vegetable infusions, in old paste, and in some of the animal fluids, a number of extremely minute moving bodies abound, which have been examined and described by the aid of powerful microscopes, and some of them proved beyond doubt to be living animals. They are commonly called *animalcules.*

*Q.* Can you describe some of these?

*A.* The *rotatòria,* or wheel-animal, exists in stagnant waters and various infusions. It swims very actively, and changes its form almost every moment. It

is capable of reviving by the contact of a drop of water after having lain in the dry state for a year apparently dead, and this may be repeated ten or twelve times. The *vibrio aceti* is found in vinegar and paste. The *volvox globator* is a little ball of yellow, green, or other colours, which, without having any evident organs of locomotion, moves and turns actively in water. When full grown the progeny can be distinguished in its body even to the fourth generation. Lastly, the milt of a carp, two pounds weight, has been calculated to contain upwards of two hundred and fifty-three thousand millions of spermatic animals.

*Q.* What is the meaning of the term spontaneous production?

*A.* It has been the opinion of some that the more minute and simple species of animals are produced from the substances in which they are found without springing from a parent animal of the same species.

*Q.* Is there any probability attached to this supposition?

*A.* No; the whole analogy or resemblance of other larger and well-known animal productions is against such opinions. You have seen that from the most perfect animal down to very minute species, the rule of nature is, that every young animal derives its existence directly from a parent animal either by a living birth, by eggs, by spawn, or by a direct shoot or bud from the parent, as was mentioned of the polypus: no such thing as spontaneous production has ever been actually witnessed, nor does it seem at all to be necessary, but, on the contrary, quite superfluous in the economy of nature.

# TABULAR VIEW

OF THE

PRINCIPAL DIVISIONS OF THE ANIMAL KINGDOM.

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## VERTEBRATED ANIMALS.

I. *Vertebrata, or Vertebrated Animals.*

Class 1. Mammalia.
2. Birds.
3. Reptiles.
4. Fishes.

## INVERTEBRATE ANIMALS.

II. *Mollusca, or Soft Gelatinous Animals.*

Class 1. Cephalopoda.
2. Pteropoda.
3. Gasteropoda.
4. Acephala.
5. Brachiopoda.
6. Cirrhopoda.

III. *Articulata, or Jointed Animals.*

Class 1. Annelides.
2. Crustacea.
3. Arachnida.
4. Insecta.

IV. *Radiata, or Radiated Animals.*

Class 1. Echinodermata.
2. Entozoa.
3. Acalephæ.
4. Polypi.
5. Infusoria.

# LIST OF WORKS ON ZOOLOGY.

Those printed in Italics will be found particularly useful.

Aristotle's Historia Animalium, 3 vols.
Ray's Synopsis Animalium, 3 vols. 8vo.
*Buffon's Natural History, General and Particular*, 8 vols. 8vo.
*Cuvier's Animal Kingdom, by Griffiths.*
*Blumenbach's Manual of Natural History, by R. T. Gore*, 1 vol. 8vo.
Linnæus' System of Nature, by Turton, 4 vols. 8vo.
*Stark's Elements of Nutural History*, 2 vols. 8vo.
Pennant's British Zoology, 4 vols. 8vo.
———— Arctic Zoology, 2 vols. 4to.
———— Indian Zoology, folio.
Fleming's Philosophy of Zoology, 2 vols. 8vo.
———— British Animals, 8vo.
Shaw's General Zoology, 14 vols. 8vo.
Temminck, Manuel d'Ornithologic, 2 vols. 8vo.
Willughby's Ornithology, folio.
———— Fishes, folio.
*Bewick's History of British Birds*, 2 vols. with wood-cuts.
Wilson's (Alexander) American Ornithology, 9 vols. 4to, beautiful engravings.
*Wilson's (James) Illustrations of Zoology, 9 parts, drawn and beautifully coloured after Nature.*
Selby's British Birds, 2 vols., beautiful engravings.
De Lacépède Histoire Naturelle des Poissons, 5 vols. 4to.
Latreille, Reaumur, De Geer } French Works on Insects.
*Kirby and Spence's Introduction to Entomology*, 4 vols. 8vo.
*Donovan's Natural History of British Insects*, 8vo.
*Samouelle's Introduction to British Insects*, 8vo.
*Huber on Bees*, 8vo.
Lamarck, Système des Animaux sans Vertèbres.
Montagu's Testacea Britannica, 2 vols. 4to, plates.
Brown's Illustrations of the Conchology of Great Britain and Ireland, 1 vol. 4to, plates.

# GLOSSARY OF SCIENTIFIC TERMS.

Abdomen, the belly or lower part of the body.

Absorb, Absorption. The minute mouths of the vessels of the skin and other parts of the body have the power of taking up or absorbing fluids, air, &c.

Amphibious, animals which live both in the water and on land.

Antennæ, the jointed horns projecting from the head of insects.

Articulata, those animals having a jointed structure, but no proper bones.

Atmosphere, the air surrounding the earth.

Bimana, two-handed.

Calcareous, composed of lime or chalk.

Carnivora, flesh-devouring animals.

Cartilaginous, gristly, of a consistence between flesh and bone.

Cavity, a recess or hollow.

Class, a term designating one of the principal divisions of the animal kingdom, including orders, genera, and species.

Claw, a hard or horny substance on the extremities of the toes of birds and other animals.

Cocoon, the silky or gummy covering of the nymphæ of several animals.

Corporeal, belonging to the body.

Degenerate, to fall off, to change one's nature.

Digestion, the process by which food is converted into nourishment for the body.

Digitigrade, animals which, in walking, only tread with their toes or the extremity of the foot on the ground.

Edentata, toothless animals.

Enamel, the hard outer covering of the teeth.

Fin, an oar or organ of motion, with which animals that move in water are furnished.

Genus, plural genera; a family, or kind of animals having a general resemblance to each other, but containing different species.

Gills, a series of flaps or thin folds on each side of the head of fishes, and some other animals, through which water constantly passes; the air which it contains being absorbed or taken into their blood.

Gizzard, the strong muscular stomach of birds.

Heart, a strong, hollow

muscular substance, which circulates the blood through the blood-vessels of the body.

Herbivora, those animals which feed on grasses and herbs.

Imago, an insect when it has become a winged fly.

Infusoria, animals found in infusions of vegetables and other liquids.

Instinct, the power which guides animals in their various operations.

Intestinal worms, animals living in the intestines of other larger beings.

Irritability, a contracting or expanding of fibres, on the application of any stimulus.

Larva, grub, or worm, the first stage of an insect before it becomes a fly.

Lungs, substances consisting of numberless cells, through which the air is breathed that contributes to the life of the body.

Mammalia, those animals which have teats and which suckle their young with milk.

Mandibles, the two upper lips of insects.

Masticate, to chew the food.

Maxillæ, or jaws.

Migration, the flight of birds from one country to another at certain regular periods of the year.

Mollusca, those animals having no bones.

Muscles, the fleshy substance on the bodies of animals, by which they move their limbs and bodies.

Nerves, small white cords proceeding from the brain and going to every part of the body, by which sensation is communicated.

Nympha, pupa, or chrysalis, the second stage of insect life.

Order, a term in Zoology, which includes genera and species.

Organized, bodies having vessels and parts necessary for life.

Oviparous, animals that bring forth their young from eggs.

Pachydermata, animals having thick skins.

Palpi, projections from the lower jaws of insects.

Phosphorescent, producing a pale light in the dark.

Plantigrade, those animals which, in walking, place the whole lower division of the leg on the ground.

Proboscis, a moveable tube attached to the head of several animals, particularly insects.

Process, a part projecting out from the main body.

Progression, the act of walking or moving.

Pupa, or nympha, the second stage of insect life.

Quanrumana, having four hands.

Quadruped, having four feet.

Reptile, a name applied to the class of serpents, frogs, tortoises, &c.

Rete Mucosum, or black network, between the outer and inner skin of the negro.

Rodentia, animals that gnaw with the fore teeth.

Ruminantia, animals which chew the cud.

Semitransparent, half transparent bodies that allow a small quantity of light to pass through them.

Sensation, the power of feeling, seeing, hearing, &c.

Skeleton, a frame of bones.

Species, belonging to the same genus or family, but having distinct characters.

Stomach, a bag for receiving the food, and in which digestion is carried on.

Thorax, the chest or upper part of the body.

Torpidity, a state of sleep that animals fall into during winter, in which they neither eat, nor move, nor have the usual warmth of body.

Unorganized, matter without any parts or organs necessary for carrying on life.

Vertebræ, the spine, or back bones.

Vertebrata, those animals having a spine, or series of small bones composing the back.

Windpipe, or trachea, the passage leading from the mouth to the lungs.

Zoology, a discourse on animals.

Zoophyta, animal plants and radiated animals.

THE END.

Oliver & Boyd, Printers.

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