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A HISTORY OF THE EARTH  
AND ANIMATED NATURE.

BY OLIVER GOLDSMITH.

WITH COPIOUS NOTES;

And an Appendix,

CONTAINING EXPLANATIONS OF TECHNICAL TERMS, AND AN OUTLINE OF  
THE CUVIERIAN AND OTHER SYSTEMS,

BY

CAPTAIN THOMAS BROWN,

F.L.S., M.W.S., M.K.S.

VOL. IV.—PART II.

A. FULLARTON AND CO.,  
EDINBURGH, GLASGOW, AND LONDON.

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1840.



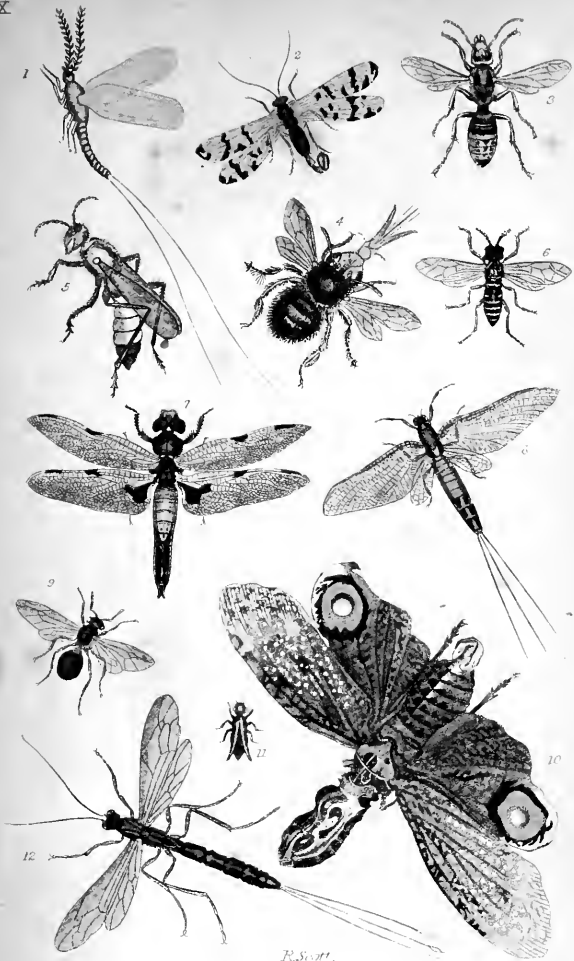
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R. Scott.

1 Coccus. 2 Panorpa communis. 3 Crabro Hornet Wasp. 4 Apis mellifica. 5 Sphecia viatica. 6 Tentredo Scrophulariae. 7 Dragon Fly. 8 Ephemera Vulgata. 9 Cicada. 10 Lantern Fly. 11 Sheeps Physanus. 12 Schizoneura Manufactura.

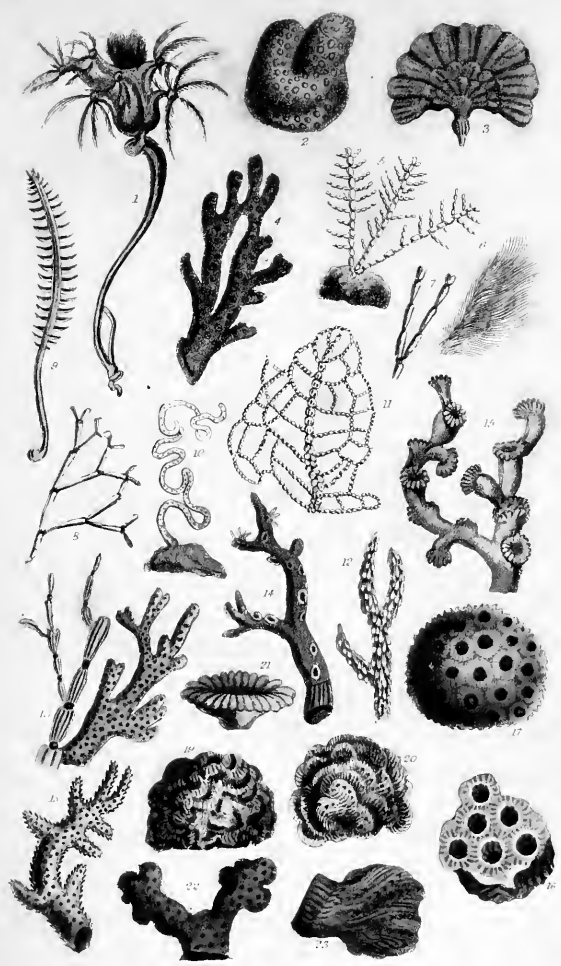






1 Herb Tipula 2 Apollo Butterfly 3 Fly 4 *Hyphobosca* 5 *Pipus culex* 6 Death-head  
 Sphinx 7 Ox-cyterus 8 *Trypoid Sabanus* 9 Channelian Fly 10 *homo Melli*  
 11 *Leach-headed ceryx* 12 *Defonax Saucius*

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R. Scott

16 Greenland Umbellaria. 2 Fan-coral *Z. chularia*. 3 Pateck Flatellaria. 4 *P. sinuata*. 5 *S. Shep. Cavallina*. 6 *Scaly P.*. 7 *Scaly P. magnified*. 8 *Cylindrical P.*. 9 *Phosphoric P. found in the*. 10 *Spiral Antipathes*. 11 *Warty Ceriporia*. 12 *Stony P.*. 13 *R. verticalis*. 14 *Cl. globulatum*. 15 *Virgin Penultima*. 16 *Rayed Astrea*. 17 *Toothed D.*. 18 *Art shaped Seriatopora*. 19 *Laberinth M. andrea*. 20 *Mushroom Pivonia*. 21 *Simple Madropora*. 22 *Club-shaped Porite*. 23 *Increasing Aqaricia*

THE UNIVERSITY OF CHICAGO

PHILOSOPHY DEPARTMENT

PHILOSOPHY 101

LECTURE NOTES

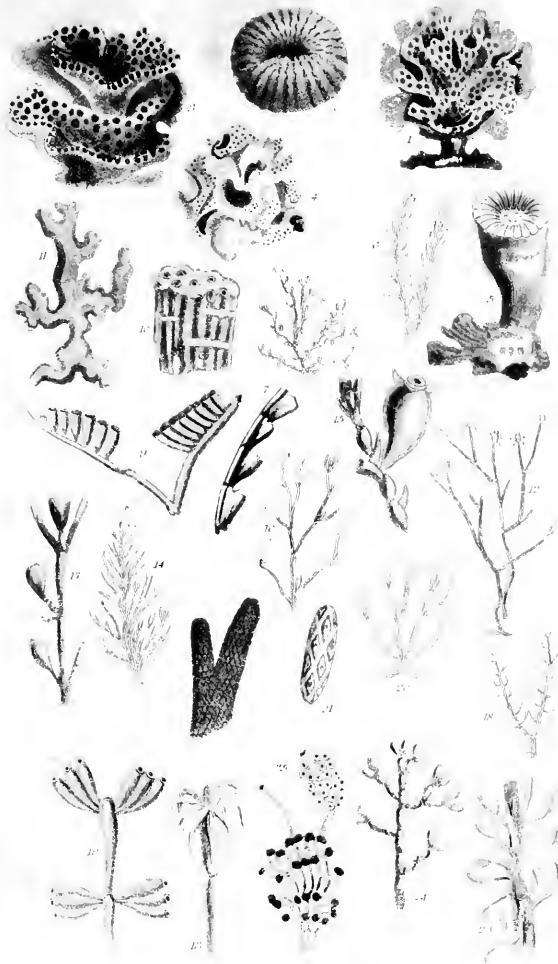
BY [Name]

DATE [Date]

TOPIC [Topic]

SECTION [Section]

INSTRUCTOR [Instructor]



1 *Milva Rotifera* 2 *Mushroom shaped Epongia* 3 *Toothed Explanaria* 4 *Foliated Echinaria* 5 *Mosses corophyllia* 6 *iristated Plumularia* 7 *D<sup>r</sup> Magnified*  
 8 *Loudipora Scutellaria* 9 *D<sup>r</sup> Magnified* 10 *Mossy Tubipora* 11 *Shapeless Mila*  
 12 *Pore* 13 *D<sup>r</sup> Magnified* 14 *Cypress Sertularia* 15 *D<sup>r</sup> Magnified* 16 *Dichotoma campanularia* 17 *D<sup>r</sup> Magnified* 18 *Caribbean Litorea*  
 19 *D<sup>r</sup> Magnified* 20 *Salicorn cellaria* 21 *D<sup>r</sup> Magnified* 22 *Coaly Flustra* 23 *Spatula like Abiquaria* 24 *Obtuse Dichotomaria* 25 *Transverse Tubulifera*

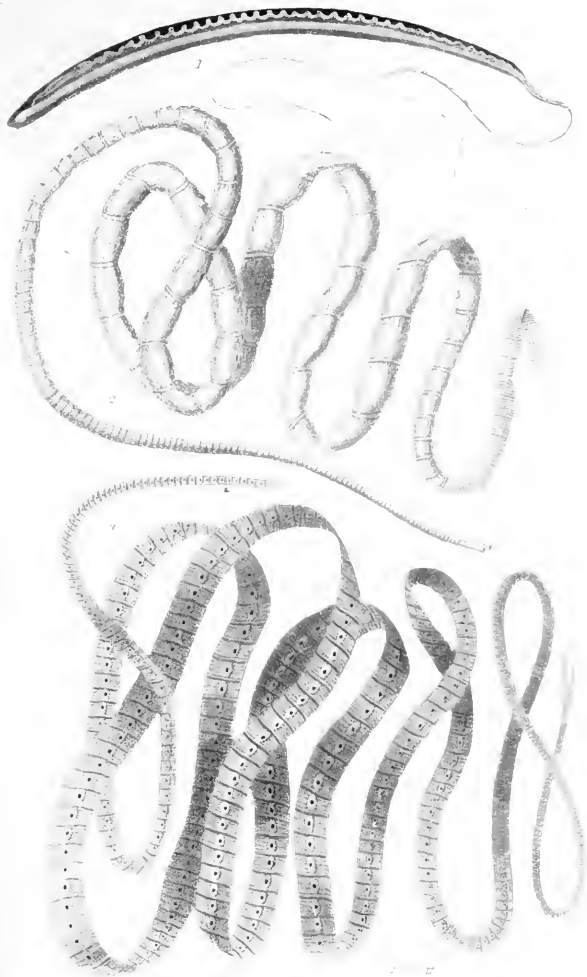




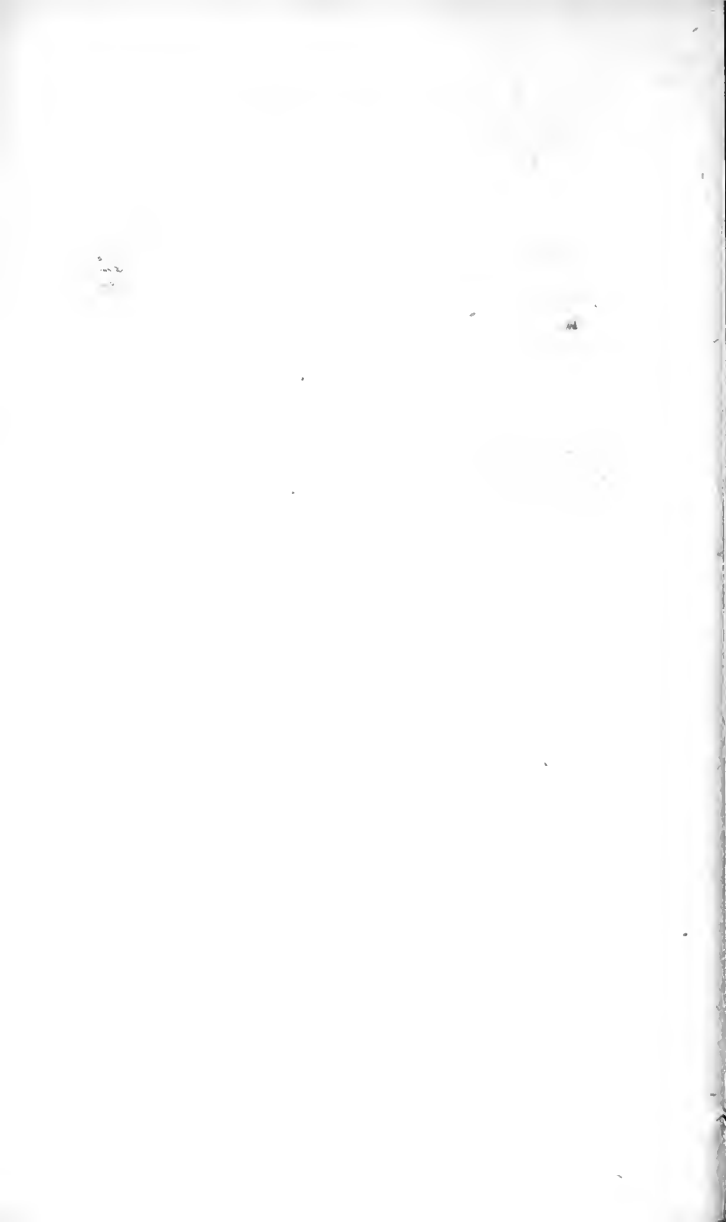
1 Maw Worm female 2 Natural size of D<sup>o</sup> 3 Maw Worm male 4 Natural size of D<sup>o</sup>  
 5 Angulated Maw Worm female 6 D<sup>o</sup> male 7 Round Worm 8 Guinea Worm 9 Sub  
 compressed Humularia 10 Head of D<sup>o</sup> magnified 11 Great Strongylus 12 Natural  
 size of D<sup>o</sup> 13 Long Thread Worm male 14 Urine Worm 15 Natural size of D<sup>o</sup> 16 The  
 Human Echinococcus.

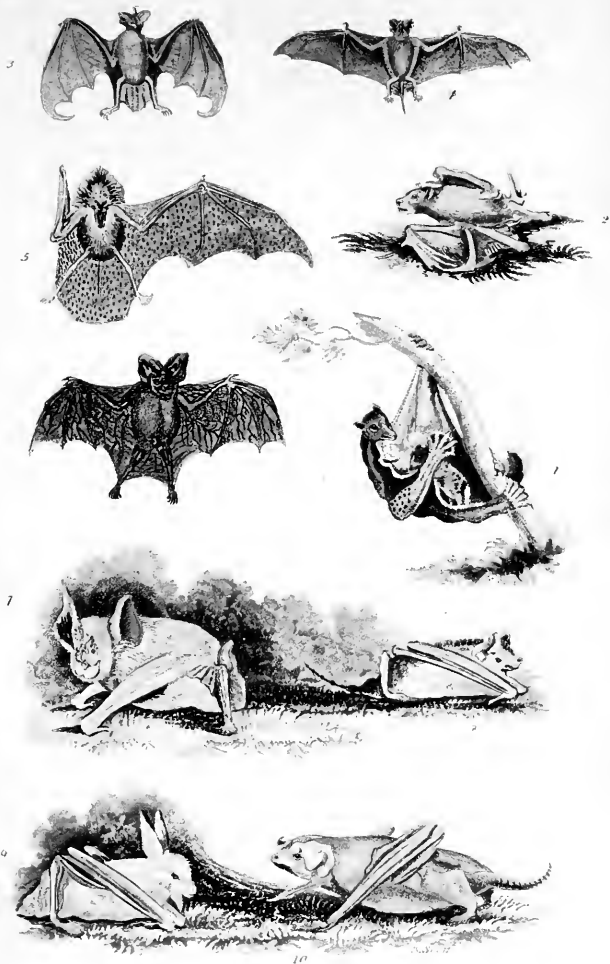






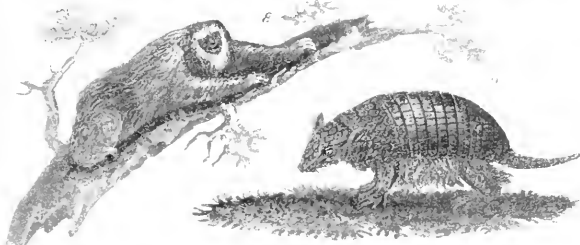
*Long; Thread Worm, from the Common Tapeworm (Broad Tapeworm)*





1. *Myotis* 2. *Pipistrellus* 3. *Nyctinomus* 4. *Myotis* 5. *Blauvilles Mermocops* 6. *Conditus Bat* 7. *the Black Rhinoceros* 8. *Saw-tailed Bat* 9. *Dendrocinetus Myotis* 10. *Ring-tailed Mollisus*

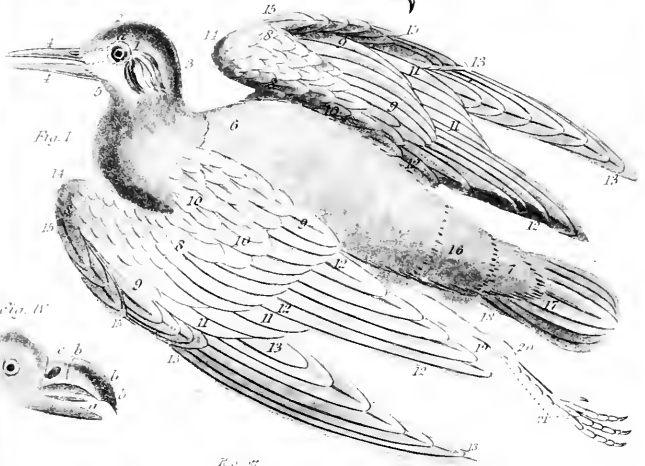
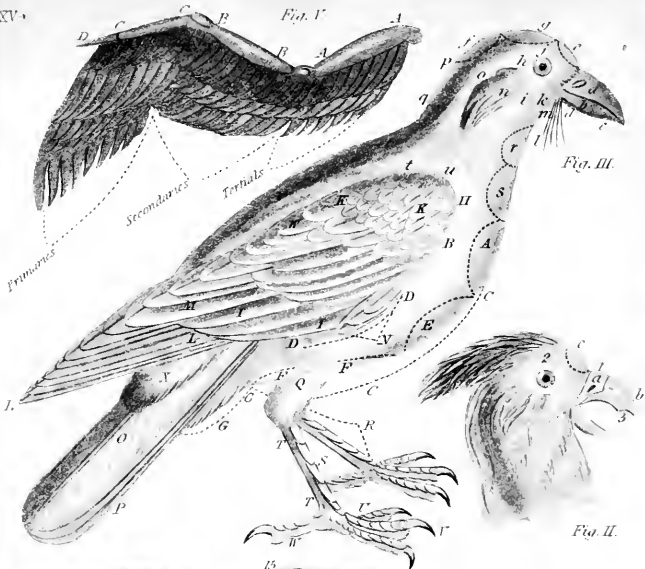




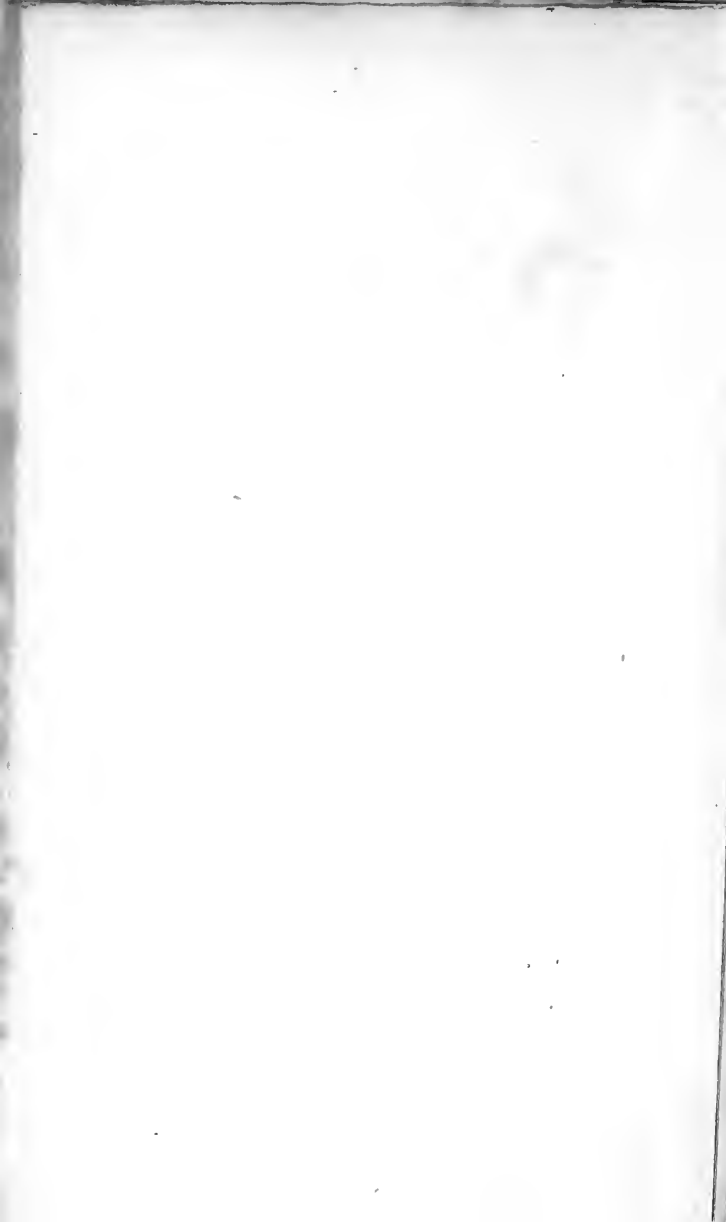
R 5 - 11

1 Porcupine 2 Brazil Porcupine 3 Hare 4 Rabbit 5 Cottontail 6 White Tail 7 Long nosed Coy. 8 Sloth 9 Six Banded Armadillo

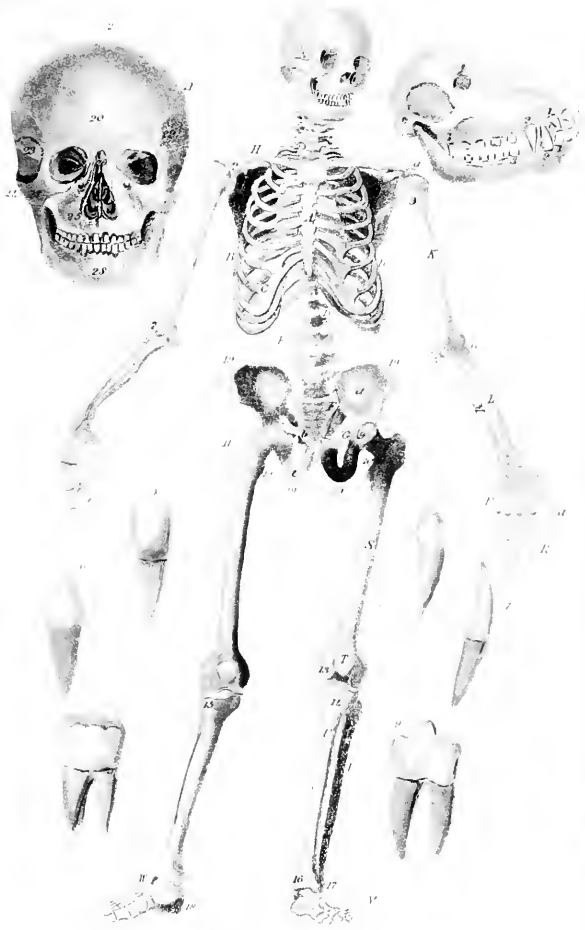




Pl. II







*Human Skeleton, Anterior, Posterior, and Lateral Views. Mandrell. Human Anatomy, with  
 the Bones, Muscles, and Nerves of the Human Body, in a Series of Plates.*

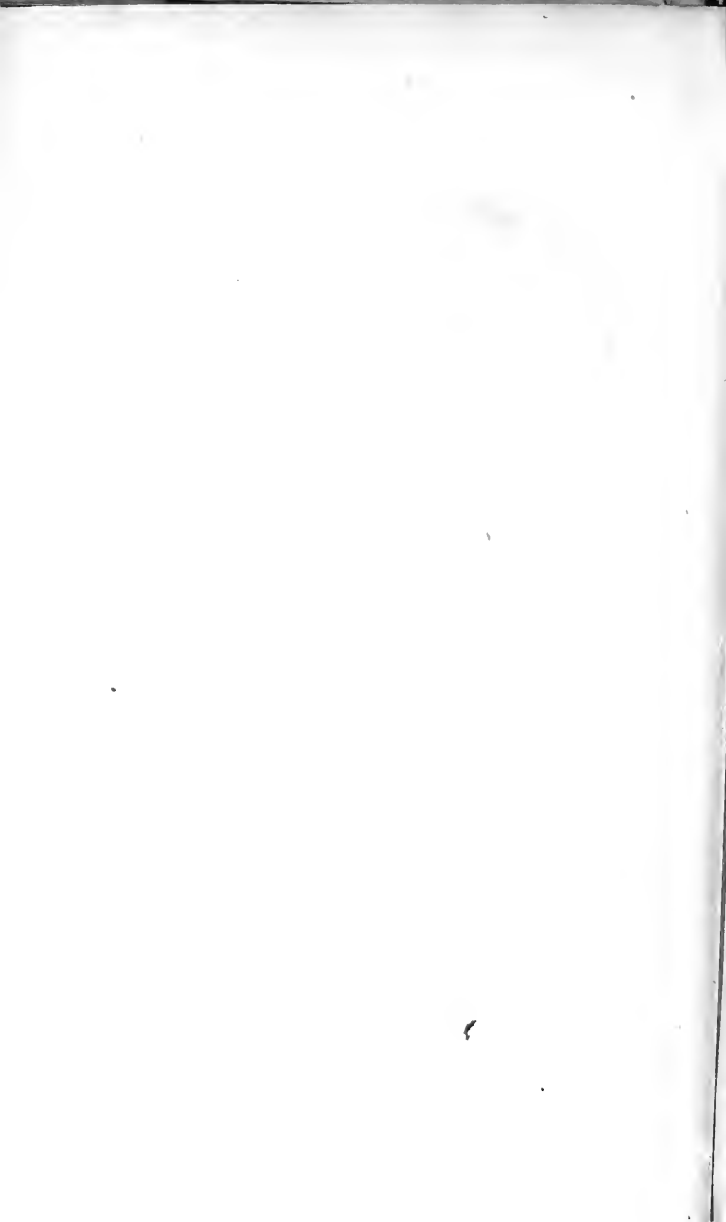
Published by Appleton & Co., New York, 1860.



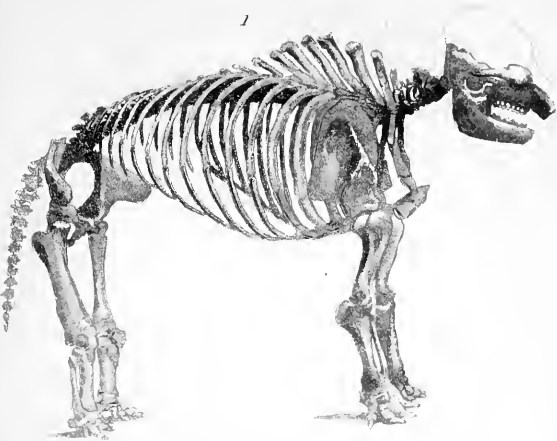


Scale of 2 inches

1 Caucasian. 2 Mongolian. 3 Ancient Greek. 4 N American Indian. 5 Japanese from Interior of New Zealand. 6 New Hollander. 7 Chinese. 8 Chaldean. 9 Negro.



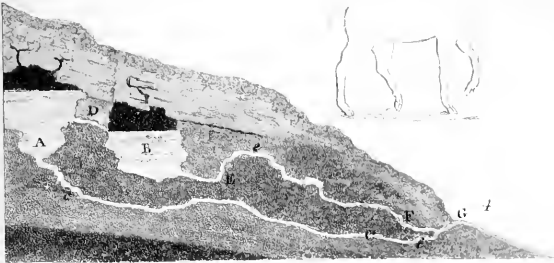
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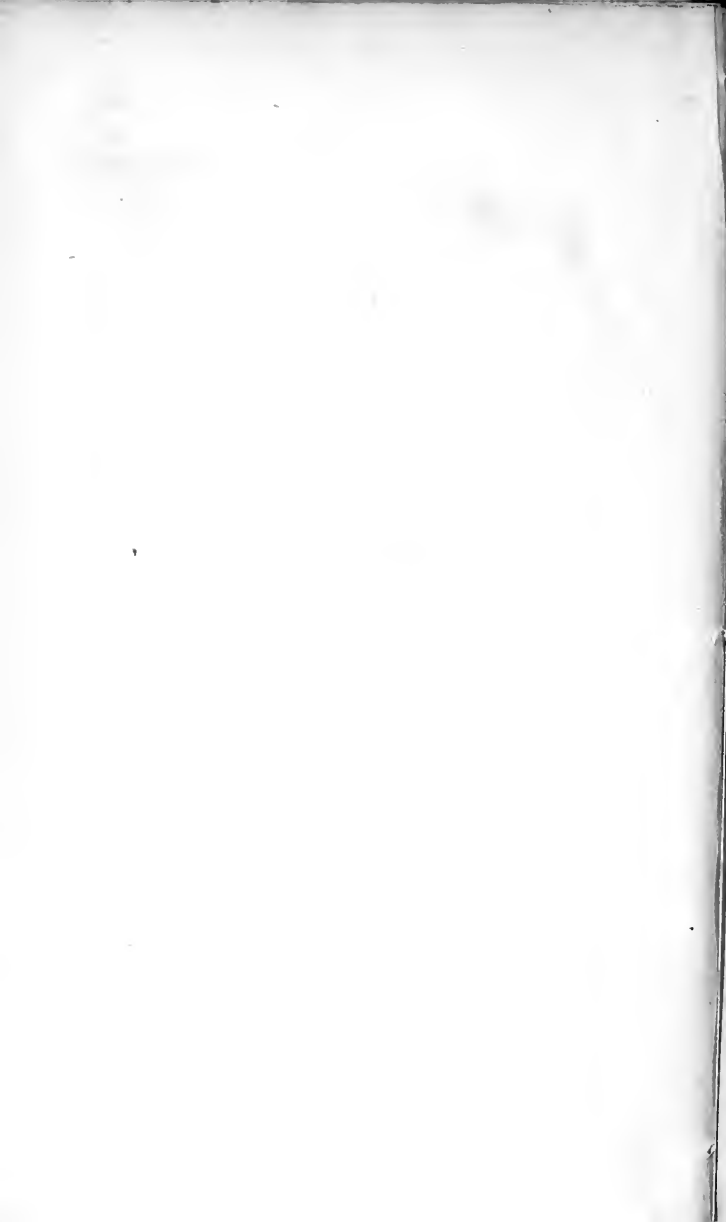


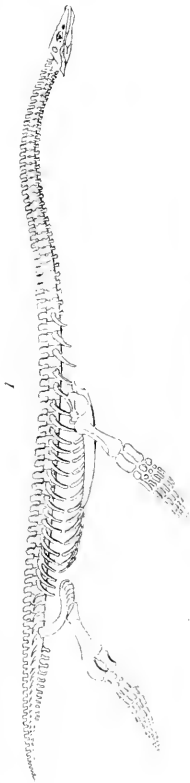
3



X. Anon.

1 Skeleton of Great Mastodon. 2 Great Anoplotherium. 3 Slender Anoplotherium.  
 4 Reciprocatino Spring



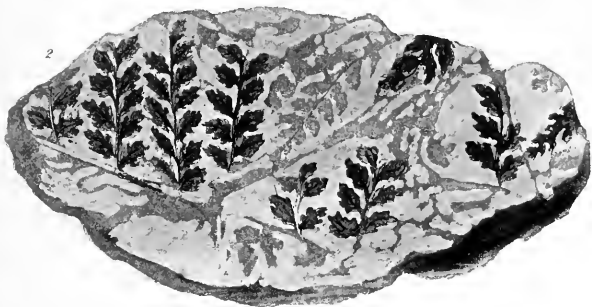
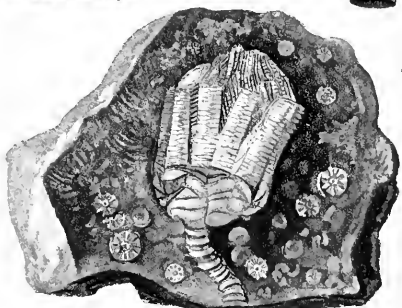
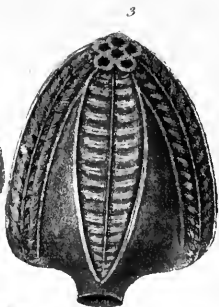


*Hesperocottus? Ichthyocottus? Molokotob. et With. et Tron. et Hyacinth. et Phaeocottus. Ichthyocottus.*

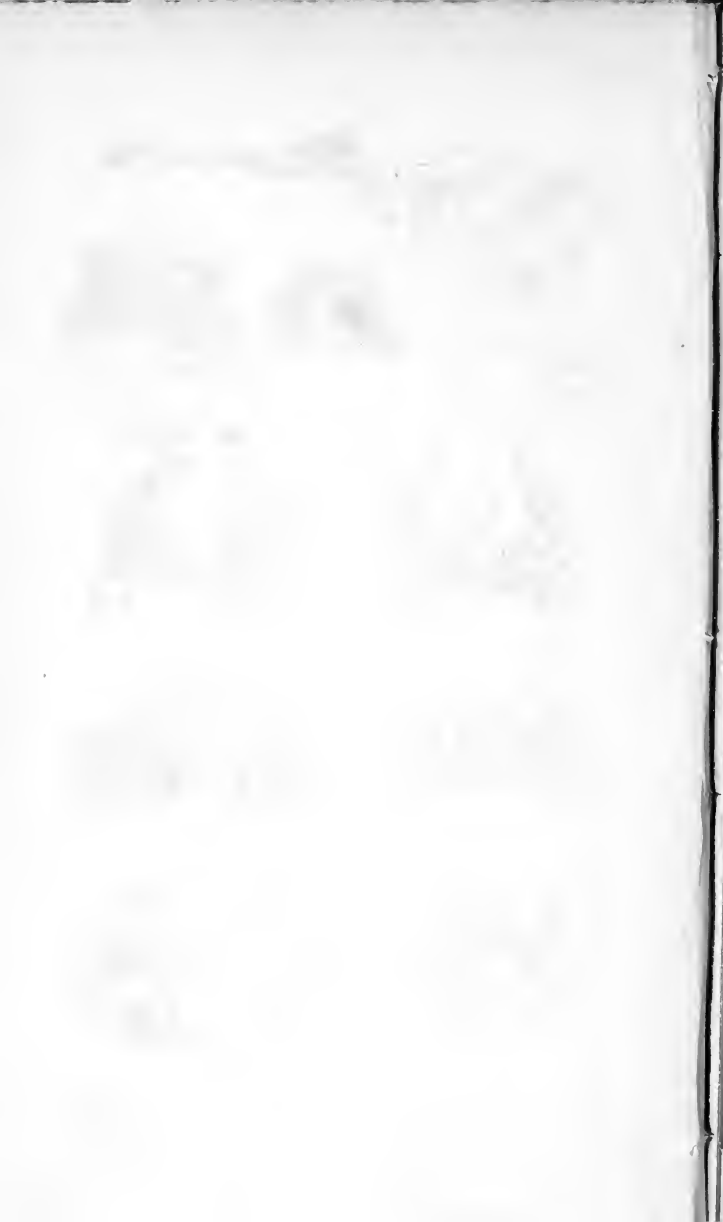
Published by the Author.







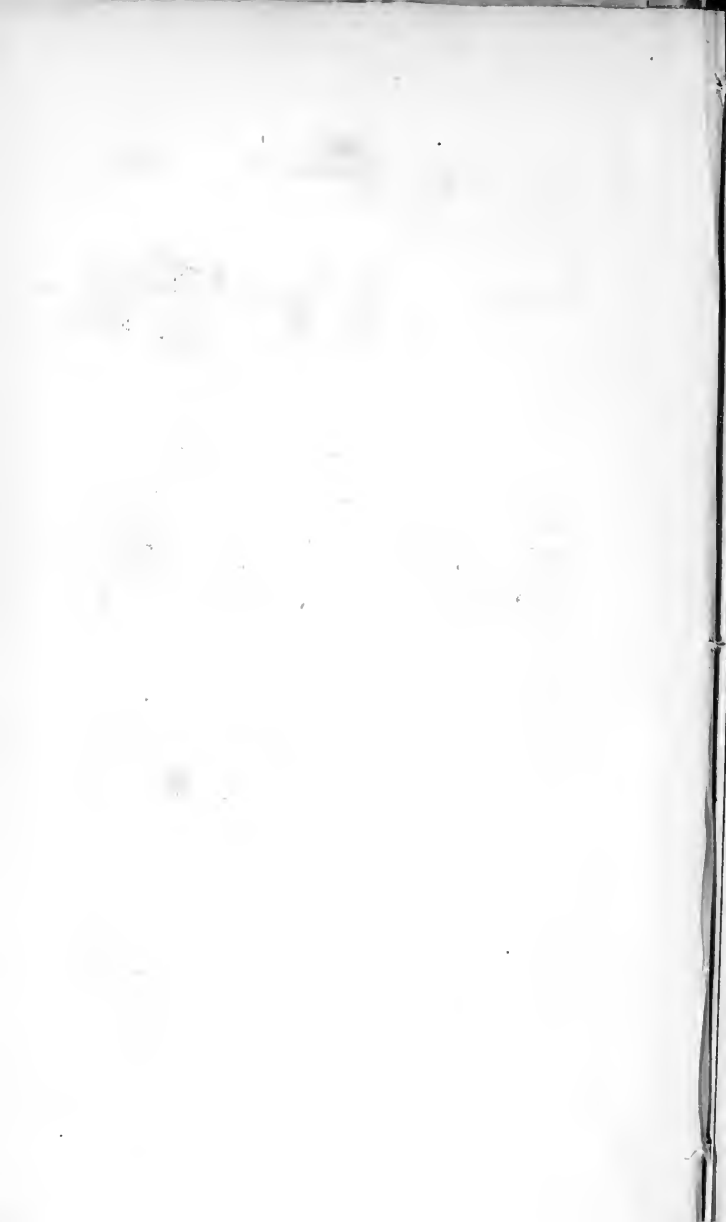
R Scott





V. Smith.

1 *Bloody Leodica*. 2 *Spined Halitha*. 3 *D. Pontobdella*. 4 *Fishna Purotheris*. 5 *Double Spined Gonoplax*. 6 *Heavy Plunius*. 7 *Four horned Spie*. 8 *Pignus*. 9 *Toothed Parmela*. 10 *Wrinkled Portunus*. 11 *Variogated Portunus*. 12 *Toothed Corystes*



## DIRECTIONS TO THE BINDER.

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*Care must be taken not to cut off the descriptive letter-press  
of the Plates.*





wasp resemble each other very strongly, yet, in examining their manner and their duration, they differ very widely: the bee labours to lay up honey, and lives to enjoy the fruits of its industry: the wasp appears equally assiduous: but only works for posterity, as the habitation is scarcely completed when the inhabitant dies.

The wasp is well known to be a winged insect with a sting. To be longer in proportion to its bulk than the bee, to be marked with bright yellow circles round its body, and to be the most swift and active insect of all the fly kind. On each side of the mouth this animal is furnished with a long tooth, notched like a saw, and with these it is enabled to cut any substance, not omitting meat itself, and to carry it to its nest. Wasps live, like bees, in community, and sometimes ten or twelve thousand are found inhabiting a single nest.

Of all other insects the wasp is the most fierce, voracious, and most dangerous, when enraged. They are seen wherever flesh is cutting up, gorging themselves with the spoil, and then

there are two or three combs placed on one another, but not united. These combs vary in size: they consist of a number of oblong or oval cells, or cocoons of a silky substance, fastened together, and spun by the larvæ when they are about to undergo their first change; for the carding bees do not form waxen cells for their young. The cells are of three dimensions, answering to the three sexes. The void spaces between the cells are filled with masses of brown paste, made of gross wax, or pollen much wrought, and honey. Besides the masses they attach to every comb, particularly the uppermost, three or four cells of the same coarse wax, in the shape of goblets, open at the top, which they fill with a liquid and very sweet honey.

The first step towards finishing a nest is to make a mass of the brown paste, and one of these honey-pots. The masses of paste are intended for the food of the larvæ, and in them the eggs are deposited. These vary in number, from three to thirty being to be found in one mass, but not all in the same cavity. The larvæ are similar to those of the hive-bee, but their sides are marked by irregular transverse black spots. After they are hatched they separate from each other, eating the paste that surrounds them. The honey-pots may be intended to supply honey for the occasional moistening of the paste in making repairs, &c. The *pupa* in each cell is placed with its head downwards, and makes its way out at the bottom of its cocoon.

The nests seldom contain more than fifty or sixty inhabitants; and in this community, both the females and males act in concert with the neuters in fitting up and repairing their habitations. The nests of the carding bees are exposed to various depredators; but field-mice and polecats are their most formidable enemies.

flying to their nests with their reeking prey. They make war also on every other fly, and the spider himself dreads their approaches.

Every community among bees is composed of females, or queens, drones or males, and neutral or working bees. Wasps have similar occupations; the two first are for propagating the species, the last for nursing, defending, and supporting the rising progeny. Among bees, however, there is seldom above a queen or two in a hive; among wasps there are above two or three hundred.

As soon as the summer begins to invigorate the insect tribes, the wasps are the most of the number, and diligently employed either in providing provisions for their nest, if already made; or in making one, if the former habitation be too small to receive the increasing community. The nest is one of the most curious objects in natural history, and contrived almost as artificially as that of the bees themselves. Their principal care is to seek out a hole that has been begun by some other animal, a field-mouse, a rat, or a mole, to build their nests in. They sometimes build upon the plain, where they are sure of the dryness of their situation; but most commonly on the side of a bank, to avoid the rain or water that would otherwise annoy them. When they have chosen a proper place, they go to work with wonderful assiduity. Their first labour is to enlarge and widen the hole, taking away the earth, and carrying it off to some distance. They are perfectly formed for labour, being furnished with a trunk above their mouths, two saws on each side, which play to the right and left against each other, and six strong muscular legs to support them. They cut the earth into small parcels with their saws, and carry it out with their legs or paws. This is the work of some days; and at length the outline of their habitation is formed, making a cavity of about a foot and a half every way. While some are working in this manner, others are roving the fields to seek out materials for their building. To prevent the earth from falling down and crushing their rising city into ruin, they make a sort of roof with their gluey substance, to which they begin to fix the rudiments of their building, working from the top downwards, as if they were hanging a bell; which, however, at length they close up at the bottom. The materials with which they build their nests are bits of wood

and glue. The wood they get where they can from the rails and posts which they meet with in the fields and elsewhere. These they saw and divide into a multitude of small fibres, of which they take up little bundles in their claws, letting fall upon them a few drops of gluey matter, with which their bodies are provided, by the help of which they knead the whole composition into a paste, which serves them in their future building. When they have returned with this to the nest, they stick their load of paste on that part where they make their walls and partitions; they tread it close with their feet, and trowl it with their trunks, still going backwards as they work. Having repeated this operation three or four times, the composition is at length flatted out until it becomes a small leaf of a gray colour, much finer than paper, and of a pretty firm texture. This done, the same wasp returns to the field to collect a second load of paste, repeating the same several times, placing layer upon layer, and strengthening every partition in proportion to the wants or convenience of the general fabric. Other working wasps come quickly after to repeat the same operation, laying more leaves upon the former, till at length, after much toil, they have finished the large roof, which is to secure them from the tumbling in of the earth. This dome being finished, they make another entrance to their habitation, designed either for letting in the warmth of the sun, or for escaping, in case one door be invaded by plunderers. Certain however, it is, that by one of these they always enter, by the other they sally forth to their toil; each hole being so small that they can pass but one at a time. The walls being thus composed, and the whole somewhat of the shape of a pear, they labour at their cells, which they compose of the same paper-like substance that goes to the formation of the outside works. Their combs differ from those of bees not less in the composition than the position which they are always seen to obtain. The honey-comb of the bee is edge-ways with respect to the hive; that of the wasp is flat, and the mouth of every cell opens downwards. Thus is their habitation contrived, story above story, supported by several rows of pillars, which give firmness to the whole building, while the upper story is flat-roofed, and as smooth as the pavement of a room, laid with squares of marble. The wasps can freely walk upon these stories between the pillars to do whatever their

wants require. The pillars are very hard and compact, being larger at each end than in the middle, not much unlike the columns of a building. All the cells of the nest are only destined for the reception of the young, being replete with neither wax nor honey.

Each cell is like that of the bee, hexagonal: but they are of two sorts; the one larger, for the production of the male and female wasps; the other less, for the reception of the working part of the community. When the females are impregnated by the males, they lay their eggs, one in each cell, and stick it in with a kind of gummy matter to prevent its falling out. From this egg proceeds the insect in its worm state, of which the old ones are extremely careful, feeding it from time to time till it becomes large, and entirely fills up its cell. But the wasp community differs from that of the bee in this; that among the latter the working bees take the parental duties upon them, whereas among the wasps the females alone are permitted to feed their young, and to nurse their rising progeny. For this purpose the female waits with great patience till the working-wasps have brought in their provisions, which she takes from them, and cuts into pieces. She then goes with great composure from cell to cell, and feeds every young one with her mouth. When the young worms have come to a certain size they leave off eating, and begin to spin a very fine silk, fixing their first end to the entrance of the cell; then turning their heads, first on one side, then on the other, they fix the thread to different parts, and thus they make a sort of door, which serves to close up the mouth of the cell. After this they divest themselves of their skins after the usual mode of transformation; the aurelia, by degrees, begins to emancipate itself from its shell; by little and little it thrusts out its legs and wings and insensibly acquires the colour and shape of its parent.

The wasp thus formed, and prepared for depredation, becomes a bold, troublesome, and dangerous insect: there are no dangers which it will not encounter in pursuit of its prey, and nothing seems to satiate its gluttony. Though it can gather no honey of its own, no animal is more fond of sweets. For this purpose it will pursue the bee and the humble-bee, destroy them with its sting, and then plunder them of their honey-bag, with which it flies triumphantly loaded to its nest to regale its young.

Wasps are ever fond of making their nests in the neighbourhood of bees, merely to have an opportunity of robbing their hives, and feasting on the spoil. Yet the bees are not found always patiently submissive to their tyranny, but fierce battles are sometimes seen to ensue, in which the bees make up by conduct and numbers what they want in personal prowess. When there is no honey to be had, they seek for the best and sweetest fruits, and they are never mistaken in their choice. From the garden they fly to the city, to the grocer's shops, and butcher's shambles. They will sometimes carry off bits of flesh half as big as themselves, with which they fly to their nests for the nourishment of their brood. Those who cannot drive them away, lay for them a piece of ox's liver, which being without fibres, they prefer to other flesh; and whenever they are found, all other flies are seen to desert the place immediately. Such is the dread with which these little animals impress all the rest of the insect tribes, which they seize and devour without mercy, that they vanish at their approach. Wherever they fly, like the eagle or the falcon, they form a desert in the air round them. In this manner the summer is passed in plundering the neighbourhood, and rearing up their young: every day adds to their numbers; and from their strength, agility, and indiscriminate appetite for every kind of provision, were they as long-lived as the bee, they would soon swarm upon the face of nature, and become the most noxious plague of man; but providentially their lives are measured to their mischief, and they live but a single season.

While the summer heats continue, they are bold, voracious, and enterprising; but as the sun withdraws, it seems to rob them of their courage and activity. In proportion as the cold increases, they are seen to become more domestic; they seldom leave the nest; they make but short adventures from home, they flutter about in the noon-day heats, and soon after return chilled and feeble.

As their calamities increase, new passions soon begin to take place; the care for posterity no longer continues; and as the parents are no longer able to provide their growing progeny a supply, they take the barbarous resolution of sacrificing them all to the necessity of the times. In this manner, like a garri-son upon short allowance, all the useless hands are destroyed;

the young worms, which a little before they fed and protected with so much assiduity, are now butchered, and dragged from their cells. As the cold increases, they no longer find sufficient warmth in their nests, which grow hateful to them, and they fly to seek it in the corners of houses, and places that receive an artificial heat. But the winter is still insupportable; and before the new year begins, they wither and die; the working-wasps first, the males soon following, and many of the females suffer in the general calamity. In every nest, however, one or two females survive the winter, and having been impregnated by the male during the preceding season, she begins in spring to lay her eggs in a little hole of her own contrivance. This bundle of eggs, which is clustered together like grapes, soon produces two worms, which the female takes proper precaution to defend and supply, and these, when hatched, soon give assistance to the female, who is employed in hatching two more; these also gathering strength, extricate themselves out of the web that enclosed them, and become likewise assistants to their mother; fifteen days after, two more make their appearance; thus is the community every day increasing, while the female lays in every cell, first a male and then a female. These soon after become breeders in turn, till, from a single female, ten thousand wasps are seen produced before the month of June. After the female has thus produced her progeny, which are distributed in different districts, they assemble from all parts in the middle of summer, and provide for themselves the large and commodious habitation which has been described above.\*

\* "One of the most remarkable of our native social wasps is the *Vespa Britannica*, or tree-wasp, which is not uncommon in the northern, but seldom to be met with in the southern parts of the island. Instead of burrowing in the ground like the common wasp, or in the hollows of trees like the hornet, it boldly swings its nest from the extremity of a branch, where it exhibits some resemblance, in size and colour, to a Welsh wig, hung out to dry. We have seen more than one of these nests on the same tree, at Catrine, in Ayrshire, and at Wemyss Bay, in Renfrewshire. The tree which the Britannic wasp prefers is the silver fir, whose broad flat branch serves as a protection to the suspended nest both from the sun and the rain. The materials and structure are nearly the same as those employed by the common wasp, and which we have already described.

"A singular nest of a species of wasp is figured by Reaumur, but is apparently rare in this country, as Kirby and Spence mention only a single nest of a similar construction, found in a garden at East-Dale. This nest

Such is the history of the social wasp; but, as among bees, so also among these insects, there are various tribes that live in solitude; these lay their eggs in a hole for the purpose, and the parent dies long before the birth of its offspring. In the pri-

is of a flattened globular figure, and composed of a great number of envelopes, so as to assume a considerable resemblance to a half-expanded Provence rose. The British specimen mentioned by Kirby and Spence had only one platform of cells; Reaumur's had two; but there was a large vacant space, which would probably have been filled with cells, had the nest not been taken away as a specimen. The whole nest was not much larger than a rose, and was composed of paper exactly similar to that employed by the common ground-wasp.

“There is another species of social-wasp meriting attention from the singular construction of its nest. It forms one or more terraces of cells, similar to those of the common wasp, but without the protection of an outer wall, and quite exposed to the weather. Swammerdam found a nest of this description attached to the stem of a nettle. Reaumur says that they are sometimes attached to the branch of a thorn or other shrub, or to stalks of grass;—peculiarities which prove that there are several species of these wasps.

“The most remarkable circumstance in the architecture of this species of vespiary is, that it is not horizontal, like those formerly described, but nearly vertical. The reason appears to be, that if it had been horizontal, the cells must have been frequently filled with rain; whereas, in the position in which it is placed, the rain runs off without lodging. It is, besides, invariably placed so as to face the north or the east, and consequently is less exposed to rains, which most frequently come with southerly or westerly winds. It is another remarkable peculiarity, that, unlike the nests of other wasps, it is covered with a shining coat of varnish, to prevent moisture from soaking into the texture of the wasp's paper. The laying on this varnish, indeed, forms a considerable portion of the labour of the colony, and individuals may be seen employed for hours together spreading it on with their tongues.

“Few circumstances are more striking with regard to insects, as Kirby and Spence justly remark, than the great and incessant labour which maternal affection for their progeny leads them to undergo. Some of these exertions are so disproportionate to the size of the insect, that nothing short of ocular conviction could attribute them to such an agent. A wild bee, or a wasp, for instance, will dig a hole in a hard bank of earth some inches deep, and five or six times its own size, labouring unremittingly at this arduous task for several days in succession, and scarcely allowing itself a moment for eating or repose. It will then occupy as much time in searching for a store of food; and no sooner is this finished, than it will set about repeating the process, and before it dies, will have completed five or six similar cells, or even more.—A few observations may here be properly bestowed upon the *material* with which the wasp family construct the interior of their nests.

“The wasp is a paper-maker, and a most perfect and intelligent one. While mankind were arriving by slow degrees, at the art of fabricating

incipal species of the Solitary-Wasps, the insect is smaller than the working-wasp of the social kind. The filament by which the corselet is joined to the body, is longer and more distinctly seen, and the whole colour of the insect is blacker than in the

this valuable substance, the wasp was making it before their eyes, by very much the same process as that by which human hands now manufacture it with the best aid of chemistry and machinery. While some nations carved their records on wood, and stone, and brass, and leaden tablets,—others, more advanced, wrote with a style on wax,—others employed the inner bark of trees, and others the skins of animals rudely prepared,—the wasp was manufacturing a firm and durable paper. Even when the papyrus was rendered more fit, by a process of art, for the transmission of ideas in writing, the wasp was a better artisan than the Egyptians; for the early attempts at paper-making were so rude, that the substance produced was almost useless, from being extremely friable. The paper of the papyrus was formed of the leaves of the plant, dried, pressed, and polished; the wasp alone knew how to reduce vegetable fibres to a pulp, and then unite them by a size or glue, spreading the substance out into a smooth and delicate leaf. This is exactly the process of paper-making. It would seem that the wasp knows, as the modern paper-makers now know, that the fibres of rags, whether linen or cotton, are not the only materials that can be used in the formation of paper; she employs other vegetable matters, converting them into a proper consistency by her assiduous exertions. In some respects she is more skilful even than our paper-makers, for she takes care to retain her fibres of sufficient length, by which she renders her paper as strong as she requires. Many manufacturers of the present day cut their material into small bits, and thus produce a rotten article. One great distinction between good and bad paper is its toughness; and this difference is invariably produced by the fibre of which it is composed being long, and therefore tough; or short, and therefore friable.

“The wasp has been labouring at her manufacture of paper, from her first creation, with precisely the same instruments and the same materials; and her success has been unvarying. Her machinery is very simple, and therefore it is never out of order. She learns nothing, and she forgets nothing. Men, from time to time, lose their excellence in particular arts, and they are slow in finding out real improvements. Such improvements are often the effect of accident. Paper is now manufactured very extensively by machinery, in all its stages; and thus, instead of a single sheet being made by hand, a stream of paper is poured out, which would form a roll large enough to extend round the globe, if such a length were desirable. The inventors of this machinery, Messrs Fourdrinier, it is said, spent the enormous sum of 40,000*l.* in vain attempts to render the machine capable of determining with precision the width of the roll; and, at last, accomplished their object, at the suggestion of a bystander, by a strap revolving upon an axis, at a cost of three shillings and sixpence. Such is the difference between the workings of human knowledge and experience, and those of animal instinct. We proceed slowly and in the dark—but our course is not bounded by a narrow line, for it seems difficult to say what is the perfection of any art; animals go clearly to a given point—but they can go no



ordinary kinds. But it is not their figure, but the manners of this extraordinary insect, that claim our principal regard.

From the end of May to the beginning of July, this wasp is seen most diligently employed. The whole purpose of its life seems to be in contriving and fitting up a commodious apartment for its young one, which is not to succeed it till the year ensuing. For this end it is employed, with unwearied assiduity, in boring a hole in the finest earth some inches deep, but not much wider than the diameter of its own body. This is but a gallery leading to a wider apartment destined for the convenient lodgment of its young. As it always chooses a gravelly soil to work in, and where the earth is almost as hard as stone itself, the digging and hollowing this apartment is an enterprise of no small labour: for effecting its operations, this insect is furnished with two teeth, which are strong and firm, but not sufficiently hard to penetrate the substance through which it is resolved to make its way. In order therefore to soften that earth which it is unable to pierce, it is furnished with a gummy liquor, which

further. We may, however, learn something from their perfect knowledge of what is within their range. It is not improbable that if man had attended in an earlier state of society to the labours of wasps, he would have sooner known how to make paper. We are still behind in our arts and sciences, because we have not always been observers. If we had watched the operations of insects, and the structure of animals in general, with more care, we might have been far advanced in the knowledge of many arts, which are yet in their infancy, for nature has given us abundance of patterns. We have learned to perfect some instruments of sound, by examining the structure of the human ear; and the mechanism of an eye has suggested some valuable improvements in achromatic glasses.

“Reaumur has given a very interesting account of the wasps of Cayenne, which hang their nests in trees. Like the bird of Africa called the *Loxia*, they fabricate a perfect house, capable of containing many hundreds of their community, and suspend it on high out of the reach of attack. But the Cayenne wasp is a more expert artist than the bird. He is a card-maker, —and travellers of veracity agree that the card with which he forms the exterior covering of his abode is so smooth, so strong, so uniform in its texture, and so white, that the most skilful manufacturer of this substance might be proud of the work.

“The nest of the card-making wasp is impervious to water. It hangs upon the branch of a tree; and those rain-drops which penetrate through the leaves never rest upon its hard and polished surface. A small opening for the entrance of the insects terminates its funnel-shaped bottom. It is impossible to unite more perfectly the qualities of lightness and strength.”

—*Insect Architecture.*

it emits upon the place, and which renders it more easily separable from the rest, and the whole becoming a kind of soft paste, is removed to the mouth of the habitation. The animal's provision of liquor in these operations is, however, soon exhausted; and it is then seen taking up water either from some neighbouring flower or stream, in order to supply the deficiency.

At length, after much toil, a hole some inches deep is formed, at the bottom of which is a large cavity; and to this no other hostile insect would venture to find its way, from the length and the narrowness of the defile through which it would be obliged to pass. In this the solitary wasp lays its egg, which is destined to continue the species; there the nascent animal is to continue for about nine months, unattended and immured, and at first appearance the most helpless insect of the creation. But when we come to examine, new wonders offer; no other insect can boast so copiously luxurious a provision, or such confirmed security.

As soon as the mother wasp has deposited her egg at the bottom of the hole, her next care is to furnish it with a supply of provisions, which may be offered to the young insect as soon as it leaves the egg. To this end she procures a number of little green worms, generally from eight to twelve, and these are to serve as food for the young one the instant it awakens into life. When this supply is regularly arranged and laid in, the old one then, with as much assiduity as it before worked out its hole, now closes the mouth of the passage; and thus leaving its young one immured in perfect security, and in a copious supply of animal food, she dies, satisfied with having provided for a future progeny.

When the young one leaves the egg, it is scarcely visible, and is seen immured among a number of insects, infinitely larger than itself, ranged in proper order around it, which, however, give it no manner of apprehension. Whether the parent, when she laid in the insect provision, contrived to disable the worms from resistance, or whether they were at first incapable of any, is not known. Certain it is, that the young glutton feasts upon the living spoil without any control; his game lies at his hand, and he devours one after the other as the calls of appetite incite him. The life of the young animal is therefore spent in

the most luxurions manner, till its whole stock of worms is exhausted, when the time of its transformation begins to approach; and then spinning a silken web, it continues fixed in its cell till the sun calls it from its dark abode the ensuing summer.

The wasps of Europe are very mischievous, yet they are innocence itself when compared to those of the tropical climates, where all the insect tribes are not only numerous but large, voracious, and formidable. Those of the West Indies are thicker, and twice as long, as the common bee; they are of a gray colour, striped with yellow, and armed with a very dangerous sting. They make their cells in the manner of a honey-comb, in which the young ones are hatched and bred. They generally hang their nests by threads, composed of the same substance with the cells, to the branches of trees, and the eaves of houses. They are seen every where in great abundance, descending like fruit, particularly pears, of which shape they are, and as large as one's head. The inside is divided into three round stories full of cells, each hexagonal, like those of a honey-comb. In some of the islands these insects are so very numerous, that their nests are stuck up in this manner, scarce two feet asunder, and the inhabitants are in continual apprehension from their accidental resentment. It sometimes happens that no precautions can prevent their attacks, and the pain of their sting is almost insupportable. Those who have felt it, think it more terrible than even that of a scorpion; the whole visage swells, and the features are so disfigured, that a person is scarcely known by his most intimate acquaintance.\*

\* *The Hornet*.—This is an insect of a large size. The thorax is black, the fore-part rufous. The extremity of the abdomen is yellow, with three black points on each segment.

It is chiefly in the hollow trunks of decayed trees that the hornets form their nest. They live collected together in communities, which consist of males, females, and neuters or labourers. Their nest is of a dirty yellow colour, and usually constructed under the shelter of some out-house, in the hole of an old wall, or more frequently in the hollow trunk of some decayed tree. The hole of entrance to this nest is oftentimes not more than an inch in diameter.

In the spring of the year, those of the females which have survived the winter are reanimated by the warmth of the season, issue from their hiding-places, and search out a convenient place in which they can establish their nest. When this is found, they commence their first operation by forming a column, of the same materials as those which are afterwards em-

## CHAP. IV.

## OF THE ICHNEUMON FLY.

EVERY rank of insects, how voracious soever, have enemies that are terrible to them, and that revenge upon them the injuries done upon the rest of the animated creation. The wasp, as we have seen, is very troublesome to man, and very formidable to the insect tribe; but the ichneumon fly (of which there are many varieties) fears not the wasp itself; it enters its retreats, plunders its habitations, and takes possession of that cell for its own young, which the wasp had laboriously built for a dearer posterity.

Though there are many different kinds of this insect, yet the most formidable, and that best known, is called the common ichneumon, with four wings, like the bee, a long, slender, black body, and a three-forked tail, consisting of bristles; the two outermost black, and the middlemost red. This fly receives its name from the little quadruped, which is found to be so destructive to the crocodile, as it bears a strong similitude in its courage and rapacity.

Though this instrument is, to all appearance, slender and feeble, yet it is found to be a weapon of great force and efficacy. There is scarcely any substance which it will not pierce; and indeed it is seldom seen but employed in penetration. This is the weapon of defence; this is employed in destroying its prey; and still more, by this the animal deposits her eggs wherever

ployed in the other parts of the fabric, but much more compact and solid. A kind of cover is next formed, and then a small comb of hexagonal cells, with their openings downward, for the purpose of containing their eggs, and the grubs which issue from them.

The eggs are soon hatched, and the mother nourishes her offspring with food which she brings to them from abroad. When the grubs have attained their full size they each spin a silken bed, in which they undergo their metamorphoses into *pupæ*, and afterwards into perfect or winged insects. Those first produced are the neuters. These are working insects, or labourers; that is to say, they are from this period occupied in the work of constructing, and in the duty of nourishing the remaining grubs. The females still continuing to lay, the family is consequently augmented; and the nest becoming now too small, necessity requires it to be enlarged. This operation falls wholly upon the labourers.

she thinks fit to lay them. As it is an instrument chiefly employed for this purpose, the male is unprovided with such a sting, while the female uses it with great force and dexterity, brandishing it when caught, from side to side, and very often wounding those who thought they held her with the greatest security.

All the flies of this tribe are produced in the same manner, and owe their birth to the destruction of some other insect, within whose body they have been deposited, and upon whose vitals they have preyed, till they came to maturity. There is no insect whatever, which they will not attack, in order to leave their fatal present in its body; the caterpillar, the guat, and even the spider himself, so formidable to others, is often made the unwilling fosterer of this destructive progeny.

About the middle of the summer, when other insects are found in great abundance, the ichneumon is seen flying busily about, and seeking proper objects upon whom to deposit its progeny. As there are various kinds of this fly, so they seem to have various appetites. Some are found to place their eggs within the aurelia of some nascent insect, others place them within the nest, which the wasp had curiously contrived for its own young, and as both are produced at the same time, the young of the ichneumon not only devours the young wasp, but the whole supply of worms which the parent had carefully provided for its provision. But the greatest number of the ichneumon tribe are seen settling upon the back of the caterpillar, and darting, at different intervals, their stings into its body. At every dart they deposit an egg, while the wounded animal seems scarcely sensible of the injury it sustains. In this manner they leave from six to a dozen of their eggs within the fatty substance of the reptile's body, and then fly off to commit further depredations. In the meantime, the caterpillar, thus irreparably injured, seems to feed as voraciously as before; does not abate of its usual activity; and to all appearance, seems no way affected by the internal enemies that are preparing its destruction in their darksome abode. But they soon burst from their egg state, and begin to prey upon the substance of their prison. As they grow larger, they require a greater supply; till at last the animal, by whose vitals they are supported, is no longer able to sustain them, but dies; its whole inside being al-

most eaten away. It often happens, however, that it survives their worm-state, and then they change into a chrysalis, inclosed in the caterpillar's body till the time of their delivery approaches, when they burst their prisons, and fly away. The caterpillar, however, is irreparably destroyed, it never changes into a chrysalis, but dies shortly after from the injuries it had sustained.

Such is the history of this fly, which, though very terrible to the insect tribe, fails not to be of infinite service to mankind. The millions which it kills in a single summer are inconceivable; and without such a destroyer, the fruits of the earth would only rise to furnish a banquet for the insect race, to the exclusion of all the nobler ranks of animated nature.\*

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## CHAP. V.

### OF THE ANT.

THOUGH the number of two-winged flies be very great, and the naturalists have taken much pains to describe their characters and varieties; yet there is such a similitude in their forms and manners, that in a work like this, one description must serve for all. We now, therefore, come to a species of four-winged insects, that are famous from all antiquity for their social and industrious habits, that are marked for their spirit

\* *The Turner Savage*.—The body is black, and the legs and pedicle which connects the abdomen and thorax are yellow. This insect lives in the haunts of men, whom it never willingly offends; but it is the terror of all the smaller insects. It inhabits holes in the earth on the sides of hills and cliffs, and recesses that it forms for itself in the mud walls of cottages and out-houses. The mud-wall of a cottage at Petersburgh, in Northamptonshire, was observed to be frequented by these creatures; and, on examination, it was found to have been wrought into the appearance of honeycomb by their operations. The eggs, as in all the other species, are deposited by the female in the back part of the cells. These cells are stored with insects for food to the larvæ as soon as they come into life, and are then filled up.

Dr Derham observes, that a species of savage built its nest in a little hole of his study window. The cell was coated over with an odoriferous and resinous gum, collected, as he supposed, from some neighbouring fir trees. The insect laid two eggs; and he soon afterwards observed it carry in maggots, some of which were even larger than itself. These it very sagaciously sealed up with great carefulness in the nest and then left it.

of subordination, that are offered as a pattern of parsimony to the profuse, and of unremitting diligence to the sluggard.

In the experiments, however, which have been more recently made, and the observations which have been taken, much of their boasted frugality and precaution seems denied them: the treasures they lay up are no longer supposed intended for future provision; and the choice they make in their stores, seems no way dictated by wisdom. It is indeed somewhat surprising, that almost every writer of antiquity should describe this insect, as labouring in the summer, and feasting upon the produce during the winter. Perhaps, in some of the warmer climates, where the winter is mild, and of short continuance, this may take place; but in France and England, these animals can have no manner of occasion for a supply of winter provisions, as they are actually in a state of torpidity during that season.

The common ants of Europe are of two or three different kinds: some red, some black; some with stings, and others without; such as have stings, inflict their wounds in that manner; such as are unprovided with these weapons of defence, have a power of spurting from their hinder parts an acid pungent liquor, which, if it lights upon the skin, inflames and burns it like nettles.

The body of an ant is divided into the head, breast, and belly. In the head the eyes are placed, which are entirely black, and under their eyes there are two small horns or feelers, composed of twelve joints, all covered with a fine silky hair. The mouth is furnished with two crooked jaws, which project outwards, in each of which are seen incisors, that look like teeth. The breast is covered with a fine silky hair, from which project six legs, that are pretty strong and hairy, the extremities of each armed with two small claws, which the animal uses in climbing. The belly is more reddish than the rest of the body, which is of a brown chestnut colour, shining as glass, and covered with extremely fine hair.

From such a formation, this animal seems bolder and more active, for its size, than any other of the insect tribe, and fears not to attack a creature often above ten times its own magnitude.

As soon as the winter is past, in the first fine day in April, the ant-hill, that before seemed a desert, now swarms with new

life, and myriads of these insects are seen just awaked from their annual lethargy, and preparing for the pleasures and fatigues of the season. For the first day they never offer to leave the hill, which may be considered as their citadel, but run over every part of it, as if to examine its present situation, to observe what injuries it has sustained during the rigours of winter,<sup>1</sup> while they slept, and to meditate and settle the labours of the day ensuing.

At the first display of their forces, none but the wingless tribe appears, while those furnished with wings remain at the bottom. These are the working ants that first appear, and that are always destitute of wings; the males and females, that are furnished with four large wings each, are more slow in making their appearance.

Thus, like bees, they are divided into males, females, and the neutral or the working tribe. These are all easily distinguished from each other; the females are much larger than the males; the working ants are the smallest of all. The two former have wings; which, however, they sometimes are divested of; the latter never have any, and upon them are devolved all the labours that tend to the welfare of the community. The female, also, may be distinguished by the colour and structure of her breast, which is a little more brown than that of the common ant, and a little brighter than that of the male.

In eight or ten days after their first appearance, the labours of the hill are in some forwardness; the males and females are seen mixed with the working multitude, and pursued or pursuing each other. They seem no way to partake in the common drudgeries of the state; the males pursue the females with great assiduity, and in a manner force them to compliance. They remain coupled for some time; while the males, thus united, suffer themselves to be drawn along by the will of their partners.

In the meantime, the working body of the state take no part in their pleasures; they are seen diligently going from the ant-hill in pursuit of food for themselves and their associates, and of proper materials for giving a comfortable retreat to their young, or safety to their habitation. In the fields of England, ant-hills are formed with but little apparent regularity. In the

<sup>1</sup> *Memoires pour servir a l'histoire des Insectes par Charles de Geer.*



more southern provinces of Europe, they are constructed with wonderful contrivance, and offer a sight highly worthy a naturalist's curiosity. These are generally formed in the neighbourhood of some large tree and a stream of water. The one is considered by the animals as the proper place for getting food; the other for supplying them with moisture, which they cannot well dispense with. The shape of the ant-hill is that of a sugar-loaf, about three feet high, composed of various substances; leaves, bits of wood, sand, earth, bits of gum, and grains of corn. These are all united into a compact body, perforated with galleries down to the bottom, and winding ways within the body of the structure. From this retreat, to the water, as well as to the tree, in different directions, there are many paths worn by constant assiduity, and along these the busy insects are seen passing and repassing continually; so that from May, or the beginning of June, according to the state of the season, they work continually, till the bad weather comes on.

The chief employment of the working ants, is in sustaining not only the idlers at home, but also finding a sufficiency of food for themselves. They live upon various provisions, as well of the vegetable as of the animal kind. Small insects they will kill and devour: sweets of all kinds they are particularly fond of. They seldom, however, think of their community, till they themselves are first satiated. Having found a juicy fruit, they swallow what they can, and then tearing it in pieces, carry home their load. If they meet with an insect above their match, several of them will fall upon it at once, and, having mangled it, each will carry off a part of the spoil. If they meet, in their excursions, any thing that is too heavy for one to bear, and yet which they are able to divide, several of them will endeavour to force it along, some dragging and others pushing. If any one of them happens to make a lucky discovery, it will immediately give advice to others, and then, at once, the whole republic will put themselves in motion. If in these struggles one of them happens to be killed, some kind survivor will carry him off to a great distance, to prevent the obstructions his body might give to the general spirit of industry.\*

\* M. Hanhart gives an account of a battle which he witnessed between two species of these insects—one the *formica rufa*, and the other a little black

But while they are thus employed in supporting the state in feeding abroad, and carrying in provisions to those that continue at home, they are not unmindful of posterity. After a few days of fine weather, the female ants begin to lay their eggs,

ant. He saw them approach in armies composed of their respective swarms, and advancing towards each other in the greatest order. The *formica rufa* marched with one in front, on a line from nine to twelve feet in length, flanked by several corps in square masses, composed of from twenty to sixty individuals. The second species (little blacks), forming an army much more numerous, marched to meet the enemy on a very extended line, and from one to three individuals abreast. They left a detachment at the foot of their hillock to defend it against any unlooked-for attack. The rest of the army marched to battle, with its right wing supported by a solid corps of several hundred individuals, and the left a wing supported by a similar body of more than a thousand. These groups advanced in the greatest order, and without changing their positions. The two lateral corps took no part in the principal action. That of the right wing made a halt and formed an army of reserve; whilst the corps which marched in column on the left wing manœuvred so as to turn the hostile army, and advanced with a hurried march to the hillock of the *formica rufa*, and took it by assault.

The two armies attacked each other and fought for a long time without breaking their lines. At length disorder appeared in various points, and the combat was maintained in detached groups; and after a bloody battle, which continued from three to four hours, the *formica rufa* were put to flight, and forced to abandon their two hillocks, and go off to establish themselves at some other point with the remains of their army.

The most interesting part of this exhibition, says M. Hanhart, was to see these insects reciprocally making prisoners, and transporting their own wounded to their hillocks. Their devotedness to the wounded was carried so far, that the *formica rufa*, in conveying them to their nests, allowed themselves to be killed by the little blacks without any resistance, rather than abandon their precious charge.

From the observations of M. Huber, it is known that when an ant-hillock is taken by the enemy, the vanquished are reduced to slavery, and employed in the interior labours of their habitation.

The *formica rufa* or wood-ant is the largest of our British ants. It is called the Hill-ant by Gould, the Fallow-ant by the English translator of Huber, and popularly the Pismire. It invariably lives in or near woods and forests. It may be readily distinguished from other ants by the dusky black colour of its head and hinder parts, and the rusty brown of its middle. The structures reared by this species are often of considerable magnitude, and bear no small resemblance to a rook's nest thrown upon the ground, bottom upwards.

The exterior of the nest is composed of almost every transportable material which the colonists can find in their vicinity; but the greater portion consists of withered grass and short twigs of trees, piled up in apparent confusion, but with sufficient regularity to render the whole smooth, conical, and sloping towards the base, for the purpose, we may infer, of carry-

and those are as assiduously watched and protected by the working ants, who take upon themselves to supply whatever is wanting to the nascent animal's convenience or necessity. They are carried, as soon as laid, to the safest situation, at the bottom of

ing off rain water. When within reach of a corn-field, they often also pick up grains of wheat, barley, or oats, and carry them to the nest as building materials, and not for food as was believed by the ancients. The coping which forms the exterior of the wood-ant's nest, though only a small portion of the structure, which consists of a great number of interior chambers and galleries, with funnel-shaped avenues leading to them, is one of the most essential parts, and we cannot follow a more delightful guide than the younger Huber, in detailing its formation.

"The labourers," he says, "of which the colony is composed, not only work continually on the outside of their nest, but, differing very essentially from other species, who willingly remain in the interior, sheltered from the sun, they prefer living in the open air, and do not hesitate to carry on, even in our presence, the greater part of their operations. To have an idea how the straw or stubble roof is formed, let us take a view of the ant-hill at its origin, when it is simply a cavity in the earth. Some of its future inhabitants are seen wandering about in search of materials fit for the exterior work, with which, though rather irregularly, they cover up the entrance; whilst others are employed in mixing the earth, thrown up in hollowing the interior, with fragments of wood and leaves, which are every moment brought in by their fellow-assistants; and this gives a certain consistence to the edifice, which increases in size daily. Our little architects leave here and there cavities, where they intend constructing the galleries which are to lead to the exterior, and as they remove in the morning the barriers placed at the entrance of their nest the preceding evening, the passages are kept open during the whole time of its construction. We soon observed the roof to become convex; but we should be greatly deceived did we consider it solid. This roof is destined to include many apartments or stories. Having observed the motions of these little builders through a pane of glass, adjusted against one of their habitations, I am thence enabled to speak with some degree of certainty upon the manner in which they are constructed. I ascertained, that it is by excavating or mining the under portion of their edifice, that they form their spacious halls, low indeed, and of heavy construction, yet sufficiently convenient for the use to which they are appropriated, that of receiving, at certain hours of the day, the larvæ and pupæ. These halls have a free communication by galleries, made in the same manner. If the materials of which the ant-hill is composed were only interlaced, they would fall into a confused heap every time the ants attempted to bring them into regular order. This, however, is obviated by their tempering the earth with rain-water, which, afterwards hardened in the sun, so completely and effectually binds together the several substances, as to permit the removal of certain fragments from the ant-hill without any injury to the rest; it, moreover, strongly opposes the introduction of the rain. I never found, even after long and violent rains, the interior of the nest wetted to more than a quarter of an inch from the surface, provided it had not been previously out of repair, or deserted by its inhabitants. The ant-

their hill, where they are carefully defended from cold and moisture. We are not to suppose, that those white substances which we so plentifully find in every ant-hill, are the eggs as newly laid. On the contrary, the ant's egg is so very small, that,

are extremely well sheltered in their chambers, the largest of which is placed nearly in the centre of the building; it is much loftier than the rest, and traversed only by the beams that support the ceiling; it is in this spot that all the galleries terminate, and this forms, for the most part, their usual residence. As to the underground portion, it can only be seen when the ant-hill is placed against a declivity; all the interior may be then readily brought in view, by simply raising up the straw-roof. The subterranean residence consists of a range of apartments, excavated in the earth, taking a horizontal direction."

There is this remarkable difference in the nest of the wood-ants, that they do not construct a long covert way as if for concealment, as the yellow and the brown ants do. The wood-ants are not, like them, afraid of being surprised by enemies, at least during the day, when the whole colony is either foraging in the vicinity or employed on the exterior. But the proceedings of the wood-ants at night are well worthy of notice; and when M. Huber began to study their economy, he directed his entire attention to their night proceedings. "I remarked," says he, "that their habitations changed in appearance hourly, and that the diameter of those spacious avenues, where so many ants could freely pass each other during the day, was, as night approached, gradually lessened. The aperture, at length, totally disappeared, the dome was closed on all sides, and the ants retired to the bottom of their nest. In further noticing the apertures of these ant-hills, I fully ascertained the nature of the labour of its inhabitants, of which I could not before even guess the purport; for the surface of the nest presented such a constant scene of agitation, and so many insects were occupied in carrying materials in every direction, that the movement offered no other image than that of confusion. I saw then clearly that they were engaged in stopping up passages; and for this purpose, they at first brought forward little pieces of wood, which they deposited near the entrance of those avenues they wished to close; they placed them in the stubble; they then went to seek other twigs and fragments of wood, which they disposed above the first, but in a different direction, and appeared to choose pieces of less size in proportion as the work advanced. They, at length, brought in a number of dried leaves, and other materials of an enlarged form, with which they covered the roof: an exact miniature of the art of our builders, when they form the covering of any building? Nature, indeed, seems everywhere to have anticipated the inventions of which we boast, and this is doubtless one of the most simple. Our little insects, now in safety in their nest, retire gradually to the interior before the last passages are closed, one or two only remain without, or concealed behind the doors on guard, whilst the rest either take their repose, or engage in different occupations in the most perfect security. I was impatient to know what tool place in the morning upon these ant-hills, and therefore visited them at an early hour. I found them in the same state in which I had left them the preceding evening. A few ants were wandering about on the surface of

though laid upon a black ground, it can scarcely be discerned. The little white bodies we see are the young animals in their maggot state, endued with life, long since freed from the egg, and often involved in a cone, which it has spun round itself,

the nest, some others issued from time to time from under the margin of their little roofs formed at the entrance of the galleries: others afterwards came forth, who began removing the wooden bars that blockaded the entrance, in which they readily succeeded. This labour occupied them several hours. The passages were at length free, and the materials with which they had been closed, scattered here and there over the ant-hill. Every day, morning and evening, during the fine weather, I was a witness to similar proceedings. On days of rain the doors of all the ant-hills remained closed. When the sky was cloudy in the morning, or rain was indicated, the ants, who seemed to be aware of it, opened but in part their several avenues, and immediately closed them when the rain commenced."

The galleries and chambers which are roofed in as thus described, are very similar to those of the mason-ants, being partly excavated in the earth, and partly built with the clay thence procured. It is in these they pass the night, and also the colder months of the winter, when they become torpid or nearly so, and of course require not the winter granaries of corn with which the ancients fabulously furnished them.

The *Carpenter-Ants*, or ants that work in wood, perform much more extensive operations than any of the other carpenter insects. Their only tools, like those of bees and wasps, are their jaws or mandibles; but though these may not appear so curiously constructed as the ovipositor file of the tree-hopper, or the rasp and saw of the saw-flies, they are no less efficient in the performance of what is required. Among the carpenter-ants the emmet or jet-ant holds the first rank, and is easily known by being rather less in size than the wood-ant, and by its fine shining black colour. It is less common in Britain than the others, though its colonies may occasionally be met with in the trunks of decaying oak or willow trees in hedges.

Among the foreign ants, we may mention a small yellow ant of South America, described by Dampier, which seems, from his account, to construct a nest of green leaves. "Their sting," he says, "is like a spark of fire; and they are so thick among the boughs in some places, that one shall be covered with them before he is aware. These creatures have nests on great trees, placed on the body between the limbs: some of their nests are as big as a hog's head. This is their winter habitation; for in the wet season they all repair to these their cities, where they preserve their eggs. In the dry season, when they leave their nests, they swarm all over the woodlands, for they never trouble the savannahs. Great paths, three or four inches broad, made by them, may be seen in the woods. They go out light, but bring home heavy loads on their backs, all of the same substance, and equal in size. I never observed any thing besides pieces of green leaves, so big that I could scarcely see the insect for his burden; yet they would march stoutly, and so many were pressing forward that it was a very pretty sight, for the path looked perfectly green with them."

Ants observed in New South Wales, by the gentlemen in the expedition under Captain Cook, are still more interesting. "Some," we are told, "are

like the silk-worm. The real egg when laid, if viewed through a microscope, appears smooth, polished, and shining, while the maggot is seen composed of twelve rings, and is often larger than the ant itself.—It is impossible to express the fond attach-

as green as a leaf, and live upon trees, where they build their nests of various sizes, between that of a man's head and his fist. These nests are of a very curious structure: they are formed by bending down several of the leaves, each of which is as broad as a man's hand, and glueing the points of them together so as to form a purse. The viscous matter used for this purpose is an animal juice which nature has enabled them to elaborate. Another sort are quite black. Their habitations are the inside of the branches of a tree which they contrive to excavate, by working out the pith almost to the extremity of the slenderest twig, the tree at the same time flourishing as if it had no such inmate. A third kind we found nested in the root of a plant, which grows on the bark of trees in the manner of mistletoe, and which they had perforated for that use. This root is commonly as big as a large turnip, and sometimes much bigger. When we cut it we found it intersected by innumerable winding passages, all filled with these animals, by which, however, the vegetation of the plant did not appear to have suffered any injury. We never cut one of these roots that was not inhabited, though some were not bigger than a hazel-nut. The animals themselves are very small, not more than half as big as the common red ant in England. They had stings, but scarcely force enough to make them felt: they had, however, a power of tormenting us in an equal, if not in a greater degree; for the moment we handled the root, they swarmed from innumerable holes, and running about those parts of the body that were uncovered, produced a titillation more intolerable than pain, except it is increased to great violence."

The species called *Sugar-Ants* in the West Indies are particularly destructive to the sugar-cane, as well as to lime, lemon, and orange-trees, by excavating their nests at the roots, and so loosening the earth that they are frequently uprooted and blown down by the winds. If this does not happen the roots are deprived of due nourishment, and the plants become sickly and die.

But the most extraordinary of ants is the *White-Ants* or Termites, inhabiting the plains of East India, Africa, and South America. Mr Smeathman has given in the Philosophical Transactions, a very complete account of these wonderful creatures. He says that they are naturally divided into three orders: first, the working insects, which he distinguishes by the name of *labourers*; second, the fighters, or *soldiers*, which perform no other labour than such as is necessary in defence of the nest; and third, the winged or perfect insects, which are male and female, and capable of multiplying the species. The latter he denotes the *nobility* or *gentry*, because they neither labour nor fight.

In their nest or hill, for they build on the surface of the ground, the labourers are always the most numerous, there being at least a hundred labourers for one of the fighting insects, or soldiers. In this state they are about a quarter of an inch in length.

The second order, or soldiers, differ in figure from the labourers. These

ment which the working ants show to their rising progeny. In cold weather they take them in their mouths, but without offering them the smallest injury, to the very depths of their habitation, where they are less subject to the severity of the season.

appear to be such insects as have undergone one change towards their perfect state. They are now nearly half an inch in length, and equal in size to about fifteen of the labourers. The shape of the head is likewise greatly changed. In the former state the mouth is evidently formed for gnawing, or for holding bodies; but in this state the jaws being shaped like two sharp awls, a little jagged, are destined solely for piercing or wounding. For these purposes they are well calculated, being as hard as a crab's claw, and placed in a strong horny head, which is larger than all the rest of the body.

The insect of the third order, or in its perfect state, is still more remarkable. The head, the thorax, and the abdomen, differ almost in the same parts in the labourers and soldiers. The animals are also now furnished with four large brownish transparent wings, by which they are enabled, at the proper season, to emigrate, and to establish new settlements. They are likewise greatly altered in their size as well as figure, and have acquired the powers of propagating the species. Their bodies now measure nearly three quarters of an inch in length; their wings, from tip to tip, above two inches and a half; and their bulk is equal to that of thirty labourers, or two soldiers. Instead of active, industrious, and rapacious little animals, when they arrive at their perfect state, they become innocent, helpless, and dastardly.

Their numbers are great, but their enemies are still more numerous. They are devoured by birds, by every species of insects, by carnivorous reptiles, and even by the inhabitants of many parts of Africa. After such devastation, it seems surprising that even a single pair should escape. Some, however, are so fortunate; and being found by some of the labouring insects, that are continually running about the surface of the ground under their covered galleries, are elected kings and queens over new states; all those who are not so elected and preserved, certainly perish. The manner in which these labourers protect the happy pair from their innumerable enemies, not only on the day of the massacre of almost all their race, but for a long time after, will, I hope, justify me in the use of the term election. The little industrious creatures immediately enclose them in a small chamber of clay suitable to their size, into which at first they leave but one entrance, large enough for themselves and soldiers to go in and out at, but too little for either of the royal pair to use; and when necessity obliges them to make more entrances, they are never larger, so that of course, the voluntary subjects charge themselves with the task of providing for the offspring of their sovereigns, as well as of working and fighting for them, until they have raised a progeny capable at least of dividing the task with them.

About this time a most extraordinary change takes place in the queen; the abdomen begins to extend and enlarge to such an enormous size, that an old queen will sometimes have it so much increased, as to be nearly *two thousand times* the bulk of the rest of her body. It is now of an irregular oblong shape, and is become one vast matrix full of eggs. When these are perfectly formed, they begin to be protruded, and they come forth so quick.

In a fine day they remove them with the same care nearer the surface, where their maturity may be assisted by the warm beams of the sun. If a formidable enemy should come to batter down their whole habitation, and crush them by thousands in

ly, that about sixty in a minute, or upwards of eighty thousand in twenty-four hours, are deposited. The eggs are immediately taken away by the attendants, and carried to the nurseries: here they are hatched. The young ones are attended and provided with every thing necessary, until they are able to shift for themselves, and take their share in the labours of the community.

The nests, or rather hills of these ants, (for they are often elevated ten or twelve feet above the surface of the ground,) are nearly of a conical shape; and sometimes so numerous, as at a little distance to appear like little villages of the Negroes. Jobson, in his history of Gambia, says that some of them are twenty feet high, and that he and his companions have often hidden themselves behind them, for the purpose of shooting deer and other wild animals. Each hill is composed of an exterior and interior part. The exterior cover is a large clay shell, shaped like a dome, of strength and magnitude sufficient to enclose and protect the interior building from the injuries of the weather, and to defend its numerous inhabitants from the attacks of natural or accidental enemies.

The royal chamber is always situated as near the centre of the building as possible, is generally on a level with the surface of the ground, and of an obtuse oval shape within. In the infant state of the colony it is not above an inch in length: but in time it becomes enlarged to six or eight inches, or more. The entrance into the royal chamber not admitting any animal larger than the labourers or soldiers, it follows that the king and queen can never possibly get out. This chamber is surrounded by a hundred of others, of different sizes, figures, and dimensions; all of them arched either in a circular or an elliptical form. These either open into each other, or have communicating passages, which being always clear, are evidently intended for the convenience of the soldiers and attendants, of whom great numbers are necessary. The latter apartments are joined by the magazines and nurseries. The magazines are chambers of clay, and are at all times well stored with provisions, which to the naked eye seem to consist of the raspings of wood and plants, but, when examined by the microscope, they are found to consist chiefly of the gums or inspissated juices of plants, thrown together in small irregular masses.

The magazines are always intermixed with the nurseries, buildings totally different from the rest of the apartments. These are composed entirely of wooden materials, which seem to be cemented with gum. They are invariably occupied by the eggs, and the young ones, which first appear in the shape of labourers. These buildings are exceedingly compact, and are divided into a number of small irregular-shaped chambers, not one of which is half an inch wide. They are placed all around, and as near as possible to the royal apartments.

When a nest is in an infant state, the nurseries are close to the royal apartment. But as in process of time the body of the queen enlarges, it becomes necessary, for her accommodation, to augment the dimensions of her



the ruin, yet these wonderful insects, still mindful of their parental duties, make it their first care to save their offspring. They are seen running wildly about, and different ways, each loaded with a young one, often bigger than the insect that sup-

chamber. She then likewise lays a greater number of eggs, and requires more attendants : of course it is necessary that both the number and dimensions of the adjacent apartments should be augmented. For this purpose, the small first built nurseries are taken to pieces, rebuilt a little farther off, and made a size larger, and their number at the same time is increased. Thus the animals are continually employed in pulling down, repairing, or rebuilding their apartments ; and these operations they perform with wonderful sagacity, regularity, and foresight.

The nurseries are enclosed in chambers of clay, like those which contain the provisions ; but they are much larger. In the early state of the nest they are not bigger than a hazel-nut ; but in great hills they are oftentimes four or five inches across.

The royal chamber, as before observed, is situated as nearly under the apex of the hill as possible, and is surrounded on all sides, both above and below, by what Mr Smeathman calls the *royal apartments*, which contain only those labourers and soldiers that are employed in defence of the common parents. These apartments compose an intricate labyrinth, which extends a foot or more in diameter from the royal chamber on every side. Here the nurseries and magazines of provisions begin ; and, being separated by small empty chambers and galleries, which surround them, and communicate with each other, are continued on all sides to the outward shell, and reach up within two-thirds, or three-fourths of its height, leaving an open area in the middle under the dome. This is surrounded by large pointed arches, which are sometimes two or three feet high next to the front of the area, but diminish rapidly as they recede, and are soon lost among the innumerable chambers and nurseries behind them. The inferior building, or assemblage of nurseries, chambers, and passages, has a flattish floor, without any perforation. By this contrivance, if by accident water should penetrate the external dome, the apartments below are preserved from injury. The area has also a flattish floor, which is situated above the royal chamber ; it is likewise water-proof, and so constructed, that if water gets admittance, it runs off by subterraneous passages, which are cylindrical, and some of them so much as even thirteen inches in diameter. These subterraneous passages are thickly lined with the same kind of clay of which the hill is composed ; they ascend the internal part of the external shell in a spiral form, and winding round the whole building up to the top, intersect and communicate with each other at different heights. From every part of these large galleries, a number of pipes, or smaller galleries, leading to different apartments of the building, proceed. There are likewise a great many which lead downward, by sloping descents, to a considerable depth under the surface of the ground. Other galleries ascend and lead out horizontally on every side, and are also carried under ground, but near the surface, to great distances, for the purpose of foraging.

When a breach is made in one of the walls by an axe or other instrument, the first object that attracts attention is the behaviour of the soldiers

ports it. I have kept, says Swammerdam, several of the working ants in my closet, with their young in a glass filled with earth. I took pleasure in observing, that in proportion as the earth dried on the surface, they dug deeper and deeper to deposit

or fighting insects. Immediately after the blow is given, a soldier comes out, walks about the breach, and seems to examine the nature of the enemy, or cause of the attack. He then goes into the hill, gives the alarm, and in a short time large bodies rush out as fast as the breach will permit. It is not easy to describe the fury that actuates these fighting insects. In their eagerness to repel the enemy, they frequently tumble down the sides of the hill, but quickly recover themselves, and bite every thing they encounter. This biting, joined to the striking of their forceps upon the building, makes a crackling or vibrating noise, which is somewhat shriller and quicker than the ticking of a watch, and may be heard at the distance of several feet. While the attack proceeds they are in the most violent bustle and agitation. If they seize hold of any part of a man's body, they instantly make a wound which gives some pain. When they attack the leg, the stain of blood upon the stocking extends more than an inch in width. They make their hooked jaws meet at the first stroke, and never quit their hold, but suffer themselves to be pulled away piece after piece, without any attempt to escape. On the other hand, if a person keeps out of their reach, and gives them no further disturbance, in less than half an hour they retire into the nest, as if they supposed the monster that damaged their castle had fled. Before the whole of the soldiers have got in, the labouring insects are all in motion, and hasten towards the breach, each of them having a quantity of tempered mortar in his mouth. This mortar they stick upon the breach as fast as they arrive, and perform the operation with so much despatch and facility, that, notwithstanding the immensity of their number, they never stop or embarrass one another. During this scene of apparent hurry and confusion, the spectator is agreeably surprised, a regular wall rising and gradually filling up the chasm. While the labourers are thus employed, almost all the soldiers remain within, except here and there one, who saunters about among six hundred or a thousand labourers, but never touches the mortar. One soldier, however, invariably takes his station close to the wall which the labourers are building. This soldier turns himself leisurely on all sides, and, at intervals of a minute or two, raises his head, beats upon the building with his forceps, and makes the vibrating noise formerly mentioned. A loud hiss instantly issues from the inside of the dome, and all the subterraneous caverns and passages. That this hiss proceeds from the labourers is apparent; for, at every signal of this kind, they work with redoubled quickness and alacrity. A renewal of the attack, however, instantly changes the scene. "On the first stroke," Mr Smeathman remarks, "the labourers run into the many pipes and galleries with which the building is perforated, which they do so quickly, that they seem to vanish; for, in a few seconds, all are gone, and the soldiers rush out as numerous and as vindictive as before. On finding no enemy, they return again leisurely into the hill; and, soon after, the labourers appear loaded as at first, as active, and as sedulous, with soldiers here and there among them, who act just in the same manner, one or other of them giving the

their eggs ; and when I poured water thereon, it was surprising to see with what care, affection, and diligence, they laboured, to put their brood in safety, in the driest place. I have seen also, that when water has been wanting for several days, and when the earth was moistened after it a little, they immediately carried their young ones to have a share, who seemed to enjoy and suck the moisture.

When the young maggot is come to its full growth, the breast swells insensibly, it casts its skin, and loses all motion. All the members which were hidden before, then begin to appear ; an aurelia is formed, which represents very distinctly all the parts of the animal, though they are yet without motion, and, as it were, wrapped up in swaddling clothes. When at length the little insect has passed through all its changes, and acquired its proper maturity, it bursts this last skin, to assume the form it is to retain ever after. Yet this is not done by efforts of the little animal alone, for the old ones very assiduously break open, with their teeth, the covering in which it is enclosed. Without this assistance the aurelia would never be able to get free, as M. de Geer often found, who tried the experiment by leaving the aurelia to themselves. The old ones not only assist them, but know the very precise time for lending their assistance ; for, if produced too soon, the young one dies of cold ; if retarded too long, it is suffocated in its prison.

When the female has done laying, and the whole brood is thus produced, her labours, as well as that of the male, become unnecessary ; and her wings, which she had but a short time before so actively employed, drop off. What becomes of her when thus divested of her ornaments is not well known, for she is seen in the cells for some weeks after. The males, on the other hand, having no longer any occupation at home, make use of those wings with which they have been furnished by nature, and fly away, never to return or be heard of more. It is probable they perish with the cold, or are devoured by the birds, which are particularly fond of this petty prey.

In the meantime, the working ants, having probably deposed

signal to hasten the business. Thus the pleasure of seeing them out to fight or to work alternately may be obtained as often as curiosity excites, or time permits ; and it will certainly be found, that the one order never attempts to fight, nor the other to work, let the emergency be ever so great.\*

their queens, and being deserted by the males, that served but to clog the community, prepare for the severity of the winter, and bury their retreats as deep in the earth as they conveniently can. It is now found that the grains of corn, and other substances with which they furnish their hill, are only meant as fences to keep off the rigours of the weather, not as provisions to support them during its continuance. It is found generally to obtain, that every insect that lives a year after it is come to its full growth, is obliged to pass four or five months without taking any nourishment, and will seem to be dead all that time. It would be to no purpose, therefore, for ants to lay up corn for the winter, since they lie that time without motion, heaped upon each other, and are so far from eating, that they are utterly unable to stir. Thus, what authors have dignified by the name of a magazine, appears to be no more than a cavity, which serves for a common retreat when the weather forces them to return to their lethargic state.

What has been said with exaggeration of the European ant, is however true, if asserted of those of the tropical climates. They build an ant-hill with great contrivance and regularity, they lay up provisions, and as they probably live the whole year, they submit themselves to regulations entirely unknown among the ants of Europe.

Those of Africa are of three kinds, the red, the green, and the black; the latter are above an inch long, and in every respect a most formidable insect. Their sting produces extreme pain, and their depredations are sometimes extremely destructive. They build an ant-hill of a very great size, from six to twelve feet high; it is made of viscous clay, and tapers into a pyramidal form. This habitation is constructed with great artifice; and the cells are so numerous and even, that a honey-comb scarce exceeds them in number and regularity.

The inhabitants of this edifice seem to be under a very strict regulation. At the slightest warning they will sally out upon whatever disturbs them; and if they have time to arrest their enemy, he is sure to find no mercy. Sheep, hens, and even rats, are often destroyed by these merciless insects, and their flesh devoured to the bone. No anatomist in the world can strip a skeleton so completely as they; and no animal, how strong soever, when they have once seized upon it, has power to resist them.

It often happens that these insects quit their retreat in a body, and go in quest of adventures. "During my stay," says Smith, "at Cape Corse Castle, a body of these ants came to pay us a visit in our fortification. It was about day-break when the advanced guard of this famished crew entered the chapel, where some negro servants were asleep upon the floor. The men were quickly alarmed at the invasion of this unexpected army, and prepared, as well as they could, for a defence. While the foremost battalion of insects had already taken possession of the place, the rear-guard was more than a quarter of a mile distant. The whole ground seemed alive, and crawling with unceasing destruction. After deliberating a few moments upon what was to be done, it was resolved to lay a large train of gunpowder along the path they had taken: by this means, millions were blown to pieces; and the rear-guard perceiving the destruction of their leaders, thought proper instantly to return and make back to their original habitation."

The order which these ants observe, seems very extraordinary; whenever they sally forth, fifty or sixty larger than the rest are seen to head the band, and conduct them to their destined prey. If they have a fixed spot where their prey continues to resort, they then form a vaulted gallery, which is sometimes a quarter of a mile in length; and yet they will hollow it out in the space of ten or twelve hours.

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## CHAP. VI.

### OF THE BEETLE, AND ITS VARIETIES.

HITHERTO we have been treating of insects with four transparent wings, we now come to a tribe with two transparent wings, with cases that cover them close while at rest, but which allow them their proper play when flying. The principal of these are the Beetle, the May-bug, and the Cantharis. These are all bred like the rest of their order, first from eggs, then they become grubs, then a chrysalis, in which the parts of the future fly are distinctly seen; and, lastly, the animal leaves its prison, breaking forth as a winged animal in full maturity.

Of the Beetle there are various kinds ; all, however, concurring in one common formation of having cases to their wings, which are the more necessary to those insects, as they often live under the surface of the earth, in holes which they dig out by their own industry. These cases prevent the various injuries their real wings might sustain, by rubbing or crushing against the sides of their abode. These, though they do not assist flight, yet keep the internal wings clean and even, and produce a loud buzzing noise when the animal rises in the air.

If we examine the formation of all animals of the beetle kind, we shall find, as in shell-fish, that their bones are placed externally, and their muscles within. These muscles are formed very much like those of quadrupeds, and are endued with such surprising strength, that, bulk for bulk, they are a thousand times stronger than those of a man.—The strength of these muscles is of use in digging the animal's subterraneous abode, where it is most usually hatched, and to which it most frequently returns, even after it becomes a winged insect, capable of flying.

Beside the difference which results from the shape and colour of these animals, the size also makes a considerable one ; some beetles being not larger than the head of a pin, while others, such as the elephant beetle, are as big as one's fist. But the greatest difference among them is, that some are produced in a month, and in a single season go through all the stages of their existence ; while others take near four years to their production, and live as winged insects a year more. To give the history of all these animals, that are bred pretty much in the same way, would be insipid and endless ; it will suffice to select one or two from the number, the origin of which may serve as specimens of the rest. I will, therefore, offer the history of the May-bug to the reader's attention ; premising that most other beetles, though not so long lived, are bred in the same manner.

The May-bug, or dorr-beetle, as some call it, has, like all the rest, a pair of cases to its wings, which are of a reddish brown colour, sprinkled with a whitish dust, which easily comes off. In some years their necks are seen covered with a red plate, and in others with a black ; these, however, are distinct sorts, and their difference is by no means accidental. The fore-legs are very short, and the better calculated for burrowing in the ground, where this insect makes its retreat. It is well known, for its

evening buzz, to children ; but still more formidably introduced to the acquaintance of husbandmen and gardeners ; for, in some seasons, it has been found to swarm in such numbers as to eat up every vegetable production.

The two sexes in the May-bug are easily distinguished from each other, by the superior length of the tufts, at the end of the horns, in the male. They begin to copulate in summer ; and at that season they are seen joined together a considerable time. The female being impregnated, quickly falls to boring a hole into the ground, where to deposit her burden. This is generally about half a foot deep, and in it she places her eggs, which are of an oblong shape, with great regularity, one by the other. They are of a bright yellow colour, and no way wrapped up in a common covering, as some have imagined. When the female is lightened of her burden, she again ascends from her hole, to live as before, upon leaves and vegetables, to buzz in the summer evening, and to lie hid among the branches of trees in the heat of the day.

In about three months after these eggs have been thus deposited in the earth, the contained insect begins to break its shell, and a small grub or maggot crawls forth, and feeds upon the roots of whatever vegetable it happens to be nearest.

All substances of this kind seem equally grateful, yet it is probable the mother insect has a choice among what kind of vegetables she shall deposit her young. In this manner these voracious creatures continue in the worm state, for more than three years, devouring the roots of every plant they approach, and making their way under ground, in quest of food, with great despatch and facility. At length they grow to above the size of a walnut, being a great thick white maggot with a red head, which is seen most frequently in new-turned earth, and which is so eagerly sought after by birds of every species. When largest, they are found an inch and a half long, of a whitish yellow colour, with a body consisting of twelve segments or joints, on each side of which there are nine breathing-holes, and three red feet. The head is large in proportion to the body, of a reddish colour, with a pincer before, and a semi-circular lip, with which it cuts the roots of plants, and sucks out their moisture. As this insect lives entirely under ground, it has no occasion for eyes, and accordingly it is found to have none ; but is furnished

with two feelers, which, like the crutch of a blind man, serve to direct its motion. Such is the form of this animal, that lives for years in the worm state under ground, still voracious, and every year changing its skin.

It is not till the end of the fourth year, that this extraordinary insect prepares to emerge from its subterraneous abode, and even this is not effected, but by a tedious preparation. About the latter end of autumn, the grub begins to perceive the approach of its transformation; it then buries itself deeper and deeper in the earth, sometimes six feet beneath the surface, and there forms itself a capacious apartment, the walls of which it renders very smooth and shining by the excretions of its body. Its abode being thus formed, it begins, soon after, to shorten itself, to swell, and to burst its last skin, in order to assume the form of a chrysalis. This, in the beginning, appears of a yellowish colour, which heightens by degrees, till at last it is seen nearly red. Its exterior form plainly discovers all the vestiges of the future winged insect, all the fore-parts being distinctly seen; while behind, the animal seems as if wrapped in swaddling clothes.

The young May-bug continues in this state for about three months longer; and it is not till the beginning of January, that the aurelia divests itself of all its impediments, and becomes a winged insect, completely formed. Yet still the animal is far from attaining its natural strength, health, and appetite. It undergoes a kind of infant imbecility; and, unlike most other insects, that the instant they become flies are arrived at their state of full perfection, the May-bug continues feeble and sickly. Its colour is much brighter than in the perfect animal, all its parts are soft, and its voracious nature seems, for a while, to have entirely forsaken it. As the animal is very often found in this state, it is supposed, by those unacquainted with its real history, that the old ones, of the former season, have buried themselves for the winter, in order to revisit the sun the ensuing summer. But the fact is, the old one never survives the season, but dies, like all the other winged tribe of insects, from the severity of cold in winter.

About the latter end of May, these insects, after having lived for four years under ground, burst from the earth, when the first mild evening invites them abroad. They are at that time seen



rising from their long imprisonment, from living only upon roots, and imbibing only the moisture of the earth, to visit the mildness of the summer air, to choose the sweetest vegetables for their banquet, and to drink the dew of the evening. Wherever an attentive observer then walks abroad, he will see them bursting up before him in his pathway, like ghosts on a theatre. He will see every part of the earth, that had its surface beat into hardness, perforated by their egression. When the season is favourable for them, they are seen by myriads buzzing along, hitting against every object that intercepts their flight. The mid-day sun, however, seems too powerful for their constitutions; they then lurk under the leaves and branches of some shady tree; but the willow seems particularly their most favourite food; there they lurk in clusters, and seldom quit the tree till they have devoured all its verdure. In those seasons which are favourable to their propagation, they are seen in an evening as thick as flakes of snow, and hitting against every object with a sort of capricious blindness. Their duration, however, is but short, as they never survive the season. They begin to join shortly after they have been let loose from their prison, and when the female is impregnated, she cautiously bores a hole in the ground, with an instrument fitted for that purpose, which she is furnished with at the tail, and there deposits her eggs, generally to the number of threescore. If the season and the soil be adapted to their propagation, these soon multiply as already described, and go through the noxious stages of their contemptible existence. This insect, however, in its worm state, though prejudicial to man, makes one of the chief repasts of the feathered tribe, and is generally the first nourishment with which they supply their young. Rooks and hogs are particularly fond of these worms, and devour them in great numbers. The inhabitants of the county of Norfolk, some time since, went into the practice of destroying their rookeries, but in proportion as they destroyed one plague, they were pestered with a greater; and these insects multiplied in such an amazing abundance, as to destroy not only the verdure of the fields, but even the roots of vegetables not yet shot forth. One farm in particular was so injured by them in the year 1751, that the occupier was not able to pay his rent, and the landlord was content not only to lose his income for that year, but also gave money for the support of

the farmer and his family. In Ireland they suffered so much by these insects, that they came to a resolution of setting fire to a wood, of some miles in extent, to prevent their mischievous propagation.\*

\* Among the numberless species of *grubs* which annoy the farmer and gardener, the one described above is the most destructive. It is the larvæ of the May-bug or cockchafer. It is not so common in Scotland as England and Ireland, in which latter country it is called the Connaught worm. The mother cockchafer, says Mr Rennie in his work on Insect Transformations, when about to lay her eggs, digs into the earth of a meadow or corn-field to the depth of a span, and deposits them in a cluster at the bottom of the excavation. Rosel, in order to watch their proceedings, put some females into glasses half-filled with earth, covered with a tuft of grass, and a piece of thin muslin. In a fortnight, he found some hundreds of eggs deposited, of an oval shape and a pale yellow colour. Placing the glass in a cellar, the eggs were hatched towards autumn, and the grubs increased remarkably in size. In the following May they fed so voraciously that they required a fresh turf every second day; and even this proving too scanty provender, he sowed in several garden pots a crop of peas, lentils, and salad, and when the plants came up, he put a pair of grubs in each pot; and in this manner he fed them through the second and third years. During this period, they cast their skins three or four times, going for this purpose deeper into the earth, and burrowing out a hole where they might effect their change undisturbed; and they do the same in winter, during which they become torpid and do not eat.

When the grub changes into a pupa, in the third autumn after it is hatched, it digs a similar burrow about a yard deep; and when kept in a pot, and prevented from going deep enough, it shows great uneasiness and often dies. The perfect beetle comes forth from the pupa in January or February; but it is then as soft as it was whilst still a grub, and does not acquire its hardness and colour for ten or twelve days, nor does it venture above ground before May, on the fourth year from the time of its hatching. At this time, the beetles may be observed issuing from their holes in the evening, and dashing themselves about in the air as if blind; hence the common saying, "as blind as a beetle."

During the three summers then of their existence in the grub state, these insects do immense injury, burrowing between the turf and the soil, and devouring the roots of grass and other plants; so that the turf may easily be rolled off, as if cut by a turving spade, while the soil underneath for an inch or more is turned into soft mould like the bed of a garden.

The best way of preventing the ravages of these insects would be to employ children to collect the perfect insects when they first appear, before they lay their eggs; but when a field is once overrun with the larvæ, nothing can be done with it, except paring and burning the surface, or ploughing it up, and turning in a flock of ducks or other poultry, or a drove of pigs, which are said to eat these grubs, and to fatten on the fare. Drenching the field with stable urine by means of reservoir carts, like those used for watering roads, would, if sufficiently done, both kill the grubs, and beneficially manure the land.

Of all the beetle kind this is the most numerous, and therefore deserves the chief attention of history. The numerous varieties of other kinds might repay the curiosity of the diligent observer, but we must be content in general to observe, that in

The grub called the *wire worm*, though not very appropriately, is the larva of one of the spring or click beetles, known by their long flattish body, and their power of springing with a clicking sound out of the hand when caught. The grubs of the click beetles are said to continue five years before producing the perfect insect. During this time the grub feeds chiefly on the roots of wheat, rye, oats, barley, and grass; but seems also sometimes to attack the larger roots of potatoes, carrots, and salads. Its ravages are often so extensive as to cut off entire crops of grain. It appears to be most partial to land newly broken up; and has not been found so abundant in meadows and pastures, unless in fields recently laid down with grass. "The wire worm," says Spence, "is particularly destructive for a few years in gardens recently converted from pasture ground. In the botanic garden at Hull, thus circumstanced, a great proportion of the annuals sown in 1813 were destroyed by it. A very simple and effectual remedy, in such cases, was mentioned to me by Sir Joseph Banks. He recommended that slices of potatoes stuck upon skewers, should be buried near the seeds sown, examined every day, and the wire-worms, which collect upon them in great numbers, destroyed."

The wire worm is long, slender, and very tough and hard; but otherwise it has no resemblance to wire, being whitish in colour, of a flattish form, and jointed or ringed. Its breathing spiracles, two in number, are on the back of its last ring. An insect of this family is exceedingly destructive, in the West Indies, to the sugar-cane; the grub, according to Humboldt and Bonpland, feeding on its roots and killing the plants.

Even when agricultural produce escapes being devoured at the root, or the young shoots eaten up, the seeds are often made the prey of the grubs of beetles and weevils. Among the first, the gnawing beetles are very destructive. In North America, the pea beetle commits such extensive depredations on pulse, that in some districts the sowing of peas has been abandoned as useless. The insect most destructive to our peas is the pulse beetle, which sometimes lays an egg on every pea in a pod, which the grub, when hatched, destroys. In the same way, clover seed is often attacked by two or more species of small weevil, known by the yellow colour of their thighs or their feet; and when the farmer expects to reap considerable profit, he finds nothing but empty husks.

Great ravages are committed in granaries by several species of grubs. One of these grubs is called by the French *cadelle*, and is reported to have done more damage to housed grain than any other insect. The pest of the granaries, which is but too well known in this country, is the grain weevil.

Kirby and Spence calculate that a single pair of weevils may produce in one season 6000 descendants; and they were told by an extensive brewer that he had collected and destroyed them by bushels,—meaning, no doubt, insects and damaged grain together.

Another beetle grub, popularly called the *meal worm*, the larva of *Tenebrio molitor*, LINN., which lives in that state two years, does no little dam

the great outlines of their history, they resemble those of which we have just been giving a description; like them all other beetles are bred from the egg, which is deposited in the ground, or sometimes, though seldom, in the barks of trees, they change

age to flour, as well as to bread, cakes, biscuit, and similar articles. Accounts are also given of the ravages committed by the grubs of other beetles, of several species apparently not well ascertained, upon different sorts of provisions, such as bacon, ham, dried tongues, ship-biscuit, &c. Sparrman tells us, that he has witnessed the ground peas on ship-board so infested with these grubs, that they were seen in every spoonful of the soup. In the case of soup, or of other food which has been exposed to heat, the only inconvenience is the disgust which must ensue; but, unfortunately, there may sometimes occur circumstances of a more serious nature,—from either the eggs or the insects themselves being incautiously swallowed alive.

The meal worm, and some of the grubs which feed on grain and other provisions, are recorded to have been swallowed, and to have given rise to disorders in the stomach and bowels; but in all such cases it is plain, that if the insects did survive the increased temperature of the stomach, they could only live on the food swallowed from time to time, for, not being carnivorous, they would not attack the stomach itself. The same remark will apply no less forcibly to the herbivorous larvæ, which might chance to be swallowed in salad, &c.

That insects are, in some rare cases, introduced into the human stomach, has been more than once proved; though the greater number of the accounts of such facts in medical books are too inaccurate to be trusted. But one extraordinary case has been completely authenticated, both by medical men and competent naturalists; and is published in the Dublin Transactions, by Dr Pickells of Cork. Mary Riordan, aged 28, had been much affected by the death of her mother, and at one of her many visits to the grave seems to have partially lost her senses, having been found lying there on the morning of a winter's day, and having been exposed to heavy rain during the night. When she was about fifteen, two popular Catholic priests had died, and she was told by some old women that if she would drink daily, for a certain time, a quantity of water, mixed with clay taken from their graves, she would be for ever secure from disease and sin. Following this absurd and disgusting prescription, she took from time to time large quantities of the draught; some time afterwards, being affected with a burning pain in the stomach, she began to eat large pieces of chalk, which she sometimes also mixed with water and drank. Now, whether in any or in all of these draughts she swallowed the eggs of insects, cannot be affirmed; but for several years she continued to throw up incredible numbers of grubs and maggots, chiefly of the churchyard beetle. "Of the larvæ of the beetle," says Dr Pickells, "I am sure I considerably underrate, when I say, that not less than 700 have been thrown up from the stomach at different times since the commencement of my attendance. A great proportion were destroyed by herself to avoid publicity; many, too, escaped immediately by running into holes in the floor. Upwards of ninety were submitted to Dr Thomson's examination; nearly all of which, including two of the specimens of the meal worm, I saw myself, thrown up at different times. The

into a worm; they subsist in that state by living upon the roots of vegetables, or the succulent parts of the bark round them. They generally live a year at least before they change into an aurelia; in that state they are not entirely motionless, nor entirely swaddled up without form.

It would be tedious and endless to give a description of all; and yet it would be an unpardonable omission not to mention the particularities of some beetles, which are singular rather from their size, their manners, or their formation. That beetle, which the Americans call the Tumble-dung, particularly demands our attention; it is all over of a dusky black, rounder than those animals are generally found to be, and so strong, though not much larger than the common black beetle, that if one of them be put under a brass candlestick, it will cause it to move backwards and forwards, as if it were by an invisible hand, to the admiration of those who are not accustomed to the sight; but this strength is given it for much more useful purposes than those of exciting human curiosity, for there is no creature more laborious, either in seeking subsistence, or in providing a proper retreat for its young. They are endowed with sagacity to discover subsistence by their excellent smelling, which directs them in flights to excrements just fallen from man or beast, on which they instantly drop, and fall unanimously to work in forming

average size was about an inch and a half in length, and four lines and a half in girth. The larvæ of the dipterous insect, though voided only about seven or eight times, according to her account, came up almost literally in myriads. They were alive and moving." Altogether, Dr Pickells saw nearly 2000 grubs of the beetle, and there were many which he did not see. Mr Clear, an intelligent entomologist of Cork, kept some of them alive for more than twelve months. Mr S. Cooper cannot understand whence the continued supply of the grubs was provided, seeing that larvæ do not propagate, and that only one pupa and one perfect insect were voided; but the simple fact that most beetles live several years in the state of larvæ sufficiently accounts for this. Their existing and thriving in the stomach, too, will appear less wonderful from the fact that it is exceedingly difficult to kill this insect; for Mr Henry Baker repeatedly plunged one into spirits of wine, so fatal to most insects, but it revived, even after being immersed a whole night, and afterwards lived three years.

That there was no deception on the part of the woman, is proved by the fact that she was always anxious to conceal the circumstance; and that it was only by accident that the medical gentlemen, Drs Pickells, Herrick, and Thomson, discovered it. Moreover, it does not appear that, though poor, she ever took advantage of it to extort money. It is interesting to learn that by means of turpentine, in large doses, she was at length cured.

round balls or pellets thereof, in the middle of which they lay an egg. These pellets, in September, they convey three feet deep in the earth, where they lie till the approach of spring; when the eggs are hatched the nests burst, and the insects find their way out of the earth. They assist each other with indefatigable industry, in rolling these globular pellets to the place where they are to be buried. This they are to perform with the tail foremost, by raising up their hinder part, and shoving along the ball with their hind-feet. They are always accompanied with other beetles of a larger size, and of a more elegant structure and colour. The breast of this is covered with a shield of a crimson colour, and shining like metal; the head is of the like colour, mixed with green, and on the crown of the head stands a shining black horn, bended backwards. These are called the kings of the beetles; but for what reason is uncertain, since they partake of the same dirty drudgery with the rest.

The Elephant-Beetle is the largest of this kind hitherto known, and is found in South America, particularly Guiana and Surinam, as well as about the river Oroonoko. It is of a black colour, and the whole body is covered with a very hard shell, full as thick and as strong as that of a small crab. Its length, from the hinder part to the eyes, is almost four inches, and from the same part to the end of the proboscis, or trunk, four inches and three quarters. The transverse diameter of the body is two inches and a quarter, and the breadth of each elytron, or case for the wings, is an inch and three-tenths. The antennæ, or feelers, are quite horny; for which reason the proboscis, or trunk, is moveable at its insertion into the head, and seems to supply the place of feelers. The horns are eight-tenths of an inch long, and terminate in points. The proboscis is an inch and a quarter long, and turns upwards, making a crooked line, terminating in two horns, each of which is near a quarter of an inch long; but they are not perforated at the end like the proboscis of other insects. About four-tenths of an inch above the head, on that side next the body, is a prominence or small horn, which, if the rest of the trunk were away, would cause this part to resemble the horn of a rhinoceros. There is indeed a beetle so called, but then the horns or trunk has no fork at the end, though the

lower horn resembles this. The feet are all forked at the end, but not like lobsters' claws.\*

To this class we may also refer the Glow-worm, that little animal which makes such a distinguished figure in the descrip-

\* We shall here notice some of the more important of the numerous species of beetles.

The *Bombardier, or Exploding Beetle*.—The head, antennæ, thorax, and feet of this insect are of a brownish red colour. The eyes are black, and the abdomen and wing-cases blue, bordering on black; the latter are marked with broad but shallow striæ. This insect is sometimes found in England. It conceals itself among stones, and seems to make little use of its wings. When it moves it is by a sort of jump; and when it is touched, we are surprised with a noise resembling the discharge of a musquet in miniature, during which a blue smoke may be seen to proceed from its extremity. The insect may at any time be made to play off its artillery by scratching its back with a needle. If we may believe Rolander, who first made these observations, it can give twenty discharges successively. A bladder, placed near its posterior extremity, is the arsenal that contains its store. This is its chief defence against its enemies; and the vapour, or liquid, that proceeds from it is of so pungent a nature, that, if it happen to be discharged into the eyes, it makes them smart as if brandy had been thrown into them. The principal enemy of the bombardier is another insect of the same tribe, but three or four times its size. When pursued or fatigued, the bombardier has recourse to this stratagem: he lies down in the path of his enemy, who advances with open mouth to seize him; but on the discharge of the artillery, this suddenly draws back, and remains for a while confused, during which the bombardier conceals himself in some neighbouring crevice; but, if not lucky enough to find one, the other returns to the attack, takes the insect by the head and tears it off.

The *Musk Beetle* derives its name from its musky smell. The grubs from which these beetles proceed resemble soft, slender worms, and are provided with six hard legs. They are commonly white, and penetrate into the inner part of trees for the purpose of obtaining food, and likewise a retreat after they are transformed into nymphs. As soon as the last change is completed, the winged capricorn is seen issuing from these cavities, and may then be very easily caught. Many of these beetles emit an odour which is perceived to a considerable distance; and when they are laid hold of, produce a sound which is supposed to be occasioned by the friction of the thorax and abdomen.

The *Larger Musk-scented Green Capricorn Beetle* is a very large, beautiful insect, being of a glossy, brilliant, bluish green colour, with a cast of a shining golden yellow. The upper part of the body is blue, and the wings underneath the cases are black. The legs are of the same bluish green colour, but rather paler; each side of the breast is furnished with a sharp protuberance; between these points are three small tubercles near the wings, and three others towards the head. The cases of the wings are oblong, and have three ribs somewhat elevated, which run lengthwise. The feelers are as long as the body, and are composed of many small joints, which decrease in size towards the ends. It frequents the leaves of the willow, and has an agreeable musky smell.

tions of our poets. No two insects can differ more than the male and female of this species from each other. The male is in every respect a beetle, having cases to its wings, and rising in the air at pleasure; the female, on the contrary, has none, but is

The *Rhinoceros Beetle* is very rare, and inhabits Asia. The throat is retuse and unarmed; the horn on the head simple and slightly curved; the shield is bifid; and the shells punctated. The body is of a pitchy black; beneath hairy. The throat of the female is excavate. The *Elephant Beetle* will be found described in the text.

The *Goliath Beetle* is one of the largest of its tribe, and is a native of several parts of Africa. Its horns are elevate, with a fissile tip. The legs are generally toothed; the body is thick and compact: the throat is unarmed, and the head somewhat forked.

The *Midas Beetle*.—The antennæ of this insect are divided at the tip, or head, into several lamellæ; the joints of the fore-legs are generally toothed; its thorax is broad and treble-horned; with a double-horned sinuated clypeus. In the beetle tribe we are presented with a wonderful, and as it were almost capricious diversity of form; every variation of horn and process, that imagination can conceive, being exemplified in the different species of this extensive genus; and if their size approached to that of the larger animals, even the monsters of romance would be exceeded by the realities of nature. In some the head alone is horned, in others the thorax only, and in others both head and thorax are furnished with these appendages. Amongst the rarest, as well as the most singular species, may be reckoned the midas beetle, which is a native of America, and particularly of South America. Its colour is deep black; but the under parts, especially towards the breast and the insertions of the legs, are coated with dark ferruginous down. The elytra, or wing-sheaths, are marked by a few longitudinal striæ.

The *Kangaroo Beetle*.—This is another instance of the freaks of nature; for there hardly can be conceived an animated form more remarkable than the Kangaroo Beetle. It is also to be observed, that, in general, the colour of the larger beetles is either black or brown, and seldom exhibits that rich assortment of brilliant hues so conspicuous in many of the smaller coleopterous insects. A striking exception, however, to this rule occurs in this insect, which to a form the most seemingly disproportioned unites the most beautiful colours, the whole animal on the upper surface being of the richest and most shining grass green, while the under surface is ornamented by a metallic lustre resembling that of burnished copper: this is particularly conspicuous on the hind legs, which are of so enormous a size in proportion to the rest of the animal, as to appear, at first view, rather an inconvenience to it. The animal may, however, be formed for leaping; for which purpose this extravagant size of leg may be well calculated. It is from this circumstance that it has received the title of kangaroo beetle.

The *Golden Beetle*.—The antennæ or horns of this species are elevate, with a fissile tip; legs generally toothed; and the body thick and compact. The first segment of the abdomen is furnished on each side with a prominent tooth. The golden beetle is a species of peculiar beauty, and is about the size of the common black or garden beetle, but of a somewhat flatter



entirely a creeping insect, and is obliged to wait the approaches of her capricious companion. The body of the female has eleven joints, with a shield breast-plate, the shape of which is oval; the head is placed over this, and is very small, and the

shape, and of a more brilliant golden-green colour, sometimes marked towards the lower part of the wing-sheaths by a few transverse whitish streaks. This elegant animal is not uncommon during the hottest part of summer, frequenting various plants and flowers. The *larva* or *caterpillar* of the golden beetle is commonly found in the hollows of trees, or among the loose dry soil at their roots, and sometimes in the earth of ant-hills. It remains about three years before it changes to a chrysalis.

The *Stag Beetle* is so called from the singular form of its large moveable maxillæ, which resemble the horns of a stag. These instruments project from the head nearly one-third of the animal's length, and are broad and flat. In the middle, towards the inner part, they have a small branch, and the ends are forked. These romantic horns are supported by a head, short, broad, and irregular; the thorax intervening between it and the body is narrower than either, and marginated around. The colour of the whole animal is a deep brown, its shells or cases being perfectly plain and unadorned with either streaks or lines. The female stag beetle is distinguished by having horns not above half as large as those of the male. They are both, however, armed on the anterior side with small teeth through their whole length. In both the male and female the horns are sometimes as red as coral, which gives the animal a very beautiful appearance. In some parts of the country these animals are very rare; their usual residence is the oak. Though here it grows to such a size as to be the largest of all coleopterous insects in this part of the world, yet in countries where the climate is warmer, and the forests more extensive, the stag beetle arrives at a much greater bulk, and possesses uncommon strength and vigour. In those parts their horns become a formidable offensive weapon, and their bite is dreaded by those who have once experienced its effects.

The *Violet-Beetle* is a beautiful insect of an oblong shape, and a dark violet colour; the edges of the cases to the wings and of the thorax are violet, with a shade of purple. The former are without either dots or streaks, but are marked lengthwise with deep wrinkles. This insect is most commonly found among rotten wood.

The *Elk-horned Stag-chaffer*.—The antennæ of this insect are elevate with a compressed tip, divided into lamellæ on the inner side: the jaws are stretched forwards, exerted and toothed. This rare species is a native of India.

The *Great Stag-beetle*.—This is the largest of any insect found in Great Britain, measuring sometimes nearly three inches from the points of its jaw to the extremity of its abdomen. Its colour is entirely dark brown, except the jaws, which are sometimes as red as coral, and give it a very beautiful appearance: by these, which somewhat resemble in form the horns of a stag, it is readily distinguished from all other insects. In some parts of the south of England, these insects are very common in the oak and willow trees, in the stumps or about the branches of which they remain hidden during the day; flying about and feeding on the leaves only in the evening

three last joints of her body are of a yellowish colour ; but what distinguishes it from all other animals, at least in this part of the world, is the shining light which it emits by night, and which is supposed by some philosophers to be an emanation

The month of July is the time during which they are principally seen. The males in particular have great strength in their mandibles or jaws. With these they are able to pinch very severely. It is a singular circumstance, with regard to these insects, that there have been found several of their heads near together, and all perfectly aliye, while the trunks and abdomens were no where to be seen ; sometimes only the abdomens have been found gone, while the heads and trunks have been left together. How this occurred has not yet been properly discovered ; but it has been supposed, that it must have been in consequence of the severe battles which at times take place among these, the fiercest of the insect tribes : but their mouths not being formed for animal food, we are at a loss to guess what becomes of their abdomens. They do not fly till most of the birds have retired to rest ; and indeed if we were to suppose that any of these devoured them, it would be difficult to say why the head or trunks alone should be rejected. The females deposit their eggs in decayed or worm-eaten trees. The larvæ, which are round and whitish, with rust-coloured head and legs, are nourished upon the bark. In this state they pass six years. When about to undergo their change into a chrysalis, each insect forms a hard and solid ball of the form of an egg, and sometimes as large as the hand. When the perfect insect issues forth, it is at first quite soft ; its parts, however, soon harden, and in a little while it is able to fly away.

The *Water-beetle Tribe*.—The bodies of these insects are admirably formed for passing through the water with as little impediment as possible, being nearly boat-shaped, and on the surface perfectly smooth. They inhabit ponds and ditches, but occasionally fly abroad, in search of other waters. The males are distinguished from the females by having a horny concave flap or shield on the fore-legs. The hind-legs in both sexes are peculiarly adapted for the aquatic residence of the insects, being furnished on the inner sides with a series of long and close-set filaments, so as somewhat to resemble fins. In the large species the elytra or wing-cases of the males are smooth, and those of the females furrowed. The larvæ are extremely voracious, feeding on other aquatic insects, on worms, and even on fish. They continue in this state about two years and a half ; and when about to change into the pupa state, they form a convenient cell, and secrete themselves for the purpose in the banks, or amongst the weeds.

The *Margined Water-beetle*.—The body is black. The edges of the thorax and other margins of the wing-cases are yellow. Although water is the principal element in which these insects reside, they are, like the rest of their tribe, perfectly amphibious. They may occasionally be found in all fresh waters, but are most frequently seen either in such as are stagnant, or where the stream is extremely slow. They are predatory and very voracious, devouring, in great numbers, not only other water insects, but oftentimes also those of the land. They seize their prey in their fore-legs, and with these carry it to their mouths. Although they are able to continue unmolested for a great length of time, yet it is necessary for them to rise oc-

which she sends forth to allure the male to her company. Most travellers who have gone through sandy countries, must well remember the little shining sparks with which the ditches are studded on each side of the road. If incited by curiosity to approach more nearly, he will find this light sent forth by the glow-worm; if he should keep the little animal for some time, its light continues to grow paler, and at last appears totally extinct. The manner in which this light is produced has hitherto continued inexplicable; it is probable the little animal is supplied with some electrical powers, so that by rubbing the joints of its body against each other, it thus supplies a stream of light, which if it allures the male, as we are told, serves for very useful purposes.\*

asionally to the surface of the water, in order to breathe. They swim with great celerity; and in flying make a humming or droning noise like beetles. The larvæ have powerful jaws, and six long legs. At the posterior part of their body, which tapers towards the extremity, there are two small slender processes, situated somewhat obliquely, and moveable at the base. It is by means of these that the larva suspends itself at the surface of the water, for the purpose of respiring the air of the atmosphere, which it does through two small cylindrical tubes, situated at the extremity of the tail.

\* It is a question by no means decided, whether the light of the female glow-worm is intended for the purpose popularly and poetically believed—viz. as the lamp of love to attract and direct the vagrant male. Baron de Geer says that “this insect shines in its infant state, in that of larva, and even after it has taken the form of a nymph. Now, as in the first of these states it cannot propagate, and still less in the second, with what design is the light displayed? It must serve some purpose yet unknown. The authors who have spoken of the male glow-worms say positively that they shine in the dark as well as females.” We have, says Mr Rennie, in two instances observed this luminosity of the male, which however is much more feeble than that of the female. Ray first discovered this fact in the common glow-worm, and Geoffroy and Muller give their testimony to its accuracy; while Illiger records it as occurring still more remarkably in two foreign species (*Lampyrus splendens*, and *L. hemiptera*). Kirby and Spence make an attempt to rebut the inferences drawn from these facts, by remarking that the circumstance of the male having the same luminous property, no more proves that the superior brilliancy of the female is not intended for conducting him to her, than the existence of nipples, and sometimes of milk in man, proves that the breast of woman’s not meant for the support of her offspring. But we do not see how the light in the male glow-worm can be thus compared with such decidedly sexual organs, though in the larva it may certainly be explained upon the principle of gradual development. Mr Main thinks that the design of the light in the female is proved by the propensity of the males to fly towards light, and states that they have been seen in such numbers, as sometimes to cover a

The *Cantharis* is of the beetle kind, from whence come *cantharides*, well known in the shops by the name of Spanish flies, and for their use in blisters. They have feelers like bristles, flexible cases to the wings, a breast pretty plain, and the sides of the belly wrinkled. *Cantharides* differ from each other in their size, shape, and colour; those used in the shops also do the same. The largest in these parts are about an inch long, an as much in circumference, but others are not above three quarters of an inch. Some are of a pure azure colour, others of pure gold, and others again have a mixture of pure gold and azure colours; but they are all very brilliant, and extremely beautiful. These insects, as is well known, are of the greatest benefit to mankind, making a part in many medicines conducive to human preservation. They are chiefly natives of Spain, Italy, and Portugal; but they are to be met with also about Paris in the

table round a lighted caudle in an open room. But he surely forgets that gnats and moths do the same, although their females are not luminous.

In a still more splendid luminous insect, the fire-fly of tropical countries, we are not informed whether the light is in any way connected with pairing. The insect itself is one of the click-beetles, several others of which are also luminous. Southey has given a spirited and accurate description of this fire-fly:—

————— “soon did night display  
More wonders than it veil'd: innumerable tribes  
From the wood-cover swarmed, and darkness made  
Their beauties visible: one while they streamed  
A bright blue radiance upon flowers that closed  
Their gorgeous colours from the eye of day;  
Now motionless and dark, eluded search,  
Self-shrouded; and anon, starring the sky,  
Rose like a shower of fire.” *Madoc.*

We are told by Muffet, that when Sir Thomas Cavendish and Sir Robert Dudley landed in the West Indies, and saw in the evening an infinite number of moving lights in the woods, which, though nothing more than fire-flies, were taken by them for Spaniards advancing upon them by torch-light, they immediately fled to their ships.

We are not aware that any native insect is luminous besides the glow-worm and the electric centipede, which is by no means uncommon, though its light is seldom seen, in consequence of its living in holes or under ground, from which it is seldom roused during the night. We have, however, more than once seen it in out-houses, or crawling along a pathway, upon which it sometimes leaves a track of phosphoric matter that may be lifted. On two different occasions we collected some of this, but it disappeared, probably by evaporation, before we could subject it to chemical analysis.—See *Insect Miscellanies*.

summer time, upon the leaves of the ash, the poplar, and the rose-trees, and also among wheat, and in meadows. It is very certain, that these insects are fond of ash-leaves, insomuch that they will sometimes strip one of these trees quite bare. Some affirm that these flies delight in sweet-smelling herbs; and it is very certain, that they are fond of honey-suckles, lilac, and wild-cherry shrubs; but some that have sought after them declare they never could find them on elder-trees, nut-trees, and among wheat. We are told that the country people expect the return of these insects every seven years. It is very certain, that such a number of these insects have been seen together in the air, that they appeared like swarms of bees; and that they have so disagreeable a smell, that it may be perceived a great way off, especially about sun-set, though they are not seen at that time. This bad smell is a guide for those who make it their business to catch them. When they are caught they dry them, after which they are so light, that fifty will hardly weigh a drachm. Those that gather them tie them in a bag, or a piece of linen cloth, that has been well worn, and then they kill them with the vapours of hot vinegar, after which they dry them in the sun, and keep them in boxes. These flies, thus dried, being chymically analysed, yield a great deal of volatile caustic salt, mixed with a little oil, phlegm, and earth. Cantharides are penetrating, corrosive, and, applied to the skin, raise blisters, from whence proceeds a great deal of serosity. They are made use of both inwardly and outwardly. However, it is somewhat strange that the effects of these flies should fall principally upon the urinary passages; for though some authors have endeavoured to account for this, we are still in the dark, for all they have said amounts to no more than that they affect these parts in a manner which may be very learnedly described, but very obscurely comprehended.

An insect of great, though perhaps not equal use in medicine, is that which is known by the name of the *Kermes*; it is produced in the excrescence of an oak, called the berry-bearing *ilex*, and appears at first wrapt up in a membranaceous bladder, of the size of a pea, smooth and shining, of a brownish-red colour, and covered with a very fine ash-coloured powder. This bag teems with a number of reddish eggs or insects, which being rubbed with the fingers pour out a crimson liquor. It is

only met with in warm countries in the months of May and June. In the month of April this insect becomes of the size and shape of a pea, and its eggs some time after burst from the womb, and soon turning worms, run about the branches and leaves of the tree. They are of two sexes, and the females have been hitherto described; but the males are very distinct from the former, and are a sort of small flies like gnats, with six feet, of which the four forward are short, and the two backward long, divided into four joints, and armed with three crooked nails. There are two feelers on the head, a line and a half long, which are moveable, streaked, and articulated. The tail, at the back part of the body, is half a line long, and forked. The whole body is covered with two transparent wings, and they leap about in the manner of fleas. The harvest of the kermes is greater or less in proportion to the severity of the winter, and the women gather them before sun-rising, tearing them off with their nails, for fear there should be any loss from the hatching of the insects. They sprinkle them with vinegar, and lay them in the sun to dry, where they acquire a red colour.

An insect, perhaps, still more useful than either of the former, is the Cochineal, which has been very variously described by authors; some have supposed it a vegetable excrescence from the tree upon which it is found; some have described it as a louse; some, as a bug; and some, as a beetle. As they appear in our shops when brought from America, they are of an irregular shape, convex on one side, and a little concave on the other; but are both marked with transverse streaks or wrinkles. They are of a scarlet colour within, and without of a blackish red, and sometimes of a white, reddish, or ash colour, which are accounted the best, and are brought us from Mexico. The cochineal insect is of an oval form, of the size of a small pea, with six feet, and a snout or trunk. It brings forth its young alive, and is nourished by sucking the juice of the plant. Its body consists of several rings, and when it is once fixed on the plant, it continues immoveable, being subject to no change. Some pretend there are two sorts, the one domestic, which is best; and the other wild, that is of a vivid colour; however, they appear to be the same, only with this difference, that the wild feeds upon uncultivated trees, without any assistance, whereas the domestic is carefully, at a stated season, removed

to cultivated trees, where it feeds upon a purer juice. Those who take care of these insects, place them on the prickly pear-plant in a certain order, and are very industrious in defending them from other insects; for if any other kind come among them, they take care to brush them off with foxes' tails. Towards the end of the year, when the rains and cold weather are coming on, which are fatal to these insects, they take off the leaves or branches covered with cochineal, that have not attained their utmost degree of perfection, and keep them in their houses till winter is past. These leaves are very thick and juicy, and supply them with sufficient nourishment, while they remain within doors. When the milder weather returns, and these animals are about to exclude their young, the natives make them nests, like those of birds, but less, of tree moss, or soft hay, or the down of cocoa-nuts, placing twelve in every nest. These they fix on the thorns of the prickly-pear plant, and in three or four days' time they bring forth their young, which leave their nests in a few days, and creep upon the branches of the plant, till they find a proper place to rest in, and take in their nourishment; and until the females are fecundated by the males, which, as in the former tribe, differ very widely from the females, being winged insects, whereas the others only creep, and are at most stationary. When they are impregnated, they produce a new offspring, so that the propagator has a new harvest thrice a-year. When the native Americans have gathered the cochineal, they put them into holes in the ground, where they kill them with boiling water, and afterwards dry them in the sun, or in an oven, or lay them upon hot plates. From the various methods of killing them, arise the different colours which they appear in when brought to us. While they are living they seem to be sprinkled over with a white powder, which they lose as soon as the boiling water is poured upon them. Those that are dried upon hot plates are the blackest. What we call the cochineal are only the females, for the males are a sort of fly, as already observed in the kermes. They are used both for dying and medicine, and are said to have much the same virtue as the kermes, though they are now seldom used alone, but are mixed with other things for the sake of the colour.\*

\* To the beetle kind also belong those animals which cause such alarm to the superstitious by their ticking noise, which is vulgarly called the death-watch. Various species of this insect are to be found in Britain.

I shall end this account of the beetle tribe with the history of an animal which cannot properly be ranked under this species, and yet cannot be more methodically ranged under any other. This is the insect that forms and resides in the gall-nut, the

The *Death-watch*, or *Ptinus*, is a dusky or somewhat hairy insect, with irregular brownish spots, about a quarter of an inch in length. Notwithstanding its smallness, this creature is often the cause of serious alarm among the lower classes of people, from the noise that it makes at a certain time of the year, resembling the ticking of a watch. From this it has its name; for, whenever this faculty is exerted, it is esteemed portentive of death to some one of the family in the house where it is heard. It is chiefly in the advanced state of spring that this insect commences its noise, which is no more than a call or signal by which they are mutually attracted to each other; and it may be considered as analogous to the call of birds. This noise does not arise from the voice, but from the insect's beating on any hard substance with the shield or fore-part of the head. The general number of successive distinct strokes is from seven to nine, or eleven. These are given in pretty quick succession, and are repeated at uncertain intervals; and in old houses, where the insects are numerous, they may be heard, if the weather be warm, every hour in the day. The noise exactly resembles that made by beating with the nail upon a table. The insect being difficult to discover, from its obscure grayish brown colour, nearly resembling that of decayed wood, it is not always easy to say from what exactly the sound proceeds.

Mr Stackhouse observed carefully the manner of its beating. He says the insect raises itself on its hinder legs, and with the body somewhat inclined, beats its head with great force and agility against the place on which it stands. One of them, on a sedge-bottomed chair, exerted so much force, that its strokes were impressed and visible in the exterior coat of the sedge, for a space equal to that of a silver penny. Mr Stackhouse took this insect and put it into a box. On the following day he opened the box, and set it in the sun. It seemed very brisk, and crept about with great activity on the bits of sedge and rotten wood, till at last getting to the end of the pieces, it extended its wings, and was about to take flight; he shut down the lid, when it withdrew them, and remained quiet. He kept it by him about a fortnight.

Strange as it may appear, this little animal is capable of being tamed. Dr Derham kept a male and female together in a box for about three weeks and by imitating their noise, (beating with his nail, or the point of a pen, on a table or board,) he made them beat whenever he pleased, and they would not only answer very readily, but even continued their beatings as long as required. At the end of this time one of them died, soon after which the other gnawed its way out and escaped.

The *Death-watch Termes*.—This insect, which is sometimes mistaken for the *ptinus* just mentioned, is of a very different tribe, and about a tenth of an inch long. At first sight it has greatly the appearance of a louse: its mouth, however, with a glass, is seen to be reddish, and its eyes are yellow. The antennæ are sharply pointed, and somewhat long. It is sometimes, though very rarely, observed to have wings.



spoils of which are converted to such useful purposes. The gall-insects are bred in a sort of bodies adhering to a kind of oak in Asia, which differ with regard to their colour, size, roughness, smoothness, and shape, and which we call galls. They are not fruit, as some have imagined, but preternatural tumours, owing to the wounds given to the buds, leaves, and twigs of the tree, by a kind of insects that lay their eggs within them. This animal is furnished with an implement, by which the female penetrates into the bark of the tree, or into that spot which just begins to bud, and there sheds a drop of corrosive fluid into the cavity. Having thus formed a receptacle for her eggs, she deposits them in the place, and dies soon after. The heart of the bud being thus wounded, the circulation of the nutritive juice is interrupted, and the fermentation thereof, with the poison injected by the fly, burns the parts adjacent, and then alters the natural colour of the plant. The juice or sap, turned back from its natural course, extravasates, and flows round the egg. After which it swells and dilates by the assistance of some bubbles of air, which get admission through the pores of the bark, and which run in the vessels with the sap. The ex-

This insect is usually found in old wood, decayed furniture, museums, and neglected books; and both the male and female have the power of making a ticking noise, not unlike that of a watch, to attract each other. The female lays her eggs in dry and dusty places, where they are likely to meet with the least disturbance: these are exceedingly small, and are not unlike the nits or eggs of lice. When they are disturbed, they are very shy in making their tickings; but if they can be viewed without being alarmed by noise, or moving the place where they are, they will not only beat freely, but even answer any person's beating with his nail. At every stroke their body shakes, or seems affected as by a sudden jerk; and these jerks succeed each other so quickly, that it requires great steadiness to perceive with the naked eye that the body has any motion. They are scarcely ever heard to beat before July, and never later than the sixteenth of August. It appears strange that so small an insect should be able to make a noise so loud as is frequently to be heard from this; sometimes equal to that of the strongest beating watch. Dr Derham, who examined and first described this species, says, he had often heard the noise, and in pursuing it found nothing but these insects, which he supposed incapable of producing it; but one day, by finding that the noise proceeded from a piece of paper loosely folded, and lying in a good light in his study window, he viewed it through, and with a microscope observed, to his great astonishment, one of them in the very act of beating. In some years they are more numerous than in others, and their ticking is of course more frequently heard. We are informed by the above naturalist, that, during the month of July, in one particular summer, they scarcely ever ceased, either in the day or night.

ternal coat of this excrescence is dried by the air, and grows into a figure, which bears some resemblance to the bow of an arch, or the roundness of a kernel. This little ball receives its nutriment, growth, and vegetation, as the other parts of the tree, by slow degrees, and is what we call the *gall-nut*. The worm that is hatched under this specious vault, finds in the substance of the ball, which is as yet very tender, a subsistence suitable to its nature; gnaws and digests it till the time comes for its transformation to a nymph, and from that state of existence changes into a fly. After this, the insect, perceiving itself duly provided with all things requisite, disengages itself soon from its confinement, and takes its flight into the open air. The case, however, is not similar with respect to the gall-nut that grows in autumn. The cold weather frequently comes on before the worm is transformed into a fly, or before the fly can pierce through its inclosure. The nut falls with the leaves, and although you may imagine that the fly which lies within is lost, yet in reality it is not so; on the contrary, its being covered up so close, is the means of its preservation. Thus it spends the winter in a warm house, where every crack and cranny of the nut is well stopped up; and lies buried, as it were, under a heap of leaves, which preserves it from the injuries of the weather. This apartment, however, though so commodious a retreat in the winter, is a perfect prison in the spring. The fly, roused out of its lethargy by the first heats, breaks its way through, and ranges where it pleases. A very small aperture is sufficient, since at this time the fly is but a diminutive creature. Besides, the ringlets whereof its body is composed, dilate, and become pliant in the passage.

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## CHAP. VII.

### OF THE GNAT TIPULA.

THERE are two insects which entirely resemble each other in their form, and yet widely differ in their habits, manners, and propagation. Those who have seen the tipula, or long-legs, and the larger kind of gnat, have most probably mistaken the one

for the other; they have often accused the tipula, a harmless insect, of depredations made by the gnat, and the innocent have suffered for the guilty; indeed the differences in their form are so very minute, that it often requires the assistance of a microscope to distinguish the one from the other: they are both mounted on long legs, both furnished with two wings and a slender body; their heads are large, and they seem to be hump-backed; the chief and only difference, therefore, is, that the tipula wants a trunk, while the gnat has a large one, which it often exerts to very mischievous purposes. The tipula is a harmless peaceful insect, that offers injury to nothing; the gnat is sanguinary and predaceous, ever seeking out for a place in which to bury its trunk, and pumping up the blood from the animal in large quantities.

The gnat proceeds from a little worm, which is usually seen at the bottom of standing waters. The manner in which the insect lays its eggs is particularly curious: after having laid the proper number on the surface of the water, it surrounds them with a kind of unctuous matter, which prevents them from sinking, but at the same time fastens them with a thread to the bottom, to prevent their floating away, at the mercy of every breeze, from a place, the warmth of which is proper for their production, to any other, where the water may be too cold, or the animals' enemies too numerous. Thus the insects, in their egg state, resemble a buoy, which is fixed by an anchor. As they come to maturity they sink deeper; and at last, when they leave the egg as worms, they creep to the bottom.\* They now

\* Goldsmith has fallen into error in the above description, as well as several other writers on natural history. "The problem of the gnat," says Mr Rennie, "is to construct a boat-shaped raft, which will float, of eggs heavy enough to sink in water if dropped into it one by one. The eggs are nearly of the pyramidal form of a pocket gunpowder-flask, rather pointed at the upper and broad at the under end, with a projection like the mouth of a bottle. The first operation of the mother gnat is to fix herself by the four fore-legs to the side of a bucket, or upon a floating leaf, with her body level with and resting upon the surface of the water, excepting the last ring of the tail, which is a little raised; she then crosses her two hind legs in form of an X, the inner opening of which is intended to form the scaffolding of her structure. She accordingly brings the inner angle of her crossed legs close to the raised part of her body, and places in it an egg, covered, as is usual among insects, with a glutinous fluid. On each side of this egg she places another, all which adhere firmly together by means of their glue, and form a triangular figure thus \* \* \*, which is the stern of the raft. She pro-

make themselves lodgments of cements, which they fasten to some solid body at the very bottom of the water, unless, by accident, they meet with a piece of chalk, which being of a soft and pliant nature, gives them an opportunity of sinking a retreat for themselves, where nothing but the claws of a cray-fish can possibly molest them. The worm afterwards changes its form. It appears with a large head, and a tail invested with hair, and moistened with an oleaginous liquor, which she makes use of as a cork to sustain her head in the air, and her tail in the water, and to transport her from one place to another. When the oil with which her tail is moistened, begins to grow dry, she discharges out of her mouth an unctuous humour, which she sheds all over her tail, by virtue whereof she is enabled to transport herself where she pleases, without being either wet or anywise incommoded by the water. The gnat, in her second state, is, properly speaking, in her form a nymph, which is an introduction or entrance into a new life. In the first place, she divests herself of her second skin; in the next, she resigns her eyes, her antennæ, and her tail; in short, she actually seems to expire. However, from the spoils of the amphibious animal, a little winged

ceeds in the same manner to add egg after egg in a vertical (not a horizontal) position, carefully regulating the shape by her crossed legs; and as her raft increases in magnitude, she pushes the whole gradually to a greater distance, and when she has about half-finished, she uncrosses her legs and places them parallel, the angle being no longer necessary for shaping the boat. Each raft consists of from two hundred and fifty to three hundred and fifty eggs, which, when all laid, float on the water secure from sinking, and are finally abandoned by the mother. They are hatched in a few days, the grubs issuing from the lower end; but the boat, now composed of the empty shells, continues to float till it is destroyed by the weather.

“Kirby justly describes this little vessel as resembling a London wherry, being sharp and higher, as sailors say, *fore* and *aft*, convex below and concave above, and always floating on its keel. ‘The most violent agitation of the water,’ he adds, ‘cannot sink it, and what is more extraordinary, and a property still a desideratum in our life-boats, though hollow, it never becomes filled with water, even though exposed. To put this to the test, I placed half a dozen of these boats upon the surface of a tumbler half-full of water: I then poured upon them a stream of that element from the mouth of a quart bottle held a foot above them. Yet after this treatment, which was so rough as actually to project one out of the glass, I found them floating as before upon their bottoms, and not a drop of water within their cavity.’ We have repeatedly pushed them to the bottom of a glass of water; but they always came up immediately to the surface apparently unwetted.’

—*Insect Transformations.*

insect cuts the air, whose every part is active to the last degree, and whose whole structure is the just object of our admiration. Its little head is adorned with a plume of feathers, and its whole body invested with scales and hair, to secure it from any wet or dust. She makes trial of the activity of her wings, by rubbing them either against her body, or her broad side-bags, which keep her in an equilibrium. The furbelow, or little border of fine feathers, which graces her wings, is very curious, and strikes the eye in the most agreeable manner. There is nothing, however, of greater importance to the gnat than her trunk, and that weak implement may justly be deemed one of nature's master-pieces. It is so very small, that the extremity of it can scarcely be discerned through the best microscope that can be procured. That part which is at first obvious to the eye, is nothing but a long scaly sheath under the throat. At near the distance of two thirds of it, there is an aperture, through which the insect darts out four stings, and afterwards retracts them. One of which, however sharp and active it may be, is no more than the case in which the other three lie concealed, and run in a long groove. The sides of these stings are sharpened like two-edged swords; they are likewise barbed, and have a vast number of cutting teeth towards the point, which turns up like a hook, and is fine beyond expression. When all these darts are stuck into the flesh of animals, sometimes one after another, and sometimes all at once, the blood and humours of the adjacent parts must unavoidably be extravasated; upon which a tumour must consequently ensue, the little orifice whereof is closed up by the compression of the external air. When the gnat, by the point of her case, which she makes use of as a tongue, has tasted any fruit, flesh, or juice, that she has found out; if it be a fluid, she sucks it up, without playing her darts into it; but in case she finds the least obstruction by any flesh whatever, she exerts her strength, and pierces through it, if possibly she can. After this she draws back her stings into their sheath, which she applies to the wound in order to extract, as through a reed, the juices which she finds inclosed. This is the implement with which the gnat performs her work in the summer, for during the winter she has no manner of occasion for it. Then she ceases to eat, and spends all that tedious season either in quarries or in caverns, which she abandons at the return of summer, and flies

about in search after some commodious ford, or standing water, where she may produce her progeny, which would be soon washed away and lost, by the too rapid motion of any running stream. The little brood are sometimes so numerous, that the very water is tinged according to the colour of the species, as green, if they be green, and of a sanguine hue, if they be red.

These are circumstances sufficiently extraordinary in the life of this little animal; but it offers something still more curious in the method of its propagation. However similar insects of the gnat kind are in their appearance, yet they differ widely from each other in the manner in which they are brought forth, for some are oviparous, and are produced from eggs: some are viviparous, and come forth in their most perfect form; some are males, and unite with the female; some are females, requiring the impregnation of the male; some are of neither sex, yet still produce young, without any copulation whatsoever. This is one of the strangest discoveries in all natural history! A gnat separated from the rest of its kind, and inclosed in a glass vessel, with air sufficient to keep it alive, shall produce young, which also, when separated from each other, shall be the parents of a numerous progeny. Thus, down for five or six generations, do these extraordinary animals propagate without the use of copulation, without any congress between the male and the female, but in the manner of vegetables, the young bursting from the body of their parents, without any previous impregnation. At the sixth generation, however, their propagation stops; the gnat no longer produces its like, from itself alone, but it requires the access of the male to give it another succession of fecundity.

The gnat of Europe gives but little uneasiness; it is sometimes heard to hum about our beds at night, and keeps off the approaches of sleep by the apprehension it causes; but it is very different in the ill-peopled regions of America, where the waters stagnate, and the climate is warm, and where they are produced in multitudes beyond expression.\* The whole air is there filled

\* Humboldt tells us, that "between the little harbour of Higuero and the mouth of the Rio Unare, the wretched inhabitants, to protect themselves from gnats, are accustomed to stretch themselves on the ground, and pass the night buried in the sand three or four inches deep, exposing only the head, which they cover with a handkerchief." Stedman also mentions, as a proof of the dreadful state to which he and his soldiers were reduced

with clouds of those furnished insects, and they are found of all sizes, from six inches long to a minuteness that even requires the microscope to have a distinct perception of them. The warmth of the mid-day sun is too powerful for their constitu-

by them, that they were forced to sleep with their heads thrust into holes made in the earth with their bayonets, and their legs wrapped round with their hammocks. "The gnats in America," says Mouffet, "do so plash and cut, that they will pierce through very thick clothing; so that it is excellent sport to behold how ridiculously the barbarous people, when they are bitten, will skip and frisk, and slap with their hands their thighs, buttocks, shoulders, arms, and sides, even as a carter doth his horses." Weld tells us that "these insects were so powerful and bloodthirsty, that they actually pierced through General Washington's boots." This does not appear very credible, though Mouffet says, "In Italy, near the Po, great store and very great ones are to be seen, terrible for biting, and venomous, *piercing through a thrice-doubled stocking, and boots likewise*, sometimes leaving behind them impoisoned, hard, blue tumours, sometimes painful bladders, sometimes itching pimples, such as Hippocrates hath observed in his Epidemics, in the body of one Cyrus, a fuller, being frantic." When we consider these circumstances, we cannot justly discredit that they attacked so fiercely the army of Julian the Apostate as to drive him back; or that Sapor, king of Persia, as reported, should have been compelled to raise the siege of Nisibis by a plague of gnats, which, attacking his elephants and beasts of burden, so caused the route of his army.

At Oxford, during the summer of 1766, gnats were sometimes seen towards evening in such myriads as literally to darken the rays of the sun. Mr Swinton mentions, that one evening, about half an hour before sunset, he was in the garden of Wadham College, when he saw six columns of them ascending from the boughs of an apple-tree, some in a perpendicular, and others in an oblique direction, to the height of fifty or sixty feet. Their bite was attended with violent inflammation, and when one was killed after it had bit, the blood contained in it would cover three or four inches of wall. About thirty years before this, vast columns of gnats were seen to rise in the air from Salisbury Cathedral, resembling, at a distance, columns of smoke, which made the people imagine the edifice was on fire. At Sagan, in Silesia, in July, 1812, a similar occurrence gave rise in like manner to an alarm that the church was on fire. The poet Spenser says, the Irish "goe all naked except a mantle, which is a fit house for an outlaw—a meet bed for a rebel—and an apt cloak for a thiefe. It coucheth him strongly against the gnats, which, in that country, doe more to annoy the naked rebels, and doe more sharply wound them, than all their enemies' swords and speares, which can seldom come nigh them."

It is worthy of remark that a numerous family are confounded under the common names of gnat and musquito, as if there were only one or two species; whereas Mr Stephens has enumerated twenty-two species of the genera *Culex* and *Anopheles*, found in Britain alone; and hence it is probable, the foreign musquitoes are also of several species, though to common observers they do not appear to differ from the common gnat.

The *Musquito-fly* is very common in the woody and marshy parts of all

tions; but when the evening approaches, neither art nor flight can shield the wretched inhabitants from their attacks; though millions are destroyed, still millions more succeed, and produce unceasing torment. The native Indians, who anoint their bodies

hot climates. It also abounds, during their short summer, throughout Lapland, Norway, and Finland, and other countries equally near the pole. The female bites, and sucks the blood in such a severe manner, as to swell and blister the skin very severely, and sometimes leave obstinate sores. These insects are found in such swarms, in the woods, that whoever enters them is sure to have his face covered, and he is scarcely able to see his way before him. A swelling and disagreeable itch instantly follows the puncture, and these are succeeded by small white ulcers; so that the face of a person coming from the country is scarcely to be recognised, and it appears full of blotches. Even gloves are not always found a protection against these troublesome insects, as they often pass their stings through the seams. It is the female only that bites; the buzzing, however, of both males and females is so very loud, as to be alone sufficient to disturb the rest of persons at night.

The *Ox Gad-fly* has brown unspotted wings; and the abdomen is marked with a black band in the middle, and has dusky yellow hairs at the tip. The front is white, and covered with down; and the thorax is yellowish before, black in the middle, and cinereous behind. The female differs from the male in having a black style at the end of the abdomen. This insect deposits its eggs in the back of the ox, and the larvæ live beneath the skin, between this and the cellular membrane. Its sac or abscess is somewhat larger than the insect, and by narrowing upwards, it opens externally to the air by a small aperture.

When young the larva is smooth, white, and transparent; but, when full grown, is of a deep brown. It is also supplied, in this state, with innumerable minute hooks, ranged in contrary directions on its body, with which, by occasionally erecting or depressing them, it is moved about in the abscess; and from this motion, and the consequent irritation, a more or less copious secretion of pus takes place for its sustenance. As soon as the larva is full grown, it effects its escape from the abscess by pressing against the external opening. When this becomes of sufficient size, it writhes itself through, and falls from the back of the animal to the ground; and, seeking for a convenient place, becomes a chrysalis. After the exit of the larva, the wound in the skin is generally closed up and healed in a few days. When the perfect insect leaves the chrysalis, it forces open a very considerable margined triangular lid, which is situated on one side of the small end. This insect is the largest of the European species, and is very beautiful: it is, however, the terror of cattle, as it inflicts great pain when depositing its eggs.

The *Horse Gad-fly* is distinguished from the rest of its tribe by having a black band in the middle and two dots at the tip of its whitish wings. The abdomen is yellow brown, with black spots at the divisions of the segments. The female is more brown than the male, and has her abdomen elongated with a cleft terminal style. The larvæ are those odd-looking grubs which are commonly found in the stomachs of horses, and sometimes, though much



with oil, and who have from their infancy been used to their depredations, find them much less inconvenient than those who are newly arrived from Europe; they sleep in their cottages covered all over with thousands of the gnat kind upon their bodies, and yet do not seem to have their slumbers disturbed by their cruel devourers. If a candle happens to be lighted in one of those places, a cloud of insects at once light upon the flame, and extinguish it: they are therefore obliged to keep their candles in glass lanterns; a miserable expedient to prevent an unceasing calamity!

less frequently, in the intestines. Here they hang in clusters of from half a dozen to more than a hundred, adhering to the inner membrane of the stomach, by means of two small hooks or tentaculæ at their heads, whose points turn outward. When they are removed from the stomach, they will attach themselves to any loose membrane, even to the skin of the hand. To effect this they draw back their hooks, which have a joint near their base, almost entirely within their skin, till the two points come close to each other; then, keeping them parallel, they pierce through the membrane, and immediately afterwards expand in a lateral direction; and by these means they become perfectly fixed.

# BOOK V.

## OF THE ZOOPHYTES.

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### CHAP. I.

#### OF ZOOPHYTES IN GENERAL.

WE now come to the last link in the chain of animated nature, to a class of beings so confined in their powers, and so defective in their formation, that some historians have been at a loss whether to consider them as a superior rank of vegetables, or the humblest order of the animated tribe. In order, therefore, to give them a denomination agreeable to their existence, they have been called Zoophytes, a name implying vegetable nature endued with animal life ; and, indeed, in some the marks of the animal are so few, that it is difficult to give their place in nature with precision, or to tell whether it is a plant or an insect that is the object of our consideration.

Should it be asked what it is that constitutes the difference between animal and vegetable life ; what it is that lays the line that separates those two great kingdoms from each other, it would be difficult, perhaps we should find it impossible, to return an answer. The power of motion cannot form this distinction, since some vegetables are possessed of motion, and many animals are totally without it. The sensitive plant has obviously a greater variety of motions than the oyster or the pholas. The animal that fills the acorn-shell is immoveable, and can only close its lid to defend itself from external injury, while the flower, which goes by the name of the fly-trap, seems to close upon the flies that light upon it, and that attempt to

rifle it of its honey. The animal in this instance seems to have scarce a power of self-defence ; the vegetable not only guards its possessions, but seizes upon the robber that would venture to invade them. In like manner, the methods of propagation give no superiority to the lower rank of animals. On the contrary, vegetables are frequently produced more conformably to the higher ranks of the creation, and though some plants are produced by cuttings from others, yet the general manner of propagation is from seeds, laid in the womb of the earth, where they are hatched into the similitude of the parent plant or flower. But a most numerous tribe of animals have lately been discovered, which are propagated by cuttings, and this in so extraordinary a manner, that, though the original insect be divided into a thousand parts, each, however small, shall be formed into an animal, entirely resembling that which was at first divided ; in this respect, therefore, certain races of animals seem to fall beneath vegetables, by their more imperfect propagation.\*

\* The reasoning held forth by our author is more chimerical than just. Although naturalists have found some difficulty in arranging, in their proper place in the system of nature, various species of zoophytes, yet there could be but few doubts as to where the different species of testaceous shells should be placed. Although all the species of lepas, or acorn-shells, are incapable of roaming about in search of food, being always parasitical, and immoveably fixed to some other substance ; yet they are possessed of powers of voluntary motion, which must at once distinguish them from vegetables. They have feelers which they can protrude in search of food, and which they can extend or withdraw at pleasure. The oyster and pholas hold still a higher rank in the scale of beings : the former of which is independent, and can move about at pleasure ; while the pholas, although generally confined within a small cavity, which it makes for itself in stone or hard clay, and which it can enlarge at pleasure, has also the power of moving its whole shell, and of protruding a long prehensile tube in search of food.

The creatures that are ranked under the Linnean order *zoophyta* seem to hold a middle station between animals and vegetables. Most of them, deprived of the powers of locomotion, are fixed by stems that take root in crevices of rocks, and among sand : these by degrees send off branches, till at length some of them attain the size and extent of large shrubs. The zoophytes are usually considered under two divisions. The stony branches of the first division, which has the general appellation of *coral*, are hollow, and full of cells, which are the habitations of animals resembling polypes, medusæ, &c. according to their respective genera. The next division consists of such animals as have softer stems, and are in general not merely inhabitants of a stem or branches, but are themselves in the form of a plant. Those of this division, which are best known, are the corallines, the sponges, and the polypes.

What, therefore, is the distinction between them?—or are the orders so intimately blended as that it is impossible to mark the boundaries of each? To me it would seem, that all animals are possessed of one power, of which vegetables are totally deficient; I mean, either the actual ability, or an awkward attempt at self-preservation. However vegetables may seem possessed of this important quality, yet it is with them but a mechanical impulse, resembling the raising one end of the lever when you depress the other; the sensitive plant contracts and hangs its leaves, indeed, when touched, but this motion no way contributes to its safety: the fly-trap flower acts entirely in the same manner; and though it seems to seize the little animal that comes to annoy it, yet, in reality, only closes mechanically upon it, and this inclosure neither contributes to its preservation nor its defence. But it is very different with insects, even of the lowest order; the earth-worm not only contracts, but hides itself in the earth, and escapes with some share of swiftness from its pursuers. The polypus hides its horns; the star-fish contracts its arms upon the appearance even of distant dangers; they not only hunt for their food, but provide for their safety; and however imperfectly they may be formed, yet still they are in reality placed many degrees above the highest vegetable of the earth, and are possessed of many animal functions, as well as those that are more elaborately formed.

But though these be superior to plants, they are far beneath their animated fellows of existence. In the class of zoophytes, we may place all those animals which may be propagated by cuttings; or in other words, which, if divided into two or more parts, each part in time becomes a separate and perfect animal; the head shoots forth a tail, and, on the contrary, the tail produces a head; some of these will bear dividing but into two parts, such as the earth-worm; some may be divided into more than two, and of this kind are many of the star-fish; others still may be cut into a thousand parts, each becoming a perfect animal; they may be turned inside out, like the finger of a glove; they may be moulded into all manner of shapes, yet

The animals which inhabit the madrepores are medusæ. The coral which contains them is fixed and simple, or branched, with cavities composed of lamellæ in a star-like form.

still their vivacious principle remains, still every single part becomes perfect in its kind, and, after a few days' existence, exhibits all the arts and industry of its contemptible parent! We shall, therefore, divide zoophytes according to their several degrees of perfection, namely, into worms, star-fish, and polypi; contenting ourselves with a short review of those nauseous and despicable creatures, that excite our curiosity chiefly by their imperfections; it must not be concealed, however, that much has of late been written on this part of natural history. A new mode of animal production, could not fail of exciting not only the curiosity, but the astonishment of every philosopher: many found their favourite systems totally overthrown by the discovery; and it was not without a wordy struggle, that they gave up what had formerly been their pleasure and their pride. At last, however, conviction became too strong for argument; and a question, which owed its general spread rather to its novelty than to its importance, was given up in favour of the new discovery.

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## CHAP. II.

### OF WORMS.

THE first in the class of zoophytes, are animals of the worm kind, which, being entirely destitute of feet, trail themselves along upon the ground, and find themselves a retreat under the earth, or in the water. As these, like serpents, have a creeping motion, so both, in general, go under the common appellation of reptiles; a loathsome, noxious, malignant tribe, to which man by nature, as well as by religion, has the strongest antipathy. But though worms, as well as serpents, are mostly without feet, and have been doomed to creep along the earth on their bellies, yet their motions are very different. The serpent, as has been said before, having a back-bone, which it is incapable of contracting, bends its body into the form of a bow, and then shoots forward from the tail; but it is very different with the worm, which has a power of contracting or lengthening itself at will. There is a spiral muscle, that runs round its whole body, from

the head to the tail, somewhat resembling a wire wound round a walking-cane, which when slipped off, and one end extended and held fast, will bring the other nearer to it; in this manner the earth-worm, having shot out, or extended its body, takes hold by the slime of the forepart of its body, and so contracts and brings forward the hinder part; in this manner it moves onward, not without great efforts; but the occasions for its progressive motion are few.

As it is designed for living under the earth, and leading a life of obscurity, so it seems tolerably adapted to its situation. Its body is armed with small stiff sharp burrs or prickles, which it can erect or depress at pleasure; under the skin there lies a slimy juice, to be ejected as occasion requires, at certain perforations between the rings of the muscles, to lubricate its body, and facilitate its passage into the earth. Like most other insects, it has breathing holes along the back, adjoining each ring; but is without bones, without eyes, without ears, and properly without feet. It has a mouth, and also an alimentary canal, which runs along to the very point of the tail. In some worms, however, particularly such as are found in the bodies of animals, this canal opens towards the middle of the belly, at some distance from the tail. The intestines of the earth-worm are always found filled with a very fine earth, which seems to be the only nourishment these animals are capable of receiving.

The animal is entirely without a brain, but near the head is placed the heart, which is seen to beat with a very distinct motion, and round it are the spermatic vessels, forming a number of little globules, containing a milky fluid, which have an opening into the belly, not far from the head; they are also often found to contain a number of eggs, which are laid in the earth, and are hatched in twelve or fourteen days into life, by the genial warmth of their situation; like snails, all these animals unite in themselves both sexes at once; the reptile that impregnates, being impregnated in turn: few that walk out, but must have observed them, with their heads laid against each other, and so strongly attached, that they suffer themselves to be trode upon.

When the eggs are laid in the earth, which, in about fourteen days, as has been said, are hatched into maturity, the young ones come forth very small, but perfectly formed, and suffer no

change during their existence ; how long their life continues is not well known, but it certainly holds for more than two or three seasons. During the winter, they bury themselves deeper in the earth, and seem, in some measure, to share the general torpidity of the insect tribe. In spring, they revive with the rest of nature, and on those occasions, a moist or dewy evening brings them forth from their retreats, for the universal purpose of continuing their kind. They chiefly live in a light, rich, and fertile soil, moistened by dews or accidental showers, but avoid those places where the water is apt to lie on the surface of the earth, or where the clay is too stiff for their easy progression under ground.

Helpless as they are formed, yet they seem very vigilant in avoiding those animals that chiefly make them their prey ; in particular, the mole, who feeds entirely upon them beneath the surface, and who seldom ventures, from the dimness of its sight, into the open air ; him they avoid, by darting up from the earth the instant they feel the ground move ; and fishermen, who are well acquainted with this, take them in what numbers they choose, by stirring the earth where they expect to find them. They are also driven from their retreats under ground, by pouring bitter or acrid water thereon, such as that water in which green walnuts have been steeped, or a ley made of pot-ashes.

Such is the general outline of the history of these reptiles, which, as it should seem, degrades them no way beneath the rank of other animals of the insect creation : but now we come to a part of their history which proves the imperfection of their organs, from the easiness with which these little machines may be damaged and repaired again. It is well known in mechanics, that the finest and most complicated instruments are the most easily put out of order, and the most difficultly set right ; the same also obtains in the animal machine. Man, the most complicated machine of all others, whose nerves are more numerous, and powers of action more various, is most easily destroyed ; he is seen to die under wounds which a quadruped or a bird could easily survive ; and as we descend gradually to the lower ranks, the ruder the composition, the more difficult it is to disarrange it. Some animals live without their limbs, and often are seen to reproduce them ; some are seen to live without their brain for many weeks together ; caterpillars continue to increase and

grow large, though all their nobler organs are entirely destroyed within; some animals continue to exist, though cut in two, their nobler parts preserving life, while the others perish that were cut away; but the earth-worm, and all the zoophyte tribe, continue to live in separate parts, and one animal, by the means of cutting, is divided into two distinct existences, sometimes into a thousand!

There is no phenomenon in all natural history more astonishing than this, that man at pleasure should have a kind of creative power, and out of one life make two, each completely formed, with all its apparatus and functions; each with its perceptions, and powers of motion and self-preservation; each as complete in all respects as that from which it derived its existence, and equally enjoying the humble gratifications of its nature.

When Des Cartes first started the opinion, that brutes were machines, the discovery of this surprising propagation was unknown, which might, in some measure, have strengthened his fanciful theory. What is life in brutes? he might have said, or where does it reside? In some we find it so diffused, that every part seems to maintain a vivacious principle, and the same animal appears possessed of a thousand distinct irrational souls at the same time. But let us not, he would say, give so noble a name to such contemptible powers, but rank the vivifying principle in these with the sap that rises in vegetables, or the moisture that contracts a cord, or the heat that puts water into motion! Nothing, in fact, deserves the name of soul, but that which reasons, that which understands, and by knowing God, receives the mark of its currency, and is minted with the impression of its great Creator.

Such might have been the speculations of this philosopher: however, to leave theory, it will be sufficient to say, that we owe the first discovery of this power of reproduction in animals to Mr Trembley, who first observed it in the Polypus, and after him, Spalanzani and others found it taking place in the earth-worm, the sea-worm, and several other ill-formed animals of a like kind, which were susceptible of this new mode of propagation. This last philosopher has tried several experiments upon the earth-worm, many of which succeeded according to his expectation: every earth-worm, however, did not retain the viva-



cious principle with the same obstinacy ; some, when cut in two, were entirely destroyed ; others survived only in the nobler part ; and while the head was living, the tail entirely perished, and a new one was seen to bourgeon from the extremity. But what was most surprising of all, in some, particularly in the small red-headed earth-worm, both extremities survived the operation ; the head produced a tail, with the anus, the intestines, the annular muscle, and the prickly beads ; the tail part, on the other hand, was seen to shoot forth the nobler organs, and in less than the space of three months sent forth a head, a heart, with all the apparatus and instruments of generation. This part, as may easily be supposed, was produced much more slowly than the former, a new head taking above three or four months for its completion ; a new tail being shot forth in less than as many weeks. Thus two animals, by dissection, were made out of one, each with their separate appetites, each endued with life and motion, and seemingly as perfect as that single animal from whence they derived their origin.

What was performed upon the earth-worm was found to obtain also in many of the vermicular species. The sea-worm, the white water-worm, and many of those little worms with feelers, found at the bottom of dirty ditches ; in all these the nobler organs are of such little use, that if taken away, the animal does not seem to feel the want of them ; it lives in all its parts, and in every part ; and by a strange paradox in nature, the most useless and contemptible life is of all others the most difficult to destroy.\*

\* Allied to these in their vermicular shape, are several other kinds of worms commonly known by the name of Thread-worms.—The *Common Hair-worm* is found in fresh waters, or in a wet clayey soil, through which it perforates. In size and appearance it exactly resembles the hair of a horse's tail ; and when touched, twists itself into a variety of knot-like contortions, for which reason it has been called the Gordius. The *Guinea-worm* is shaped something like this, except that the mouth is dilated, and has a roundish concave lip. It enters the naked arms and legs of the inhabitants of the East and West Indies, sinking deep into the muscles, and frequently occasioning inflammation and fever. The *Fury* is a still more dangerous worm, and has on each side a single row of closely pressed reflected prickles. It is found in Finland and the northern parts of Sweden, in marshy places, where it crawls up the stems of sedge-grass and low shrubs ; and being wafted by the wind, darts into the naked parts of such as may happen to be near it. The celebrated naturalist, Sir Charles Linne,

## CHAP. III.

## OF THE STAR-FISH.

THE next order of zoophytes, is that of the star-fish, a numerous tribe, shapeless and deformed, assuming at different times different appearances. The same animal that now appears

was so severely bitten by one of these dreadful animals, that for some time it was doubtful whether he would live or die.

The *Naked Tube Worm*.—The body of the tube worms is elongated: they have cylindrical mouths at the one end, and narrower than the body: the aperture at the side of the body is cruciform. The body of the naked tube worm is covered with a close skin, and globular at the lower end. It inhabits the European seas, under stones, and grows to eight inches in length.

The *Taenia*, or *Tape Worms*.—Teniæ are worms that inhabit the bodies of different animals, where they are destined to feed upon the juices already animalised. They are generally found in the alimentary canal, and usually about the upper part of it, where there is the greatest abundance of chyle, which seems to be their natural food.

We are not to suppose that these worms are created for the purpose of producing disease in the animals they inhabit, but rather that nature has directed that no situation should be vacant, where the work of multiplying the species of living beings could be carried on. By thus allowing them to exist within each other, the sphere of increase is considerably enlarged. There is, however, little doubt, that worms, and more especially those of the present tribe, do sometimes produce diseases in the bodies they inhabit; but we are at the same time very certain, that worms do exist abundantly in many animals without at all disturbing their functions, or annoying them in the slightest degree: and we ought to consider all these creatures rather as the concomitants, than the causes of disease.

The *Common Tape Worm* inhabits the intestines of mankind, generally at the upper part of the alimentary canal; it is from three to thirty feet in length, and has been found even sixty feet long. It is sometimes solitary, but generally in considerable numbers, and occasions emaciation and various distressing maladies; and adheres so firmly to the intestine, that it is removed with great difficulty.

The head has a terminal mouth, surrounded with two rows of radiate hooks or holders; and a little beneath, on the flattened surface, it has four tuberculate orifices or suckers, two on each side. The body is composed of a number of distinct joints, appearing as if sheathed on each other; each joint with a lateral marginal pore, by which it attaches itself to the intestines; those near the head a little smaller, enlarging towards the middle, and gradually lessening towards the tail: the tail is terminated by a semi-circular joint, without any aperture.

Upwards of 1200 species of intestinal worms have been discovered. Sixteen of these have been found in the human body; the rest are peculiar to other animals.

round like a ball, shortly after flattens as thin as a plate. All of this kind are formed of a semi-transparent gelatinous substance, covered with a thin membrane, and to an inattentive spectator often appear like a lump of inanimate jelly, floating at random upon the surface of the sea, or thrown by chance on shore at the departure of the tide.\* But upon a more minute inspection, they will be found possessed of life and motion; they will be found to shoot forth their arms in every direction, in order to seize upon such insects as are near, and to devour them with great rapacity. Worms, the spawn of fish, and even muscles themselves, with their hard resisting shell, have been found in the stomachs of these voracious animals; and what is very extraordinary, though the substance of their own bodies be almost as soft as water, yet they are no way injured by swallowing these shells, which are almost of a stony hardness. They increase in size as all other animals do. In summer, when the water of the sea is warmed by the heat of the sun, they float upon the surface, and in the dark they send forth a kind of shining light resembling that of phosphorus. Some have given these animals the name of sea-nettles, because they burn the hands of those that touch them, as nettles are found to do. They are often seen fastened to the rocks, and to the largest sea-shells, as if to derive their nourishment from them. If they be taken and put into spirit of wine, they will continue for many years entire;

\* Our author has here confounded the actinæ, or sea anemones, with star-fish animals considerably different in their forms as well as functions. When we take a view of the lower orders of zoology, we find a large and singular set of beings, which are so widely distinct from the other tribes of the animal world, that they seem almost as nearly allied to vegetables as animals. Many of these curious productions of nature are arranged by Linnæus under the title of Mollusca; which title is one of the subdivisions of the Linnæan tribe of worms. Of the various genera belonging to the mollusca, or soft animals, that of the actinia is perhaps the most elegant and curious. Many species of this genus have been called by the name of sea anemones, from a general resemblance which they bear, during their expanded state, to that flower.

The *Anemone Actinia*, though extremely common on several of the European coasts, and on our own in particular, does not seem distinctly mentioned by Linnæus in the *Systema Naturæ*. It adheres firmly to rocks, so as to be frequently left above water at the ebbing of the sea; but it is generally found adhering at some little depth below the surface of the water. Its general colour is deep red, more or less vivid in different specimens.

The *Funnel Medusa* is an elegant species of an oval form, which is to be found about the western islands of Jamaica.

but if they be left to the influence of the air, they are, in less than four and twenty hours, melted down into limpid and offensive water.

In all of this species, none are found to possess a vent for their excrements; but the same passage by which they devour their food, serves for the ejection of their fæces. These animals, as was said, take such a variety of figures, that it is impossible to describe them under one determinate shape; but in general their bodies resemble a truncated cone, whose base is applied to the rock to which they are found usually attached. Though generally transparent, yet they are found of different colours, some inclining to green, some to red, some to white, and some to brown. In some, their colours appear diffused over the whole surface, in some they are often streaked, and in others often spotted. They are possessed of a very slow progressive motion, and in fine weather they are continually seen, stretching out and fishing for their prey.\* Many of them are possessed of a number of long slender filaments, in which they entangle any small animals they happen to approach, and thus draw them into their enormous stomachs, which fill the whole cavity of their bodies. The harder shells continue for some weeks undigested, but at length they undergo a kind of maceration in the stomach, and

\* The *Asterias*, or *Star-fish Tribe*.—These are inhabitants of the sea, and are usually found on the sand, or among rocks on the sea shore, commonly below high water mark. They are a numerous tribe, and subject to great variety of form; and differ materially in the number and construction of their rays. The covering is a coriaceous crust, which defends them from the attacks of the smaller animals; and they have five or more rays proceeding from a centre, in which their mouth is situated. Every ray is furnished with a prodigious number of tentaculæ, or short, soft, and fleshy tubes, which appear to be of use not only in taking prey, and in aiding the motion of the animal, but also in enabling it to adhere to rocks and other substances, by which it withstands the force of the waves. In a single animal the tentaculæ have been found several hundred in number; and, when the star-fish are thrown on their backs, these may be observed to be pushed out and withdrawn, in the same manner as snails do their horns. The progressive motion of the star-fish, which is performed by the undulation of their rays, is very slow. They possess considerable powers of re-production; for if a ray happens to be broken off, in the course of a short time a new one will appear.

The *Hairy Asteria*, or *Star-fish*, is not uncommon on the coasts of Great Britain. The animal is coriaceous, with acute angles, and hairy. The rays are five in number, broad, and angulated at top; rough, with short bristles: its colour is brown. This species is common at Anglesea.

become a part of the substance of the animal itself. The indigestible parts are returned by the same aperture by which they were swallowed, and then the star-fish begins to fish for more. These also may be cut in pieces, and every part will survive the operation; each becoming a perfect animal, endued with its natural rapacity. Of this tribe, the number is various, and the description of each would be tedious and uninteresting; the manners and nature of all are nearly as described; but I will just make mention of one creature, which, though not properly belonging to this class, yet is so nearly related, that the passing it in silence would be an unpardonable omission.

Of all other animals, the cuttle-fish, though in some respects superior to this tribe, possesses qualities the most extraordinary. It is about two feet long, covered with a very thin skin, and its flesh composed of a gelatinous substance, which, however, within-side, is strengthened by a strong bone, of which such great use is made by the goldsmith. It is possessed of eight arms, which it extends, and which are probably of service to it in fishing for its prey: while in life, it is capable of lengthening or contracting these at pleasure; but when dead, they contract, and lose their rigidity. They feed upon small fish, which they seize with their arms; and they are bred from eggs, which are laid upon the weeds along the sea-shore.\*

The cuttle-fish is found along many of the coasts of Europe, but are not easily caught, from a contrivance with which they are furnished by nature; this is a black substance, of the colour of ink, which is contained in a bladder generally on the left side of the belly, and which is ejected in the manner of an excrement from the anus. Whenever, therefore, this fish is pursued, and when it finds a difficulty of escaping, it spurts forth a great quantity of this black liquor, by which the waters are totally

\* Of this genus eight species have been discovered. The structure of these animals is very remarkable. The body is cylindrical, and in some of the species entirely covered with a fleshy sheath; in others the sheath reaches only to the middle of the body. They have eight tentacles or arms, and in general two feelers, as they are called, which are much longer than the arms. Both the feelers and arms are furnished with strong circular cups or suckers. The mouth of these animals is hard, strong, and horny, resembling, both in texture and substance, the beak of a parrot. In hot climates, the cuttle-fish sometimes becomes of such a size as to measure twelve feet across the centre, and to have each of its arms between forty and fifty feet long. The Indians are sometimes clapped in their canoes by them.

darkened, and then it escapes by lying close at the bottom. In his manner the creature finds its safety; and men find ample cause for admiration, from the great variety of stratagems with which creatures are endued for their peculiar preservation.

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## CHAP. IV.

### OF THE POLYPUS.

THOSE animals which we have described in the last chapter are variously denominated. They have been called the Star-fish, Sea-nettles, and Sea-polypi. This last name has been peculiarly ascribed to them by the ancients, because of the number of feelers or feet of which they are all possessed, and with which they have a slow progressive motion; but the moderns have given the name of Polypus to a reptile that lives in fresh water, by no means so large or observable. These are found at the bottom of wet ditches, or attached to the under surface of the broad-leaved plants that grow and swim on the waters. The same difference holds between these and the sea-water polypus, as between all the productions of the sea, and of the land and the ocean. The marine vegetables and animals grow to a monstrous size. The eel, the pike, or the bream, of fresh-waters is but small; but in the sea they grow to an enormous magnitude. The herbs of the field are at most but a few feet high; those of the sea often shoot forth a stalk of a hundred. It is so between the polypi of both elements. Those of the sea are found from two feet in length to three or four, and Pliny has even described one, the arms of which were no less than thirty feet long. Those in fresh waters, however, are comparatively minute; at their utmost size seldom above three parts of an inch long, and when gathered up into their usual form, not above a third even of those dimensions.

It was upon these minute animals that the power of dissection was first tried in multiplying their numbers. They had been long considered as little worthy the attention of observers and were consigned to that neglect in which thousands of minute species of insects remain to this very day. It is true, indeed, that Reaumur observed, classed, and named them. By

contemplating their motions, he was enabled distinctly to pronounce on their being of the animal and not of the vegetable kingdom ; and he called them *polypi*, from their great resemblance to those larger ones that were found in the ocean. Still, however, their properties were neglected, and their history unknown.

Mr Trembley was the person to whom we owe the first discovery of the amazing properties and powers of this little vivacious creature. He divided this class of animals into four different kinds : into those inclining to green, those of a brownish cast, those of a flesh-colour, and those which he calls the *polype de panache*. The differences of structure in these, as also of colour, are observable enough ; but the manner of their subsisting, of seizing their prey, and of their propagation, is pretty nearly the same in all.

Whoever has looked with care into the bottom of a wet ditch when the water is stagnant, and the sun has been powerful, may remember to have seen many little transparent lumps of jelly, about the size of a pea, and flatted on each side ; such also as have examined the under side of the broad-leafed weeds that grow on the surface of the water, must have observed them studded with a number of these little jelly-like substances, which were probably then disregarded, because their nature and history were unknown. These little substances, however, were no other than living *polypi*, gathered up into a quiescent state, and seemingly inanimate, because either undisturbed, or not excited by the calls of appetite to action. When they are seen exerting themselves, they put on a very different appearance from that when at rest : to conceive a just idea of their figure, we may suppose the finger of a glove cut off at the bottom ; we may suppose also several threads or horus planted round the edge like a fringe. The hollow of this finger will give us an idea of the stomach of the animal ; the threads issuing forth from the edges may be considered as the arms or feelers with which it hunts for its prey. The animal, at its greatest extent, is seldom seen above an inch and a half long, but it is much shorter when it is contracted and at rest ; it is furnished neither with muscles nor rings, and its manner of lengthening or contracting itself more resembles that of the snail, than worms, or any other insect. The *polypus* contracts itself more or less, in proportion as it is touched, or as the water is agitated in which they are

seen. Warmth animates them, and cold benumbs them ; but it requires a degree of cold approaching congelation before they are reduced to perfect inactivity ; those of an inch have generally their arms double, often thrice as long as their bodies. The arms, where the animal is not disturbed, and the season not unfavourable, are thrown about in various directions, in order to seize and entangle its little prey ; sometimes three or four of the arms are thus employed, while the rest are contracted like the horns of a snail, within the animal's body. It seems capable of giving what length it pleases to these arms ; it contracts and extends them at pleasure, and stretches them only in proportion to the remoteness of the object it would seize.

These animals have a progressive motion, which is performed by that power they have of lengthening and contracting themselves at pleasure ; they go from one part of the bottom to another ; they mount along the margin of the water, and climb up the side of aquatic plants. They often are seen to come to the surface of the water, where they suspend themselves by their lower end. As they advance but very slowly, they employ a great deal of time in every action, and bind themselves very strongly to whatever body they chance to move upon as they proceed ; their adhesion is voluntary, and is probably performed in the manner of a cupping-glass applied to the body.

All animals of this kind have a remarkable attachment to turn towards the light ; and this naturally might induce an inquirer to look for their eyes ; but however carefully this search has been pursued, and however excellent the microscope with which every part was examined, yet nothing of the appearance of this organ was found over the whole body ; and it is most probable that, like several other insects which hunt their prey by their feeling, these creatures are unfurnished with advantages which would be totally useless for their support.

In the centre of the arms, as was said before, the mouth is placed, which the animal can open and shut at pleasure, and this serves at once as a passage for food, and an opening for it after digestion. The inward part of the animal's body seems to be one great stomach, which is open at both ends ; but the purposes which the opening at the bottom serves are hitherto unknown, but certainly not for excluding their excrements, for those are ejected at the aperture by which they are taken in.



If the surface of the body of this little creature be examined with a microscope, it will be found studded with a number of warts, as also the arms, especially when they are contracted; and these tubercles, as we shall presently see, answer a very important purpose.

If we examine their way of living, we shall find these insects chiefly subsisting upon others, much less than themselves, particularly a kind of millepedes that live in the water, and a very small red worm, which they seize with great avidity. In short, no insect whatsoever, less than themselves, seems to come amiss to them; their arms, as was said before, serve them as a net would a fisherman, or perhaps, more exactly speaking, as a limetwig does a fowler.

Wherever their prey is perceived, which the animal effects by its feeling, it is sufficient to touch the object it would seize upon, and it is fastened without a power of escaping. The instant one of this insect's long arms is laid upon a millepede, the little insect sticks without a possibility of retreating. The greater the distance at which it is touched, the greater is the ease with which the polypus brings the prey to its mouth. If the little object be near, though irretrievably caught, it is not without great difficulty that it can be brought to the mouth to be swallowed. When the polypus is unsupplied with prey, it testifies its hunger by opening its mouth; the aperture, however, is so small that it cannot be easily perceived; but when, with any of its long arms, it has seized upon its prey, it then opens the mouth distinctly enough, and this opening is always in proportion to the size of the animal which it would swallow; the lips dilate insensibly by small degrees, and adjust themselves precisely to the figure of their prey. Mr Trembley, who took a pleasure in feeding this useless brood, found that they could devour aliments of every kind, fish and flesh, as well as insects; but he owns they did not thrive so well upon beef and veal, as upon the little worms of their own providing. When he gave one of these famished reptiles any substance which was improper to serve for aliment, at first it seized the prey with avidity, but after keeping it sometime entangled near the mouth, it dropt it again with distinguishing nicety.

When several polypi happen to fall upon the same worm, they dispute their common prey with each other. Two of them are

often seen seizing the same worm at different ends, and dragging it at opposite directions with great force. It often happens, that while one is swallowing its respective end, the other is also employed in the same manner, and thus they continue, swallowing each his part, until their mouths meet together; they then rest, each for some time in this situation, till the worm breaks between them, and each goes off with his share; but it often happens that a seemingly more dangerous combat ensues, when the mouths of both are thus joined upon one common prey together; the largest polypus then gapes and swallows his antagonist; but what is very wonderful, the animal thus swallowed seems to be rather a gainer by the misfortune. After it has lain in the conqueror's body for about an hour, it issues unhurt, and often in possession of the prey which had been the original cause of contention. How happy would it be for men if they had as little to fear from each other!

These reptiles continue eating the whole year, except when the cold approaches to congelation; and then, like most others of the insect tribe, they feel the general torpor of nature, and all their faculties are for two or three months suspended: but if they abstain at one time, they are equally voracious at another, and, like snakes, ants, and other animals, that are torpid in winter, the meal of one day suffices them for several months together. In general, however, they devour more largely in proportion to their size, and their growth is quick exactly as they are fed; such as are best supplied, soonest acquire their largest size, but they diminish also in their growth with the same facility if their food be taken away.

Such are the more obvious properties of these little animals, but the most wonderful still remain behind: their manner of propagation, or rather multiplication, has for some years been the astonishment of all the learned of Europe. They are produced in as great a variety of manner as every species of vegetable. Some polypi are propagated from eggs, as plants are from their seed: some are produced by buds issuing from their bodies, as plants are produced by inoculation; while all may be multiplied by cuttings, and this to a degree of minuteness that exceeds even philosophical perseverance.

With respect to such of this kind as are hatched from the egg, little curious can be added, as it is a method of propagation so

common to all the tribes of insect nature ; but with regard to such as are produced like buds from their parent stem, or like cuttings from an original root, their history requires a more detailed explanation. If a polypus be carefully observed in summer, when these animals are chiefly active, and more particularly prepared for propagation, it will be found to bourgeon forth from different parts of its body several tubercles or little knobs which grow larger and larger every day ; after two or three days' inspection, what at first appeared but a small excrescence takes the figure of a small animal, entirely resembling its parent, furnished with feelers, a mouth, and all the apparatus for seizing and digesting its prey. This little creature every day becomes larger, like the parent to which it continues attached ; it spreads its arms to seize upon whatever insect is proper for aliment, and devours it for its own particular benefit : thus it is possessed of two sources of nourishment, that which it receives from the parent by the tail, and that which it receives from its own industry by the mouth. The food which these animals receive often tinctures the whole body, and upon this occasion the parent is often seen communicating a part of its own fluids to that of its progeny that grows upon it ; while, on the contrary, it never receives any tincture from any substance that is caught and swallowed by its young. If the parent swallows a red worm, which gives a tincture to all its fluids, the young one partakes of the parental colour ; but if the latter should seize upon the same prey, the parent polypus is no way benefited by the capture, but all the advantage remains with the young one.

But we are not to suppose that the parent is capable of producing only one at a time ; several young ones are thus seen at once, of different sizes, growing from its body, some just budding forth, others acquiring their perfect form, and others come to sufficient maturity, and just ready to drop from the original stem to which they had been attached for several days. But what is more extraordinary still, those young ones themselves that continue attached to their parent, are seen to bourgeon, and propagate their own young ones also, each holding the same dependence upon its respective parent, and possessed of the same advantages that have been already described in the first connection. Thus we see a surprising chain of existence continued,

and numbers of animals naturally produced without any union of the sexes, or other previous disposition of nature.

This seems to be the most natural way by which these insects are multiplied; their production from the egg being not so common; and though some of this kind are found with a little bladder attached to their bodies, which is supposed to be filled with eggs, which afterwards come to maturity, yet the artificial method of propagating these animals is much more expeditious, and equally certain. It is indifferent whether one of them be cut into ten, or ten hundred parts, each becomes as perfect an animal as that which was originally divided; but it must be observed, that the smaller the part which is thus separated from the rest, the longer it will be in coming to maturity, or in assuming its perfect form. It would be endless to recount the many experiments that have been tried upon this philosophical prodigy: the animal has been twisted and turned into all manner of shapes; it has been turned inside out, it has been cut in every division, yet still it continued to move; its parts adapted themselves again to each other, and in a short time it became as voracious and industrious as before.

Besides these kinds mentioned by Mr Trembley, there are various others which have been lately discovered by the vigilance of succeeding observers, and some of these so strongly resemble a flowering vegetable in their forms, that they have been mistaken by many naturalists for such. Mr Hughes, the author of the natural history of Barbadoes, has described a species of this animal, but has mistaken its nature, and called it a sensitive flowering plant; he observed it to take refuge in the holes of rocks, and, when undisturbed, to spread forth a number of ramifications, each terminated by a flowery petal, which shrunk at the approach of the hand, and withdrew into the hole from whence before it had been seen to issue. This plant, however, was no other than an animal of the polypus kind, which is not only to be found in Barbadoes, but also on many parts of the coast of Cornwall, and along the shores of the continent.

## CHAP. V.

## OF THE LYTROPHYTES AND SPONGES.

It is very probable that the animals we see and are acquainted with, bear no manner of proportion to those that are concealed from us. Although every leaf and vegetable swarms with animals upon land, yet at sea they are still more abundant; for the greatest part of what would seem vegetables growing there, are in fact nothing but the artificial formation of insects, palaces which they have built for their own habitation.

If we examine the bottom of the sea along some shores, and particularly at the mouths of several rivers, we shall find it has the appearance of a forest of trees under water, millions of plants growing in various directions, with their branches entangled in each other, and sometimes standing so thick as to obstruct navigation. The shores of the Persian Gulf, the whole extent of the Red-sea, and the western coasts of America, are so choked up in many places with these coralline substances, that though ships force a passage through them, boats and swimmers find it impossible to make their way. These aquatic groves are formed of different substances, and assume various appearances. The coral plants, as they are called, sometimes shoot out like trees without leaves in winter; they often spread out a broad surface like a fan, and not uncommonly a large bundling head like a faggot; sometimes they are found to resemble a plant with leaves and flowers; and often the antlers of a stag, with great exactness and regularity. In other parts of the sea are seen sponges of various magnitude, and extraordinary appearances, assuming a variety of fantastic forms, like large mushrooms, mitres, fonts, and flower-pots. To an attentive spectator, these various productions seem entirely of the vegetable kind; they seem to have their leaves and their flowers, and have been experimentally known to shoot out branches in the compass of a year. Philosophers, therefore, till of late, thought themselves pretty secure in ascribing these productions to the vegetable kingdom; and Count Marsigli, who has written very laboriously and learnedly upon the subject of corals and sponges, has not hesitated to declare his opinion, that they were plants of the

aquatic kind, furnished with flowers and seeds, and endued with a vegetation entirely resembling that which is found upon land. This opinion, however, some time after, began to be shaken by Rumphius and Jussieu, and at last by the ingenious Mr Ellis, who, by a more sagacious and diligent inquiry into nature, put it past doubt, that corals and sponges were entirely the works of animals, and that, like the honeycomb which was formed by the bee, the coral was the work of an infinite number of reptiles of the polypus kind, whose united labours were thus capable of filling whole tracts of the ocean with those embarrassing tokens of their industry.

If, in our researches after the nature of these plants, we should be induced to break off a branch of the coralline substance, and observe it carefully, we shall perceive its whole surface, which is very rugged and irregular, covered with a mucous fluid, and almost in every part studded with little jelly-like drops, which, when closely examined, will be found, to be no other than reptiles of the polypus kind. These have their motions, their arms, their appetites, exactly resembling those described in the last chapter; but they soon expire when taken out of the sea, and our curiosity is at once stopped in its career, by the animals ceasing to give any mark of their industry: recourse, therefore, has been had to other expedients, in order to determine the nature of the inhabitant, as well as the habitation.

If a coralline plant be strictly observed, while still growing in the sea, and the animals upon its surface be not disturbed, either by the agitation of the waters, or the touch of the observer, the little polypi will then be seen in infinite numbers, each issuing from its cell, and in some kinds the head covered with a little shell, resembling an umbrella, the arms spread abroad, in order to seize its prey, while the hinder part still remains attached to its habitation, from whence it never wholly removes. By this time it is perceived, that the number of inhabitants is infinitely greater than was at first suspected; and that they are all assiduously employed in the same pursuits, and that they issue from their respective cells, and retire into them at pleasure. Still, however, there are no proofs that those large branches which they inhabit, are entirely the construction of such feeble and minute animals. But chemistry will be found to lend a clue to extricate us from our doubts in this particular. Like the shells

which are formed by snails, mussels, and oysters, these coraline substances effervesce with acids; and may therefore well be supposed to partake of the same animal nature. But Mr Ellis went still farther, and examined their operations, just as they were beginning. Observing an oyster-bed which had been for some time neglected, he there perceived the first rudiments of a coraline plantation, and tufts of various kinds shooting from different parts of this favourable soil. It was upon these he tried his principal experiment. He took out the oysters which were thus furnished with coralines, and placed them in a large wooden vessel, covering them with sea-water. In about an hour, he perceived the animals, which before had been contracted by handling, and had shown no signs of life, expanding themselves in every direction, and appearing employed in their own natural manner. Perceiving them, therefore, in this state, his next aim was to preserve them thus expanded, so as to be permanent objects of curiosity. For this purpose, he poured, by slow degrees, an equal quantity of boiling water into the vessel of sea-water in which they were immersed. He then separated each polypus with pincers from its shell, and plunged each separately into small crystal vases, filled with spirit of wine mixed with water. By this means the animal was preserved entire, without having time to contract itself, and he thus perceived a variety of kinds, almost equal to that variety of productions which these little animals are seen to form. He has been thus able to perceive and describe fifty different kinds, each of which is seen to possess its own peculiar mode of construction, and to form a coraline that none of the rest can imitate. It is true, indeed, that on every coraline substance there are a number of polypi found, no way resembling those which are the erecters of the building: these may be called a vagabond race of reptiles, that are only intruders upon the labours of others, and that take possession of habitations, which they have neither art nor power to build for themselves. But, in general, the same difference that subsists between the honeycomb of the bee, and the paper-like cells of the wasp, subsists between the different habitations of the coral-making polypi.

With regard to the various forms of these substances, they have obtained different names from the nature of the animal that produced them, or the likeness they bear to some well-known

object, such as corallines, fungi-madrepores, sponges, astroites, and keratophytes.\* Though these differ extremely in their outward appearances, yet they are all formed in the same manner by reptiles of various kinds and nature. When examined che-

\* The genus *Madrepore* consists of many species, of varied form, and many of them most elegant in their structure. The animal resembles a medusa; the coral has lamellate, star-shaped cavities. It is principally in hot climates, betwixt the tropics, that they are in greatest abundance. Few of them have been observed in any of the European seas, except the Mediterranean. Many species are found in a fossil state.

The *Truncated Madrepore*.—It is curious to remark, in this species, the poroliferous mode in which the new joints arise from the surfaces of the already formed stars.

The *Cup Madrepore* is clovate, and turbinated with a tapering base; the star is obconic, with a double prominent jagged centre. This coral is dragged up in great abundance by the coral-fishers on the southern coast of France and Italy: it is always found single, without branches, and generally adhering to a piece of red coral. It is of a white colour, and very hard. The lamellæ, or gills, are about forty in number, and as many intermediate small ones; the latter extend to the margin, but do not reach to the bottom of the star, like the larger ones. The common, or middle size of this coral, is about two inches long, and three quarters of an inch in diameter, in the broadest part.

The *Mushroom Madrepore* is orbicular and convex, with simple longitudinal gills; beneath, concave and papillous. This coral is met with in great abundance in the Red Sea, and the East Indian ocean; it is frequently found of five or six inches diameter, and often of a milk-white colour.

The genus *Coralline* consists of animals greatly resembling plants, and has been thought by some writers to belong entirely to the vegetable kingdom, and to differ but little from fucuses and confervas: but as Linnæus observes, that all calcarious substances are truly of animal production, therefore these corallines, consisting of that substance, do belong to the animal kingdom.

What or where the link is that unites the animal and vegetable kingdoms of nature, no one has yet been able to point out: some of these corallines appear to come the nearest to it of any other animal production; but then the calcarious covering, though ever so thin, shows us that they cannot be vegetables. The white mealy substance on the surface of some of the lichens would induce one to think them covered with a calcarious matter; but chemistry shows us, it is no more of a calcarious nature than the mealy whiteness of various auriculæ.

The minuteness of the pores of corallines, though as small as those of some plants, is no proof of their being vegetables; because there may be suckers that come through these pores, which our glasses cannot discover; or perhaps they may be like the pores of sponges, contrived in such a manner as to suck in and throw out the water. Let us observe the pores of those corals called millepores, and we shall find them equally as small as those of the corallines; and yet these are universally allowed to be of the animal kingdom. The characteristics of this genus are, that the animal is growing in the form of a plant; the stem is fixed, with calcarious subdivided branches, for the most part jointed.



mically, they all discover the marks of animal formation; the corals, as was said, dissolve in acids, the sponges burn with an odour strongly resembling that of burnt horn. We are left somewhat at a loss with regard to the precise manner in which this

The *Pencil Coralline*.—This coralline varies in the thickness of its branches, as well as in its size; they are found from one inch to four inches long; in some the stem is very short, in others it is four times as long as the head. They are generally white. The joints are easily distinguished, where the branches divide; the stem is composed of tubular filaments, covered with a calcareous crust. They adhere to shells by the base of these filaments, and are often found in the West Indian ocean, growing to shells, many of them together.

The *Mop Coralline*.—This coralline has a single membranaceous wrinkled stem, on the top of which is a tuft of jointed dichotomous branches. This is the most singular of all this genus, and differs from the rest by the regular wrinkles of the stem, which is small at the base, and grows wider as it rises, till it sends forth its branches at the top: from the base it sends forth branched tubes, like the sertularias, by which it adheres: these tubes do not lessen as they extend, but have an equal diameter their whole length. When the branches at the top are magnified, their calcareous crust, full of pores, may be distinguished, which brings it to this genus. This is found in the American seas, many growing together, particularly near the Bahama Islands.

The *Sertularia*, or *Sea Pen*, is a many-headed animal, growing in the shape of a plant, and fixed by its base. Its tubulous horny stem is full of cup-shaped denticles, through which proceed little heads, in the form of polypes, from the gelatinous medullary part which is continued through the inside. Nature has been very favourable to the animals of this genus, in providing little cup-like denticles to secure their many tender heads safe, when they are drawn in upon any alarm of danger; whereas the heads of the tubular corallines have no such protection, for which reason they are not so often found in the turbulent parts of the ocean, as in sheltered recesses of harbours, &c.

The *Pen-shaped Sertularia*, or *Sea Pen*.—This coralline has a single pinnated stem; the pinnæ, or side small branches, are jointed and curved; the denticles are ranged on one side, each supported by a little horn-like tube; they have a crenated margin, with a little spine on each side, opposite to each other; the ovaries are not known. This coralline is as remarkable for the elegance of its form, as its likeness to the feather of a pen. It is of a yellowish brown colour, about five or six inches high. There are many of them rise together from the same adhering tubes, with stiff jointed stems. The little crooked tubes that support the denticles are longer in this species than in any of the like kind, being twice as long as the denticles. It is not uncommon among the islands of the East Indies.

The genus *Sponge* is exceedingly complicated, and still remains in much doubt with various individuals. Colonel Montagu, in an essay on the nature and constitution of sponges, in the Wernerian Transactions, is clearly of opinion that they are animal substances, although no polypi, or vermes of any kind, have as yet been discovered in their cells or pores; and he is of opinion that they possess vitality without perceptible action or motion,

multitude of cells, which at last assume the appearance of a plant or flower, are formed.

If we may be led in this subject by analogy, it is most probable, that the substance of coral is produced in the same manner

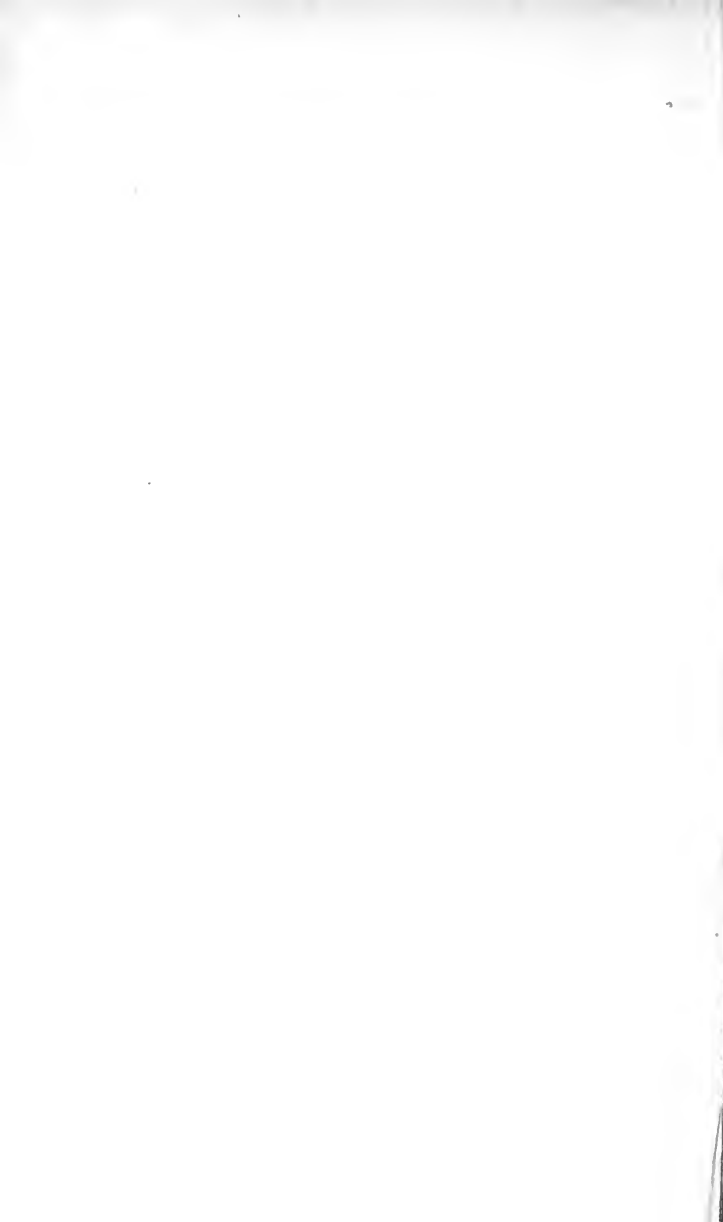
Sponges have afforded a field for philosophical observers, and may be numbered amongst the most obscure or doubtful productions of nature. By some they have been supposed the fabric of certain worms allied to terebellæ, which are often found straying about in cavities; an idea not very probable, and which is now sufficiently exploded. Others have imagined them to be mere vegetables; but that they are really possessed of a living principle seems evident from the circumstance of their alternately contracting and dilating their pores, and shrinking in some degree from the touch when examined in their native waters. In short, sponges consist of an infinitely ramified mass of capillary tubes, possessed of a certain degree of contractile power, and capable from their structure of absorbing nutriment from the surrounding fluid in which they are by nature immersed. They therefore form an animal tribe different from all others, and may be considered as the most torpid of all zoophytes.

The *Funnel Sponge*.—This species is funnel-shaped, and flexible, with the surface more or less roughened and irregular. It is found both in the Mediterranean and Indian seas; adhering, like others of its genus, to rocks. In size it varies from a few inches in diameter to that of a foot or more. Its colour is pale brown, and its substance less strong or tenacious than that of the common or officinal species.

The *Vorticellæ*, or *Wheel Animals*, are the most remarkable of all animalcules, not only in their structure, but also in their habits and production. In general form they bear a great affinity to the polypes, having a contractile, naked body, furnished with rotatory organs round the mouth; and indeed many microscopical writers have denominated them *cluster polypes*. They are almost invisibly minute, and generally found in clear stagnant waters, during the summer months, attached to the stalks of the lesser water plants, where they feed on animalcules still smaller than themselves. Many of the species are found in groups, sometimes formed by the mere approximation of several individuals, and at other times by the ramified or aggregate manner in which they grow. Their various motions, like those of the polypes, are generally exerted only for the purpose of obtaining prey. The rotatory motion of their tentacula cause an eddy in the water, around each individual, sufficient to attract into its vortex such animalcules as happen to swim near; these the little creature seizes, by suddenly contracting its tentacula, and inclosing them in the midst. In several of the species the stems, into which they occasionally withdraw themselves, are somewhat rigid or scaly. The young are carried in oval integuments on the outside of the lower part of the stems, and when ready to issue forth, the parents aid their extrusion, where such is necessary, by writhing their bodies, or striking the little vesicle. As soon as the young one is liberated from its prison, it fixes itself, and commences the necessary operations to procure its food. The infusory animals of Linnæus are extremely simple in their form, and generally invisible without a magnifying power. They are chiefly found in infusions of animal and vegetable substances.

that the shell of the snail grows round it ; these little reptiles are each possessed of a slimy matter, which covers its body, and this hardening, as in the snail, becomes a habitation exactly fitted to the body of the animal that is to reside in it ; several of these habitations being joined together, form at length a considerable mass ; and as most animals are productive in proportion to their minuteness, so these multiplying in a surprising degree, at length form those extensive forests that cover the bottom of the deep.

Thus all nature seems replete with life ; almost every plant on land has its surface covered with millions of these minute creatures, of whose existence we are certain, but of whose uses we are entirely ignorant ; while numbers of what seem plants at sea, are not only the receptacles of insects, but also entirely of insect formation. This might have led some late philosophers into an opinion, that all nature was animated ; that every, even the most inert, mass of matter was endued with life and sensation, but wanted organs to make those sensations perceptible to the observer : those opinions, taken up at random, are difficultly maintained, and as difficultly refuted ; like combatants that meet in the dark, each party may deal a thousand blows without ever reaching the adversary. Those, perhaps, are wiser who view nature as she offers ; who, without searching too deeply into the recesses into which she ultimately hides, are contented to take her as she presents herself ; and storing their minds with effects rather than with causes, instead of the embarrassments of systems, about which few agree, are contented with the history of appearances, concerning which all mankind have but one opinion.



# APPENDIX.

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## INTRODUCTORY.

### OF THE ANIMAL KINGDOM IN GENERAL.

SYSTEMS are conventional arrangements, to enable naturalists the more easily to classify species, so that their identity may be traced, and compared, and investigated. As new species were discovered, the task of ascertaining them became so difficult and uncertain, that the necessity of Systems was the more apparent. Accordingly, systematic arrangement was practised to a limited extent before the time of Linnæus, but to him we are indebted for the production of a new and comprehensive classification. He reduced all natural objects into three great divisions: these he called Kingdoms; viz. the Animal, Vegetable, and Mineral Kingdoms. These kingdoms he divided into Classes, Orders, Genera, Species, and Varieties.

A plurality of species constitute a genus, a variety of genera an order, and several orders a class. When, therefore, an object presents itself, with which we are totally unacquainted, our first business is to consider what is the class to which it belongs: having ascertained this, we next compare it with the characters of the orders; and having determined to which it is allied, we proceed to investigate its generic characters: when we have satisfied ourselves as to this, we come to the last and most difficult point, namely, the discovery of its species; which often rests on very trivial distinctions.

See an account of various systems, vol. I. p. 438, &c.

The *Systema Naturæ* of Linnæus, laid the foundation on which almost all succeeding systems have been built. He arranged the ANIMAL KINGDOM into six classes, as follow:—

## CLASS I.—MAMMALIA. CLASS IV.—PISCES.

## ORDER 1. Primates

2. Bruta
3. Ferre
4. Glires
5. Pecora
6. Belluæ
7. Cete

## ORDER 1. Apodes

2. Jugulares
3. Thoracci
4. A dominales

## CLASS V.—INSECTA.

## ORDER 1. Coleoptera

2. Hemiptera
3. Lepidoptera
4. Neuroptera
5. Hymenoptera
6. Diptera
7. Aptera

## CLASS II.—AVES.

## ORDER 1. Accipitres

2. Picæ
3. Anseres
4. Grallæ
5. Gallinæ
6. Passeres

## CLASS VI.—VERMES.

## ORDER 1. Intestina

2. Mollusca
3. Testacea
4. Lithophyta
5. Zoophyta

## CLASS III.—AMPHIBIA.

## ORDER 1. Reptilia

2. Serpentes
3. Nantes

To this system may be attributed, in a great measure, the rapid progress which Natural History has made since it was promulgated. The first outline appeared in 1748, and was perfected in the 12th Edition of his *Systema Naturæ*, published in 1766. This system was improved by Blumenbach, in his "Manual of Comparative Anatomy," published in 1803.

The modern discoveries, however, by Cuvier, Geoffroy, Lamarck, and other French comparative anatomists, have pointed out the necessity of substituting other arrangements. Among the various systems which have been devised, that of Cuvier seems to approach nearest to the natural affinities; especially in his class *Mammalia*, which is that we have adopted, with the addition of some new genera, possessing decided characters.

Cuvier separates all known animals into *four* great divisions: namely, I. VERTEBRATED animals; II. MOLLUSCOUS animals; III. ARTICULATED animals; and, IV. RADIATED animals. The foundation of these divisions rests on the organization of the various animals, as they exist in nature.

All animals are characterised by sensation and motion. The brain and nervous system are the medium by which the functions of animal life is manifested : while the heart and its accessory organs, nutrition and generation, &c. are the vital and vegetative functions, and are common to animals and plants. Sensation, therefore, exists in the nervous system. As we descend in the scale of being, these agents gradually become less perfect, until they at last disappear. In the lowest state of animal existence, the nervous system is invisible, if it exists at all ; and the muscular fibre has given way to a shapeless mass of animal matter.

#### OF VERTEBRATED ANIMALS.

FROM man, who stands at the head of vertebrate animals, in consequence of his perfect organization, down to the lowest of the fish, the brain is encased in a cranium, and the spinal cord is inclosed in a bony articulated column, called the spine. To the sides of the spine the ribs are attached, and the bones of the upper and lower extremities : these are either articulated, or kept together by ligaments. Over these, again, are placed the muscles, which give action to the bones. The alimentary system is inclosed within the cavity of the ribs and abdomen.

All vertebrated animals have a muscular heart, red blood ; the mouth is constructed with two horizontal jaws ; and organs are situated in the head by which they enjoy, through the medium of the nerves, the various senses, namely, of vision, hearing, smell, and taste. There is no instance of their having more than four limbs.

Comparative anatomy enables us to trace a similarity to all the parts of man, through the whole vertebrated animals.

The organs of sense, in all animals with a spine, consist in two eyes, two ears, two nostrils, the tongue, and all the muscles which cover the skeleton. The nervous system takes its rise in two masses situated in the cavity of the skull ; the substance is called medullary, or marrow ; and anatomists have remarked, that its volume is proportioned to the intellectual energy. The true nature of the medullary substance has not yet been ascertained by anatomists. When minutely examined, it appears a soft matter, of a cream-coloured white ; and seems to consist of infinitely small globules. It appears itself to be devoid of

motion; but from it are transmitted to the mind, the impressions of the senses; and from it are conveyed the impulses of the will to the different muscles of the body.

The brain appears to be principally composed of the medullary substance: the spinal marrow is the great stem leading from it, which conducts the numerous ramifications of the nerves through every part of the body. The muscular fibre consists of many series of filaments, whose distinctive property consists in contraction, arising, either from the contact of an external body, or the agency of the will carried along the nerves.

The whole elements of the body are derived from the nutritive or vegetative system. Substances taken into the stomach are converted into fluids, of which the blood is the principal, and contains the general elements of the animal system. It is composed of carbon, hydrogen, oxygen, and azote; in combination with fibrin, gelatine; and the compound substance called albumen, forming a constituent part of the animal solids and fluids; phosphorus and lime, from which the bones are principally formed; iron, and oily or fatty matter.

Hence, the nutritive fluid sustains, and supplies the expenditure of all the solid parts of the body, which are subject to perpetual change, from respiration, perspiration, &c.

The intestinal canal extends from the mouth, to the opening of the rectum; and in its length, consists of various degrees of expansion, which anatomists have designated by different names. The food, in its passage through this alimentary canal, is converted into chyle, the fluid of nutrition, and is absorbed by vessels called the lacteals, and conducted into the veins, by a separate set of vessels; which form what is termed the lymphatic system.

The blood, after having served the purposes of nutrition, is returned to the heart by the veins. This blood, for the purpose of restoring its arterial character, must pass, either wholly or in part, through the lungs, or organ of respiration, before it is conveyed by the arteries to the different parts of the body. In the three first classes of animals with vertebræ, the lungs consist of a number of small cells, through which the external air passes on inhalation.

The quantity of respiration depends on two causes: first,



the relative portion of blood contained at every instant of time, in the respiratory organ ; and, secondly, the quantity of oxygen which enters into combination with the surrounding fluid.

In mammiferous animals the circulation is double, and is performed by means of their capacious lungs alone. The volume of their respiration is consequently greater than in reptiles, whose respiratory organs are less ; and also greater than in fishes, from their breathing through a more dense medium.

Birds respire in greater volume than quadrupeds, in consequence of their double circulation and aërial respiration, with the addition of cavities, which penetrate through almost every part of their bodies ; acting with the same effective force upon the branches of the aorta, as upon the pulmonary artery.

Hence, in quadrupeds which are designed for walking and running, the respiration is moderate. Birds which are lightly formed, and which require strength of muscle to support them in the air, have a greater degree of respiration. Reptiles, which are destined to crawl along the earth, have a more restricted respiration ; and fishes, which move through a fluid so much specifically heavier than themselves, breathe by means of gills.

## OF THE MAMMALIA.

MAMMIFEROUS animals are placed at the head of every system, in consequence of the highest degree of organization being allotted to them. The comparative perfection of their organs—the number of their faculties—the delicacy of their sensations—and their varied powers of motion, all combining to produce a superior intelligence, which entitles them to a higher rank in the scale of being.

The young are produced alive, and nourished after birth by milk, which is secreted within the mammæ, or breasts. It is from the teats that the class takes its name.

The Mammalia, having but a moderate respiration, are generally only fitted for progressive motion on the earth ; which they can sustain with long endurance. A few species can, however, mount into the air, by means of extensible membranes, attached to their limbs, which are usually much elongated ; as in the bat tribe, &c. : while the cetaceous animals, and some others, are formed to move in the water only, from the shortness of their limbs.

Most of the generic and specific distinctions in the mammalia are founded on the teeth, together with the size and shape, &c. of the bones of the animal skeleton. It must, therefore, be apparent, that to understand these, a knowledge of the various principal bones of which the skeleton is composed becomes absolutely necessary. Man being the most perfect of vertebrate animals, his skeleton contains all the parts which exist in other animals, which have vertebræ. It is the province of the comparative anatomist and zoologist to examine and compare these, as they exist in the various species, and upon his anatomical skill will depend the success of his investigations. We, therefore, give a view of the

### HUMAN SKELETON.—PLATE I

#### BONES OF THE TRUNK.

- A. The sternum.
- B. The seventh, or last true rib.
- C. The cartilage of the ribs.
- D. The twelfth, or false rib.
- E. The lumber vertebræ, with their intervertebral cartilages, and transverse processes.
- F. The os sacrum.
- G. The os innominatum, composed of
  - The os ilium, *a*.
  - The os pubis, *b*.
  - The os ischium, *c*.

#### BONES OF THE SUPERIOR EXTREMITY.

- H. The clavicle.
- I. Inner surface of the scapula.
  - 1. The acromion of the scapula.
  - 2. The coracoid process of the bone.
- K. The os humeri.
  - 3. The head, or ball of the os humeri.
  - 4. Internal tubercle of the os humeri; and, farther out, the groove for lodging the tendon of the long head of the biceps muscle.
  - 5. The inner, and
  - 6. The outer condyle of the os humeri. Between 5 and 6, the hollow for lodging the coronoid process of the ulna in the flexion of the fore arm.

- L. The radius.
- 7. The head of the radius.
- M. The ulna.
- 8. The coronoid process of the ulna.
- N. Bones of the carpus.
- O. The metacarpal bone of the thumb.
- P. The metacarpal bones of the fingers.
- Q. The two bones of the thumb.
- R. The three phalanges of the fingers, and the os coccygis joined by its shoulder to the os sacrum.

## BONES OF THE INFERIOR EXTREMITY.

- S. The os femoris.
- 9. The ball or head of this bone, lodged in the acetabulum.
- 10. The cervix of the bone.
- 11. The large trochanter.
- 12. The small trochanter.
- 13. The inner condyle.
- T. The patella, placed upon the trochlea of the os femoris.
- U. The tibia.
- 14. The head of the tibia, between which and the condyles of the os femoris, the semi-lunar cartilages appear.
- 15. The tubercle of the tibia.
- 16. The malleolus internus.
- V. The fibula, the upper end of which is connected with the tibia.
- 17. The malleolus externus.
- W. The bones of the tarsus.
- 18. The projection of the os calcis.
- X. The metatarsal bones.
- Y. The phalanges of the toes.
- 19-19-19-19. The pelvis.

## BONES OF THE HEAD AND NECK.

- 20. Os frontis.
- 21. The parietal bone.
- 22. The temporal process of the sphenoid bone.
- 23. The squamous part of the temporal bone.
- 24. The mastoid process of the temporal bone.
- 25. The superior maxillary bone.

26. The nasal bone.
27. The malar, or cheek bone.
28. The lower jaw.

Fig. 2.—JAWS OF THE MANDRILL.

1. Incisory teeth.
2. Canine teeth.
3. Molars or grinders.

The upper jaw of the whole class is fixed to the cranium ; the lower jaw consists of two pieces, and is articulated by a projecting condyle into an immoveable temporal bone. The neck is composed of seven, and in one species, of nine, vertebræ. The anterior ribs are attached to a sternum, formed of various pieces placed vertically. Their anterior extremity commences from a shoulder-blade or scapula, which is not articulated to any other bone, but merely suspended in the flesh, and often indeed resting solely on the sternum by an intermediate bone, denominated the clavicle. This extremity is continued by an arm, a fore-arm, and a hand, which is itself formed of two ranges of small bones called the carpus, and another called the metacarpus, and the fingers, each composed of two or three bones termed phalanges.

The whole of this class, with the exception of the Cetacea, have the posterior extremity fixed to the spine, where it shelves out into a girdle, or pelvis. In youth, this process is divided into three pairs of bones : the *ilium*, which is attached to the spine ; the *pubis*, which forms the anterior of the pelvis ; and the *ischium*, which forms the posterior part. At the point of union of these bones, there is a cavity into which the thigh is articulated, to which is attached the leg, composed of two bones, the *tibia* and *fibula*. The leg is terminated by the foot, composed of parts analogous to those of the hand, and are termed the tarsus, metatarsus, and toes.

The head of the Mammalia is always articulated by two condyles upon the atlas, or first vertebra.

The cranium is divided into three compartments. The anterior is formed of the two frontal bones and the ethmoid ; the intermediate, by the parietal bones and the sphenoid ; and the posterior by the occipital. Between the occipital bones and

the sphenoid, are inserted the temporal bones, a part of which properly belong to the face.

In the fœtus the occipital bone is divided into four parts; the body of the sphenoid into two, and three of its pairs of alæ are separate. The temporal bone is divided into three, one of which serves to complete the cranium, another to close the labyrinth of the ear, and the third to form the sides of its cavity. These parts of the bones of the cranium unite more or less quickly in the different species, and end by perfect union in the adult.

The face is formed by two maxillary bones, between which the nasal canal passes; they have the two intermaxillary bones in front, and the two palatines behind; between these descends the single lamina of the ethmoid bone, called the *Vomer*. At the entrance of the nasal canal, are the bones proper to the nose. The jugal, or cheek bone of each side, unites the maxillary bone to the temporal, and often to the frontal bones; and finally, the lachrymal occupies the internal angle of the orbit, and sometimes a part of the cheek.

The brain consists of two hemispheres, united by a medullary lamina, called the *corpus callosum*, contains two ventricles, and inclosing four pair of *tuberculæ*, or eminences; these are called the *corpora striata*, or striated bodies, *thalami optici*, or optic beds, *nates*, and *testes*. Between the *thalami optici* is a third ventricle, which communicates with a fourth, situated beneath the cerebellum. The *crura* of the cerebellum always form under the *medulla oblongata*, a transverse prominence, termed the *tuber annulare*.

The *eye*, lodged invariably in its orbit, and protected by two eyelids, and a vestige of a third, has its crystalline humour fixed by the ciliary process. Its sclerotic coat is simply cellular.

In the ear there is always found a cavity, called the *tympanum* or drum, closed from without by a membrane called the *membrana tympani*; it has also four small bones, called the *incus*, *malleus*, *stapes*, and *os orbiculare*, at the entrance of which is placed the stapes, which communicates with three semicircular canals; finally, a spiral canal, called the *cochlea*, which terminates by one of its canals in the tympanal cavity, and by the other, in the vestibule.

The tongue is always fleshy, and is attached to a bone called the hyoid, suspended by ligaments to the cranium.

The lungs are two in number, composed of an infinity of small cells, and are always inclosed, without adhesion, in a cavity formed by the ribs and the diaphragm, and lined by the pleura.

The organ of voice is always at the superior extremity of the *trachea*; and a fleshy continuation denominated the *velum palati*, or soft palate, establishes a direct communication between the larynx and the back part of the nostrils.

Living on the earth's surface, these animals are exposed to the transitions of heat and cold. Their bodies have a covering of hair, which is thicker in the northern regions, and more scanty as they approach the warm latitudes. The *Cetacea*, however, which inhabit the sea, are totally devoid of this covering.

The internal canal in the Mammalia, is suspended by a fold in the peritoneum, called the mesentary, which contains a number of conglobulated glands for the lacteal vessels. Another production of the peritoneum, termed the epiploon, hangs on the front of, and underneath the intestines.

Cuvier divides the Mammalia into orders, whose essential characters are founded on the construction of the feet or organs of touch, and the number and kinds of teeth. On the perfection of the organs of touch, the power of expertness depends; and from the dentition may be ascertained, in a great measure, the nature of their food and digestive functions.

The organ of touch is more perfect in animals whose fingers are more numerously developed, and which are least covered at their tips;—such as those possessing only a single nail protecting their upper extremities, as in man; sensation in the toes of such as are covered with hoofs, on the contrary, is extremely blunted.

In the dentition given, and the generic characters, the method of Cuvier is followed. The arrangement of the figures is intended to represent the upper and under jaw. For example, in man, the incisory, or cutting teeth, are in the centre of each jaw, and are marked  $\frac{4}{4}$ , (Plate III\*. fig. 2—1,) that is, four above and four below; the canine, or sharp pointed teeth, are next to these, and are marked  $\frac{1-1}{1-1}$ , (fig. 2—2,) that is, one on each side of the incisory teeth in both jaws; beyond these, and further in the mouth, are the grinders, molars, or cheek teeth, marked

$\frac{2-3}{2-3}$ , (fig. 2—3,) that is, five on each side of the canine teeth of each jaw, making in man a total of thirty-two teeth. The Chimpanzé, an animal which stands next to man, as approaching nearest to him in his organization, has a similar arrangement in the number and kinds of his teeth.

The class Mammalia is divided in the following orders by Cuvier and Latreille:—

I. **BIMANA**; with two hands, of which man is the only species. He possesses three kinds of teeth.

II. **QUADRUMANA**; or animals with four hands, and having three kinds of teeth.

III. **CHEIROPTERA**. The general form of these animals is adapted for flight; with a fold of skin between their four limbs, and two pectoral teats, and they have three kinds of teeth.

IV. **FERÆ**. The four extremities are formed for walking with three kinds of teeth: the teats vary in number.

V. **MARSUPIALIA**. These vary in different genera. The young are produced prematurely, and brought to perfection in an abdominal pouch which incloses the teats.

VI. **RODENTIA**. These have two large incisory teeth in each jaw, separated from the grinders by a vacant space; they have no canine teeth: the grinders have flat crowns, or, if tuberculated, they are blunt; the hind limbs are longer than the fore ones, and furnished with nailed toes, and varying in different species: the teats are also variable.

VII. **EDENTATA**. The animals of this order have no incisory teeth in either jaw; some species have canine teeth and grinders, and others grinders only. Some genera are destitute of teeth: they have feet, with toes variable in number, which are armed with strong nails.

VIII. **PACHYDERMATA**. These have either three, or two kinds of teeth; the toes are variable in number, and furnished with strong nails or hoofs: the organs of digestion are formed for ruminating.

IX. **RUMINANTIA**. The genera of this order have no incisory teeth in the upper jaw, and are usually furnished with eight in the lower one: there is a vacant space between the incisory teeth and the grinders. Some genera have one or two canine teeth: the grinders are twelve in each jaw; they have two toes protected by hoofs; they have four stomachs; the males have always horns, as also the females in some species.

X. CETACEA. The bodies of the animals composing this order, are shaped like those of fishes, terminated by an appendage nearly allied to the fin tail, which is cartilaginous and horizontal; the head is joined to the body by a very short, thick neck; they have two teats, which are either pectoral or abdominal.

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## CLASS FIRST.

### M A M M A L I A,

OR ANIMALS WHICH SUCKLE THEIR YOUNG.

#### ORDER I.—BIMANA.

THE animals of this order have three kinds of teeth: on the anterior extremitities are hands: and the posterior extremitities are furnished with feet adapted for walking: the nails are flat; they have two pectoral mammæ or breasts; the orbital and temporal fossæ are distinct: the stomach is simple: and the body erect.

#### *Genus* 1.—HOMO.—*Linnaeus*.

*Generic Character*.—The incisory teeth are  $\frac{1}{1}$ , the canine teeth  $\frac{1-1}{1-1}$ , grinders or molars  $\frac{2-5}{2-5}$ , total 32. The facial angle varies in different nations.

#### HOMO SAPIENS.—MAN.

Man, who stands at the head of created beings, consists but of one species. When he enters the world, he is a defenceless and helpless creature: he remains in a state of infancy longer than any other animal, and attains maturity from the years of twelve to twenty according to the latitude. Speech and reason, which place him above all other creatures, are but germs, which do not ripen of themselves, but are evolved by the aid of culture and education. His instinct seems inferior to that of most other animals: for, they possess internal impulses, peculiar to their kinds, by which they can provide for themselves, and form habitations for their young: while man is entirely destitute of these instincts. The Almighty has, however, given him in their stead, reason and reflection. He has, besides, a voice, by which he can give utterance to infinite modifications



of articulate sounds, and thereby has constructed language, which enables him to communicate his ideas to his fellows. These qualities are possessed by every known race of men. He differs from all other creatures in his upright gait, and in the admirable construction of his hands; which enable him to perform actions and form instruments with such nicety. These, in connection with his intellectual faculties, have qualified him to make discoveries beyond this earth.

The specific distinction betwixt man and all other animals, consists in his upright posture, and in the bones of his legs and arms being so constructed, that it is impossible for him to walk on his four extremities; the great length of the thigh bone would bring the knee in contact with the ground, and the short inflexible structure of his feet disqualify him for this sort of action: the arms being so far separated from the central line and the articulations of the shoulder joints, together with their distance from each other, show that he could not support himself in a horizontal position; the muscle which acts as a binder betwixt the shoulders, is small in man compared to that of other animals: his head is heavier, and the vertebræ and muscles of the neck weaker, so that he could not support it in this position: in the quadrumina, the arteries which supply the brain are subdivided, while in man they are entire, and would in the horizontal position consequently flow with such force and rapidity, as soon to produce stupor. Man is the only true biped, his feet being exclusively formed for walking, and his hands for higher and more varied purposes: in one particular they differ widely from those of all other animals, namely, in the structure of the thumb, which being entirely independent from the fingers in its action, gives it a facility and power in grasping, greatly superior to the chimpansé, which approaches nearest to man in conformation.

But what raises man far above every other creature, is his brain. Several of the inferior animals, as the elephant and whale, have brains larger in absolute size than man; several species of monkeys, and in the sparrow, canary, linnæus, and red-breast, the brain is larger in proportion to the size of the body than in him. But man is distinguished from the inferior creatures by the possession of several cerebral parts, which are wanting in them. For example, in man there are certain convolutions lying transversely in the upper region of the brain,

under part of the parietal bones ; and also a variety of convolutions in the anterior lobe, which do not present themselves in the brains of the inferior animals. In the human species, these parts are connected with certain moral feelings and intellectual faculties, which are denied to the brutes ; such as the sentiment of justice, veneration, the love of perfection ; the faculties of inventing and using artificial language, of wit, of tracing the relation of cause and effect, of calculation, and others. Man is distinguished from the lower animals also by difference of proportion between certain parts of the brain common to both : in man, for example, the anterior lobe connected with intellect, is greatly larger in proportion to the posterior lobe, connected with the lower propensities, than in brutes : these faculties confer on man his proper human character—they constitute him a rational, moral, and religious being.

Man, under all his varied modifications, is but of one species. Cuvier has reduced these changes to three distinct varieties, which, he considers, preserve uniformity of character, namely, the white, or CAUCASIAN ; the yellow, or MONGOLIAN ; and the NEGRO, or ETHIOPIAN. These, however, we consider too limited, and agree with Blumenbach, that they may be divided into five races or varieties : viz. the CAUCASIAN, MONGOLIAN, ETHIOPIAN, AMERICAN, and MALAYAN.

*General Remarks.*—In addition to the distinctions of Blumenbach, we shall give the phrenological characters, that a clearer notion may be got of the varied modifications of the skull in man. These we have taken, together with the drawings of the different crania in plate III. from the valuable collection of the Phrenological Society. They were drawn through a lotted scale, from ordinary specimens, and exhibit on the plate their relative proportions.

According to Phrenologists, the organs which manifest the propensities common to man with the lower animals, lie in the base, on the sides, and at the back portions of the brain ; those which manifest the moral sentiments, occupy the coronal or upper horizontal region ; and those which manifest the intellectual faculties, constitute the anterior lobe. The temperament means the *quality* of the brain. The skull indicates this by its texture. A low temperament is indicated by a coarse open grain in the core, and a high temperament by a fine close texture.

VARIETY I.—THE CAUCASIAN.—Plate V. fig. 1, and plate IV. fig. 1.—See description, vol. I. p. 387.

The proportions of the different regions are favourable. The base and sides are fully developed, but the coronal region is broad and full, and the anterior lobe is well developed. This combination gives aptitude for acquiring refinement and intelligence; it presents the finest forms to the painter and sculptor. The Saxon head, which predominates in civilized Europe, is a variety of it. The temperament is favourable, the size is moderately large.

*Ancient Greek Skull.*—Plate IV. fig. 3.—This skull is large, and the temperament favourable. It is a specimen of the Caucasian variety. The base, sides, and back parts of the brain are large, but the coronal region and anterior lobe are likewise greatly developed. The combination indicates vigorous animal, moral, and intellectual faculties. A distinguishing characteristic is, large constructiveness, ideality, and imitation,—giving talent for works of art.

*New Zealander.*—Plate IV. fig. 6.—This is a large coarse skull, with immense base, sides, and posterior parts. The coronal region is flat, particularly in the consecutions. It is rather narrow in the anterior region, but broader towards the back. The anterior lobe is small. The skull indicates a coarse, cautious, cunning, cruel, and energetic character; with different moral and intellectual powers: it belongs, however, in its form to the Caucasian variety.—See vol. I. p. 397, &c.

*New Hollander.*—Plate V. fig. 6, and plate IV. fig. 7.—This skull is rather large; the temperament is extremely coarse, and the bones are unusually thick. The base, sides, and posterior portions of the brain are very large, the coronal region is rather narrow, sloping like a roof, and the anterior lobe is very small. The skull indicates coarseness, great ascendancy of animal propensity, deficient moral power, and extremely low intellectual ability.—See vol. I. p. 397.

VARIETY II.—THE MONGOLIAN.—Plate V. fig. 2, and plate IV. fig. 2.—See description, vol. I. p. 387, &c.

The skull from which we figured the example, plate IV. fig. 2, was a Chinese specimen. The skull is large, but the temperament is low. The base of the brain is fully developed, but the organs of combativeness are deficient. The coronal region is

fairly developed, but the anterior lobe is remarkably shallow. The character indicated, is one fond of animal gratification, but not brave; alive to moral emotions, but feeble in intellect.

VARIETY III.—THE ETHIOPIAN.—Plate V. fig. 3, and plate IV. fig. 9.—See vol. I. p. 399.

This figure is drawn from a cast. The size is of a fair average. The characteristics of the development are, great length and moderate breadth. The organ of the love of children is very largely developed. The animal organs are large; but without presenting the predominating appearance of the Charib and New Hollander. The coronal region is pretty fairly developed; and the anterior lobe is considerable. The character is one of preponderating animal feeling, but with considerable moral and intellectual susceptibility.—See vol. I. p. 399, &c.

VARIETY IV.—THE AMERICAN.—Plate V. fig. 4, plate IV. fig. 4.—See vol. I. p. 401.

This specimen is drawn from a cast which does not indicate the temperament: the skull differs widely in form from the Caucasian variety. It is rather small, short, round and high. The organs of the animal propensities occupy an immense portion of the brains. The leading organs in the department of the feelings, are secretiveness, cautiousness, love of approbation, and firmness. The coronal region is very moderately developed; and the anterior lobe is shallow and small. The character indicated is one of cunning, vanity, and powers of endurance; with small aptitude for refinement and acquiring intelligence.—See vol. I. p. 402.

*The Charib.*—This figure is also drawn from a cast, and the temperament cannot be determined. It is large, but presents the most preponderating of the lower lateral and posterior portions of the brain of any variety of skull known to exist. The anterior lobe is exceedingly defective, and the coronal region is very flat. The forehead appears to be depressed artificially. The character indicated is one of energy, but of pure animal ferocity and cunning; with feeble intellect, and very limited moral susceptibility.—See vol. I. p. 413.

VARIETY V.—THE MALAYAN.—Plate V. fig. 5, and plate IV. fig. 5.—See vol. I. p. 390, and 413.

*The Javanese.*—Plate IV. fig. 5.—The example we have given of this variety is the skull of Java, from the interior of

the island. This skull is of a full size—the temperament is coarse—the base, sides, and posterior portions of the brain are large—the coronal region is moderately, and the anterior lobe considerably developed. The character indicated is one of considerable power; but more liable to the predominance of animal feeling, than susceptible of moral cultivation. The intellect, however, is considerable, which will aid the moral powers.

All the varieties of the human race may be traced to one or other of these varieties. Food, climate, and other causes, may greatly alter the general character, but the hereditary peculiarities may nevertheless be traced.—See description of the colouring matter of the skin, vol. I. p. 406.

Man is found to be the native of all climes, while other animals are generally circumscribed in their geographical range. He can endure the burning heats of the torrid zone, and Zembla's snows; but it is found that in either extreme he is subject to diminution of stature: and attains the greatest size, and most perfect form, under a temperate latitude.

Man is truly an omnivorous animal, as he lives upon all kinds of food.

## ORDER II.—QUADRUMANA.

THE *Quadrumana* have three kinds of teeth, namely, incisors, canines, and molars: the four extremities are terminated by hands, with the thumb detached, having a muscular action by which it is capable of being more or less opposed to the fingers, which are long and flexible, so that they can grasp branches of trees with facility: they have two or four pectoral mammæ; the clavicles are complete; the bones of the legs and arms are separate, capable of pronation and supination; the stomach is simple and membranaceous; the intestines are short, with a small cæcum; the orbital and temporal fossæ are distinct.

The animals of this order eat fruit, roots, and insects: they live upon trees—are intelligent, imitative, and active. Their geographical range extends to the warm parts of America, Africa, and India.

### FAMILY I.—SIMLE.

The form of this family approaches that of man. The nostrils are contiguous, separated only by a thin septum; nose

somewhat arched in some species, and much flattened in others; with two pectoral teats; with or without a tail.

They are gravid from five to seven months; and bring forth from one to two at a birth.

## TRIBE I.

### NATIVES OF THE OLD CONTINENT.

(Simiæ Catarrhini, Geoffroy.)

The animals of this tribe have five grinders, crowned with blunt tubercles in each jaw—nostrils divided only by a thin septum—tails, either wanting or short; some few long, but not prehensile. They inhabit Africa, India, and its islands.

*Sub-Genus 1.*—ORANGS Proper.—Without callosities on the hinder parts.

#### *Genus 1.*—TROGLODYTES.—*Geoffroy.*

*Generic Character.*—Facial angle 50 degrees; no cheek pouches, tail, nor callosity on the hinder parts; arms short; superciliary ridges distinct. The canine teeth are somewhat projecting, and are close to the incisory and grinding teeth, like those of the human species;—the head is rounded, and the muzzle slightly projecting.

*Troglodytes niger.*—THE CHIMPANSE.—Plate V\*. fig. 1.—See specific description, vol. II. p. 404.

#### *Genus 2.*—PITHECUS.—*Cuvier.*

*Generic Character.*—The incisory teeth are  $\frac{4}{1}$ , canines,  $\frac{1-1}{1}$ , molars,  $\frac{5-5}{3-3}$ ; total 32. The canine teeth are somewhat larger than the others; the molars more equal than in man, with the tubercles more produced: the head is orbicular, without a superciliary ridge. While young, the facial angle is 50 degrees, and when adult, 60 degrees. No cheek pouches—ears are rounded, as in the human species—arms much longer than in man—thumbs rather short—tailless—some of the species with callosities on the hinder parts.

*Pithecus satyrus.*—THE ORANG-OUTANG.—Plate VI. fig. 1.—See specific description, vol. II. p. 404.

*Sub-Genus 2.*—GIBBONS.—With callosities on the hinder parts.

*Pithecus lar.*—THE GIBBON.—Plate VI. fig. 2.—See specific description, vol. II. p. 419.

*Genus 3.*—COLOBUS.—*Geoffroy.*

*Generic Character.*—The incisory teeth are  $\frac{4}{4}$ , canine teeth  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{5-5}$ . Facial angle from 40 to 45 degrees,—muzzle short, face naked,—nostrils inclining towards each other, with distinct cheek pouches,—no thumbs on the hands,—feet with five fingers, the thumb much separated from the others, increasing in length from the first to the third,—tail long and slender, with a tuft at its extremity,—with callosities on the hinder parts,—body and legs generally slender.

*Colobus polycomos.*—FULL BOTTOM MONKEY.—Plate IV. fig. 2.—With a short, black, and naked face; the head small, which, with the shoulders, are covered with long coarse flowing hairs, like a full-bottomed periwig, of a dirty yellowish colour, mixed with black,—body, arms, and limbs, of a glossy black,—the hands are naked, with four fingers only,—on each of the lower limbs are five long fingers,—the tail is long, of a snowy whiteness, with an oblong tuft at its point. About three feet in height. Inhabits Sierra Leone.

*Genus 4.*—SEMNOPITHECUS.—*F. Cuvier.*

*Generic Character.*—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{5-5}$ , total 32. The last grinders in the lower jaw have five projections on their crowns, the fifth occupying the middle line of the tooth. Facial angle 45 degrees; the head round; the nose flat; the ears moderately large, with cheek pouches; tubercles very long; the thumbs on the hands very short, and remote from the fingers; with callosities on the hinder parts.

*Semnopithecus entellus.*—THE ENTELLUS MONKEY.—Plate IV. fig. 3.—Described, vol. II. p. 441.

*Genus 5.*—CERCOPITHECUS.—*Cuvier.*

*Generic Character.*—With 32 teeth; canines somewhat projecting, with intermediate spaces for their reception in each jaw. The head is rounded, and the facial angle from 45 to 50 degrees; ears generally rounded, although they are a little an-

gular in some species; they have cheek pouches, and a tail at least the length of their body.

*Sub-Genus 1.*—*LASIOPYGA.*—*Illiger.*—The hands are longer than the fore-arms; anterior thumbs short and slender; without callosities on the hinder parts, but bordered with long ciliated hairs.

*Cercopithecus næmeus.*—*THE COCHIN-CHINA MONKEY.*—Plate V\*. fig. 4.—Described, vol. II. p. 440.

*Sub-Genus 2.*—*NASALIS.*—*Geoffroy.*—Nose produced, and disproportionately long; ears small and round; body gross; anterior hands with four fingers only, and a short thumb; posterior hands broader, with thick nails; tail longer than the body, with callosities on the hinder parts.

*Cercopithecus nasicus.*—*THE PROBOSCIS MONKEY.*—Plate V\*. fig. 5.—Face somewhat curved, brown, marked with blue and red; head chestnut coloured, large in proportion to the size of the body; ears broad, thin, naked, and hid with hair; body chestnut colour, approaching to orange on the breast; throat and shoulders with long hair, resembling a tippet. Two feet long from the nose to the tail. Inhabits India, principally at Cochin-China.

*Sub-Genus 3.*—*CERCOPITHECUS.*—*Linnaeus.*—The head is round, the coronal surface produced; facial angle 50 degrees; superciliary ridges wanting; nose depressed, nostrils open at the top of the nasal furrows; orbital hollows with smooth edges; no callosities on the hinder parts.

*Cercopithecus mona.*—*THE VARIED MONKEY.*—Plate VI. fig. 9.—Described, vol. II. p. 439.

*Sub-Genus 4.*—*CERCOCEBUS.*—*Geoffroy.*—Muzzle somewhat longer than the preceding; facial angle 45 degrees; margins of the orbits projecting.

*Cercopithecus sabæus.*—*THE GREEN MONKEY.*—Plate VI. fig. 7.—Described, vol. II. p. 439.

*Genus 6.*—*MACACUS.*—*Lacepede.*

*Generic Character.*—Teeth, same as in all others of the Ape tribe, thirty-two in number; canines, very strong; facial angle



40 degrees; superciliary and occipital ridges very distinct; tail very short, or only a small tubercle in its stead; cheek pouches and callosities distinct; ears angular; general aspect of the face like that of a dog.

*Sub-Genus 1.*—MACACUS, Proper.—The tail more or less long.

*Macacus nemistrinus.*—THE BROWN BABOON.—Plate V\*. fig. 6.—The muzzle large and thick; face and ears naked, and of a flesh colour; hair on the head and back deep olive; paler on the belly: the eyes hazel; it has cheek pouches, and red callosities on the hinder parts. Inhabits Sumatra and Japan.

*Sub-Genus 2.*—MAGOT.—A simple tubercle is substituted for the tail.

*Macacous inuus.*—THE BARBARY APE.—Plate VI. fig. 3.—Described, vol. II. p. 421.

*Genus 7.*—CYNOCEPHALUS.—Cuvier.

*Generic Character.*—With thirty-two teeth, as in the rest of the tribe; the canine teeth very large; head elongated; muzzle much produced, like that of a dog; facial angle from 30 to 35 degrees; face considerably wrinkled, and striated longitudinally; the superciliary, sagittal, and occipital ridges, strikingly developed. They have cheek pouches.

*Sub-Genus 1.*—BABOONS.—Tail as long as the body, and sometimes longer.

*Cynocephalus papio.*—THE BABOON.—Plate VI. fig. 4.—Described, vol. II. p. 422.

*Cynocephalus hamadryas.*—THE DOG-FACED BABOON.—Plate VI. fig. 5.—See description, vol. II. p. 426.

*Sub-Genus 2.*—MANDRILLS.—Tail very short, slender, and perpendicular to the dorsal spine.

*Cynocephalus mormon.*—THE RIBBED NOSE BABOON.—Plate V\*\*. fig. 1.—See description, vol. II. p. 425.

TRIBE II.—AMERICAN APES.

(Simiæ Platyrrhini, Geoffroy.)

Head round; on each side of both jaws are six blunt tuber-

culated grinders; no cheek pouches; nostrils opening on the sides of the nose; partition broad; tail long, generally prehensile; hinder parts hairy, without callosities.

*Section 1st.*—SAPAJOUS.—Tail long and prehensile.

*Genus 8.*—ATELES.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{6-6}{6-6}$ ; facial angle 60 degrees; ears bordered; extremities very long and slender; the anterior ones generally tetradactyle; no thumb, but sometimes replaced by a wart; tail very long, and strongly prehensile; the under part, towards the point, naked. Bring forth but one at a birth.

\* With a very small nailed thumb on the anterior hands, or a rudimentary nailless thumb.

*Ateles hypoxanthus.*—*Desmarest.*—Face skin-coloured, with gray spots; fur grayish-fawn colour; hinder parts, yellow rust colour; thumb short and strong. Two feet long, tail the same. Inhabits Brazil.

\*\* With no vestige of a thumb on the anterior hands.

*Ateles paniscus.*—THE COAITA.—Plate V\*, fig. 7.—The face flesh-coloured, and the whole body of a uniform black; it has no thumbs on its hands; but, instead of these, there are very small projections or appendices; the tail prehensile, naked, and has a second covering of a very delicate and sensitive skin, highly susceptible of touch. Inhabits South America; common in the woods of Brazil and Guiana.

*Genus 9.*—LAGOTHRIX.—*Humboldt.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 50 degrees; head round; muzzle projecting; limbs proportioned to the body; anterior hands furnished with nails, divided with a thumb. Tail strongly prehensile, with the lower part of the extremity naked; hair of a woolly texture.

*Lagothrix Humboldtii.*—THE CAPPARO.—Hair long, of a blackish ash-colour; body twenty-eight inches; tail nearly thirty inches. Inhabits the banks of the River Guariara, South America.

Genus 10.—MYCETES.—*Illiger.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 30 degrees; head pyramidal; visage oblique; os hyoides extremely ventricose; outside prominent; the anterior hands provided with a thumb; tail very long; naked at the lower extremity.

*Mycetes fusca.*—THE GUARIBA; OR PREACHER MONKEY.—Plate V\*\*, fig. 2.—Fur smooth, glossy, dark chestnut-brown; paler on the back and head; with a round beard beneath the chin; feet and point of the tail brown. Size of a fox. Inhabits the woods of Guiana, in immense societies.

Genus 11.—CEBUS.—*Erzleber.*

*Generic Character.*—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 60 degrees; the head round with a short muzzle; forehead somewhat prominent; the occiput projecting behind; the ears rounded; the os hyoides not prominent; the tail prehensile and hairy all over.

*Cebus fatuellus.*—THE HORNED SAPAJOU.—Plate V\*, fig. 8.—Fur of the face reddish-brown, chestnut on the back, paler on the sides, bright red on the belly, extremities and tail brown; with two strong brushes of hair elevated on the base of the forehead; claws longish, and somewhat blunted. About the size of a half-grown cat. Inhabits Guiana.

*Section 2d.*—SAGOINS.—Tail long, but not prehensile.

Genus 12.—CALLITHRIX.—*Cuvier.*

*Generic Character.*—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 60 degrees; head small and rounded; ears long, mis-shapen; tail somewhat longer than the body, covered with hair, and not prehensile; body slender, in proportion to its size.

*Callithrix sciureus.*—THE SQUIRREL MONKEY.—Plate V\*, fig. 9.—Colour of the fur, bright gold yellow; hands and feet orange; the head round; nose blackish; orbits of the eyes flesh-colour; ears hairy and ill formed; under parts whitish; tail very long, with a black tip. Size of a squirrel. Inhabits Cayenne and Brazil, South America.

Genus 13.—ACTUS.—*Humboldt.*

*Generic Character.*—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; to-

tal 36. Head large and round; muzzle short; eyes very large and approaching; nostrils separated by a very thin partition; ears small; tail as long as the body, covered with hair, but not prehensile.

*Aotus trivirgatus*.—THE DOUROUCOULI.—Plate V\*. fig. 10.—Hair of the body gray, mixed with white, exhibiting a silvery lustre in the sun, and a brown line passing down the back; forehead with three black divergent lines; face blackish and hairy; mouth surrounded by bristly hairs; palms of the hands white; tail brushy, half as long again as the body; no external ears. Length of the body nine inches and a half. Inhabits the forests of Maypura and Esmeralda, South America.

Genus 14.—PITHECIA.—Desmarest.

*Generic Character*.—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 60 degrees; ears rounded; tail a little longer than the body, not prehensile, and covered with long hair; feet with five toes; nails short and sharp.

*Pithecia rufiventer*.—THE FOX-TAILED MONKEY.—Plate V\*\*. fig. 3.—Fur dusky brown, with a slight rusty tinge, except on the head and face; from the top of the nose to the chin it is black; face dark brown, surrounded by white downy hair, which rises on each side of the forehead, like a wig, diverging from the centre of the forehead; bushy at the cheeks; eyes large; ears round and flat; tail equal to the length of the body, thick, like that of a fox, but more bushy. Size of a domestic cat. Inhabits French Guiana.—See vol. II. p. 441.

Genus 15.—JACCHUS.—Desmarest.

*Generic Character*.—Incisive teeth  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 36. Facial angle 50 degrees; head round; muzzle short; occiput prominent; tail longer than the body, soft, and entirely covered with hair; feet with five toes; the thumbs of the anterior hands in the same direction as the fingers, and not opposable; nails very long, compressed, arched, and pointed.

*Sub-Genus I*.—OUISTITI.—Geoffroy.—Intermediate incisive teeth of the upper jaw broader than the lateral ones, isolated on each side; lower incisive teeth elongated, narrow, vertical, the lateral ones longest; upper canines conical, of medium length, the two inferior ones very small.

\* With the tail annulated.

*Jacchus vulgaris*.—THE STRIATED MONKEY.—Plate VI. fig. 6.—Described, vol. II. p. 441.

\*\* Tail without annulations.

*Jacchus argentatus*.—THE FAIR MONKEY.—Plate VI. fig. 8.—Head small and round; face and hands vivid scarlet; body and limbs covered with long snowy-white shining hairs, of silvery brightness; tail longer than the body, deep chestnut. Somewhat larger than the striated monkey.

*Sub-Genus 2.*—TAMARIN.—*Geoffroy*.

The four upper cutting teeth are contiguous, the intermediate somewhat broader than the lateral ones; four under incisors inclined, contiguous; ears large; forehead produced.

*Jacchus œdipus*.—RED-TAILED MONKEY.—Plate V\*\*. fig. 4.—Upper parts of the body pale reddish-brown, under parts and limbs white; face black; hair on the head white, long, loose, and spreading over the shoulders; lower parts of the back, and upper half of the tail deep orange-red; rest of the tail black; claws small and sharp. Size of a large squirrel. Inhabits Guiana.

#### FAMILY II.—LEMURES.

Form approaching to the quadrupeds who walk on all fours; upper and under cutting teeth varying both in form and situation; nostrils at the point of the muzzle; posterior extremities longer than the anterior; first finger of the hind feet next the thumb, with a sharp nail; with or without a tail, which is not prehensile when it exists; from two to four pectoral mammæ.

*Genus 16.*—INDRIS.—*Lacepede*.

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{5-5}{5-5}$ ; total 32: the superior incisory teeth united in pairs, the external inferior ones broadest; grinders with a tuberculated crown; head long, triangular; the ears short and rounded; two pectoral mammæ; posterior members rather long, terminated by a sharp reflected nail; the toe of the hind feet is larger than the others.

*Indris brevicaudatus*.—THE SHORT-TAILED INDRIS.—Plate

V\*\*. fig. 5.—Face lengthened, like a dog's; ears short, tufted; face, abdomen, and rump, white; all the other parts of the body bluish-black; fur silky, and thick; nails flat, but pointed. Three feet and a half, when standing erect. Inhabits Madagascar.

*Genus 17.—LEMUR.—Linnaeus.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{5-5}{5-5}$ ; total 32; upper incisory teeth united in pairs; lower ones long and inclined; grinders with a tubercle on their crown; head long, triangular, with a slender muzzle; ears short and rounded; two pectoral mammæ; fourth toe of the feet longer than the others; tail longer than the body, not prehensile; hair soft and woolly.

*Lemur macaco.*—THE MACACO, OR RUFFED LEMUR.—Plate V\*\*. fig. 10.—Fur entirely black; head gray; with black patches round the eyes; tail long and bushy; hair of the cheeks very long: some individuals are covered with black and white patches. About twenty inches long. Inhabits Madagascar.—See vol. II. p. 444, The VARI.

*Genus 18.—LORIS.—Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ , canine  $\frac{1-1}{1-1}$ , grinders  $\frac{6-8}{5-5}$ , total 36. Upper incisory teeth very small, and separated in the middle; grinders with sharp pointed crowns; head round; muzzle reflected; nose rather long; eyes very large; ears short and hairy: with four pectoral mammæ: tailless. The bones of the legs distinct, and the tibia larger than the femur: the tarsus and metatarsus equal in length.

*Loris gracilis.*—THE SLENDER LORIS.—Plate V\*\*. fig. 6.—Described, vol. II. p. 444.

*Genus 19.—NYCTICEBUS.—Geoffroy.*

*Generic Character.*—Cutting teeth  $\frac{2 \text{ or } 4}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{5-5}$ ; total 34 or 36. Intermediate cutting teeth separate; lateral ones small,—awanting in some species; crowns of anterior grinders large, hollow in the centre; tuberculated at the angles: body strong; head round; muzzle short, bent upwards; ears short and hairy; tail short; with two pectoral mammæ.

*Nycticebus Bengalensis.*—SLOW LEMUR.—Plate VI. fig. 9.—Fur pale reddish-brown; dorsal line brown, with four upper

incisory teeth, tail very short, legs very strong; eyes very large, approximate: about a foot long. Inhabits Bengal.

*Genus 20.*—GALAGO.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{2}{6}$  or  $\frac{4}{6}$ ; the lower ones generally horizontal; canine teeth  $\frac{1-1}{1-1}$ ; grinders  $\frac{6-6}{5-5}$ ; ears very long, membranaceous, and naked; eyes large and approaching; hind legs long; tail very long, not prehensile; with two pectoral mammae.

*Galago crassicaudatus.*—THE GREAT GALAGO.—Plate V\*\*. fig. 7.—Fur grayish red; ears two-thirds the length of the head; tail greatly tufted; four upper incisory teeth. About the size of a rabbit. Inhabits Senegal.

*Genus 21.*—TARSIVUS.—*Cuvier.*

*Generic Character.*—Incisory teeth  $\frac{2}{4}$ , equal; canine teeth  $\frac{1-1}{1-1}$ , small; grinders  $\frac{6-6}{6-6}$ ; total 34: muzzle very short; ears large, naked; the hinder legs very long, the tarsus being three times the length of the metatarsus; the tail very long.

*Tarsivus spectrum.*—THE WOOLLY TARSIVUS.—Plate V\*\*. fig. 11.—Fur pale rust-colour on the upper parts, white beneath; tail bright chestnut: fur soft, face black, ears small, eyes large; feet with five fingers; nails sharp, except the thumbs, which are blunt. One foot nine inches long. Inhabits Amboyna.—See vol. II. p. 446.

*Genus 22.*—CHIROMYS.—*Cuvier.*

*Generic Character.*—Incisory teeth  $\frac{2}{2}$ , strong; no canine teeth, but a vacant space where they should be; grinders  $\frac{4-4}{5-5}$ ; total 18: fore-feet short, with the middle finger very long and thin; hind legs and tail long, the latter tufted; with two inguinal mammae.

*Chiromys Madagascarensis.*—THE AYE AYE.—Plate V\*\*. fig. 9.—Fur pale rusty brown, mixed with black and gray; on the head the rusty brown prevails, blacker on the back and limbs; tail black; sides of the head, neck, lower jaw, and belly grayish: head shaped like that of a squirrel. About eighteen inches long. Inhabits Madagascar.—See vol. II. p. 446.

## ORDER III.—CARNASSIERS.

THE Carnassiers have three kinds of teeth; grinders more or less of a carnivorous character. The articulation of the lower jaw transverse, for the purpose of vertical motion. The orbits are not separated from the temporal fossæ. The thumb of the anterior extremities never opposable to the other toes. Stomach simple, membranaceous: intestines short.

Some of the animals eat vegetable substances, but never grass or leaves.

This order is divided into four families; namely, 1. CHEIROPTERA, 2. INSECTIVORA, 3. CARNIVORA, and MARSUPIATA.

## FAMILY I.—CHEIROPTERA.

Fingers connected by a membrane, which spreads from the anterior to the posterior extremities: fitting the animals for flight. Incisory teeth variable in number; canine teeth more or less strong; grinders, in general, having acute-pointed crowns, with a longitudinal furrow; clavicles very strong, scapulæ large; fore-arms not capable of rotatory motion: two pectoral mammæ.

## TRIBE I.—GALEOPITHECI.

Fingers furnished with long, much crooked nails; dental formulæ anomalous. Skin of the membranes covered with hair on both sides.

Genus I.—GALEOPITHECUS.—*Geoffroy*.

Incisory teeth  $\frac{4}{6}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{6-6}{5-5}$ ; total 36. Upper intermediate incisors very small; lateral ones long and compressed, edged with a tubercle on each side at their base. Inferior incisors, inclined and notched; posterior grinders rough, with points and notches; ears small and rounded; tail of uncertain length; a large membrane envelopes the neck, anterior and posterior extremities, the fingers and the tail; fingers of the anterior extremities short; nails bent and slender; two pectoral mammæ.

*Galeopithecus rufus*.—THE COLUGO.—Plate VI\*. fig. J.—Fur red, without spots; head very small; arms very muscular. About a foot long. Inhabits the Pelew Islands.



## TRIBE II.—VESPERTILIONES.

Fingers of the hands much elongated, supporting very fine membranes, the thumb alone being separated, but not opposable.

DIVISION I.—Grinders without sharp points; and no tail.

Genus 2.—PTEROPUS.—*Brisson.*

Incisors  $\frac{4}{4}$ , conical; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{5-5}{6-6}$ ; total 34: each tooth furnished with two roof-shaped ridges, forming a longitudinal furrow along them. Nose without a membranaceous appendage: tail short, or wanting. Interfemoral membrane sloped off, index finger with a third phalanx and a nail. Tongue papillary.

*Pteropus vulgaris.*—THE TERNATE BAT.—Plate VI. fig. 12.—Fur of under parts black, except about the pubis, where the colour is red; face reddish brown, sides same colour: hair all over the body coarse. Length of body about ten inches; expanse of wings upwards of three feet. Inhabits the Isle of France and Bourbon.

## SUB-DIVISION II.—With a tail.

*Pteropus stramineus.*—THE LESSER TERNATE BAT.—Fur reddish yellow; neck red; tail very short; length of body upwards of five inches; extent of wings two feet. Inhabits Timor and the Island of Ternate.

## SUB-DIVISION III.—With wings upon the back.

*Pteropus palliatus.*—THE PALE TERNATE BAT.—Membrane of the wings attached to the dorsal line, giving it the appearance of a mantle. Body about four inches long; tail six and a half inches; extent of wings fourteen inches.

Genus 3.—CEPHALOTES.—*Geoffroy.*

*Generic Character.*—Incisive teeth  $\frac{4}{6}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{5-5}{4-4}$ ; total 32. Incisors in the upper jaw, insulated and distinct; in the lower, almost close; upper surface of the molars large, flattened, without tubercles or ridges. No membranaceous appendage to the nose; index finger of one species with a nail, and of the other without one; tail very short: interfemoral

membrane sloped off, membrane of the wings attached to the dorsal line.

*Cephalotes Pallasii*.—PALLAS'S CEPHALOTE.—Plate VI\*. fig. 2.—Fur ash-coloured gray above, pale white beneath, undulated on the abdomen; nostrils prolonged into a tube, very distant and open: index finger provided with a nail. Body about four inches long; wings one foot four inches when extended; tail not an inch long. Inhabits the Moluccas.

DIVISION II.—With pointed insectivorous grinders.

Genus 4.—MOLOSSUS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{4-4}{5-5}$ ; total 26. Incisors in the upper jaw bifid, converging, and separated from the canine teeth; in the lower very small, and crowded together, each having two small points; the molars with several sharp points; head and muzzle very large; nostrils open; ears large, united at their base, and provided with a smaller secondary tragus: without any membranaceous appendage at the nose; interfemoral membrane, narrow and cut rectangular; tail long.

*Molossus amplexicaudatus*.—THE RING-TAILED MOLOSSUS.—Plate VI\*. fig. 10.—Fur blackish, but lighter underneath; interfemoral membrane large, entirely enveloping the tail. Body from three to four inches long. Inhabits Cayenne.

Genus 5.—NYCTINOMUS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{4}$ ; canine teeth  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{5-5}$ ; total 28. The incisors are conical and contiguous in the upper jaw, and small in the lower; molars furnished with sharp tubercles; nose flat, parallel with the lips, which are deeply cleft and wrinkled; ears large, and united with the tragus; tail long, extending in part beyond the interfemoral membrane; nose without appendage; hind feet five-toed, covered with long hair; wings very large.

*Nyctinomus Bengalensis*.—THE BENGAL NYCTINOME.—Plate VI\*. fig. 3.—Fur mixed with ash-colour, paler below; snout blunt, projecting beyond the lower jaw; nostrils small circular holes remote from each other, placed under the margin; neck short, covered with hair scarcely discernible. From nose to tail three inches. Inhabits Puttaha in Bengal.

*Genus 6.*—CHEIROMELES.—*Horsfield.*

*Generic Character.*—Incisory teeth  $\frac{2}{2}$ ; canines  $\frac{1-1}{1-1}$ ; cheek teeth  $\frac{4-4}{5-5}$ ; total 26. Face conical; ears distant and spreading; operculum short, semicordate, and blunt; interfemoral membrane short; tail exerted; thumb distinct; claw flat, fringed on the edge with a series of bristles.

*Cheiromeles torquatus.*—THE COLLARED CHEIROMELES.—Horsfield's Zoology of Java, No. 7.—Neck covered with longish hairs; back naked and dotted. Inhabits the Indian Archipelago.

*Genus 7.*—STENODERMA.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{4-4}{4-4}$ ; total 28. Ears moderate, lateral, and distinct; nose simple; interfemoral membrane only rudimentary, bordering the legs: without tail.

*Stenoderma rufa.*—THE RED STENODERME.—Fur bright chestnut; ears small, lateral, and isolated, without orellion; no tail. Length of the body about three inches; expanse of wings nearly twelve inches.

*Genus 8.*—NOCTILIO.—*Geoffroy.*

*Generic Character.*—Incisors  $\frac{4}{2}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{2}$ ; total 26. Two upper intermediate incisors larger than the others, lower incisors placed before the canine teeth; the molars furnished with sharp tubercles; ears small, lateral, and insulated; muzzle short, thick, and cleft, furnished with warts or fleshy tubercles; nose without an appendage; interfemoral membrane large; tail extending a little beyond the membrane; claws of hind feet very large.

*Noctilio unicolor.*—THE PERUVIAN NOCTILIO.—Plate VI\*. fig. 4.—Head round; muzzle blunt; ears large and strait, sharp at the ends, and pointing forwards; tail inclosed in the membrane, which joins to each hind leg, and is also supported by two cartilaginous ligaments; colour of the fur iron-gray; tibia and fibula separated, each invested by its own hairy skin. Size of a rat. Inhabits Brazil.

*Noctilio rufus.*—THE RED NOCTILIO.—Plate VI\*\*. fig. 1.—Body reddish-brown; legs and ears nearly destitute of hairs. Inhabits Brazil.

Genus 9.—PHYLLOSTOMA.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{5-5}{5-5}$ ; total 32. The incisory teeth are pressed close between the canines, the intermediate being the largest; nose supports two membranous crests—one like a leaf, and the other like a horse-shoe; ears large, without fur, and not united; tail and interfemoral membrane more or less developed, varying in different species; tongue forked, with sharp horny prickles.

\* Tail distinct, shorter than the extent of the interfemoral membrane.

*Phyllostoma hastatum.*—THE JAVELIN BAT.—Fur brownish red above, yellowish brown on the abdomen; nasal leaf like a spear-head, small at the bottom and top, and swelling out in the middle; horse-shoe appendage very large; a range of warts in the form of the letter V, on the upper lip; tail short, entirely enveloped in the membrane, which is large. Length of the body four inches; expanse of wings about twenty-one inches. Inhabits Guiana.

\*\* Without a tail.

*Phyllostoma spectrum.*—THE SPECTRE VAMPIRE.—Plate VI\*<sup>\*</sup>. fig. 3.—Fur on the body ash-coloured; nose long, at the tip of which is an upright, long, conical membrane, reflected at the point; teeth large; ears long, broad, and upright; membrane extending from one hind leg to the other. Five inches and a half long; expanse of wings two feet two inches. Inhabits South America.

Genus 10.—VAMPYRUS.—*Spix.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{4-4}$ ; total 28. Incisory teeth conical, the two intermediate in the upper jaw being largest; the first molar has one tubercle, and the others three each; mouth somewhat obtuse; under jaw ventricose; tail short, involved in the membrane, except just at the apex.

*Vampyrus soricinus.*—THE SORICINE VAMPIRE.—Fur mouse-coloured on the back, brownish-gray underneath; chin smooth. Inhabits Brazil.—*Spix* Brazil, f. 36, f. 2, 6.

*Genus 11.*—GLOSSOPHAGA.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canine teeth  $\frac{1-1}{1-1}$ ; molars  $\frac{3-3}{3-3}$ ; total 24. Incisory teeth are ranged regularly; canines of medium size; the tongue very long, and extensible, acting as an organ of suction; nose with a small crest, shaped like the head of a lance; interfemoral membrane and tail inconsiderable. Sucks the blood of man and animals by means of the tongue.

*Glossophaga soricina.*—THE LEAF-GLASSOPHAGA.—Plate VI\*\*. fig. 9.—Fur mouse-coloured above, bright brown underneath; muzzle long, surmounted by a small spear-shaped appendage; body about two inches long; without any tail; expanse of the wings about ten inches. Inhabits Surinam, Cayenne, &c.—See description, vol. II. p. 373.

*Genus 12.*—MORMOOPS.—*Leach.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{5-5}{5-5}$ ; total 32. The two intermediate incisory teeth in the upper jaw largest; ears large and close, furnished with auricles; nasal appendage single, erect, confluent with the ears; index finger with two joints; middle finger with four; the others with three; tail, except the last joint, enveloped in the membrane.

*Mormoops Blainvillii.*—BLAINVILLE'S MORMOOPS.—Plate VI\*\*. fig. 5.—Nasal leaf plaited; ears above with double lobes; labial processes divided. Inhabits Jamaica.

*Genus 13.*—MEDATEUS.—*Leach.*

*Generic Character.*—Incisory teeth  $\frac{4}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{5-5}$ ; total 30. The two intermediate incisory teeth in the upper jaw longest; two nasal appendages, the one vertical, the other lunate and horizontal; lips furnished with a series of warts; without a tail.

*Medateus Lewisii.*—LEWIS'S MEDATEUS.—Fur blackish; nasal leaf vertical, spear-shaped; ears rounded; expanse of wings seventeen inches.—Linnean Transactions, xiii. p. 81.

*Genus 14.*—MEGADERMA.—*Geoffroy.*

*Generic Character.*—Incisory teeth  $\frac{0}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{5-5}$ ; total 26. The canine teeth are triangular in the upper, and inclining backwards in the lower jaw; ears very large, and united; interior ears much developed; nose with three appen-

dages, one erect, one foliaceous or horizontal, and the third horse-shoe-shaped; without any tail; interfemoral membrane square; third finger without the nail joint.

*Megaderma spasma*.—CORDATED BAT.—Plate VI\*. fig. 6.—Fur reddish, brighter on the head; the erect nasal appendage heart-shaped, moderate in size; foliaceous appendage same shape as the former, but very large; tragus semicordate. Body about four inches long. Inhabits the Isle of Ternate.

Genus 15.—RHINOLOPHUS.—*Geoffroy*.

*Generic Character*.—Incisive teeth  $\frac{2}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{5-5}{5-5}$ ; total 30. Upper incisors very small, and not permanent; molars furnished with sharp points; nose provided with a horse-shoe-shaped crest, surmounted by a leaf; ears distinct; interfemoral membrane large; two pectoral mammæ, and two warts on the pubes, having the appearance of teats, but destitute of lactiferous glands; tail long and free.

*Rhinolophus unihastatus*.—HORSE-SHOE RHINOLOPHUS.—Plate VI\*. fig. 6.—Fur ash-coloured, mixed with red on the back, abdomen yellowish-gray, membrane black; ears long, broad, and pointed; the anterior nasal membrane horse-shoe-shaped, the posterior shaped like a lance-head. Length of the body about three inches; expanse of the wings about sixteen inches. Inhabits Europe, frequenting old quarries and caverns.—See vol. II. p. 372.

Genus 16.—NYCTERIS.—*Geoffroy*.

*Generic Character*.—Incisors  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{4-4}$ ; total 30. Incisive teeth lobed; molars with sharp tubercles; forehead with a deep longitudinal groove; nostrils covered with a cartilaginous moveable operculum; interfemoral membrane larger than the body, embracing the tail, which is terminated in the form of the letter T; the mouth with a pouch on each side, communicating with a large membranaceous sac, formed by the skin of the body.

*Nycteris Daubentonii*.—DAUBENTON'S NYCTERIS.—Plate VI\*. fig. 9.—Fur reddish-brown on the back, yellowish-white on the abdomen, throat, breast, and head, except the crown; ears very large; tragus simple, very small. Length of body about an inch and a half; expanse of the wings from eight to nine inches.

Genus 17.—RHINOPOMA.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{4}$ , canines  $\frac{1-1}{1-1}$ , cheek teeth  $\frac{4-4}{5-5}$ ; total 28. The upper incisors separated from each other; the nose long, truncated, and surmounted by a small leaf; nasal openings contracted, transverse, and operculated; ears large, united, and hanging over the face; forehead large, concave, interfemoral membrane narrow, and cut square; tail long, extending beyond the membrane.

*Rhinopoma microphylla*.—SMALL-LEAVED RHINOPOME.—Fur ash-coloured; tail very long and thin; nostrils can be closed or opened, at the will of the animal, as in the seal genus. Two inches long; expanse of wings seven inches. Inhabits Egypt.—Brunnich, l. c. vi. p. 50, f. 1, 2, 3, and 4.

Genus 18.—TAPHOZOUS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{0}{4}$ ; canines  $\frac{1-1}{1-1}$ ; molars  $\frac{4-4}{5-5}$ ; total 26. Nose with a furrow, as in the two preceding genera; but destitute of an appendage; ears moderate, separated from each other; interfemoral membrane large, tail shorter than the membrane, and exerted on its upper side.

*Taphozous perforatus*.—THE PERFORATED TAPHOZOUS.—Fur red; gray above, ash-coloured beneath, the lower part of each hair white; inner ears in the form of a hatchet, and terminated by a rounded edge. Three inches long; expanse of the wings nine inches. Inhabits Egypt; frequenting ancient buildings, at Thebes, Ombo, &c.—*Geoffroy's Egypt*, ii. plate 3, fig. 1.

Genus 19.—MYOPTERIS.—*Geoffroy*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{5-5}$ ; total 26. Nose without a foliation, membrane, or furrow; muzzle short and thick; forehead depressed; ears large; tail long, half enveloped at its base, free at the extremity.

*Myopteris Daubentonii*.—DAUBENTON'S MYOPTERIS.—Fur on the top of the head and back brown; the under parts pale yellowish-white. Body three inches in length. Country unknown.

Genus 20.—CELÆNO.—*Leach*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canine teeth, molars  $\frac{8}{8}$ ; total 20. The upper incisive teeth acuminate and simple, the

lower formed, as it were, of four columns; the anterior grinders in both jaws acuminate, the three posterior acutely tuberculated.

*Celæno Brooksiana*.—BROOKS'S CELÆNO.—Fur on the back rust-coloured, abdomen and shoulders yellowish; membrane black; ears acuminate, distinct, the anterior margin rounded, the posterior straight; oreillon very small; tail doubtful.

Genus 21.—AELLO.—Leach.

*Generic Character*.—Incisors  $\frac{2}{3}$ , no canines, molars  $\frac{4-4}{6-6}$ ; total 26: the two upper anterior acuminate; the third bifid, and the fourth with three edges; in the lower jaw, the three anterior acuminate, the three posterior bifid.

*Aëlo Cuvieri*.—CUVIER'S AELLO.—Fur of an isabella-ferruginous colour; wings dark umber-brown; ears short, approximated, broad, no oreillon; tail not extending beyond the inter-femoral membrane. Habitat unknown.

Genus 22.—SCOTOPHILUS.—Leach.

*Generic Character*.—Incisive teeth  $\frac{4}{6}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 26. Grinders furnished with acuminate processes; in the upper jaw the two lateral teeth shorter. Habitat unknown.

*Scotophilus Kuhlî*.—KUHLE'S SCOTOPHILUS.—Fur ferruginous, with the ears, nose, and wings brown; ears distinct; oreillon small; tail reaching to the end of the membrane. Habitat unknown.

Genus 23.—ARTIBEUS.—Leach.

*Generic Character*.—Incisive teeth  $\frac{4}{5}$ , no canine teeth, molars  $\frac{4-4}{5-5}$ ; total 26. The two intermediate incisors in the upper jaw largest; in the lower jaw truncated, the two intermediate largest, reeded in front; the posterior teeth small.

*Artibeus Jamaicaensis*.—JAMAICA ARTIBEUS.—Fur dark brown on the upper parts, mouse-coloured underneath; ears small; nasal appendages and membranes, dark brown; with two nasal appendages, one horizontal, the other vertical and acuminate, marked with a streak anteriorly; without any tail. Inhabits Jamaica.

Genus 24.—DIPHYLLA.—Spix.

*Generic Character*.—Incisive teeth  $\frac{4}{3}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{4-4}$ ?



or  $\frac{8-8}{8-8}$ ? total 28 or 42. The upper middle largest, apex six-pointed; the canines are scarcely exerted; the molars have a short crenulated apex; lips smooth, with two short, erect, truncated leaves, placed close together; hind legs nearly as long as the anterior; tail and interfemoral membrane deficient.

*Diphylla ccaudata*.—THE TAILLESS DIPHYLLA.—Fur on the body woolly; of a black fuscous-brown; head and abdomen brownish-gray beneath; wings blackish, nearly naked; face denuded of hair near the ears.—Spix, Sim. Braz. 13, 6, f. 7.

Genus 25.—MONOPHYLLUS.—*Leach*.

*Generic Character*.—Incisory teeth  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{6-6}$ , total 30. The two intermediate incisors the largest; the two first, in the upper jaw, distant, the rest tuberculated on both edges; the second and third, in the lower jaw, with a space between them.

*Monophyllus Redmani*.—REDMAN'S MONOPHYLLUS.—Fur dark-brown above, mouse-colour beneath; ears, membranes, and nasal appendages, brown; only one of the nasal appendages erect, and acute; ears round; beard elongated. Inhabits Jamaica.

Genus 26.—DYSOPES.—*Fred. Cuvier*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{5-5}$ , total 28. Upper incisors close, elongated, and elliptical.

*Dysopes mops*.—Inhabits India.—F. Cuvier's Dents de Mam. 49.

Genus 27.—NYCTOPHILUS.—*Leach*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{4-4}$ , total 28. Upper incisory teeth conical and short, the under equal; the first grinder in the upper jaw acute, with one tubercle, the second and third with four tubercles, and the fourth with three; in the lower jaw the first is acute and conical, the other three tuberculated.

*Nyctophilus Geoffroy*.—GEOFFROY'S NYCTOPHILUS.—Fur dull brown on the back, whitish on the under parts; ears broad; two erect nasal appendages, the posterior longest; membrane blackish; tail as long as the interfemoral membrane. Habitat unknown.—Linn. Trans. xiii. pl. 1.

## Genus 28.—THYROPTERA.—Spix.

*Generic Character.*—Dentition, unknown; body slender, small; nose simple; wings very narrow, running down to the tarsus; thumb of the hand armed below with a somewhat concave patella; interfemoral membrane expanded, not extending beyond the feet; tail long, exerted beyond the membrane.

*Thyroptera tricolor.*—THE THREE-COLOURED THYROPTERA.—Fur of the body above fuscous brown, pure white beneath; wings and legs deep black. Inhabits Brazil, frequenting the shores of the river Amazon.—Spix, Sim. Braz. t. 36, f. 69.

## Genus 29.—PROBOSCIDEA.—Spix.

*Generic Character.*—Incisors  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{5-5}{5-5}$ ; total 34. Upper incisive teeth very small, distant, and diverging; the lower lobed, and placed in a semicircle; the front molars small, the rest with many tubercles; wings narrow; tail long, half involved in the interfemoral membrane.

*Proboscidea saxatilis.*—THE ROCK PROBOSCIDEA.—Fur of the upper parts of the body variegated with gray and brown, ash-coloured, inclining to mouse-colour, beneath; wings and feet fuscous-brown. Inhabits Brazil, frequenting rocky places on the shores of St Francis.—Spix, Sim. Braz. t. 35, f. 8.

## Genus 30.—VESPERTILIO.—Linnæus.

*Generic Character.*—Incisive teeth  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{5-5}$ ,  $\frac{6-6}{6-6}$ ,  $\frac{5-5}{5-5}$  or  $\frac{5-5}{6-6}$ ; from 32 to 36. The upper incisors are separated in pairs, cylindrical and pointed, very close, with two cutting lobes directed forward; the anterior molars conical, the posterior having several sharp points or prominences; the nose simple, without any membranaceous appendage, ridge, or furrow; ears lateral and distinct, internal ears visible; tongue smooth, not protractile; index finger with but one phalanx, the middle with three, the annular and little finger with two; tail not exceeding the interfemoral membrane. Sebaceous glands under the skin of the face, assuming different forms and dimensions in the various species.

*Vespertilio murinus.*—THE COMMON BAT.—Plate V. fig. 13.—See description, vol. II. p. 369.

## Genus 31.—PLECOTUS.—Geoffroy.

*Generic Character.*—Incisors  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{4-4}{4-4}$  or  $\frac{5-5}{6-6}$ .

total 30 or 36. Ears larger than the head, often much developed; united together at the base; with four or five superior molars, and from four to six inferior on each side. In other respects they agree with the *Vespertilio*.

*Plecotus auritus*.—THE LONG-EARED BAT.—Plate VI\*\*. fig 2.—Ears almost as long as the body; fur gray, deeper above than below; body nearly two inches long; expanse of wings eleven or twelve inches. Inhabits Europe, and is common in Britain.

M. Rafinesque has proposed two other Genera of the Bat tribe, namely, *Hypexodon* and *Nycticeius*, but he has not yet given satisfactory characters of these Genera.

Genus 32.—ATALAPHA.—*Rafinesque*.

*Generic Character*.—Without incisory teeth; nose simple; ears separate, and provided with auricles; tail long, extending beyond the interfemoral membrane, or comprised in it.

*Atalapha Americana*.—THE NEW-YORK ATALAPHA.—Ears broad, short, and rounded; tail encompassed by the interfemoral margin. Inhabits the State of New-York.

FAMILY II.—INSECTIVORA.

Four extremities formed for walking; three kinds of teeth; stomach simple and membranous; intestines short.

The grinders are furnished with various sharp points; the canine teeth in some species very long, in others short, in which case they are termed false cheek teeth, or grinders; the incisory teeth varying also, both in number and length; teats ventral, or both ventral and pectoral; legs short; mode of locomotion always plantigrade; all the feet pentadactylous, except in one species.

TRIBE I.

With long incisors in front, false canines, not longer than the grinders.

Genus 33.—ERINACEUS.—*Linnaeus*.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{5-5}{4-4}$ ; total 34: the intermediate upper incisory teeth separate, and are of a cylindrical shape; the canine teeth are smaller than the grinders; the body is thick, covered with prickles on the back and sides, and on the belly with long, stiff, tubulate hairs; the

crown of the head high; muzzle acute; the ears are of a medium size, somewhat rounded; the toes have strong nails; tail very short, and in some species none; the mammæ are ten in number—six pectoral and four ventral.

*Erinaceus Europæus*.—THE COMMON HEDGE-HOG.—Plate VII. fig. 1. described, vol. II. p. 350.

*Genus 34.*—SOREX.—*Linnaeus*.

*Generic Character*.—Incisary teeth  $\frac{2}{2}$  in the upper jaw, indented at their base; lateral incisors  $\frac{3-3}{2-2}$  or  $\frac{4-4}{2-2}$  conical, small, shorter than the grinders, which are  $\frac{4-4}{3-3}$ ; total 28 or 30. Muzzle and nose much elongated, the latter moveable; ears and eyes small; tail varying in length—round, compressed, or four-sided; feet five-toed; nails crooked, short, curved, and pointed; teats, six or eight, both pectoral and ventral; Sebaceous gland on each flank, exuding a strong smelling secretion.

*Sorex araneus*.—COMMON SHREW.—Plate VII. fig. 2.—Fur extremely soft, mouse-coloured, lighter underneath; ears large and naked, with two lobes or folds within; tail subquadrated, not so long as the body. About two inches long. Inhabits Europe.

*Genus 35.*—MYGALE.—*Cuvier*.

Incisary teeth  $\frac{2}{4}$ , the two upper large, very strong, conical; lower incisors, with the two middle ones smallest; false canines  $\frac{1-2}{1-2}$ ; grinders  $\frac{4-4}{3-3}$ ; total 26. The four posterior above, and the three underneath, with rugose points; nose pointed, flexible; no external ears; eyes very small; tail long, scaly, and laterally compressed; feet palmated.

*Mygale Muscovitica*.—MUSCOVY MUSK-RAT.—Plate VII. fig. 3.—Fur brown above, and dusky ash below; nose long and slender; tail long, scaly, and compressed, striated at its base; size of the common rat. Inhabits southern Russia and Lapland.

*Genus 36.*—TUPAIA.—*Raffles*.

Incisary teeth  $\frac{2}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{7-7}{6-6}$ ; total 28. Body elongated; head triangular, attenuated, blunt; eyes and ears large; tail very long; four ventral mammæ, diurnal.

*Tupaia ferruginea*.—THE FERRUGINOUS TUPAIA.—Fur ferruginous; muzzle slightly pointed. Inhabits Java.

*Genus 37.—SCALOPS.—Geoffroy.*

Incisory teeth  $\frac{2}{4}$ , upper ones large; lateral, or conical teeth,  $\frac{3-3}{3-3}$ , with a void between them and the incisors; grinders  $\frac{3-5}{5-5}$ ; total 30, with several tubercles; muzzle elongated and cartilaginous; no external ears; anterior toes large, united as far as the third phalange, armed with long, strong, flat nails, constructed for digging.

*Scalops Canadensis.*—THE CANADIAN SCALOPS.—Fur gray-brown; eyes hidden within the hair; nose long, terminated by a button-shaped cartilage. Inhabits Canada and Virginia.

*Genus 38.—CHRYSOCHLORIS.—Cuvier.*

Incisory teeth  $\frac{2}{4}$ , conical teeth  $\frac{3-3}{3-3}$ , grinders  $\frac{6-6}{5-5}$ ; total 40. The intermediate lower incisors very small; anterior extremities with three toes only, armed with strong nails, like those of the Mole; hinder extremities with five toes; eyes very small; no external ears; muzzle terminated with a cartilaginous appendage.

*Chrysochloris Capensis.*—THE CAPE CHRYSOCHLORIS, OR SHINING MOLE.—Plate VI\*\*. fig. 8.—Fur brown, but giving in certain angles of light fine iridescent metallic green and copper colour, with five toes on the hind feet.

*Genus 39.—TALPA.—Linnæus.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ , small, placed vertically in the upper jaw, forming an arch, and a little inclining in the lower; canine teeth  $\frac{1-1}{1-1}$  triangular; cheek teeth  $\frac{7-7}{6-6}$ ; total 44. The three anterior in the upper, and the two in the lower jaw, smaller than the rest; head elongated; eyes extremely small; no external ears; pentadactylous; fore feet very large; toes united to the nails, which are strong and slightly arched; hinder feet weak.

*Talpa Europæa.*—THE COMMON MOLE.—Plate VII. fig. 4.—See description, vol. II. p. 344.

There are several varieties of this species, namely, white, white and black marbled, pale fawn colour, and ash-coloured.

*Genus 40.—CENTENES.—Illiger.*

Incisors  $\frac{6}{6}$  or  $\frac{4}{4}$ , canine teeth  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 38 or 40. The canines similar to the grinders; the first grinders are very

small, the rest pointed; muzzle produced; ears scarcely visible; legs short, body nearly touching the ground, covered with short stiff spines, but divested of the power of turning into a ball; toes five; without a tail.

*Centenes setosus*.—THE TENREC.—Plate VI\*\*. fig. 10.—See description, vol. II. p. 353.

Genus 41.—CONDYLURA.—*Illiger*.

Incisive teeth  $\frac{6}{4}$ , canines  $\frac{1-1}{1-1}$ , conical teeth  $\frac{5-3}{5-3}$ , grinders  $\frac{4-4}{3-3}$ ; total 40. The superior incisive teeth are anomalous; the two intermediate ones are of considerable breadth; muzzle produced, provided with membranous radiating spines around the nostrils; no external ears; eyes very small; body thick; feet with five toes; nails on the fore-feet strong.

*Condylura cristata*.—THE RADIATED MOLE.—Plate VI\*\*. fig. 7.—Fur very close, short, and fine; of a sooty-black colour; nostrils surrounded by a radiated membrane; tail not quite half the length of the body. About four inches long. Inhabits Canada.

FAMILY III.—CARNIVORA.

Six incisors in each jaw; molars not furnished with sharp points, as in the preceding family, but either trenchant or tuberculous, or both; the species more or less carnivorous, in proportion to the tuberculous character of these teeth; canines long and strong.

TRIBE I.

Beasts of prey; the soles of their feet resting entirely, from the toe to the heel, on the ground, when walking.

Genus 42.—URSUS.—*Linnaeus*.

*Generic Character*.—Incisive teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4}{4}$  to  $\frac{7}{7}$ ; total number from 32 to 44. The false molars are very small, make their appearance late, and fall out early; body thick, covered with strong hair; ears somewhat long, and slightly acuminate; toes, five, furnished with strong curved claws, destitute of retractility, blunt in their edges, and more calculated for climbing trees and burrowing in the earth, than for the purposes of prehension, or destroying other animals; tail short; six teats, two of which are pectoral and four ventral.

Bears are large clumsy animals, with thick strong limbs.

The cartilage of their nose is mobile. They dig caves for their residence, where they pass the winter in a state of semi-torpidity, and without taking any aliment.

*Ursus arctos*.—THE BROWN BEAR.—Plate VIII. fig. 1.—Described, vol. II. p. 519.

*Ursus maritimus*.—THE POLAR BEAR.—Plate VIII. fig. 2.—Described, vol. II. p. 525.

*Genus 43.*—PROCYON.—*Storr*.

*Generic Character*.—Incisory teeth  $\frac{6}{8}$ ; canines  $\frac{1-1}{1-1}$ , large and compressed; grinders  $\frac{6-6}{6-6}$ ; total 42. The three first pointed, the three posterior tuberculated; body rather slight; feet with five toes; nails sharp; muzzle pointed; ears small; tail long and pointed, with six ventral teats.

*Procyon lotor*.—THE RACON.—Plate VII. fig. 6.—Described, vol. II. p. 530.

*Genus 44.*—NASUA.—*Storr*.

Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 40. Under incisory teeth parallel; the three posterior grinders with tubercles; feet with five toes, semi-palmate; nails strong; body long, thin; nose elongated and moveable; tail long; teats six, ventral.

*Nasua fusca*.—THE BROWN COATI.—Plate XIV\*. fig. 1.—Described, vol. II. p. 531.

*Genus 45.*—CERCOLEPTES.—*Cuvier*.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{5-5}$ . The two first incisors pointed in front, the three posterior tuberculated; body thin; head round; muzzle not produced; tongue extensible; ears oval; feet large, membranous, five-toed; claws armed with strong crooked nails; tail long and prehensile, like that of the Sapajous.

*Cercoleptes caudivolvulus*.—THE POTTO, OR YELLOW MACAU-CO.—Plate XIV\*. fig. 2.—Fur silky, of a bright brownish-yellow. About nineteen inches long. Inhabits South America.

*Genus 46.*—TAXUS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{6-6}$ ; total 38. The first grinder very small, second and third

acute, the fourth cutting on the outer side, the fifth large and tuberculous; the body is thick; legs very short; feet with five toes and strong nails; muzzle moderately long; ears short and round; eyes small; tail very short, with a pouch under it, containing a fetid secretion.

*Taxus Vulgaris*.—THE BADGER.—Plate VII. fig. 5.—Described, vol. II. p. 526.

Genus 47.—GULO.—Cuvier.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{6-6}$  or  $\frac{5-5}{6-6}$ ; total 36 or 38. The three first molars in the upper jaw, and the four first in the lower, are small, succeeded by a larger carnivorous or cutting tooth, and small tuberculous teeth at the back; the body low; head moderately elongated; ears short and round; tail short; feet with five toes, armed with crooked nails.

*Gulo arcticus*.—THE WOLVERENE, OR GLUTTON.—Plate IX. fig. 6.—Described, vol. II. p. 286.

Genus 48.—RATELUS.—F. Cuvier.

*Generic Character*.—Incisors  $\frac{3}{3}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{4-4}{5-5}$ ; total 28. Canines very thick and strong, somewhat triangular; in the upper jaw two false molars, with pointed and conical crowns; one lanceolate and one tuberculate; lower jaw with three false molars, anterior to a broad lacerator; body thick, depressed; legs stout and short; five toes on each foot, nails slightly arched and retractile; without external ears; snout prolonged; muzzle naked; tongue rough.

*Ratelus mellivorus*.—THE RATEL.—Plate IX. fig. 9.—Fur dull ash-gray above, under parts of a deep black; hair stiff and wiry; a stripe of light gray passes from behind the ears along each side, forming a boundary between the colours of the back and lower parts; claws on the fore feet extremely long and powerful, the middle three being longer than the others. Length nearly three feet, including the tail. Inhabits Africa. A variety is found in Asia, differing only in wanting the lateral light gray stripe.

TRIBE II.—DIGITIGRADES.

Beasts of prey, which walk on their toes only.



**DIVISION I.**—With a tuberculous tooth behind the carnivorous tooth, in the upper jaw.

**Genus 49.**—**MUSTELA.**—*Linnaeus.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{4-4}{5-5}$  or  $\frac{5-5}{6-6}$ ; total 34 or 38. Head small and oval; ears short and round; body long vermiform; legs short; toes five, armed with sharp crooked claws; no anal pouch, but a small gland, containing a strong fetid secretion.

*Sub-Genus I.*—**PUTORIUS.**—*Cuvier.*—Two false molars above, and three below; the great carnivorous tooth below, without an internal tubercle; muzzle short; fetid.

*Mustela putorius.*—**THE POLECAT, OR FOU MART.**—Plate IX. fig. 3.—See description, vol. II. p. 269.

*Mustela furo.*—**THE FERRET.**—Plate IX. fig. 2.—See description, vol. II. p. 267.

*Mustela vulgaris.*—**THE COMMON WEASEL.**—Plate IX. fig. 1.—See description, vol. II. p. 259.

*Sub-Genus II.*—**ZORILLES.**—*Cuvier.*—Muzzle short; two false molars above, three below; nails of the fore feet strong and fitted for digging.

*Mustela zorilla.*—**THE ZORILLA.**—See description, vol. II p. 279.

*Sub-Genus III.*—**MARTES.**—One false molar more in each jaw than in the Putorius, and the lower large carnivorous tooth with a tubercle on the inner side.

*Mustela zibellina.*—**THE SABLE.**—Plate IX. fig. 4.—See description, vol. II. p. 274.

**Genus 50.**—**MEPHITIS.**—*Cuvier.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ , canine teeth  $\frac{1-1}{1-1}$ , grinders  $\frac{4-4}{5-5}$ ; total 34. The great carnivorous tooth provided with two tubercles on the inner side; the posterior tooth tuberculated, and very long and large; the toes of the feet separated, and furnished with long nails, formed for digging; the heel very little raised in walking; the palm and heel hairy; the tail long and bushy; in some of the species none.

*Mephitis Americanus*.—THE CHINCE, OR SKUNK.—Plate X. fig. 5.—Fur soft and shining, marked by white longitudinal bands, upon a blackish brown ground; tail long and furry.

There are many varieties of this species. Most of these are permanent and local in their habitats, and have been distinguished by naturalists and travellers as separate species.—See description, vol. II. p. 278.

Genus 51.—LUTRA.—Ray.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{5-5}$  or  $\frac{5-5}{6-6}$ ; total 36 or 38. The lower great carnivorous tooth, with two points on its outer side; the head large and flattened; the ears short; the body long; tail long, flattened horizontally, and tapering; legs short; feet webbed; nails crooked and sharp.

*Lutra vulgaris*.—THE OTTER.—Plate VII. fig. 12.—Fur brown above; whitish underneath; tail a little more than half the length of the body.

Genus 52.—ENHYDRA.—Fleming.

*Generic Character*.—Incisory teeth  $\frac{6}{4}$ , cheek teeth  $\frac{4-4}{5-5}$ , false grinders  $\frac{2-2}{5-5}$ . Body much elongated; hind legs and tail short.

*Enhydra marina*.—THE SEA OTTER.—Plate VII. fig. 13.—Fur deep brownish-black, very glossy; body very long; hind feet one-fourth the length of the body—hairy; tail one-fourth as long as the body.

DIVISION II.—With two tubercular flat teeth behind the great carnivorous tooth in the upper jaw.

Genus 53.—CANIS.—Linnaeus.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{7-7}$  total 42. The three first grinders in the upper jaw are small and edged; they are termed false molars, or grinders; the great carnivorous tooth above bicuspid, with a small tubercle on the inner side, and two tuberculous teeth behind each of the carnivorous ones; muzzle elongated; shorter in some of the tame species and varieties; tongue soft, by which organ they perspire; ears in the wild species erect, in the tame ones usually pendulous; fore feet with five toes, hind feet with four toes; teats both inguinal and ventral.

DOGS.—Pupils of the eyes round.

*Canis familiaris*.—THE COMMON DOG.—Tail recurved into an arch, generally tipped with white; muzzle more or less elongated; fur varying in the nature of its hair.—See description of all the dogs, at vol. II. p. 191, &c.

This species is subject to infinite variety, resulting from domestication, food, climate, and other causes. There are many permanent varieties, which we have divided something on the plan adopted by M. F. Cuvier, but which we think nearer a natural arrangement than his,

DIVISION I.—Head elongated.

SECTION I.—Wild and half reclaimed dogs, which hunt in packs.

Variety 1.—*Australis*.—THE DINGO.—Plate VIII. fig. 3.—See description, vol. II. p. 193.

Variety 2.—*Orientalis*.—THE DHOLE.—See description, vol. II. p. 194.

Variety 3.—*Villaticus*.—THE PARIAH.—Described, vol. II. p. 194.

Variety 4.—*Æthiopicus*.—THE EKIA.—Described vol. II. p. 195.

Variety 5.—*Brazilianus*.—THE SOUTH AMERICAN DOG.—Described, vol. II. p. 195.

Variety 6.—*Amazonius*.—THE ALCO.—Described, vol. II. p. 195.

Variety 7.—*Canadius*.—NORTH AMERICAN DOG.—Described, vol. II. p. 196.

SECTION II.—Domesticated Dogs, which hunt in packs or singly, principally by the eye, although sometimes the scent.

Variety 8.—*Graius Hibernicus*.—THE IRISH GREYHOUND.—Described, vol. II. p. 196.

Variety 9.—*Defendans*.—THE ALBANIAN DOG.—Described, vol. II. p. 197.

Variety 10.—*Lanarius*.—FRENCH MATIN.—Described, vol. II. p. 197.

Variety 11.—*Maculatus*.—GREAT DANISH DOG.—Described, vol. II. p. 197.

Variety 12.—*Caledonius*.—SCOTTISH HIGHLAND GREYHOUND.—Described, vol. II. p. 197.

Variety 13.—*Graius Borealis*.—RUSSIAN GREYHOUND.—Described, vol. II. p. 198.

SECTION III.—Domesticated dogs, which hunt singly, and always by the eye.

Variety 14.—*Agasæus*.—THE GAZEHOOND.—Described, vol. II. p. 199.

Variety 15.—*Graius*.—THE GREYHOUND.—Plate VIII. fig. 4.—Described, vol. II. p. 199.

Variety 16.—*Graius Italianus*.—THE ITALIAN GREYHOUND.—Described, vol. II. p. 200.

Variety 17.—*Ægypticus*.—THE TURKISH GREYHOUND.—Described, vol. II. p. 200.

DIVISION II.—Head less elongated than former divisions.

SECTION IV.—Pastoral dogs, or such as are employed in domestic purposes.

Variety 18.—*Domesticus*.—THE SHEPHERD'S DOG.—Plate X. fig. 5.—Described, vol. II. p. 201.

Variety 19.—*Carcinarius*.—THE CUR DOG.—Plate X. fig. 6.—Described, vol. II. p. 202.

Variety 20.—*Pomeranius*.—THE POMERANIAN DOG.—Described, vol. II. p. 202.

Variety 21.—*Sibericus*.—THE SIBERIAN DOG.—Described, vol. II. p. 202.

Variety 22.—*Greenlandicus*.—THE GREENLAND DOG.—Plate X. fig. 7.—Described, vol. II. p. 203.

Variety 23.—*Islandicus*.—THE ICELAND DOG.—Described, vol. II. p. 203.

Variety 24.—*Borealis*.—THE ESQUIMAUX DOG.—Described, vol. II. p. 203.

Variety 25.—*Lagopus*.—THE HARE-INDIAN DOG.—Plate XI. fig. 8.—The Wild Variety.—Muzzle narrow, elongated, and pointed; tail thick, bushy, curved slightly upwards; hair straight, long, white, with patches of grayish-black and brown. Inhabits banks of Mackenzie River, North America.—This is the Isatis of Goldsmith, vol. II. p. 248.

Variety 26.—*Sensilis*.—THE NEWFOUNDLAND DOG.—Plate X. fig. 8.—Described, vol. II. p. 203.

Variety 27.—*Russianus*.—THE RUSSIAN DOG.—Described, vol. II. p. 205.

Variety 28.—*Aquaticus*.—THE GREAT ROUGH WATER-DOG.—Plate VIII, fig. 7.—Described, vol. II, p. 205.

Sub-Variety 28.—*Aquaticus Minor*.—THE SMALL WATER-SPANIEL, OR POODLE.—Described, vol. II, p. 205.

Variety 29.—*Inquisitor*.—LARGE WATER-SPANIEL.—Plate XI, fig. 1.—Described, vol. II, p. 205.

Variety 30.—*Fotor*.—THE SHOCK-DOG.—Described, vol. II, p. 206.

SECTION VI.—Fowlers, or dogs whose natural inclination is to chase and point birds, and hunt singly by the scent.

Variety 31.—*Extrarius*.—THE STUBBORN.—Described, vol. II, p. 206.

Sub-Variety 31.—*Extrarius*.—THE COCKER.—Plate VI, fig. 5.—A third less than the former; body shorter, and legs more round; ears long, and covered with feathers, as indicated.

Variety 32.—*Upator*.—WATER-SPANIEL.—Described, vol. II, p. 205.

Variety 33.—*Indica*.—THE OLD ENGLISH POINTING-DOG.—Described, vol. II, p. 208.

Sub-Variety 33.—*Indica*.—THE ENGLISH SPANIEL.—Plate XI, fig. 1.—Described, vol. II, p. 208.

Variety 34.—*Barques*.—THE COCKER-SPANIEL.—Described, vol. II, p. 206.

Variety 35.—*Consuetus*.—THE COCKER-SPANIEL.—Plate VIII, fig. 6.—Described, vol. II, p. 208.

Variety 36.—*Melioris*.—THE MAYER-DOG.—Described, vol. II, p. 209.

Variety 37.—*Leucus*.—THE LEUC-DOG.—Described, vol. II, p. 206.

Variety 38 *a*.—*Leucus*.—THE LEUC-SPANIEL.—Plate X, fig. 3.—Head broad, muzzle serrated, ears short, chest and hind quarters strong, tail erect, hair short and smooth.

Sub-Variety 38 *b*.—*Leucus*.—THE LEUC-SPANIEL.—Shaped like the preceding, but lighter in the make, and legs more acute.

Sub-Variety 38 *c*.—*Leucus minor*.—THE SPANIEL-POINTER.—Described, vol. II, p. 209.

Sub-Variety 38 *d.*—*Avicularis*.—THE RUSSIAN POINTER.—Described, vol. II. p. 209.

Variety 39.—*Dalmatianus*.—THE DALMATIAN.—Plate X. fig. 4.—Described, vol. II. p. 209.

SECTION VII.—Hounds which hunt in packs, by the scent.

Variety 40 *a.*—*Terrarius*.—THE SCOTCH TERRIER.—Plate XI. fig. 2.—Described, vol. II. p. 209.

Sub-Variety 40 *b.*—*Terrarius*.—THE ENGLISH TERRIER.—Described, vol. II. p. 210.

Variety 41.—*Serpentis-destructor*.—THE SOUTH AMERICAN TERRIER.—Described, vol. II. p. 210.

Variety 42.—*Sagax*.—THE OLD ENGLISH HOUND.—Described, vol. II. p. 211.

Variety 43 *a.*—*Sanguinarius*.—THE BLOOD-HOUND.—Described, vol. II. p. 211.

Sub-Variety 43 *b.*—*Sanguinarius*.—AFRICAN BLOOD-HOUND.—Beautifully formed, something between a greyhound and pointer; head broad, muzzle long, sharp; ears long, pendulous; tail long, naked, and tapering to a fine point; hair very short. Inhabits Central Africa.

Variety 44.—*Strenuus*.—THE STAG-HOUND.—Described, vol. II. p. 212.

Variety 45.—*Celer*.—THE FOX-HOUND.—Plate X. fig. 2.—Described, vol. II. p. 212.

Variety 46.—*Leverarius*.—THE HARRIER.—Described, vol. II. p. 212.

Variety 47.—*Prestans*.—THE BEAGLE.—Described, vol. II. p. 212.

Variety 48.—*Lutrans*.—THE OTTER-HOUND.—Head large and broad; ears long, pendant, and rough; face with long hairs; hair strong, shaggy, and wiry; legs thick.—See vol. II. p. 213.

Variety 49.—*Pugilis*.—THE BULL-TERRIER.—Described, vol. II. p. 213.

SECTION VIII.—Mongrel hounds, which hunt singly either by the scent or eye.

Variety 50.—*Indagator*.—THE LURCHER.—Described, vol. II. p. 213.

Variety 51.—*Saltator*.—THE TUMBLER.—Described, vol. II. p. 213.

Variety 52.—*Vertagus*.—THE TURNSPIT.—Described, vol. II. p. 214.

DIVISION III.—Head truncated.

SECTION IX.—Watch-dogs, which have no propensity for hunting.

Variety 53.—*Anglicus*.—THE MASTIFF.—Plate XI. fig. 4.—Described, vol. II. p. 214.

Sub-Variety 53.—*Anglicus*.—THE THIBET DOG.—Larger than the English mastiff; head large, broad, and truncated; forehead capacious; ears shorter than those of the mastiff, and lips more deeply pendulous; tail long, curved upwards, and villous; hair over the whole body rough, of a deep black, with the feet, and a spot over each eye, of a bright brown.

Sub-Variety 53.—*Anglicus*.—THE CUBAN MASTIFF.—Less than the mastiff; well made, and stout in their proportions; head broad, flat; muzzle short, broad, and abruptly truncate, slightly turned upwards; lips very pendulous; tail short, cylindrical; hair bright brown, short and even. Inhabits Cuba.

Variety 54.—*Munio*.—THE BAN-DOG.—Described, vol. II. p. 215.

Variety 55.—*Molossus*.—THE BULL-DOG.—Plate XI. fig. 3.—Described, vol. II. p. 215.

Variety 56.—*Pricator*.—THE PUG-DOG.—Described, vol. II. p. 216.

Variety 57.—*Dubius*.—THE SMALL DANISH DOG.—Described, vol. II. p. 216.

Variety 58.—*Hybridus*.—THE ROQUET.—Described, vol. II. p. 216.

Variety 59.—*Descrepans*.—THE MOPSIE.—Described, vol. II. p. 216.

Variety 60.—*Discors*.—THE ARTOISE DOG.—Described, vol. II. p. 216.

*Canis lupus*.—THE COMMON WOLF.—Plate XI. fig. 5.—Described, vol. II. p. 227.

*Canis aureus*.—THE CHACAL, OR JACKAL.—Plate XI. fig. 6.—Described, vol. ii. p. 245.

\*\* Pupils of the eyes long; tail long and bushy.

*Canis vulpes*.—THE COMMON FOX.—Plate XI. fig. 7.—Described, vol. II. p. 239

Genus 54.—VIVERRA.—*Linnæus*.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canine teeth  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 40. In the upper jaw, three false grinders, which are a little conical and compressed; a large carnivorous bicuspid tooth, and two tuberculous ones; in the lower jaw are four false grinders; one bicuspid, and one large tuberculous tooth behind; the head is long, muzzle pointed; nostrils pierced on the sides of the nose; pupils of the eyes capable of being contracted almost into a line; tongue aculeated; feet with five toes, the claws partly retractile; with an oval pouch, more or less deep.

*Sub-Genus I*.—VIVERRA.—*Cuvier*.—Anal pouch very deep, and divided into two sacs, containing an unctuous, musky secretion; cheek teeth or grinders  $\frac{6-6}{6-6}$ .

*Viverra civetta*.—THE CIVET.—Plate IX. fig. 7.—See description, vol. II. p. 283.

*Mustela zibetha*.—THE ZIBET.—Plate IX. fig. 8.—Fur gray; legs transversely spotted with brown; throat white, with two black bands on each side; destitute of mane; tail long, with eight or ten rings of black and white.

*Sub-Genus II*.—GENETTA.—*Desmarest*.—Anal pouch reduced to a mere fold of the skin, containing very little secretion; tail straight; cheek teeth  $\frac{6-6}{6-6}$ .

*Genetta vulgaris*.—THE GENET.—Plate XVII\*\*, fig. 1.—See description, vol. II. p. 281.

*Sub-Genus III*.—PARADOXURUS.—Dentary formula and general shape the same as in the *Viverra*; destitute of the secretory pouch; plantigrade; tail as long as the body, flattened above and below, which the animal can roll up spirally.

*Paradoxurus typus*.—THE TYPE PARADOXURUS.—Plate XVI\*. fig. 4.—Fur grayish black with a tinge of yellow, with one broad dorsal, and two or three narrow indistinct black lines;



under-jaw, legs, and tail, nearly black; under each eye a white spot. Inhabits India.

*Genus 55.*—SURICATA.—*Desmarest.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{6-6}{6-6}$ ; total 40. Body elongated; feet with three toes, nails strong, formed for digging; ears small; tail long and slender; and with a pouch around the anus.

*Suricata capensis.*—THE SURIKATE.—Plate XIV\*. fig. 3.—Hairs annulated with brown, white, yellow, and black, forming a general shade of dull brown; nose round; eyes and ears black; under parts and tail yellowish; nails long, strong, and black.

DIVISION III.—Without a tuberculous tooth behind the great carnivorous tooth in the lower jaw.

*Genus 56.*—HYÆNA.—*Cuvier.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ ; canines  $\frac{1-1}{1-1}$ , very strong; grinders  $\frac{5-5}{4-4}$ ; total 34. Three false grinders; one very large, strong, carnivorous tooth, with three cutting edges on the outer side, and a small tubercle within, with a little tuberculous tooth behind in the upper jaw; in the lower, three false molars; the carnivorous tooth bicuspid, without an inner tubercle, and no tuberculous tooth behind; jaws powerful, shorter than those of the dog, but longer than in the Felinæ; tongue aculeated; ears large; feet tetradactylous; nails not retractile; a glandular pouch at the anus; teats four.

*Hyæna vulgaris.*—THE STRIPED HYÆNA.—Plate XIV. fig. 1.—Described vol. II. p. 249, 252, &c.

*Hyæna crocuta.*—THE SPOTTED HYÆNA.—Plate XIV. fig. 2.—Described, vol. II. p. 253.

*Genus 57.*—RATULUS.—*Bennet.*

*Generic Character.*—Incisory teeth  $\frac{6}{6}$ ; canines  $\frac{1-1}{1-1}$ ; grinders  $\frac{4-4}{4-4}$ ; total 32. Canines very thick, strong and triangular; in the upper jaw the cheek teeth consist of two false molars, with conical pointed crowns; one lacerator, and one tubercular, arranged exactly in the same manner as in cats; lower jaw, three

false molars, anterior to the lacerator, and having no tubercle behind it; body thick, heavy, and depressed; legs short, stout; feet with five toes; claws arched and retractile, grooved on their under surface; no external ears; snout lengthened; muzzle naked: tongue aculeated.

*Ratelus mellivorus*.—THE RATEL.—Plate IX. fig. 9.—Hair stiff and wiry; head, neck, back, and root of the tail, dull ash-gray, whiter towards the head; under parts, muzzle, contour of the eyes, and remainder of the tail, deep black. Size of a badger. Inhabits Africa and India.

Genus 58.—FELIS.—*Linnaeus*.

*Generic Character*.—Incisory teeth  $\frac{6}{6}$ , canines,  $\frac{1-1}{1-1}$ , grinders  $\frac{4-4}{3-3}$  or  $\frac{3-3}{3-3}$ ; total 28 or 30. Head round, jaws short, tongue aculeated; ears in general short and triangular, in many species with a white spot on the back of them; pupils of the eyes in some circular, in others vertically oval; fore feet with five toes; hind feet with four only, furnished with long, sharp, retractile claws, usually contained in sheaths.

\* Without spots.

*Felis leo*.—THE LION.—Plate XII. fig. 1.—LIONESSE.—Plate XII. fig. 2.—Described, vol. II. p. 138 and 184.

*Felis concolor*.—THE PUMA.—Plate XIII. fig. 5.—fig. 4, a variety.—Fur uniformly yellow fawn, without mane or tuft on the tail. Inhabits America.—Described, vol. II. p. 167.

\*\* Large, with transverse stripes.

*Felis tigris*.—THE TIGER.—Plate XII. fig. 3.—Described, vol. II. p. 156 and 184.

\*\*\* Large, with round spots of black or brown.

*Felis pardus*.—THE PANTHER.—Plate XIII. fig. 1.—Described, vol. II. p. 171.

*Felis leopardus*.—THE LEOPARD.—Plate XIII. fig. 2.—Described, vol. II. p. 172.

*Felis unciæ*.—THE OUNCE.—Plate XIII. fig. 3.—Described, vol. II. p. 176.

\*\*\*\* Middle-sized, generally covered with stripes and spots; tail usually long.

*Felis pardalis*.—THE OCELOT.—Plate XIII. fig. 7.—Described, vol. II. p. 177 and 181.

\*\*\*\* Middle-sized, legs long; ears broad, long, and frequently tipped with a pencil of hairs; three upper grinders not tuberculated.

*Felis lynx*.—THE LYNX.—Plate XIII. fig. 10.—Described, vol. II. p. 179 and 184.

\*\*\*\*\* Small ears not pencilled; legs shorter than former division.

*Felis serval*.—THE SERVAL.—Plate XIII. fig. 6.—Described, vol. II. p. 179 and 183.

*Felis tigrina*.—THE MARGAY.—Plate XIII. fig. 8.—Fur on the upper parts of the body yellowish-gray; four black lines pass from the vertex of the shoulders, where they change into a series of streaks; under parts white; tail irregularly annulated. Inhabits Brazil.

*Felis catus*.—THE DOMESTIC CAT.—Plate XIII. fig. 9.—Fur generally whitish-gray above, with clouds and streaks; beneath white. Inhabits, in a wild state, the forests of Europe.

### FAMILY III.—AMPHIBIA.

Feet short, enveloped in the skin, shaped like fins, and adapted for swimming; hind ones horizontal. Incisive teeth variable; often four, and sometimes six, above, and from two to four in the under jaw.

#### Genus 59.—PHOCA.—*Linnæus*.

*Generic Character*.—The teeth of this genus vary much in the different species. The incisive teeth are  $\frac{6}{3}$ , or  $\frac{6}{2}$ , or  $\frac{4}{4}$ ; differing also in form; canine teeth  $\frac{1-1}{1-1}$ , strong, conical, and slightly curved; grinders  $\frac{5-5}{5-5}$ , or  $\frac{6-6}{5-5}$ , or  $\frac{6-6}{6-6}$ ; total 30, 31, 36, or 38. The grinders are all cutting or conical; the head round, snout elongated, with strong mustachios; the nostrils capable of being completely closed; eyes large; no external ears; feet with five toes; the anterior extremities having a fin-like hand, and the

posterior feet only; the phalanxes of both enveloped in the skin; the tail short and thick; they have four abdominal teats.

In this genus, Cuvier seems to have paid little regard to external form, as in this respect the animals which he brings together are very different; taking the dentition alone for his character.

*Sub-Genus I.*—*PHOCA.*—*Peron.*—Without external ears; incisory teeth with a simple edge; grinders edged; toes of the hind feet terminated by pointed nails, placed on the border of the membrane.

*Phoca vitulina.*—*THE COMMON SEAL.*—Plate XIV. fig. 3. Described, vol. II. p. 386.

*Sub-Genus II.*—*MIRUNGA.*—*Gray.*—Cutting teeth  $\frac{4}{2}$  or  $\frac{6}{2}$ ; canines  $\frac{1-1}{1-1}$ ; grinders short, broad, and roots simple; crown striated and nearly flat; no external ears; fur crowned on the nose, elongated into a trunk.

*Phoca cristata.*—*CRESTED SEA-LION.*—Top of the head furnished with a moveable hood, susceptible of erection, and covering the eyes and muzzle. From seven to eight feet long. Inhabits the Northern Seas.—Type of M. F. Cuvier's genus *Stenatope*.

*Sub-Genus III.*—*OTARIO.*—*Peron.*—Cutting teeth  $\frac{6}{4}$ ; canines  $\frac{1-1}{1-1}$ , large; grinders  $\frac{6-6}{5-5}$ ; root simple; crown with a principal conical point, and one little lineal lobe before and another behind it; external ears distinct.

*Phoca ursina.*—*THE SEA BEAR.*—Plate XIV. fig. 4.—Described, vol. II. p. 388.—*THE URSINE SEAL.*—This is the type of M. F. Cuvier's *Arctocephale*.

*Genus 60.*—*TRICHECUS.*—*Linnaeus.*

*Generic Character.*—Incisory teeth  $\frac{2}{0}$ , canine teeth  $\frac{1-1}{0-0}$ , grinders  $\frac{6-6}{5-5}$ ; total 24. The incisory teeth are small and deciduous; the superior canines or tusks, very large, somewhat longer than the head, compressed, and laterally arched; the grinders are of a cylindrical shape, with their upper surface obliquely truncated; the body is long and conical; the head round; muzzle large; without any external ears; tail short; fore feet paddle-shaped,

armed with five short claws; hind feet horizontal, with five toes enveloped in the skin.

*Trichecus rosmarus*. — THE MORSE, OR WALRUS. — Plate XIV. fig. 5. — Described, vol. II. p. 396.

## ORDER V.—MARSUPIALIA.

In the sub-divisions of the different genera, the teeth vary considerably. The young are all produced prematurely, or in an early stage of development, and become attached to the teats of the female, where they remain till they are fit to provide for themselves. The mammæ are situated in the abdominal region, usually within a pouch, or fold of the skin, which serves as a protection to the young. This pouch is supported by two marsupial bones: thumb of the posterior extremities mostly distinct and opposable to the fingers; it, however, is wanting in a few species.

Almost all the species are inhabitants of New Holland and South America.

### DIVISION I.

Having canine and insectivorous cheek teeth or grinders.

#### Genus 1.—DIDELPHIS.—*Linnaeus*.

*Generic Character*.—Incisory teeth  $\frac{10}{8}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{7-7}$  or  $\frac{6-6}{7-7}$ ; total 48 or 50. The two intermediate incisors in the upper jaw longer than the rest, and separated from them; they are very small and equal in the lower jaw; the canines are strong compressed, and somewhat reflected; the three first grinders in the upper jaw are false teeth, small and triangular; the remainder are insectivorous, or furnished with sharp points; the four first in the under jaw are also false and small; and the three others furnished with sharp tubercles; head long and conical, and the muzzle acute; ears large, rounded, and nearly naked; tongue aculeated. They are plantigrade in their locomotion; feet with five toes, with long and bent nails; thumbs of the hind feet long, opposable to the fingers, and without nails; tail long, half hairy and scaly; hair hard and close; stomach simple. Inhabits America.

\* Females having an abdominal pouch.

*Didelphis Virginiana*.—THE VIRGINIAN OPOSSUM, OR SARAGOY.—Plate VII. fig. 8.—Described, vol. II. p. 447.

\*\* Females without an abdominal pouch.

*Didelphis murina*.—THE MURINE OPOSSUM.—Plate XIV\*. fig. 5.—Fur yellow-gray above, very pale yellow beneath; eyes surrounded with brown; tail as long as the body and naked. Inhabits Cayenne and Surinam.

Genus 2.—CHIRONECTES.—*Illiger*.

*Generic Character*.—Incisors  $\frac{10}{8}$ , canines  $\frac{1-1}{1-1}$ , the number of grinders unknown; cheek teeth pointed and cutting; ears naked; feet round, with five toes; nails sharp and bent; the posterior feet plantigrade and palmated; thumb without a nail; tail long, cylindrical, prehensile, naked and covered with scales. Female with an abdominal pouch.

*Chironectes palmata*.—THE YAPOCK.—Plate XIV\*. fig. 6.—Fur brown above, with three transverse gray patches or bands; white underneath. Inhabits the banks of the rivers Yapock and Guyane.

Genus 3.—DASYURUS.—*Geoffroy*.

*Generic Character*.—Incisive teeth  $\frac{8}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 42. The incisors are small and regular; canines large; the two first grinders cutting, the others with points on their crowns; head conical and elongated; fore feet with five toes on each, furnished with crooked nails; hind feet with four toes and nails; thumb very short, distant from the fingers, and without a nail; tail long, covered all over with hairs; females with a marsupial pouch.

*Dasyurus macrourus*.—THE SPOTTED DASYURUS.—Plate VII. fig. 9.—Fur bright chestnut-coloured, irregularly spotted with white; hairs on tail long and spotted. Size of a cat. Inhabits New Holland.

Genus 4.—GYMNURA.—*Raffles*.

*Generic Character*.—Incisive teeth  $\frac{2}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{3}{7}$ ; total 26. The incisive teeth large, subcylindric and remote, short and compressed; upper canines remote, short, and conical;

the inferior one large, conical, and subarcuated; molars remote, with one elongated tubercle; second molar short; next four cuspid, conical, and elongated; lower molars with one tubercle; first and second short, third sub-elongated, the fourth tuberculated and elongated, fifth gradually shortening, and sixth and seventh large, with acute tubercles; head elongated, laterally compressed; muzzle much produced, the upper jaw being considerably longer than the under; ears round, prominent, and naked; eyes small; whiskers very long; tongue smooth; body rather robust; tail long, naked, and scaly; feet with five toes, furnished with strong hooked nails, which are retractile; the three centre toes longer than the others; hind legs very long, fore legs short.

*Gymnura Rafflesii*. — RAFFLES'S GYMNURA. — Plate VI\*. fig. 6. — Body robust; head large; muzzle much elongated; hair on the whole body setose, mingled with soft fur; tail naked; claws retractile. Length of body upwards of fourteen inches; tail ten inches and a quarter. Inhabits Sumatra.

Genus 5. — PARAMELES. — *Geoffroy*.

*Generic Character*. — Incisory teeth  $\frac{10}{6}$  or  $\frac{10}{8}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{7-7}$ , or  $\frac{8-8}{6-6}$ ; total 50. The last incisors on each side of the upper jaw very long; those of the lower divided by a groove; canine teeth long; grinders acutely tubercular; head very long; fore feet with five distinct toes, the three middle longest, and the thumb merely rudimentary; hind feet longer than the fore, and having four toes only, two of which are internal, very small, united and enveloped in the skin, the claws only being seen; the third very long, with a strong claw, and the outer one very small; tail long and pointed, thick at the base and naked beneath; not prehensile.

*Parameles nasuta*. — THE LONG-NOSED POUCHED PARAMELES. — Plate XV\*. fig. 1. — Fur grayish-brown above, and white beneath; head long; muzzle slender and produced. Cutting teeth  $\frac{10}{6}$ . Inhabits New Holland.

DIVISION II. — Cutting teeth  $\frac{6}{2}$ , the lower very long; in the under jaw the canines are very small, and in some none.

Genus 6. — PHALANGISTA. — *Geoffroy*.

*Generic Character*. — Incisors  $\frac{2}{2}$ , canines  $\frac{1-1}{0-0}$  or none, false

grinders  $\frac{2-2}{3-3}$ , or  $\frac{2-2}{4-2}$ , grinders  $\frac{5-5}{5-5}$ , or  $\frac{6-6}{5-5}$ ; total 38 or 40. Fore-head convex; snout elongated; feet with five toes, not united to the body by the skin of the sides; anterior toes separate, furnished with strong crooked nails; hind feet, with a large thumb without a nail; tail naked in some, and in others covered with hair. Females with an abdominal pouch.

SUB-DIVISION I.—Tail naked or scaly and prehensile.

*Phalangista rufa*.—THE RED PHALANGER.—Plate XIV\*. fig. 7.—Fur reddish chestnut, with a darker dorsal line.

SUB-DIVISION II.—Tail hairy and prehensile.

*Phalangista Cookii*.—COOK'S PHALANGER.—Plate XIV\*. fig. 8.—Described, vol. II. p. 455.

Genus 7.—PETAURISTA.—Cuvier.

*Generic Character*.—Incisors  $\frac{6}{2}$ , canines  $\frac{1-1}{0-0}$  or  $\frac{1-1}{2-2}$ , grinders  $\frac{6-6}{6-6}$  or  $\frac{7-7}{6-6}$ ; total 32 or 34. The lower incisors are horizontal; head somewhat elongated; eyes small; ears long; feet short, with five toes; the posterior with a large thumb, without a nail; the two first toes short, united by a common skin; claws compressed and arched; skin of the sides extending and uniting the extremities, so as to form a kind of parachute; tail long, hairy, and not prehensile.

SUB-DIVISION I.—Tail round.

*Petaurista taquanoides*.—THE FLYING PETAURISTA.—Plate VII. fig. 10.—Described, vol. II. p. 455.

SUB-DIVISION II.—Tail villous.

*Petaurista pigmæa*.—THE PIGMY PETAURISTA.—Plate XIV\*. fig. 10.—Fur uniform mouse-gray, somewhat reddish on the back, and white underneath. Inhabits New Holland.

DIVISION III.—Incisory teeth  $\frac{6}{2}$ , the lower ones very long and oblique; canines  $\frac{0-0}{1-1}$ .

Genus 8.—POTOROUS.—Desmarest.

*Generic Character*.—Incisors  $\frac{6}{2}$ , canines  $\frac{1-1}{0-0}$ , grinders  $\frac{5-5}{5-5}$ ; total 30. The canines are small, the four posterior grinders



in both jaws having blunted tubercles; head long; muzzle acute; upper lip cleft; ears large; fore legs short; feet with five toes; claws sharp; hind feet long, with four toes, two of which are united and small; tail long, thick; hair woolly. Female with an abdominal pouch.

*Potorous marinus*.—THE KANGAROO RAT.—Plate XV\*. fig. 2.—Fur brownish above, and gray beneath; ears rather large and rounded. Size of a Rabbit. Inhabits New Holland.

Genus 9.—KANGURUS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{5}{5}$ , no canine teeth, grinders  $\frac{5-5}{5-5}$ ; total 28. The head elongated; ears large and pointed; eyes large; fore legs very short, with five toes on the feet, which have strong claws; hind legs very strong and long, having only four toes, the two inner small and united; the central ones very large, long, and strongly clawed; the outer toe moderate; the metatarsus very long and thin; the soles of the feet applied their whole length to the earth; tail long, very thick at the base, tapering and very strong, but not prehensile; is used to assist the animal in leaping. Female furnished with an abdominal pouch, in which the teats are situated.

*Kangurus labiatus*.—THE GREAT KANGAROO.—Plate VII. fig. 11.—Described, vol. II. p. 549.

Genus 10.—PHASCOLARCTOS.—*Blainville*.

*Generic Character*.—Incisory teeth  $\frac{6}{2}$ , false grinders,  $\frac{2-2}{0-0}$ , true grinders  $\frac{4-4}{4-4}$ ; total 28: with four intermediate teeth between the incisors and the upper grinders; molars with four tubercles; ears large and pointed; feet with five toes; the fore feet parted into two groups; the thumb and index finger on one side, the three others on the opposite; hind feet with a large distinct clawless thumb; and the two inner fingers small, united to the claws.

*Phascolarctos fuscus*.—THE KOALA.—Plate XIV\*. fig. 9.—Fur long, thick, and harsh, of an uniform chocolate-brown. Size of a moderate dog. Inhabits New Holland.

DIVISION IV.—Incisory teeth  $\frac{2}{2}$ , without canine teeth.

Genus 11.—PHASCOLOMYS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canine teeth, grin-

ders  $\frac{5-5}{3-3}$ ; total 24. Cutting teeth very strong, thick, and short, the upper ones converging at their tips; grinders separated from the incisors by a vacant space; crowns oval, flat, separated into two by a groove; body thick; head large, flat; ears short; feet with five toes; claws of the fore feet strong; thumbs of the hind feet small, indistinct, and without claws; tail short, scarcely visible. Female with an abdominal pouch.

*Phascolomys wombat*.—THE WOMBAT.—Plate XV\*. fig. 3. —Fur uniform grayish; eyes small. Size of a badger. Inhabits New Holland.

## ORDER VI.—RODENTIA.—CUVIER.

### GLIRES.—*Linnaeus*.

Two large incisors in each jaw, separated from the grinders by a vacant space; destitute of canine teeth; grinders in some of the genera with flat or ridged crowns, in others with blunt tubercles. Under jaw articulated by a longitudinal condyle; orbits not separated from the temporal fossæ, having a small zygomatic arch; toes variable; nails unguiculated; stomach simple; intestines long; cæcum large; mammæ varying in number. Feed generally on vegetables, but the species with tuberculated grinders are nearly omnivorous. Their habits are various, but generally timid. Inhabit the Continents and larger Islands.

### SECTION I.—With perfect clavicles.

#### Genus I.—CASTOR.—*Linnaeus*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Incisory teeth very strong, with a flat anterior surface, and the posterior angular. The grinders have a fold, or ridge of enamel, on the internal edge, and three similar folds on the outer edge of the upper teeth, which are inverted in the lower ones; eyes small; ears short and round; each of the feet have five toes; the anterior short and close, and the posterior longer and palmated; tail large, flat, and scaly; near the root of the tail in the male, is a pouch filled with an unctuous secretion.

*Castor fiber*.—THE BEAVER.—Plate XV. fig. 1.—Described, vol. II. p. 381.

*Genus 2.—FIBER.—Cuvier.*

*Generic Character.*—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{5-5}{3-3}$ ; total 16. Lower incisors sharp-pointed, and convex in front; grinders with flat crowns, furnished with scaly transverse zigzag laminæ; fore feet with four toes, and the rudiments of a thumb; hind feet with five toes, having the edges furnished with stiff hairs, used in swimming like the membrane of palmated feet; tail long, compressed laterally; both sexes secrete an odoriferous musky unguent.

*Fiber Zibethicus.*—THE MUSK RAT, OR ONDATRA.—Plate XV. fig. 2.—Described, vol. II. p. 336, &c.

*Genus 3.—ARVICOLA.—Desmarest.*

*Generic Character.*—Incisive teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{5-5}{3-3}$ ; total 16. Grinders are flat on the crowns, with angular plates of enamel; ears large; anterior toes with nails; tail round, covered with hair, and almost as long as the body.

*Arvicola amphibius.*—THE WATER RAT.—Plate XV\*. fig. 4.—Fur blackish gray, slightly tinged with yellow above, lighter underneath; tail black. Somewhat larger than the common Norway rat. Inhabits Europe, Northern Asia, and North America.

One variety of this species is entirely black, another with a white spot on the shoulders, and a third black with white feet.

*Genus 4.—ISODON.—Say.*

*Generic Character.*—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Grinders converging, with flat crowns not divided into radicles; the incisive teeth not narrowed at the top, but obtusely rounded; fore feet four-toed, with a small tubercle in place of a thumb; hind feet four-toed; the toes in all the feet divided, and rest equally on the sole in walking.

*Isodon pilorides.*—Known only from the skeleton.

*Genus 5.—NEOTOMA.—Say and Ord.*

*Generic Character.*—Incisors  $\frac{2}{2}$ , molars  $\frac{6-6}{6-6}$ ; total 16. The incisors in the upper jaw slightly rounded on their anterior face; molars with profound radicles; first molar with five triangles, one of which is anterior, two exterior, and two interior; second molar with four triangles, one anterior, two on the exterior side,

and a very small one on the interior side ; third molar with four triangles, one anterior, two exterior, and a minute interior one ; fore feet four-toed, with an armed rudiment of a fifth toe ; hind feet five-toed.

*Neotoma Floridana*.—THE FLORIDA NEOTOMA.—Plate VI\*\*. fig. 4.—Fur extremely fine, on the upper part of the body lead coloured, intermixed with yellow and black hairs ; border of the abdomen and throat buff colour ; snout elongated ; whiskers very long ; eyes and ears very large ; tail longer than the body, white beneath, dusky above, its scales so small as to be covered with the hair. Length of the body seven inches and a half ; tail six inches and a quarter. Inhabits East Florida.

Genus 6.—SIGMADON.—*Say and Ord.*

*Generic Character*.—Incisors  $\frac{2}{2}$ , molars  $\frac{6-6}{6-6}$  ; total 16. Molars in each jaw with very profound radicles towards the summit, composed of alternate folds, two on each side, extend to the middle of the teeth ; the incisors in the upper jaw slightly rounded, in the inferior jaw obliquely truncate ; tail hairy ; feet simple ; fore feet four-toed, with the rudiment of a fifth toe having a nail ; hind feet five-toed.

*Sigmaton hispidum*.—THE PRICKLY SIGMADON.—*Zoological Journal*, vol. II. plate X. fig. 5, 6, 7, 8.—Head thick ; snout elongated ; eyes and ears large, the latter round, slightly clothed with hair ; tail nearly as long as the body ; fore legs short ; hind feet large and strong ; lateral toes very short ; claws stout ; upper parts and head pale dirty ochre yellow, mixed with black ; lower parts ash-coloured ; hair of the upper parts and sides long, plentiful, and coarse. Length from the tip of the snout to the tail six inches ; tail four inches. Inhabits the banks of the river St John in East Florida.

Genus 7.—LEMMUS.—*Cuvier.*

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{3-3}{3-3}$  ; total 16. Grinders with a flat crown and angular plates of enamel ; ears very short ; fore feet in some species have five and in others four toes, with nails on all of them fitted for digging ; tail short, covered with hair.

*Lemmus Norvegicus*.—THE LEMMING, OR LAPLAND MARMOT.—Plate XV. fig. 2.—Described, vol. II. p. 311.

Genus 8.—ECHIMYS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Head long; eyes large; ears shortish; no cheek pouches; fore feet with four toes, and the rudiment of a thumb; hind feet with five toes; tail long and generally scaly; back covered with shortish flat spines, more or less abundant.

*Echymys hispidus*.—THE ROUGH-HAIRED ECHIMYS.—Plate XV\*. fig. 5.—Fur brownish-red above, and lighter underneath; head reddish; tail as long as the body, scaly; hairs of the back very rough. From seven to eight inches long. Inhabits South America.

Genus 9.—MYOXUS.—*Cuvier*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , canines none, grinders  $\frac{4-4}{4-4}$ ; total 20. The grinders are divided by transverse bands; eyes large and prominent; ears large and round; with long mustachios; no cheek pouches; fore feet with four toes, and the vestige of a thumb; hind feet with five toes; tail long, more or less villose, and tufted in some species; fur soft. No cæcum or large intestines.

*Myoxus avellanarius*.—THE COMMON DORMOUSE.—Plate XV\*. fig. 6.—Described, vol. II. p. 335.

Genus 10.—HYDROMYS.—*Geoffroy*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canine teeth, grinders  $\frac{2-2}{2-2}$ ; total 12. Crowns of the grinders flat, provided with enamelled ridges in the shape of the figure 8, with two excavations corresponding with the hollow spaces in that figure; ears small and round; five toes on all the feet, but the thumb on the fore feet very small; hind feet palmated and united by a membrane; tail as long as the body, cylindrical, but pointed at the end, and covered with thick hair.

*Hydromys Coypus*.—THE COYPOU.—Plate XV\*. fig. 7.—Fur soft and downy, dark chestnut-brown on the back, red on the flanks, and light-brown on the belly. About two feet long; tail eighteen inches; hair rather hard.

Genus 11.—MUS.—*Linnaeus*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canine teeth, grinders  $\frac{3-3}{3-3}$ ;  
2 T 3

total 16. The grinders are furnished with tubercles; ears oblong or round, nearly naked; without cheek pouches; fore feet with four toes, and a wart in place of a thumb, covered with an obtuse nail; hind feet with five toes; nails long, sharp, and incurved; tail long, naked, and scaly; fur smooth, with a few scattered hairs extending beyond the rest, which in some species are spinous.

SUB-DIVISION I.—Spineless Rats of the Old Continent.

*Mus decumanus*.—THE NORWAY RAT.—Plate XV. fig. 3.—Described, vol. II. p. 326.

*Mus pumilio*.—THE LINIATED MOUSE.—Plate XV. fig. 5.—Fur ash-coloured brown above, lighter beneath, with four longitudinal black lines on the ridge of the back; tail nearly naked, of middling length. Little more than two inches long from the nose to the tail. Inhabits the forests on the Slangen River, eastward of the Cape of Good Hope.

*Mus musculus*.—THE COMMON MOUSE.—Plate XVIII. fig. 4.—Described, vol. II. p. 331.

SUB-DIVISION II.—American Spineless Rats.

*Mus rufus*.—THE RED RAT.—Fur yellowish-red; darker on the head and back; belly yellowish; tail more than half as long as the body. About six inches long. Inhabits Paraguay.

SUB-DIVISION III.—Spinous Rats.

*Mus perchal*.—THE PERCHAL RAT.—Plate XV\*. fig. 9.—Fur reddish-brown above, with spiny hairs intermixed; grayish underneath; tail not quite so long as the body. Body eighteen inches long. Inhabits the town and neighbourhood of Pondicherry, in India.

Genus 12.—CRICETUS.—*Lacpede*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{3-5}{3-3}$ ; total 16. Surface of the grinders with blunt tubercles; head thick; ears oval and round; with cheek pouches; fore feet with four toes, and a rudimentary thumb; hind feet with five toes, and strong nails; tail short and hairy.

*Cricetus vulgaris*.—THE COMMON HAMSTER.—Plate XV\*. fig. 10.—Described, vol. II. p. 338

## Genus 13.—DIPUS.—Cuvier.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{3-3}{3-3}$  or  $\frac{1-1}{4-4}$ ; total 16 or 18. Lower incisory teeth sharp pointed; grinders simple, with tuberculous crowns; eyes large; ears long and pointed; fore feet short, with four toes, and a tubercle in place of a thumb, which is furnished with a nail; the hind feet are five or six times longer than those before, with three or five toes, having one metatarsus for the three middle toes; tail very long, generally tufted.

*Dipus sigitta*.—THE COMMON JERBOA.—Plate XV. fig. 6. —Described, vol. II. p. 542. See also vol. II. p. 339.

## Genus 14.—GERBILLUS.—Desmarest.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{3-3}{3-3}$ ; total 16. Grinders tuberculous; the first with three, the second with two, and the third with one tubercle; ears moderately sized; fore feet short, with four toes, and a rudimentary thumb; the hind legs very long, having five toes with nails; each foot with a proper metatarsal bone; tail long, covered with hair.

*Gerbillus Canadensis*.—THE CANADA GERBIL.—Plate XV\*. fig. 11.—Fur yellowish above, white underneath; ears short; tail with hardly any hair, somewhat longer than the body; without any tuft. Inhabits Canada, in the neighbourhood of Quebec

## Genus 15.—ASPALAX.—Desmarest.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{3-3}{3-3}$ ; total 16. Incisory teeth large; square at top and bottom; those in the under jaw twice the length of the upper ones; grinders with tuberculous crowns; body long, cylindrical; eyes very small, concealed by the skin; no external ears; feet short, with five toes; tail naked; fur short and soft.

*Aspalax typhlus*.—THE SPALAX.—Plate XVI\*. fig. 1.—Fur blackish ash colour at the base, reddish towards the point; head large and thick; the whole animal cylindrical; eyes concealed by the fur. About eight inches long. Inhabits Asia Minor, Syria, Mesopotamia, Persia, and Southern Russia. This is the mole of the ancients. There is a variety with irregular white spots.

Genus 16.—BATHYERGUS.—*Cuvier*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$  or  $\frac{3-3}{3-3}$ ; total 20 or 16. Incisory teeth very long, large, and square; grinders slightly tuberculous, indented on the edges; body thick and cylindrical; head thick; muzzle truncated; eyes small; no external ears; feet short, with five toes on each; nails formed for digging; tail very short.

*Bathyergus maritimus*.—COAST BATHYERGUS.—Plate XVI\*. fig. 2.—Fur whitish-gray; tail flat, covered with rough hairs; body above a foot long; tail about three inches. Inhabits the Cape of Good Hope.

Genus 17.—PEDETES.—*Desmarest*.—

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Lower incisory teeth cut obliquely, and not pointed; grinders formed of two elliptical parts, united at their external extremity, and separated above by a deep furrow; head short, large, and flat; muzzle obtuse, terminated by small nostrils set at right angles; ears long, narrow, and pointed; eyes large; no cheek pouches; whiskers large; fore feet with four toes, having long, narrow, digging nails; hind feet with four toes, the external ones very small, the intermediate of the other three much the longest, the rest being equal, all furnished with thick strong nails; tail long and thick. The females have an abdominal pouch, which does not inclose the teats.

*Pedetes Capensis*.—THE CAPE PEDETES.—Plate XVI\*. fig. 3.—Fur bright, fulvous, varied with black above, white underneath; with a line of the same colour in the folds of the arms; legs brown; tail thin, reddish above, near the insertion, gray below, and black at the end. Inhabits the Cape of Good Hope.

Genus 18.—ARCTOMYS.—*Geoffroy*.

*Generic Character*.—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{3-3}{3-3}$ , total 22. Incisors very strong; anterior surface rounded; upper surface of the grinders furnished with ridges and tubercles; head large; eyes large; ears short; body thick and heavy; paws strong; fore feet with four toes, and a rudimentary thumb; the hind feet with five toes; nails strong and compressed; tail generally short.



SUB-DIVISION I.—ARCTOMYS.—*M. F. Cuvier*.—Without cheek pouches. Habits social.

*Arctomys marmotta*.—THE ALPINE MARMOT.—Plate XV. fig. 7.—Described, vol. II. p. 311 and 318.

*Arctomys empetra*.—THE QUEBEC MARMOT.—Plate XV. fig. 8.—Fur blackish-brown, dotted with white above and red underneath; tail short, and black at the end. Inhabits Canada.—See vol. II. p. 316.

SUB-DIVISION II.—SPERMOPHILUS.—*M. F. Cuvier*.—With large cheek pouches. Habits solitary.

*Arctomys Franklinii*.—FRANKLIN'S MARMOT.—Plate XVI\*. fig. 4.—Fur fuscous and variegated; head broad; snout very blunt; ears small; tail elongated. Inhabits Canada.

Genus 19.—CAPROMYS.—*Desmarest*.

*Generic Character*.—Incisory teeth  $\frac{5}{2}$ , no canines, grinders  $\frac{5-5}{4-4}$ ; total 22. Upper incisors not very strong, transversely truncated at the extremity, and not furrowed on the anterior surface; the lower ones slightly tubulate, and very similar to the upper; head long, laterally compressed; tip of the snout truncated; ears large, erect, and lateral; body bulky; fore legs short; feet with four toes; hind legs long; teats four, two pectoral and two abdominal.

*Capromys Furnieri*.—THE UTIA, OR FOURNIER'S CAPROMYS.—Plate XV\*. fig. 4.—Fur rough, brown on the back of the neck, back, flanks and exterior surface of the limbs; each hair has a ring of yellowish colour towards the extremity; forehead, chin, and under part of the neck gray; rump reddish brown; belly brownish-gray; upper parts of the toes covered with scales, interspersed with hairs; neck short; tail naked, with about one hundred and fifty scaly rings; eyes situated near the line of the forehead. Size of a large rat. Inhabits the Island of Cuba.

Genus 20.—SCIURUS.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{5-5}{1-4}$ ; total 22. The upper incisory teeth are flat in front, and wedge-shaped at the extremity; the lower pointed and compressed laterally; grinders tubercular; head small; ears erect; eyes large; body small, elongated; anterior feet with four long toes,

and a tubercle instead of a thumb; the hind feet with five long toes, all furnished with long crooked nails; tail long, frequently very villose; two pectoral teats and six ventral.

\* Tail distichous.

*Sciurus vulgaris*.—THE COMMON SQUIRREL.—Plate XV. fig. 11.—Described, vol. II. p. 304.

*Sciurus Clarkii*.—CLARK'S SQUIRREL.—Plate XVI\*. fig. 5.—Fur silvery-gray above; shoulders, flanks, and belly, white, with an ochry tint; tail flat, terminating in a point. Inhabits North America.

\*\* Tail round, distichous only at the extremity.

*Sciurus æstuans*.—THE GUERLINGUET SQUIRREL.—Plate XVII\*\*. fig. 1.—Fur olive-gray, mixed with red above, pale red underneath; tail round, longer than the body.

\*\*\* Having cheek pouches, tail distichous.

*Sciurus striatus*.—THE STRIATED SQUIRREL.—Plate XVII\*\*. fig. 9.—Fur light brown above, with five longitudinal brown stripes, and two white ones; belly cream-coloured white; tail grayish-black above, chestnut, margined with black, beneath. Inhabits Southern Asia.

Genus 21.—PTEROMYS.—*Cuvier*.

*Generic Character*.—Incisive teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{5-5}{4-4}$ ; total 22. Head round; ears short and rounded; eyes large; fore feet with four elongated toes, furnished with sharp nails, and a rudimentary thumb, having an obtuse nail; hind feet with five long toes, much divided, and adapted for seizing; tail long, villose; skin of the sides extended from the anterior to the posterior extremities, forming a kind of parachute.

\* With the tail round, and hairs not distichous.

*Pteromys petaurista*.—THE SAILING PETAURISTA.—Plate XVI\*. fig. 6.—Fur chestnut colour, the hairs being tipped with white on the shoulders; whitish-gray underneath; thighs red; feet brown; tail blackish, and cylindrical. Inhabits India and the Islands.

\*\* With the tail depressed, and the hairs distichous.

*Pteromys Sibericus*.—SIBERIAN PTEROMYS.—Plate XV fig. 12.—Fur ash-gray above, white underneath; tail half the length of the body. About seven inches long. Inhabits Siberia, Finland, and Lapland.—This is the type of M. F. Cuvier's genus *Sciuropterus*.—See vol. II. p. 309, note.

SECTION II.—With imperfect clavicles, or none.

Genus 22.—HYSTRIX.—*Linnaeus*.

*Generic Character*.—Incisive teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. The grinders have flat tops, but furnished with ridges of enamel. Head strong, convex; muzzle thick; ears short and rounded; tongue furnished with spiny scales; fore feet with four toes, and the rudiment of a thumb; hind feet with five toes; the nails on all the feet are strong; body covered with spines, intermixed with strong hair; tail more or less long, sometimes prehensile.

M. F. Cuvier has divided this genus into five distinct genera.

*Hystrix cristata*.—THE CRESTED PORCUPINE.—Plate XVI. fig. 1.—Described, vol. II. p. 354, &c.

*Hystrix Cuandu*.—THE BRAZILIAN PORCUPINE.—Plate XVI. fig. 2.—Described, vol. II. p. 358, &c.

This is the type of M. F. Cuvier's genus *Sinæthere*.

Genus 23.—ATHERURA.—*Cuvier*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Head strong, forehead depressed, nearly straight from the occiput to the extremity of the nose; ears short, rounded; fore feet with four toes, and a rudimentary thumb; hind feet with five toes; nails strong; tail one-third the length of the body, covered throughout with scales, disposed in rings, tip surmounted by a tuft of long flat bristles.

*Atherura fasciculata*.—THE FASCICULATED PORCUPINE.—Plate XVI\*. fig. 7.—Upper parts of the body, outer sides of the limbs, head, neck, and face, dusky; under parts, and insides of the limbs, grayish-white, with a darker band crossing the breast, in front of the fore legs; covered with spines from the back of the head to the root of the tail; white at their base, and black towards their extremity; the upper surface of each with a deep

groove: whiskers very long. Length of the body one foot; tail five inches. Inhabits the Island of Fernando Po.

*Genus 24.*—CHINCHILLA.—*Bennet.*

*Generic Character.*—Incisory teeth  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-1}$ , total 20. The three anterior grinders of the upper jaw formed of three parallel bony portions, the third separated from the rest by a deep groove, with three alternating lines of enamel, and the fourth having an additional portion of bone and enamel; head round, eyes large; ears very large, broad, and rounded; fore feet with four toes, and a rudimentary thumb; hind feet also with four toes, three of them long, the middle more produced than the two lateral ones, the fourth, or external toe, very short, and placed far behind; claws short, and nearly hidden by tufts of hairs; tail half the length of the body, usually turned upwards.

*Chinchilla lanigera.*—THE CHINCHILLA.—Plate XVI\*. fig. 10.—Fur ash-gray and white, and exceedingly soft; ears large, being nearly as long as the head; eyes large and black; moustaches plentiful, and very long, the longest being twice the length of the head, some of which are black and others white. Length of the body nine inches, and tail five. Sits usually upon its haunches, the fore legs being shorter than the hind ones. Inhabits Chili and Peru.—See its history, vol. II. p. 542.

*Genus 25.*—LEPUS.—*Linnaeus.*

*Generic Character.*—Incisory teeth  $\frac{4}{2}$ , no canines, grinders  $\frac{6-6}{5-5}$ , total 28. The upper incisory teeth are placed in pairs, two wedge-shaped, with a longitudinal furrow in front, and two smaller ones immediately behind; the under incisory teeth square; grinders with flat crowns and transverse laminæ of enamel; ears and eyes large; fore feet with five toes, and the hind feet four, with slightly arched nails; all the feet are covered with hair; tail short, erect; teats from six to ten; the cæcum is very large.

*Lepus timidus.*—THE HARE.—Plate XVI. fig. 3.—Fur brownish-red and gray mixed; chin and belly white; ears black at the tips; tail black above and white underneath. About two feet in length. Inhabits Europe, and the northern and temperate parts of the old world.

*Lepus cuniculus*.—THE RABBIT.—Plate XVI. fig. 4.—Domestic variety. Fur white, variously clouded with black, brown, fawn-colour, or gray. The wild variety is gray and yellow mixed; reddish-brown about the neck, throat, and belly; tail brown above and white underneath. About sixteen inches long. Its original country supposed to be Africa; now spread over most parts of the world.

Genus 26.—LAGOMYS.—*Geoffroy*.

*Generic Character*.—Incisors  $\frac{4}{2}$ , no canines, grinders  $\frac{6-6}{5-5}$ ; total 28. The teeth and toes are similar to those of the *Lepus*; eyes moderately sized; ears rather short and rounded; hind legs about the same length as the fore ones; soles of feet with fur; without any tail; mammæ four or six; clavicles nearly perfect.

*Lagomys Alpinus*.—THE PIKA OR ALPINE HARE.—Plate XVI\*. fig. 8.—Fur reddish-yellow; ears and soles of the feet dark brown. About ten inches long. Inhabits the mountains of the old world.

Genus 27.—HYDROCHÆRUS.—*Cuvier*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 22. The incisory teeth without longitudinal furrow; the lower compressed and sharp; the grinders are laminous; muzzle compressed; eyes large; ears moderate and rounded; fore feet palmated with four toes; posterior with three; without any tail; two teats; hair scattered and bristly.

*Hydrochærus capybara*.—THE CAPYBARA.—Plate XVI\*. fig. 9.—Fur brown; head very large; nose broad, divided; nostrils distant; whiskers very long; neck very short; body short and thick; legs strong and short; feet large. About three feet long. Inhabits the banks of the larger rivers in South America.

Genus 28.—CAVIA.—*Desmarest*.

*Generic Character*.—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Body thick; muzzle short, compressed; eyes large; ears round; legs short; four toes on the fore feet, and three on the hind feet; not palmated; without a tail; teats two, ventral.

*Cavia Cobaya*.—THE COBAYA, OR GUINEA PIG.—Plate XVI. fig. 5.—Fur short, reddish-gray on the upper parts, paler beneath. Tame variety varied, with patches of black, fawn-

colour, and white; legs very short. Inhabits Brazil and Paraguay.

*Genus 29.—DASYPROCTA.—Illiger.*

*Generic Character.*—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Head somewhat elongated; forehead flat; eyes large; muzzle thick; fore feet with four toes, and a tubercle in place of a thumb; hind feet longer than those before, with three toes, and long strong nails; soles of the feet devoid of hair, and callous.

*Dasyprocta Acuti.*—THE AGOUTI.—Plate XVI. fig. 7.—Fur brown, sprinkled with straw-colour, and reddish, orange on the crupper; ears short; tail merely rudimentary. Body about two feet long. Inhabits South America.

*Genus 30.—CÆLOGENUS.—F. Cuvier.*

*Generic Character.*—Incisors  $\frac{2}{2}$ , no canines, grinders  $\frac{4-4}{4-4}$ ; total 20. Head obtuse, with cheek pouches; with five toes on all the feet; interior and exterior toes very short; nails strong, conical, and formed for digging; no tail, but in its stead, a naked tubercle; teats four, two pectoral and two inguinal.

*Cælogenus Sub-Niger.*—THE BROWN PACA.—Plate XVI. fig. 6.—Fur dark yellowish-brown above, paler on the sides, belly dirty white; sides spotted with white. Nearly two feet long. Inhabits South America.

ORDER VII.—EDENTATA.

No incisory teeth in either jaw; some genera have canines, but others have grinders alone; various genera are toothless; toes varying in number, and generally furnished with large nails; orbits of the skull and temporal fossæ united.

The food of this order is various. Some of the genera feed on vegetable substances; while others live on flesh and insects. Their habits are also various; but they are in general more or less inactive.

TRIBE I.—TARDIGRADA.

The face is short; having grinders and canine teeth, or grinders only; feet furnished with long and bent nails.

Genus 1.—BRADYPUS.—*Linnaeus*.

*Generic Character*.—No incisory teeth, canines  $\frac{1-1}{1-1}$ , grinders  $\frac{4-4}{3-3}$ ; total 18. Canines larger than the grinders, pyramidal, and pointed; grinders cylindrical; head small, muzzle truncated, neck short; nostrils at the extremity of the muzzle; fore legs longer than the hind ones, with two or three toes furnished with strong nails; fur thick, harsh, and long; intestines short; no cæcum; stomach membranous.

*Bradypus tridactylus*.—THE THREE-TOED SLOTH.—Plate XVI. fig. 8.—Fur gray, coarse, usually spotted on the back with brown or white; all the feet with three long curved nails; soles of the feet covered with hair. Size of a fox. Inhabits South America.

This is the type of F. Cuvier's genus *Acheus*.

Genus 2.—MEGATHERIUM.—*Cuvier*.*Fossil*.

*Generic Character*.—No incisors or canine teeth, grinders  $\frac{4-4}{4-4}$ ; total 16.

*Megatherium Cuvieri*.—Grinders with transverse furrows on their crowns. Body twelve feet long. Found fossil in Paraguay, South America.

No living species of this genus have been discovered.

## TRIBE II.—EFFODIENTIA, OR DIGGING EDENTATA.

Muzzle generally elongated; with grinders only, or destitute of teeth.

Genus 3.—DASYPUS.—*Linnaeus*.

*Generic Character*.—No incisory teeth, or  $\frac{2}{4}$ ; no canines: teeth varying exceedingly in the dentary formula; some having 28, while they extend in others to 68; these teeth are cylindrical and separate, without enamel on the inner side. Head long, mouth and eyes small; tongue partially extensible; body enveloped in shelly plates, which also cover the upper part of the head, and entire tail, with moveable transverse bends between them; fore feet with four to five toes, hind feet with five toes; nails long, formed for digging; tail long, round; stomach simple, intestines without a cæcum.

SECTION I.—Four toes on the fore feet; two or four teats.

*Dasypus Apar.*—THE THREE-BANDED ARMADILLO.—Plate XVI\*. fig. 11.—With three moveable transverse bands on the body; tail short and flat; with five toes on fore and hind feet; grinders  $\frac{8-8}{3-3}$ ; two pectoral teats. Inhabits Brazil and Paraguay.

This is the type of F. Cuvier's genus *Tatuses*.

SECTION II.—With five toes on the fore feet, and two pectoral teats.

*Dasypus sexcinctus.*—THE SIX-BANDED ARMADILLO.—Plate XVI. fig. 9.—Incisive teeth  $\frac{2}{4}$ , grinders  $\frac{8-8}{8-8}$ . Having six or seven moveable transverse bands; belly covered with long hairs; tail round, half the length of the body; feet with five toes. Inhabits Paraguay.—See the TATOU, vol. II. p. 367.

This is the type of F. Cuvier's genus *Tatous*.

Genus 4.—ORYCTEROPUS.—*Geoffroy.*

*Generic Character.*—Without incisive or canine teeth; grinders  $\frac{6-6}{6-6}$ , separate, formed of a bony substance, traversed longitudinally, by a number of parallel tubes; head elongated; fore feet with four toes; hind feet with five toes, and plantigrade; nails strong, shaped like hoofs. The tarsi and metatarsi very like those of the Pachydermata.

*Orycteropus Capensis.*—THE CAPE ANT-EATER.—Plate XVII\*. fig. 1.—Fur pale gray, approaching to lead colour, and inclining to red on the flanks; feet deep brown. Three feet five inches long. Inhabits the Cape of Good Hope.

Genus 5.—MYRMECOPHAGA.—*Linnaeus.*

*Generic Character.*—Perfectly toothless; head elongated; muzzle tapering to a point; tongue protractile; toes united to the root of the nails, four before and five behind, or two before and four behind; furnished with strong nails formed for digging: two pectoral teats and two ventral; tail sometimes prehensile.

*Myrmecophaga jubata.*—THE GREAT ANT-EATER.—Plate XVII. fig. 1.—Described, vol. II. p. 532, &c.

Genus 6.—MANIS.—*Linnaeus.*

Destitute of teeth; body elongated, covered with strong



cornicous, triangular, imbricated scales; muzzle pointed; tongue protractile; feet with five toes, formed for digging; tail long, tapering, covered with scales, somewhat prehensile.

*Manis crassicaudata*.—THE PANGOLIN, OR SHORT-TAILED MANIS.—Plate XVII. fig. 2.—Described, vol. II. p. 360.

Genus 7.—CHLAMYPHORUS.—*Harlan*.

*Generic Character*.—No incisory or canine teeth, grinders  $\frac{8-8}{8-8}$ ; total 32. The two first pointed, the others flat at top, and cylindrical in form; shell composed of a series of transverse plates; five toes on the fore feet, and five on the hind ones, with long laterally compressed nails; tail short and prehensile; lower jaw articulated nearly in the same manner as the Pachydermata.

*Chlamyphorus truncatus*.—THE TRUNCATED CHLAMYPHORUS. Plate VI\*\*. fig. 4.—Body covered with a leather-like shell, abruptly truncated behind, and with white silky hair underneath; tail short, and bent under the abdomen. Length about five inches. Inhabits North America.

TRIBE III.—MONOTREMA.—No teats observable; with marsupial bones.

Genus 8.—ECHIDNA.—*Cuvier*.

*Generic Character*.—Destitute of teeth, but with the palate aculeated; muzzle flat, narrow, and small; tongue protractile; eyes small; no external ears; feet short, with five toes; a moveable sharp-pointed spur on the hind legs, through which an acrid secretion is ejected; tail short; body covered with spines; large marsupial bones. Body capable of a spherical shape.

*Echidna hystrix*.—THE SPINY ECHIDNA.—Plate XVII\*. fig. 2.—Upper part of the body covered with thick spines, without hairs; under part with bristly hair, and deep brown spines, tipped with black. About the size of a hedge-hog. Inhabits New Holland.

Genus 9.—ORNITHORYNCHUS.—*Blumenbach*.

*Generic Character*.—No incisory or canine teeth, grinders  $\frac{2-2}{2-2}$ ; total 8. Grinders fibrous, fixed only in the gum; having a horny beak, resembling a duck's bill; nostrils contiguous,

opening at the end of the upper mandible; cheek pouches; feet webbed, having five toes, with a spur on the hind ones in the male; tail short, broad at the base.

*Ornithorynchus rufus*.—THE DUCK-BILLED PLATYPUS.—Plate XVII\*. fig. 3.—Described, vol. II. p. 399.

## ORDER VIII.—PACHYDERMATA.

This order is so named from the thickness of the skin of the animals which compose it. They have two or three kinds of teeth. The four extremities furnished with the toes, variable in number, and terminated with strong nails or hoofs. They have no clavicles; and the organs of digestion are not formed for ruminating.

### FAMILY PROBOSCIDEA.

The upper incisory teeth are in the form of elongated tusks; grinders are compound, and small in number; with five toes on all the feet; nose prolonged into a proboscis or trunk.

#### *Genus 1.*—ELEPHAS.—*Linnæus*.

*Generic Character.*—Incisory teeth  $\frac{2}{0}$ , no canine teeth, grinders  $\frac{2-2}{2-2}$ ; total 10. The incisive teeth are enormously elongated, and termed husks, which taper, and are bent upwards towards their extremities, composed of ivory incased in a crust of enamel; the grinders are composed of vertical and transverse laminae; feet with five toes on each; nose elongated into a cylindrical proboscis, moveable in all directions, with an elongated finger-like member at its tip, which has the power of grasping; head very large; ears large and flat; neck very short; tail medium length, furnished with a tuft of hair; two teats. Nasal fossæ greatly elevated.

*Elephas Indicus.*—THE INDIAN ELEPHANT.—Plate XVII. fig. 3.—Described, vol. II. p. 457.

#### *Genus 2.*—LOXODONTA.—*F. Cuvier*.

*Generic Character.*—Incisory teeth or tusks  $\frac{2}{0}$ , no canine teeth, grinders  $\frac{2-2}{2-2}$ ; total 10. The enamel is disposed in lozenges; head small, round; neck very short; ears very large; tail short; proboscis very thick at the base, and small at the point, where

it is furnished with a moveable finger-like process, fitted for grasping; feet with five toes on the fore feet, and four on the hind ones.

*Loxodonta Africanus*.—THE LOXODON, OR AFRICAN ELEPHANT.—Plate XVII\* fig. 7.—Described, vol. II. p. 459.

Genus 3.—MASTODON.—Cuvier.

*Fossil.*

*Generic Character*.—Incisive teeth  $\frac{2}{0}$ , no canines, grinders  $\frac{2-2}{2-2}$ ; total 10. Grinders rectangular, without cortical substance, the crowns with points disposed in pairs, varying in number.

*Mastodon giganteum*.—THE MAMMOTH.—Plate XVII\*. fig. 4.—Described, vol. II. p. 487.

FAMILY II.—TRUE PACHYDERMA.

Most of them with three kinds of teeth; two, at least, in others; feet with four or two toes.

Genus 4.—HIPPOPOTAMUS.—Linnaeus.

*Generic Character*.—Incisors  $\frac{4}{4}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{7-7}$ ; total 40. Upper incisive teeth thick, short, and conical, bent inward, the lower ones cylindrical, directed obliquely forward, the intermediate being the strongest; the canines greatly developed, forming strong tusks, which are obliquely truncated; the three or four first grinders are conical and simple; head thick and square; muzzle large and obtuse; eyes and ears very small; body very thick and heavy; legs short; feet with four toes; with two ventral mammae; skin without hair; tail short, with hairs near its point.

*Hippopotamus amphibius*.—THE HIPPOPOTAMUS.—Plate XVII. fig. 4.—Described, vol. II. p. 114.

Genus 5.—SUS.—Linnaeus.

*Generic Character*.—Incisors  $\frac{4}{6}$  or  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{7-7}$ ; total 42 or 44. The lower incisive teeth directed obliquely forward, the upper ones conical; the canines protruded, and bent upwards; grinders simple and tuberculous; nose elongated, cartilaginous, and furnished with a particular bone to the snout; feet with four toes, the two middle ones only touching the

ground, furnished with strong hoofs; body covered with bristles; mammæ twelve.

*Sus scrofa*.—THE HOG.—Plate XVIII. fig. 2.—Described, vol. II. p. 114.

THE WILD BOAR.—Fig. 1.—Described, vol. II. p. 112.

*Sus babyrussa*.—THE BABYROUSSA.—Plate XVIII. fig. 4.—Described, vol. II. p. 127.

Genus 6.—PHASCOCHÆRUS.—Cuvier.

*Generic Character*.—Incisors  $\frac{2}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{5-5}{4-4}$ ; total 30. The two intermediate incisive teeth smaller than the others; canines very large, strong, and erect; grinders composed of cylinders of enamel which envelope the osseous substance; cheeks with large warts or excrescences; toes like the sus.

*Phascochærus Africanus*.—THE ÆTHIOPIAN BOAR.—Plate XVIII. fig. 3.—Hair of a bright yellow or sand colour; tusks round, very thick, directed laterally and vertically; with a large fleshy lobe on each cheek.

Genus 7.—DICOTYLES.—Cuvier.

*Generic Character*.—Incisive teeth  $\frac{4}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{6-6}{6-6}$ ; total 38. Canines or tusks projecting from the mouth; a vacant interval in the upper jaw before the canines, into which the under teeth enter; the two lower outer canines smaller, separated from the intermediate ones by a vacant space; fore feet with four toes; hind feet with three, only two of which rest upon the ground; on the back a glandular opening, from which exudes a fetid humour; a tubercle in place of a tail.

*Dicotyles Sub-Niger*.—THE COLLARED PECCARY.—Plate XXI\*. fig. 1.—Hair yellowish-gray, each bristle having alternate rings of straw-colour and black; a black mane extends from the ear to the rump; face yellowish, grizzled; nose projecting considerably, very moveable; a yellow line runs from the mane across the shoulders, and terminates in the breast; ears very short and pointed. Length three feet. Inhabits South America.

DIVISION II.—Toes mostly unequal in number on the hind feet, and frequently so on the fore feet.

## Genus 8.—ANOPLOTHERIUM.—Cuvier.

## Fossil.

*Generic Character.*—Incisors  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , molars  $\frac{7-7}{7-7}$ ; total 44. Teeth all in one line; general form supposed to be intermediate between the rhinoceros and horse; feet with two toes; grinders arranged in uniform lines.

*Anoplotherium vulgaris.*—THE GREATER ANOPLOTHERIUM.—Plate XVII\*\*, fig. 5.—Represents the supposed shape of the animal, judging from the structure of the bones.

## Genus 9.—RHINOCEROS.—Linnaeus.

*Generic Character.*—Either no incisory teeth, or  $\frac{2}{2}$  or  $\frac{1}{1}$ ; destitute of canines; grinders  $\frac{7-7}{7-7}$  or  $\frac{6-6}{6-6}$ ; total 32. The incisors are unequal among themselves, when they exist; the anterior canines small; posterior ones progressively increasing; eyes small, lateral, and placed far back; as are also the ears, which are long and narrow; nose with one or two erect inflected horns; feet with three toes; tail short, laterally compressed near the end; skin very thick, naked, and rugose; mammæ two.

*Rhinoceros Indicus.*—THE INDIAN RHINOCEROS.—Plate XVIII. fig. 5.—Described, vol. II. p. 488.

*Rhinoceros Africanus.*—THE AFRICAN RHINOCEROS.—Plate XVIII. fig. 6.—Described, vol. II. p. 493.

## Genus 10.—HYRAX.—Hermann.

*Generic Character.*—Incisors  $\frac{2}{4}$ , no canines, grinders  $\frac{7-7}{6-6}$ ; total 32. Incisors large and bent, with a vacant space between them and the grinders; anterior grinders in the upper jaw, with flat crowns, the others slightly concave; posterior lower grinders having a transverse central ridge on the crown; fore feet with four or three toes; hind feet with four toes; nails small and flat; head large, round; muzzle short; nostrils oblique; ears large and rounded; eyes small; no tail; fur of two kinds, short and woolly, and long and silky; six mammæ, two pectoral and four ventral.

*Hyrax Capensis.*—THE CAPE HYRAX.—Plate XXI\*\*, fig. 2.—Fur grayish-brown above, whiter underneath; inside of the ears white; four toes on all the feet. Length about two feet six inches; height eight inches. Inhabits the Cape of Good Hope. This is the Coney of the Sacred Writings.

## Genus 11.—PALÆOTHERIUM.—Cuvier.

## Fossil.

*Generic Character*.—Incisors  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{7-7}$ ; total 44. Incisors wedge-shaped and parallel; canines conical, crossing each other; grinders square, with four roots, ridged with enamel, separated from the canines by a vacant space; general form of the skull like that of the Tapir.

\* PALÆOTHERIA.—Lower grinders set in double crescents.

*Palæotherium medium*.—Size of the wild boar; feet long and slender.

\*\* LOPHIDON.—Lower grinders with transversely ridged crowns.

*Palæotherium giganteum*.—Eight feet long. Found in alluvial formations in the neighbourhood of Paris.

## Genus 12.—TAPIRUS.—Cuvier.

*Generic Character*.—Incisive teeth  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , grinders  $\frac{7-7}{6-6}$ ; total 42. Intermediate incisors shorter than the exterior; a void between both the incisors and the canines and grinders; nose elongated, forming a small moveable proboscis, but not prehensile like that of the Elephant; eyes small; ears long and mobile; fore feet with four toes; hind feet with three; all the toes are provided with short round hoofs; tail very short; two inguinal mammæ.

*Tapirus Americanus*.—THE AMERICAN TAPIR.—Plate XVIII. fig. 7.—Described, vol. II. p. 528.

## FAMILY III.—SOLIDUNGULA.

With three kinds of teeth; only one visible toe, and a strong hoof on each foot.

## Genus 13.—EQUUS.—Linnaeus.

*Generic Character*.—Incisors  $\frac{6}{6}$ , canines  $\frac{1-1}{1-1}$ , which are wanting in the females of some species, grinders  $\frac{6-6}{6-6}$ ; total 40. The grinders are furrowed on each side with flat crowns, and several ridges of enamel; between the canines and grinders a vacant space; upper lip capable of considerable motion; eyes large; ears rather large, pointed and erect; feet with a single visible

toe, covered with strong hoofs; tail with long hair, or in some species with a tuft at its extremity; two inguinal teats; stomach simple and membranaceous; intestines and cæcum very large.

*Equus Caballus*.—THE HORSE.—Plate XIX fig. 1 and 2.—Described, vol. I. p. 466.

*Mulus*.—THE MULE.—Plate XIX. fig. 3.—Described, vol. I. p. 507.

*Equus asinus*.—THE ASS.—Plate XIX. fig. 4.—Described, vol. I. p. 499.

*Equus zebra*.—THE MOUNTAIN ZEBRA.—Plate XX. fig. 1.—Described, vol. II. p. 509.

## ORDER IX.—RUMINANTIA.

Having three kinds of teeth; destitute of incisory teeth in the upper jaw, with usually eight in the lower one, which are opposed to a callosity on the upper gums. In some species there are canines in the upper jaw, and others have them in both jaws; grinders, twelve in each jaw, marked with two double crescents of enamel on their crowns, of which the convexity is outwards in the lower, and internal in the upper jaw; articulations of the jaw, adapted for a triturating motion; without clavicles; limbs disposed for walking; feet with two hoofed toes; metacarpal and metatarsal bones united; organs of digestion calculated for ruminating, consisting of four stomachs; intestines long; from two to four inguinal mammæ; males always with horns, and also the females in most species.

The food of the Ruminantia consists always of vegetables. They embrace a wide geographical range.

The order is divided into five tribes.

### TRIBE I.—CAMELIDÆ.

Without horns, or succentorial hoofs; feet with horny soles; toes covered with nails; canines in both sexes.

#### Genus I.—CAMELUS.—*Linneus*.

*Generic Character*.—Incisory teeth  $\frac{2}{6}$ , canines  $\frac{1-1}{1-1}$ , false grinders  $\frac{1-1}{1-1}$ , true grinders  $\frac{5-5}{5-5}$ ; total 36. Inferior grinders in the form of cutting wedges; the superior ones lateral; canines conical, strong, and erect. false grinders on each side of the inter-

dentary space ; head long ; nostrils slit obliquely, and closing at will ; upper lip cleft ; eyes large, projecting ; ears small ; neck very long, bent ; feet with toes only free ; back with one or two callous fleshy hunches ; breast with callosities, and flexures on the extremities ; hair woolly ; tail medium length ; four ventral mammæ.

*Camelus Bactrianus*.—THE BACTRIAN CAMEL.—Plate XXI. fig. 1.—Described, vol. II. p. 501.

*Camelus dromedarius*.—THE DROMEDARY, OR ARABIAN CAMEL.—Plate XXI. fig. 2.—Described, vol. II. p. 502.

Genus 2.—AUCHENIA.—*Illiger*.

*Generic Character*.—Incisors  $\frac{2}{0}$ , canines  $\frac{1-1}{1-1}$ , false grinders  $\frac{1-1}{0-0}$ , true grinders  $\frac{5-5}{5-5}$  ; total 32. Teeth resembling those of the Camel ; muzzle not much produced ; upper lip cleft ; eyes large and brilliant ; ears long, pointed, and mobile ; neck slender, vertical ; feet with two toes, provided with crooked nails ; soles of the feet callous ; breast and knees with callosities ; tail short ; two ventral mammæ.

*Auchenia glama*.—THE LLAMA.—Plate XXI. fig. 3.—Described, vol. II. p. 511.

TRIBE II.—CERVIDÆ.

Feet bisulcated and destitute of horns ; males with canines in the upper jaw.

Genus 3.—MOSCHUS.—*Linnaeus*.

*Generic Character*.—Incisors  $\frac{0}{8}$ , canines  $\frac{1-1}{0-0}$  in the males, grinders  $\frac{6-6}{6-6}$  ; total 34. Canines wanting to the females. Incisors and grinders as in other ruminating animals. Superior canines large in the males ; ears long, pointed ; body slender ; feet with cleft hoofs, enveloping the last phalanges ; tail very short ; two inguinal mammæ ; no horns.

*Moschus moschiferus*.—THE THIBET MUSK.—Plate XXI. fig. 3.—Described, vol. II. p. 57, &c.

*Moschus memminna*.—THE CEYLON MUSK, OR MEMMINNA.—Plate XXI. fig. 4.—Described, vol. II. p. 49.

*Moschus pygmaeus*.—THE PIGMY MUSK, OR CHEVROTAIN.—Plate XXI. fig. 5.—Described, vol. II. p. 49.



Genus 4.—CERVUS.—*Linnaeus*.

*Generic Character*.—Incisors  $\frac{0}{8}$ , no canines, or  $\frac{1-1}{0-0}$ , grinders  $\frac{6-6}{6-6}$ ; total 32 or 34. The canines, when they exist, are bent back and compressed; head long, terminated by a muzzle; eyes large, pupils elongated transversely; most of the species have a lachrymal sinus; ears long and pointed; tongue soft; horns solid, deciduous, palmated, branched, or simple, in the males; females destitute of horns, except in one species; four inguinal mammæ.

*Sub-Genus 1*.—ALCE.—HORNS united into one blade or palm, more or less indented; no muzzle, nor canines; tail very short.

*Cervus alces*.—THE ELK.—Plate XXI. fig. 6.—Described, vol. II. p. 91, 92, &c.

*Sub-Genus 2*.—RANGIFER.—Both sexes have horns; palmated or pointed at the brow, bezantlers, and at top; incipient muzzle; canines in both sexes.

*Cervus tarandus*.—THE REIN-DEER.—Plate XXI. fig. 7.—Described vol. II. p. 97, &c.

In the background of the plate is represented the Laplander's sledge, which these useful animals draw.

*Sub-Genus 3*.—DAMA.—HORNS round, with brow bezantler pointed; summit palmated length-ways; no canines; with a muzzle.

*Cervus dama*.—THE FALLOW-DEER.—Plate XXII. fig. 3.—Described, vol. II. p. 82.

*Sub-Genus 4*.—ELAPHUS.—HORNS round; three antlers turned to the front; summit terminating in a fork or in snags from a common centre; having a suborbital sinus; canines in the males; and with a muzzle.

*Cervus elaphus*.—THE STAG.—Plate XXII. fig. 1.—Described, vol. II. p. 62.

*Sub-Genus 5*.—RUSA.—HORNS trifurcate, with a basal but no medium antler; beam terminating in a perch, with one process or snag on the anterior or posterior side of the beam, and forming a fork; muzzle broad; suborbital slit deep; having

canines, sometimes even in the females; neck with a mane; colours generally dark.

*Cervus Equinus*.—THE MALAYAN RUSA.—Plate XXI. fig. 8.—Fur dark-brown, with an orange-coloured disc on the buttocks; horns robust, pearly; basal antler on the burr; terminal bifurcated from the internal posterior side of the beam; points obtuse; suborbital opening very large, moveable, admitting air; heavy mane covering the sides of the neck and throat; suture large; canines in both sexes. Inhabits Java and Sumatra.

*Sub-Genus 6*.—AXIS.—Horns similar to the former, but more slender; no canines; suborbital opening small, or none; usually spotted with white; no mane; tail down to the houghs.

*Cervus axis*.—THE AXIS.—Plate XXII. fig. 2.—Described, vol. II. p. 80.

*Sub-Genus 7*.—CAPREOLUS.—Horns somewhat allied to the former; a small antler to the front, high upon the beam; the superior one turned to the rear, and forms a somewhat flattened fork; destitute of canines, and lachrymary sinus; tail very short.

*Cervus capreolus*.—THE ROEBUCK.—Plate XXII. fig. 4.—Described, vol. II. p. 86.

*Sub-Genus 8*.—MAZAMA.—Horns having a tendency to flatten, bending into segments of a circle, the concave part to the front; one anterior antler, the other posterior and mostly vertical; tail long; suborbital sinus forming a fold of the skin; having a muzzle, but no canines.

*Cervus paludosus*.—THE GUAZUPACO DEER.—Plate XXII\*. fig. 2.—Fur red-bay above, in summer, and approaching to gray in winter; white below; the hair of the inguinal parts, and under the tail, long and white; with a black triangle on the forehead; horns rather large, cylindrical, terminated by a fork; with a branch above the burr, pointing forward and upwards, sometimes bifurcate; lachrymal sinus considerably developed; tail middling. Size of a stag. Inhabits Paraguay, in swampy places.

*Sub-Genus 9*.—SUBULO.—Horns small, simple, without

branches or processes; lachrymal sinus small; muzzle widening to a glandular termination, near the nostril.

*Cervus rufus*.—THE PITA BROCKET.—Plate XXII\*\*, fig. 4.—Fur lively reddish-bay; face and feet rufous; lips and chin white; head pointed, muzzle small above; small lachrymal sinus; male with canines; horns about five inches long. Somewhat higher than the roebuck. Inhabits South America, south of Honduras, and Paraguay.

*Sub-Genus 10*.—STYLOCERUS.—Horns small, with only one anterior snag standing upon elevated pedicles; canines long in most of the males; suborbital sinus deep; muzzle small.

*Cervus montjac*.—THE SUMATRA MUNTJAK.—Plate XXII\*\*, fig. 3.—Fur gray-brown, paler below; horns very short, upon pedicles, bent inwards, with a little rudimentary antler at the base, pointing forwards; pedicles prolonged in the form of ribs, down to the nose; male with two superior canines. Size of a roebuck. Inhabits India.

### TRIBE III.—GIRAFFIDÆ.

Frontal processes prolonged in the shape of horns, covered with hairy skin, in both sexes.

#### *Genus 5*.—CAMELOPARDALIS.—*Linnaeus*.

*Generic Character*.—Incisors  $\frac{6}{6}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Head very long, with a bony sub-conic tubercle on the forehead, and two osseous peduncles covered with skin, and hairy, terminated by a tuft of bristles; upper lip entire; no lachrymal sinuses; ears pointed; tongue rough, with corneous papillæ; eyes large, prominent; neck extremely long, erect; withers greatly elevated; legs slender, feet large, cleft; a callosity on the sternum; four mammæ.

*Camelopardalis giraffa*.—THE GIRAFFE.—Plate XXII. fig. 5.—Described, vol. II. p. 499.

### TRIBE IV.—CAPRIDÆ.

Horns persistent, generally annulated, having the prominences of the frontal bone covered with a horny case.

*Genus 6.* — ANTILOPE. — *Cuvier*.

*Generic Character.*—Incisors  $\frac{0}{8}$ ; no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Horns common to both sexes, or in the male only; bony core round and solid, sometimes compressed, generally standing beneath the frontal crest; variously inflected, for the most part with annulations, or a projecting spiral ridge, in some species bifurcated; with a muzzle, half muzzle, or simple nostrils; lachrymal sinus in most species; eyes large; ears generally long, pointed; with inguinal pores; legs slender; two or four teats.

*Antelope cervicapra.* — THE COMMON ANTELOPE. — Plate XXII. fig. 6. — Described, vol. II. p. 50.

*Sub-Genus 1.* — GAZELLA. — Horns, with double flexures, lyre form, annulated, without ridges in either sex.

*Antelope Euchore.* — THE SPRINGBOK. — Plate XXI\*. fig. 4. — Described, vol. II. p. 50.

*Sub-Genus 2.* — CERVICAPRA. — Horns simple, having no annulations, or ridges; some species, however, have a few.

## SUB-DIVISION I. — With horns pointing forward.

*Antelope eleotragus.* — THE RIETBOK. — Plate XXI\*. fig. 5. — Fur ash-gray, tinged with ochre, white beneath; hair on the throat and breast long, of a cream white; horns black, slightly bent forward, nine or ten inches long; tail about ten inches. Four feet and a half long. Inhabits Caffraria.

## SUB-DIVISION II. — Horns erect.

*Antelope quadriscopa.* — THE FOUR-TUFTED ANTELOPE. — Plate XVII\*. fig. 6. — Fur yellowish-gray, white beneath; legs slender, with tufts of hair on the knees and hind legs; horns four inches long, reclining, diverging, and pointed, with six or seven small annulations at their base. Size of the roebuck. Inhabits Africa.

## SUB-DIVISION III. — Horns bent back.

*Sub-Genus 3.* — ALCELAPHUS. — Horns annulated, and with double flexures; in neither sex are they ridged; no inguinal pores, but with lachrymal sinuses.

*Antelope caama*.—THE HARTBEEST.—Plate XXI\*. fig. 6.  
—Described, vol. II. p. 55, &c.

*Sub-Genus 4.*—TRAGELAPHUS.—Horns spiral, more or less compressed, with ridges in both sexes, or in the males only; lachrymal sinuses sometimes wanting.

*Antelope scripta*.—THE HARNESSSED ANTELOPE.—Plate XXIII. fig. 8.—Fur bright fulvous bay; sides with two white transverse and longitudinal bands; horns seven inches long, reclining. Four feet eight inches long. Inhabits Senegal.

*Sub-Genus 5.*—ORYX.—Horns large, erect, and pointed in both sexes, with a slight curvature backwards; annulated; having lachrymal sinuses; tail tufted.

*Antelope leucoryx*.—THE WHITE ORYX.—Plate XXI\*. fig. 8.—Fur white; a black triangular spot on the forehead, and another lozenge-shaped one on the nasal ridge, and a third through the eyes; and a transverse brown fillet above the knee joints in the fore legs; mane short and brown; tail with a tuft at its point. Size of a small horse. Inhabits Arabia and Persia.

*Sub-Genus 6.*—EGOCERUS.—Horns very large, strong, and pointed, bent backwards; annulated; a semimuzzle; no sub-orbital process; tail pretty long.

*Antelope leucophaea*.—THE BLUE ANTELOPE.—Plate XXI\*. fig. 9.—Fur silver-gray; mane short, white, and turning towards the head; tail with a tuft at the end; horns slightly compressed, scimitar-shaped, twenty inches long, very closely annulated; ears long. Nearly six feet long. Inhabits Southern Africa.

*Antelope equina*.—THE ROAN ANTELOPE.—Plate XVII\*. fig. 5.—Fur coarse grayish-brown; a white spot round the eye, which is formed of long hairs; horns very strong, about twenty-four inches long; reflected with upwards of twenty prominent annulations. Inhabits Southern Africa.

*Sub-Genus 7.*—RUPICAPRA.—With simple, vertical, round and striated horns, strongly bent backwards towards the point in both sexes; no lachrymal processes or inguinal pores; tail very short; mammae two.

*Antilope rupicapra*.—THE CHAMOIS.—Plate XXIII. fig. 3.  
—Described, vol. II. p. 32.

*Sub-Genus 8.*—ANTILOCAPRA.—Horns compressed, posteriorly hooked towards the point, and provided with an anterior antler.

*Antilope furcifer*.—THE PRONG-HORNED ANTELOPE.—Plate XVII\*. fig. 4.—Fur rufous-brown above, white below; neck with a red mane; horns one foot long, compressed, flat interiorly and striated; with a flattened snag to the front, forking with the after part, which forms a hook to the rear; eyes large, high in the head. About three feet high at the shoulder. Inhabits the United States.

*Genus 7.*—CAPRA.—*Linnæus*.

*Generic Character.*—Incisors  $\frac{9}{8}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Horns common to both sexes; they rise perpendicularly, and are then directed backwards, more or less angular and nodose; no muzzle; interval between the nostrils naked; without lachrymal sinus, or inguinal pores; ears erect, pointed; legs strong; tail short; chin with a beard.

*Capra ibex*.—THE IBEX.—Plate XXIII. fig. 4.—Hair reddish-brown in summer, and gray in winter; beard short, dark brown; dorsal line blackish brown; horns thirty inches long, dark brown, depressed, with two longitudinal ridges at the sides, crossed by numerous transverse knotty annulations. Five feet long. Inhabits the Alps and Pyrenées.

*Capra agagrus*.—THE GOAT.—Plate XXIII. fig. 5.—Described, vol. II. p. 24.

*Variety.*—THE ANGORA GOAT.—Plate XXIII. fig. 6.—Described, vol. II. p. 24.

*Variety.*—THE SYRIAN GOAT.—Plate XXIII. fig. 7.—Described, vol. II. p. 28.

*Genus 8.*—OVIS.—*Linnæus*.

*Generic Character.*—Incisors  $\frac{9}{8}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Horns common to both sexes, sometimes wanting in the female; thick, angular, wrinkled transversely, pale-coloured, turned laterally and spirally; ears small; legs slender; hair of two kinds; tail more or less short; having two inguinal mammæ.

*Ovis aries*.—THE SHEEP.—Plate XXIV. fig. 1.—Described, vol. II. p. 1.

*Variety*.—THE WALLACHIAN SHEEP.—Plate XXIV. fig. 3.—Described, vol. II. p. 19.

*Variety*.—THE TARTARIAN SHEEP.—Plate XXIV. fig. 2.—Described, vol. II. p. 17.

*Ovis musmon*.—THE MUSMON.—Plate XXIV. fig. 4.—Described, vol. II. p. 20.

*Genus 9*.—DALMALIS.—*Smith*.

*Generic Character*.—Incisors  $\frac{0}{3}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Horns common to both sexes, or found in the males only, nearly straight, with a long spiral ridge; without lachrymal sinuses; head heavy; neck short; spinous process of the first vertebrae of the back mostly elevated, and croup generally depressed; body bulky; dew-laps on the breast; tail long, tufted.

These Major Smith divides into the following Sub-Genera:—1. *Acronotus*. 2. *Boselaphus*. 3. *Strepsiceros*. 4. *Portax*. Two and three we do not think sufficiently distinct for Sub-Genera.

*Dalmalis oreas*.—THE IMPOFO.—Plate XXII\*. fig. 5.—Fur grayish-fawn colour; horns black, thick, diverging; with a strong ridge; having a small mane on the neck; dewlap with long hairs. Eight feet long. Inhabits Southern Africa. This is an example of Sub-Genus 2.

*Sub-Genus 4*.—PORTAX.—Horns in the males only, placed on the sides of the frontal crest; short, robust, sub-angular, without annulations; a complete muzzle; deep suborbital sinus; elevated shoulders; croup depressed; body bulky and short; neck with a mane; throat with a tuft of hair; small dewlap.

*Dalmalis picta*.—THE NYL-GHAU.—Plate XXIII. fig. 1.—Described, vol. II. p. 516.

TRIBE V.—BOVIDÆ.—*Smith*.

Horns persistent, common to both sexes, forming a sheath upon a bony nucleus, increasing by rings at the base, horns round, without annulations, striæ, or ridges, never straight, but bending outwards or forwards from their base; muzzle broad

naked; no lachrymal sinuses; neck short; breast with dewlaps; vertebræ of the tail frequently prolonged beyond the houghs; no inguinal pores; females with an udder; with from two to four teats.

*Genus 10.*—*CATOBLEPAS.*—*Smith.*

*Generic Character.*—Incisors  $\frac{0}{8}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Head square; horns flat, and broad at base, nearly joining on the crest of the frontals; lying outwards, turning down, with the points turning upwards; muzzle broad; nostrils provided internally with a moveable valve; glandulous excrescence on the cheeks; neck with a mane; throat with a beard; dewlap small; bristles round the orbits and on the lips; a ridge of hair on the forehead; tail hairy as in the horse.

*Catoblepas gnu.*—*THE GNU.*—Plate XXIII. fig. 2.—Described, vol. II. p. 54.

*Genus 11.*—*OVIPOS.*—*Elainville.*

*Generic Character.*—Incisors  $\frac{0}{8}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Body thick, compact; legs short; forehead broad, flat; face elevated; no muzzle; horns close at base, turned downwards, and slightly upwards at the points; ears short, placed behind the horns; eyes small; without furrow on the upper lip; tail very short.

*Ovibus moschatus.*—*THE MUSK OX.*—Plate XXI\*. fig. 10.—Described, vol. II. p. 540.

*Genus 12.*—*BOS.*—*Linnaeus.*

*Generic Character.*—Incisive teeth  $\frac{0}{8}$ , no canines, grinders  $\frac{6-6}{6-6}$ ; total 32. Head large; forehead straight; muzzle square; horns occupying the crest of the forehead; eyes large; ears funnel shaped; dewlaps on the neck; female with an udder, having four teats; tail long, tufted; horns simple, conical, round, with various inflections; sometimes directed laterally.

*Sub-Genus 1.*—*BUBALUS.*—*Smith.*—Animals low in proportion to their bulk; head large; forehead narrow, very strong, convex; forehead straight; muzzle square; horns lying flat, or bending laterally, with a certain direction to the rear; eyes



large; ears funnel-shaped; dewlap small; udder of the female with four teats; tail long, slender.

*Bos bubalus*.—THE DOMESTIC BUFFALO.—Plate XXIV. fig. 5.—Described, vol. II. p. 541.

*Sub-Genus 2.*—BISON.—*Smith*.—Forehead slightly arched, much broader than high; horns placed before the salient line of the frontal crest, the plane of the occiput forming an obtuse angle with the forehead, and semicircular in shape; fourteen or fifteen pairs of ribs; the shoulders rather elevated; the tail shorter; the legs more slender; tongue blue; hair soft and woolly.

*Bos Americanus*.—THE AMERICAN BISON.—Plate XXIV. fig. 7.—Described, vol. II. p. 535.

*Sub-Genus 3.*—TAURUS.—Forehead square from the orbits to the occipital crest; somewhat concave, and not arched as in the former; horns rising from the sides of the salient ridge or crest of the frontal bone; the plane of the occiput forming an acute angle with the frontal bone, and of a quadrangular form; curve of the horns outwards, upwards, and forwards; no mane, a deep dewlap; thirteen pair of ribs; tail long; udder with four teats in a square.

*Bos urus*.—THE URUS, OR EUROPEAN BISON.—Plate XX. fig. 4.—Described, vol. II. p. 523.

*Variety*.—THE COMMON BULL.—Plate XX. fig. 2.—Described, vol. II. p. 520, &c.

THE COW.—Plate XXVII. fig. 3.

*Variety*.—THE ZEBU.—Plate XXIV. fig. 6.—Described, vol. II. p. 528.

## ORDER X.—CETACEA.

Body pisciform, terminated by a caudal appendage, cartilaginous and horizontal; two anterior extremities formed like fins, the bones of which are flattened and very short; neck very short and thick; two pectoral or two abdominal teats; ears with very small external openings; brain large; hemisphere well developed; bone of the internal ear separate from the head; two rudimentary bones in the flesh are substituted for the pelvis.

## FAMILY I.—SIRENIA.

## Herbivorous Cetacea.

Molars flat in the crown; some species are furnished with tusks in the upper jaw; two pectoral teats; mustachios; nostrils, properly so called, placed at the end of the muzzle; nasal apertures situated in the upper part of the head; body massive.

*Genus 1.*—*MANATUS.*—*Linnaeus.*

*Generic Character.*—Incisors  $\frac{2}{0}$ , no canines, grinders  $\frac{9-9}{9-9}$ ; total 38. The incisory teeth are very small, and exist in the foetus only; adults having only 32 teeth, four of the molars being lost while young; grinders with two transverse inflated ridges; head not distinct from the body; mustachios formed by a bundle of very stiff hairs directed downwards, forming a kind of corneous tusk on each side; eyes very small; tongue oval; on the margins of the pectoral fins are rudimentary nails; cervical vertebræ six; sixteen pairs of thick ribs.

*Manatus Senegalensis.*—THE SENEGAL MANATUS.—Plate XXV. fig. 1.—See vol. II. p. 397, &c.

*Genus 2.*—*HALICORE.*—*Cuvier.*

*Generic Character.*—Incisors  $\frac{2}{0}$ , no canines, grinders  $\frac{5-5}{3-3}$ ; total 14, in the adult; but in the young the incisors are  $\frac{4}{8}$ , no canines, grinders  $\frac{5-5}{5-5}$ ; total 32. Two upper incisory teeth cylindrical, straight, forming real tusks; grinders cylindrical, adults having only three on each side; body pisciform, terminated by a horizontal two-lobed fin; muzzle truncated and moveable; lips with thick spiny hairs; tongue soft; fins short; no distinct fingers or nails; cervical vertebræ seven; eighteen pairs of ribs.

*Halicore Indica.*—THE DUGONG.—Upper jaw with two short straight tusks, directed obliquely downwards; lips gross, spinous; tail bilobate; of a bluish-gray colour. Seven or eight feet long. Inhabits the Indian Seas.

*Genus 3.*—*STELLERUS.*—*Cuvier.*

*Generic Character.*—Devoid of incisory or canine teeth, grinders  $\frac{1-1}{1-1}$ ; total 4. Teeth not implanted in the jaws, but attached to a molar plate on each side, by vessels and nerves; grinders with tortuous surfaces; body ventricose towards its

centre, gradually diminishing towards its caudal extremity, which is luniform, with two points; head obtuse; lips double; no external ears, or appearance of a neck; eyes surmounted by a cartilaginous crest; anterior extremities in the form of palmed fins.

*Stellerus borealis*. — THE NORTHERN STELLERA. — Head round; without tusks or canines. Twenty-three feet long. Inhabits northern parts of the South Sea and North America.

#### FAMILY II.—CETACEA.

Teeth generally pointed, sometimes obtuse, all of one kind, and placed on the margins of the jaws; sometimes with transverse corneous laminae in the arch of the palate, in place of teeth; two anal mammae; spiracles or nostrils opening at the top of the head, for the ejection of water; tongue smooth; without hairs, eye-lashes, or mustachios.

#### TRIBE I.—SMALL-HEADED CETACEA.

##### Genus 4.—DELPHINUS.—*Linnaeus*.

*Generic Character*.—Teeth all shaped like canines, compressed, and notched on their cutting margins; varying in number from 200 to none; jaws more or less protruded in form of a beak; aperture of spiracles luniform; an adipose dorsal fin, with sometimes a longitudinal dorsal fold of skin; tail horizontally flattened and bifurcated.

*Sub-Genus 1*.—DELPHINUS.—*Cuvier*.—Muzzle elongated into a moderate beak; large at the base, point rounded; jaws posteriorly widened, having their edges provided with numerous teeth; a single dorsal fin.

*Delphinus delphis*.—THE DOLPHIN.—Plate XXV. fig. 2.—Described, vol. III. p. 382.

*Sub-Genus 2*.—PHOCÆNA.—No beak; muzzle short and convex; jaws with numerous teeth; having a dorsal fin.

*Delphinus grampus*.—THE GRAMPUS.—Described, vol. II. p. 382.

*Sub-Genus 3*.—DELPHINOPTERUS.—*Loeferle*.—Head ob-

tuse; muzzle beak-formed, not elongated; number of teeth middling; without dorsal fin.

*Delphinus leucas*.—THE BELUGA.—Plate XXV. fig. 5.—Head like that of the porpoise, teeth short, blunt, nine on each side in both jaws; instead of a fin, a small dorsal eminence; colour yellowish-white. From twelve to eighteen feet long. Inhabits the Northern Seas.

*Sub-Genus 4.* — HETERODON.—*Lacepede*. — One tooth in each jaw, sometimes none; lower jaw larger than the upper.

*Delphinus heterodon*.—THE HORNFLÉUR DOLPHIN.—Head round, terminated by a round depressed beak; no teeth; palate supplied with small points, or false teeth; lower jaw very thick in proportion to the upper one; spiracle orifice semilunar; colour gray above, and whitish below. Twenty-three feet long.

*Genus 5.* — MONODON.—*Linnaeus*.

*Generic Character*.—Incisors,  $\begin{smallmatrix} 1-1 \\ 0-0 \end{smallmatrix}$ , no canines nor grinders; total 2. One or two large, straight, very long and pointed tusks inflated in the upper jaw; shaped like the dolphins; orifice of spiracles united on the top of the head; with a longitudinal dorsal projection.

*Monodon monoceros*.—THE NARWAL.—Plate XXV. fig. 4. Described, vol. III. p. 476.

## TRIBE II.—LARGE-HEADED CETACEA.

*Genus 6.* — PHYSETER.—*Linnaeus*.

*Generic Character*.—Lower jaw elongated, narrow, corresponding to a furrow in the upper, with from 18 to 25 thick conical teeth on each side; upper jaw broad, elevated, with bony laminae, or having short and undeveloped teeth; orifice of spiracles united at the upper end of the snout; some species with a dorsal fin, others have simple eminences; upper part of the cranium having cartilaginous cavities, filled with oily matter, which chrystallises when cool, forming spermaceti.

*Sub-Genus 1.* — CATODON.—*Lacepede*.—Orifice of spiracles placed at the extremity of the upper part of the muzzle; without dorsal fin.

*Physeter macrocephalus*.—THE GREAT-HEADED CACHALOT.  
— Plate XXV. fig. 3.—Described, vol. III. p. 479.

*Sub-Genus 2.*—PHYSETER.—*Lacepede*.—Spiracle orifice situated at the end, or near the end, of the upper part of the muzzle; having a dorsal fin.

*Physeter microps*.—THE SMALL-EYED CACHALOT.—Lower jaw with 21 arched, slightly turned back teeth, on each side; dorsal fin large, straight and pointed; pectoral fins broad; eyes small; sixty to eighty feet long. Inhabits the Northern Seas.

*Genus 7.*—BALÆNA.—*Linnæus*.

*Generic Character.*—Without teeth; upper jaw keel-shaped, provided on each side with transverse horny laminae or whalebone, slender, serrated, and attenuated at the edges; orifices of the spiracles separated, placed near the centre of the upper portion of the head; some species with a dorsal fin; and nodosities on the backs of others.

*Sub-Genus 1.*—BALÆNA.—No dorsal fin.

*Balæna mysticetus*.—THE COMMON WHALE.— Plate XXV. fig. 6.—Described, vol. III. p. 461.

*Sub-Genus 2.*—BALENOPTERA.—With dorsal fin.

*Balæna boops*.—THE JUBARTA.—Nape of neck elevated and round; with longitudinal folds under the throat and belly; semi-spherical tuberosities before the spiracles; dorsal fin curved backwards. Fifty-four feet long. Inhabits the Greenland Seas.

## CLASS SECOND.

### BIRDS.

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ALL the animals of this class are Oviparous ; that is, they produce their young by eggs. They are distinguished from the other divisions of the animal kingdom, by being covered with feathers. To aid in their classification, the feathers have been distinguished by different names, according to the particular part of the animal which they cover.

Birds have a double respiration and circulation,—these are for adapting the animals for flight. Another admirable contrivance for this purpose is the general diffusion of air through their bodies. Their lungs are not divided, but adhere to the ribs, and are composed of a membrane penetrated by orifices, which permit the free passage of the air into the cavities of the chest, lower abdomen, the arm-pits, and even to the bones. Birds respire not only by branches of the aorta, but also by means of the pulmonary artery.

Birds are true bipeds, and can only lift things from the ground by means of their bill. The neck is much elongated, as well as the beak, which is covered with a horny substance. They are always destitute of teeth. The upper mandible is a prolongation of the intermaxillary bones : these are prolonged into two arches ; the internal one of which consists of the palate bones, and the external one of the maxillary and jugal bones ; the mandible being united to the cranium by elastic laminae. The two mandibles move upon each other by means of an intermediate bone placed at their articulation.

The organ of smell is situated at, or near the base of the bill, generally hidden by the feathers.

The tongue has but little muscular substance, and is supported by a production of the hyoid bone. Most birds seem not to be possessed of a fine degree of taste.

The eyes of birds are so constructed, that their sight is very acute, whether near or at a distance. In addition to the ordinary eyelids, there is a membrane which acts like a curtain to cover the eye.

Birds which fly by day seldom have an external ear ; but nocturnal birds possess that organ, although not nearly so much developed as that of quadrupeds. It is generally covered by barbed feathers, which are more fringed than those of their body.

The brain of birds agrees in character with that of the other vertebrate oviparous animals, but remarkable for its volume, being proportionally greater, and even exceeding, in many cases, that of the mammalia. This increased bulk is attributable to tubercles, which are analogous to the *corpora striata*, and not to the hemispheres themselves, which are rather compressed and without circumvolutions. The cerebellum is largely deve-

loped, nearly without lateral lobes, and consisting almost entirely of the vermiform process.

The *trachea* is formed of entire rings. At its bifurcation is a glottis furnished with a set of muscles called the lower larynx. This organ produces the voice of birds, which has great compass owing to the large volume of air contained in the air vessels. The voice is modified by the length and width of the trachea. The upper larynx is very simple.

The anterior extremities, or wings of birds, are formed for sustaining them in flight, but are neither adapted for prehension nor standing. The body has a forward inclination, and the toes are considerably produced, to assist in sustaining them in an upright posture. The pelvis is much elongated, in order to furnish attachment to the muscles which support the trunk upon the thighs. There is also a beautiful provision in nature, by which birds are enabled to sleep with certainty perched on trees. A set of muscles take their rise in the pelvis and extend themselves to the toes, so that the weight of the bird alone is sufficient to close them.

The lower extremities are composed of a femur, a tibia, and a peroneum which is articulated to the femur by a spring, whose extension is maintained without the muscles being exerted. The tarsus and metatarsus consist of a single bone only.

Most birds undergo two moults annually; and in some species the winter plumage differs considerably from that of the summer; and the male and female also vary in colour, in many species.

The digestive function in birds is very rapid. The stomach is composed of three parts; namely, the crop, the succentorial ventricle, and the gizzard.

#### CLASSIFICATION OF BIRDS.

The orders and genera into which birds are divided, are established chiefly from the formation of the bill and feet. The classification adopted is that of Temminck, who possesses a deeper knowledge of this subject than any other naturalist. It is remarkable for its simplicity. He divides this class into sixteen orders, namely,—

- I. RAPACES.—Birds of prey.
- II. OMNIVORES.—Those which live on all kinds of food.
- III. INSECTIVORES.—Birds which feed on insects.
- IV. GRANIVORES.—Birds which feed on grain.
- V. ZYGODACTYLI.—Birds which have two toes before and one behind.
- VI. ANISODACTYLI.—Birds which have the exterior toe joined to the middle one at the base.
- VII. ALCYONES.—Birds with three toes before, united, and one behind; the tarsi being very short.
- VIII. CHELIDONES.—Birds with short legs, three toes before, divided, or only united at the base by a short membrane; the back toe often reversible.
- IX. COLUMBE.—Birds with three toes before, entirely divided, and one behind.
- X. GALLINE.—Birds with three toes before, united by a membrane; the back toe joined to the tarsus above the joint of the other toes.
- XI. ALECTORIDES.—Birds with the tarsus long and slender; three toes before and one behind; the articulation of the posterior one higher than those before.

XII. CURSORES.—Birds with long legs, naked above the knee, with two or three toes directed forwards.

XIII. GRALLATOIRES.—Birds with long and slender legs, more or less naked above the knee; three toes before and one behind; the posterior one joined on the same level with the others, or more elevated.

XIV. PINNATIPEDES.—Birds with feet of medium length; tarsi slender, or compressed; three toes before and one behind, with a rudimentary membrane alone the toes; the posterior one joined interiorly on the tarsus.

XV. PALMIPEDES.—Birds with short feet, more or less drawn up to the abdomen; anterior toes partly or wholly connected by a membrane; the posterior toe articulated interiorly upon the tarsus, or totally wanting in some genera.

XVI. INERTES.—Birds with feet retracted into the abdomen; three toes divided before; the posterior toe short, articulated interiorly.

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### TERMINOLOGY OF BIRDS.

It is impossible to understand the descriptions given by authors, so as to enable the student to trace with certainty various species, without being acquainted with the technical names of the different parts of Birds.

Within these few years a new nomenclature has been adopted, so that to be an expert Ornithologist, a knowledge of the old as well as the new terminology is indispensable.

#### OLD TERMINOLOGY.—Plate XXV\*. fig. 1.

The *Auriculars*, or feathers which cover the ears, 1.

The *Crown*, 2.

The *Nape*, 3.

Upper and under mandibles, or chaps, 4-4.

Chin, 5.

The interscapular region, 6.

Tail coverts; these feathers cover the tail at its upper side or base, 7.

*Lesser Wing Coverts*, 8-8-8-8,—(*tectrices primæ*, *Linnaeus*.)—these are small feathers that lie in several rows on the bones of the wings.

*Greater Wing Coverts*, 9-9-9-9,—(*tectrices secundæ*, *Linn.*)—the feathers that lie immediately over the quill feathers and the secondaries.

The *Scapulars*, 10-10-10, or those feathers which take their rise from the shoulders and cover the sides of the back.

The *Secondaries*, 11-11-11-11, or secondary quills,—(*secundariæ*, *Linn.*)—those that rise from the second bone.

The *Tertials*, 12-12-12-12.—These also take their rise from the second bone at the elbow joint, forming a continuation of the secondaries, and seem to do the same with the scapulars which lie over them. These feathers are so long in some species of the *Scolopax* and *Tringa*, that when the bird is flying, they give it the appearance of having four wings, as in the figure we have given. In nearly all other species they are but a little longer than the *Secondaries*.

The *Primaries* or *Primary Quills*, 13-13-13-13,—(*primores*, *Linn.*)—the largest feathers of the wing; they rise from the first bone.

The *Shoulder*, 14-14.



The *Bastard Wings*, or *Spurious Wings*, 15-15-15-15.

The *Rump*, 16.

*Middle Tail Feather*, 17.

The *Vent feathers*, 18.

The *Thigh*, 19.

The *knee joint*, 20.

The *leg*, 21.

The *Under Coverts* are those which line the inside or under surface of the wings.

#### Figure II.

The *Cere*—(*cera*, *Lim.*)—the naked skin which covers the base of the bill, 1.

The *Orbits*—(*orbita*, *Lim.*)—the skin which surrounds the eye. It is generally bare, as in Parrots and the Heron, &c. 2.

A *Notched Mandible*, 3.

#### Figure III.

According to the new nomenclature, the principal parts of Birds are eight, as follow :—

- |   |   |   |
|---|---|---|
| I. THE ROSTRUM,<br>bill or beak,<br>which is divid-<br>ed into 3 parts. | } | 1. <i>Maxilla</i> , upper part, or mandible of the bill, fig. III. <i>a</i> .<br>2. <i>Mandibula</i> , the lower mandible, <i>b</i><br>3. <i>Gongs</i> , point of the Mandibula, <i>c</i> . |
|---|---|---|

The beak is again subdivided into 5 parts.

- |   |   |
|---|---|
| } | 1. <i>Nares</i> , the nostrils, fig. II. <i>a</i> .<br>2. <i>Dertrum</i> , the hook, fig. II. <i>b</i> .<br>3. <i>Culmen</i> , the ridge, fig. IV. <i>b</i> .<br>4. <i>Mesorhinium</i> , the upper ridge, <i>d</i> .<br>5. <i>Cera</i> , the wax or cere or the bill, fig. II. I. and fig. IV. <i>c</i> . |
|---|---|

- |   |   |   |
|---|---|---|
| II. CAPUT, the<br>head, which is<br>divided into 18<br>parts. | } | 1. <i>Lorum</i> , the naked line at the base of the bill, fig. III. <i>d</i><br>2. <i>Lingua</i> , the tongue.<br>3. <i>Frons</i> , the forehead, fig. III. <i>e</i> , fig. II. <i>c</i> .<br>4. <i>Capistrum</i> , the face, fig. I. <i>a</i> .<br>5. <i>Sinciput</i> , the hinder part of the head, fig. III. <i>f</i> .<br>6. <i>Corona</i> , the crown of the head, fig. III. <i>g</i> .<br>7. <i>Regio Ophthalmica</i> , region of the eyes, <i>h</i> .<br>8. <i>Oculus</i> , the eye.<br>9. <i>Orbitæ</i> , the orbits or centre of the eyes.<br>10. <i>Tempora</i> , the temples, <i>i</i> .<br>11. <i>Supercilium</i> , the eye-brows, <i>j</i> .<br>12. <i>Gena</i> , the cheek, <i>k</i> .<br>13. <i>Crista</i> , the crest, fig. II. <i>d</i> .<br>14. <i>Cornua</i> , the horns, as exemplified in the horned owls, consisting of upright bunches of feathers.<br>15. <i>Barba</i> , the beard, fig. III. <i>l</i> .<br>16. <i>Mentum</i> , the chin, <i>m</i><br>17. <i>Aures</i> , the ears,<br>18. <i>Regio parotica</i> , the protuberance behind the ear, <i>o</i> . |
|---|---|---|

- III. COLLUM, the neck, which is divided into 2 parts.
1. *Cervix*, the hinder part of the neck, which includes 2 parts, from *p* to *q*.
  2. *Guttur*, the throat, which is subdivided into 4 parts.
    1. *Nucha*, nape of the neck, *p*.
    2. *Auchenium*, part below the nape, *q*.
    1. *Carunculae*, or wattles, the fleshy substances under the throat of the cock, &c.
    2. *Gula*, the gullet, *r*.
    3. *Jugulum*, the lower part of the throat, *s*.
    4. *Saccus jugularis*, the crop.
- IV. DORSUM, the back, which is divided into 5 parts.
1. *Interscapulum*, between the shoulders, *t t*.
  2. *Humeri*, the shoulders, *u*.
  3. *Tergum*, the middle of the back, *v*.
  4. *Scapulares*, the scapulars, *w*.
  5. *Uropygium*, the rump, or tail coverts, *x*.
- V. CORPUS, the body, which is divided into 7 parts.
1. *Pectus*, the breast, *A*.
  2. *Axillae*, the arm-pits, *B*.
  3. *Abdomen*, the abdomen, *C. C. C.*
  4. *Hypochondria*, the sides of the abdomen, *D. D.*
  5. *Epigastrium*, the stomach, *E*.
  6. *Venter*, the belly, *F. F.*
  7. *Crissum*, the vent, *G*.
- VI. ALA, the wing, which is divided into 7 parts.
1. *Flexura*, the bend of the wing, *H*.
  2. *Tectrices majores*, largest wing-coverts, *I. I.*
  3. *Tectrices mediae*, middle wing-coverts, *J. J.*
  4. *Tectrices minores*, smallest wing-coverts, *K. K.*
  5. *Primariae*, quills, *L. L.*
  6. *Rciniges*, rowers, *M*.
  7. *Alula spuria*, bastard wing, *N*. and fig. I. 15.
- VII. CAUDA, the tail, has 2 parts.
1. { *Rectrices intermediae*, or *Tectrices cauda intermediae*. } Middle tail feathers, *O*.
  2. { *Rectrices laterales*, or *Tectrices caudae laterales*. } Side tail feathers, *P*.
- VIII. CRUS, the leg, which is divided into 3 parts.
1. *Femora*, the thighs, *Q*.
  2. *Tibia*, the part from the foot to the thigh, which contains 3 parts, *R*.
    1. *Acrostarsium*, the front of the leg, *S*.
    2. *Planta*, the back of the leg, *T*.
    3. *Calcaria*, the spurs, as in the domestic cock.
  3. { *Pes*, or *Tarsus*. } The foot, which contains 3 parts.
    1. *Digiti*, the toes, *U*.
    2. *Hallux*, the great or hind toe, *W*.
    3. *Ungues*, the claws, *V*.

The bones of the wing are, first, the *Brachium*, fig. V. *A. A.*—second, the *Cubitus*, *B. B.*—third, the *Carpus*, *C. C.*—fourthly, the spurious wing bone, *D.*

## ORDER I.—RAPACES.

Bill short, robust; base of the upper mandible covered by a membrane or cere; sides compressed; point hooked; nostrils open; legs very strong, muscular, and short; occasionally of medium length, covered with feathers to the knee in some species, and to the toe in others; feet with three toes before and one behind; divided, or united at the base by a membrane; rough below; claws powerful, hooked, sharp, and retractile.

### Genus 1.—VULTUR.—*Illiger*.

*Generic Character*.—Bill thick, short, its depth greater than its breadth; covered at its base by a cere; upper mandible nearly straight, bent downwards near its point; lower mandible straight, rounded, inflected at the point; head in some species naked, in others covered by a short down; nostrils lateral, naked, and opening obliquely towards the margin of the cere; legs robust, provided with slightly bent talons; the middle toe longest and united at the base with the exterior one.

*Vultur fulvus*.—The Fulvous Vulture. Plate xxvi. fig. 1. Head and neck covered with white down; the bottom of neck surrounded by a thick ruff or collar, of upright, slender, pale ferruginous feathers; on the breast is a white spot; body and wings rich fawn-colour; tail blackish-brown; beak dull yellow; cere red; irides hazel; legs gray. Four feet long. Inhabits Europe, Asia, and Africa.

### Genus 2.—CATHARTES.—*Illiger*.

*Generic Character*.—Bill long, straight, compressed, bent towards the point; cere naked, extending more than half the length of the beak; upper mandible tumid towards the tip; head naked and oblong; upper part of the neck divested of feathers; the nostrils nearly in the centre of the beak, close to the ridge of the upper mandible, cleft longitudinally, broad, and sometimes surmounted by fleshy appendages; legs with the tarsus naked, more or less slender; middle toe long, and united to the exterior one at the base.

*Cathartes gryphus*.—The Condor. Plate xxvi. fig. 2. Described, vol. iii. p. 65.

### Genus 3.—GYPETUS.—*Storr*.

*Generic Character*.—Beak long; upper mandible arched towards its tip, and hooked; nostrils ovate, concealed by stiff reflexed hairs; feet short, with four toes, the three anterior united by a short membrane; the middle one considerably longer than the others; talons slightly hooked; wings long.

*Gypatus barbatus*.—The Bearded Vulture. Plate xxvi\*. fig. 8. Blackish on the back, with a white line down the middle of each feather; neck and upper part of the body bright yellow; head surrounded by a black fillet. Expanse of wings about eight feet. Inhabits Egypt, Abyssinia, and the German and Swiss Alps.

Genus 4.—GYPOGERANUS.—*Illiger*.

*Generic Character*.—Beak shorter than the head, thick, strong, hooked, and bent from its base, somewhat arched and compressed at the point; with a cere at its origin; nostrils within the cere, lateral, a little separated at the base, oblong, open, and placed diagonally; legs very long and slender; tibia feathered, tarsus very long, tapering downwards; toes short, robust, and warty below, the anterior one united at the base; the hallux articulated on the tarsus; wings long, the first five quills longest, and nearly equal; carpus of the wings armed with a blunt spur.

*Gypoggeranus serpentarius*.—The Secretary, or Serpent Eater. Plate xxvi\*, fig. 9. Described, vol. iii. p. 69.

Genus 5.—POLYBORUS.—*Vieillot*.

*Generic Character*.—Beak somewhat elongated, deep, compressed laterally, and strongly hooked at the tip of the upper mandible; cere hispid, continued over the cheeks and around the eyes; nostrils narrow, elliptical, oblique, and placed near the upper edge of the beak; wings somewhat rounded, nearly as long as the tail; third and fourth quills longest; legs long, naked, and reticulated; claws of moderate length and curvature.

*Polyborus vulgaris*.—The Caracara Eagle. Plate xxvii, fig. 1. Upper parts blackish-brown; head black; feathers capable of being elevated to a crest; neck, breast, and shoulders, brownish-gray, with transverse wavy bars of darker brown; tail white, with undulated dusky bands, and a broad black band at its tip; beak blue at the base, horny colour at the tip; iris hazel; cere and cheeks dull red; legs yellow; claws black. Twenty-one inches long. Inhabits Brazil.

Genus 6.—HARPYIA.—*Cuvier*.

*Generic Character*.—Beak much incurved; upper mandible very thick at the base, and continues straight for more than a third of its length, from whence it suddenly curves downwards, and is much arched towards the point, which is extremely sharp; lower mandible, straight, short, and obtuse; nostrils transverse and ovate; wings very short, reaching only to the middle of the tail; tail rounded at its extremity; legs partially feathered on their upper part; toes and talons very strong.

*Harpyia destructor*.—The Great Harpy. Plate xxvii, fig. 2. Described, vol. iii. p. 63.

Genus 7.—AQUILA.—*Brisson*.

*Generic Character*.—Head much flattened above, which, with the neck, is plumed; eyes deeply sunk; beak thick, powerful, and straight at its base; somewhat angular above, and strongly hooked at the point; nostrils short, and nearly circular; cere hispid; wings as long as the tail, with the third and fourth quills the longest; legs very strong, clothed with feathers to the base; toes robust, of moderate length, the outer one united to the middle; talons strong, incurved, and channelled on their under surface.

*Aquila fulvus*.—The Golden Eagle. Plate xxvi, fig. 3. Described, vol. iii. p. 53.

Genus 8.—HALIAETUS.—*Vieillot*.

*Generic Character*.—Ridge of the beak convex and compressed; upper

half of the tarsi with short, close set feathers, and scutellated on their anterior surface; cere slightly hispid; wings long and powerful; toes free; outer one capable of taking a retroverted direction; talons of equal size, much bent, and furnished with a deep internal groove.

*Haliaetus albicilla*.—The Great Sea Eagle. Plate xxvi. fig. 4. Dusky-brown above, intermixed with ashy-gray, spotted with umber-brown; under parts same colour but paler; tail white; cere and legs pale yellow; talons black. Two feet four inches long. Inhabits Europe.

*Haliaetus arundinaceus*.—The Osprey.—*Gmelin*. Plate xxvi. fig. 5. Described, vol. iii. p. 59, The Bald Eagle; and 60, Osprey.

Genus 9.—FALCO.—*Linnaeus*.

*Generic Character*.—Beak hooked, generally bent from its base, which is furnished with a somewhat hairy cere; mandibles notched in some species; nostrils lateral, rounded, or oval, open, and placed within the cere; tarsus covered with feathers or scales; three toes before and one behind, the exterior usually united at its base to the middle toe; talons sharp, much hooked, and retractile.

Section 1.—FALCONS.—Beak short, bent from its base; upper mandible with one and sometimes with two notches, which fit into hollows in the under mandible; legs robust; toes long, strong, talons sharp and hooked; tarsus short; wings long, first and third quill feathers of equal length, the second quill being the longest.

*Falco tinnunculus*.—The Kestrel—*Female*. Plate xxvi\*. fig. 7. Described, vol. iii. p. 79.

Section 2.—HAWKS.—Wings short, terminating at two-thirds the length of the tail; first quill shorter than the second, the third nearly equal to the fourth; tarsus as long as the intermediate toe; claw greatly hooked, and sharp.

*Falco palumbarius*.—The Goshawk. Plate xxvi. fig. 8. Described, vol. iii. p. 80.

*Falco nisus*.—The Sparrow-Hawk—*Female*. Plate xxvi. fig. 7. Described, vol. iii. p. 81.

*Sub-Genus 3*.—KITES.—With oblique nostrils, having a fold at their exterior margin; tarsus short, feathers extending a little under the knee; wings very long, the third and fourth quills longest; tail forked.

*Falco milvus*.—The Kite or Gled. Plate xxviii. fig. 1. Described, vol. iii. p. 86.

*Sub-Genus 4*.—BUZZARDS.—Beak small, and bent from the base; wings somewhat shorter than the tail, the first four feathers notched near their tip; first quills very short, the fourth being the longest; feathers on the thighs long and pendulous; tarsus short, talons slightly hooked.

*Falco buteo*.—The Common Buzzard. Plate xxvi. fig. 6. Described, vol. iii. p. 87.

*Sub-Genus 5*.—HARRIERS.—Beak bent from its base; nostrils ovate; tail long, rounded; wings long, first quill very short, the third and fourth longest; tarsus long and slender.

*Falco cyaneus*.—The Hen-Harrier. Plate xxvi\*. fig. 3. Described, vol. iii. p. 88.

*Sub-Genus 6.*—CARACARÉ.—Cheeks and throat naked.

*Falco formosus.*—The Red-Throated Falcon. Plate xxvi\*. fig. 4. Upper parts dark liver-coloured brown; abdomen Indian red; throat purple; cere, orbits, and feet, dull yellow. Eighteen inches long. Inhabits South America.

*Sub-Genus 7.*—CYMINDI.—Tarsi short, toes semi-webbed.

*Falco uncinatus.*—The Hooked Eagle. Plate xlvii\*. fig. 3. Lead-coloured above, paler below; quills with fillets of dark brown; base of tail white; beak considerably hooked. Fifteen inches long. Inhabits Brazil.

*Genus 10.*—STRIX.—*Linnaeus.*

*Generic Character.*—Beak compressed, bent from its origin; base surrounded by a cere, covered wholly, or in part, by stiff, erect hairs; head large, much feathered; nostrils lateral, rounded, open, pierced in the anterior margin of the cere, concealed by hairs directed forwards, eyes very large; orbits surrounded by feathers; legs feathered, frequently to the talons; feet with three toes before and one behind, separate; the anterior reversible; first quills dentated on their anterior border, the third longest.

*Sub-Genus 1.*—NOCTUA.—*Savigny.*—Without tufts on the head; ears small; disc of feathers surrounding the eyes, small.

*Strix nyctea.*—The Snowy Owl. Plate xxvii. fig. 3. Described, vol. iii. p. 96.

*Sub-Genus 2.*—STRIX.—*Savigny.*—Ears large, wide and open, furnished in front with a broad membranous operculum; discs around the eyes large; beak nearly straight from its base, and arched towards the point; legs covered with slender feathers.

*Strix flammea.*—The Barn Owl. Plate xxviii. fig. 3. Described, vol. iii. p. 96.

*Strix stridula.*—The Tawny Owl. Plate xxviii. fig. 4. Described, vol. iii. p. 97.

*Sub-Genus 3.*—BUBO.—*Gerin.*—Beak strongly inclined from the base; nostrils large, oblique, and concealed; ears of moderate size; head surmounted by tufts of feathers, somewhat resembling horns.

*Strix otus.*—The Long-Eared Owl. Plate xxviii. fig. 2. Described, vol. iii. p. 95.

## ORDER II.—OMNIVOROUS BIRDS.

Beak robust, medium-sized, and sharp on the edges; upper mandible more or less convex, and notched at the point; feet with four toes, three before and one behind; wings of medium length; quill feathers terminating in a point.

*Genus 1.*—OPISTHOCOMUS.—*Illiger.*

*Generic Character.*—Bill short, thick, convex, bent downwards at point; base dilated laterally; under mandible strong; angular at its termination; nostrils near the middle of the bill, covered by a membrane; legs strong; tarsus shorter than the middle toe; toes edged by a rudimentary membrane; first quill short, the next four graduated, and the sixth longest.

*Opisthocomus cristatus*.—The Hoatzin. Plate xxxvii\*\* fig. 7. White above and black beneath; head with a long somewhat pendulous crest; a naked rufous space round the eyes; wings with two paler bands; tail wedge-shaped; with a fillet of yellow. Twenty-two inches long. Inhabits Guiana.

Genus 2.—BUCEROS.—*Linnaeus*.

*Generic Character*.—Bill large, long, convex; curved from the base; edges serrated, with a large horny protuberance near the base of the upper mandible rising into a crest; nostrils behind the base of the bill, covered by a membrane; legs robust, short; lateral toes equal; the external one united to the second joint; first three quills graduated, the fourth or fifth longest.

*Buceros monoceros*.—The Malabar Hornbill. Plate xxix. fig. 1. Black above, extending to the bottom of the jugulum; breast and thighs white; middle tail feathers black, external feathers white; bill pale yellow; horny crest black in front and yellow behind. Two feet long. Inhabits Malabar.

Genus 3.—PRIONITES.—*Illiger*.

*Generic Character*.—Bill strong, hard, middle-sized, convex above, and hooked towards its point, where it is compressed; edges of the mandibles serrated; nostrils lateral, oblique, situated at the base of the bill, open, but partially covered by feathers; toes lateral, unequal, the internal one being very short, joined at its base; the external united to the second joint; wings short; the first three quills graduated, the fourth and fifth longest.

*Prionites ruficapillus*.—The Red-Headed Saw-Bill. Plate xxvi<sup>a</sup>. fig. 6. Head reddish-brown, back and wings brownish-green; primaries and tail verdigris-colour, greenish above; abdomen ferruginous; a black patch around the eyes; bill horn-colour. Fourteen inches long. Inhabits Paraguay.

Genus 4.—CORVUS.—*Linnaeus*.

*Generic Character*.—Bill thick, straight at its base, slightly bent towards the point; nostrils concealed by reflected bristly feathers; legs and feet plaited; feet with three toes before and one behind, divided, the tarsus longer than the middle toe; wings pointed, the fourth quill being the longest.

*Corvus corax*.—The Raven. Plate xxviii. fig. 5. Described, vol. iii. p. 150.

*Corvus cornix*.—The Hooded Crow. Plate xxviii. fig. 6. Described, vol. iii. p. 155.

*Corvus monedula*.—The Jack-Daw. Plate xxviii. fig. 7. Described, vol. iii. p. 157.

Genus 5.—GARRULUS.—*Ficillot*.

*Generic Character*.—Bill of medium size, robust, edges thin and cutting, beset with setaceous feathers at its base, pointing outwards; upper mandible hollow, and curved towards the point; nostrils hid by basal feathers; tarsus annulated; middle toes attached from the base of the exterior, but completely separated from the interior toe; wings of medium length; bastard feathers short, rounded at their extremities; the three first remiges

equal, the fourth and fifth quills longer than the others; tailed wedge-shaped consisting of twelve feathers.

*Garrulus pica*.—The Magpie. Plate xxviii. fig. 8. Described, vol. iii. p. 162.

*Garrulus glandarius*.—The Jay. Plate xxviii. fig. 9. Described, vol. iii. p. 167.

Genus 6.—*QUISCALUS*.—*Vieillot*.

*Generic Character*.—Bill smooth, straight, robust, and somewhat compressed at the base; edge angular, bent inwards; upper mandible forming an acute angle, with the feathers of the head tapering towards its point; nostrils dilated, oval, covered by the membrane; tarsus annulated; middle toe attached to the exterior one the length of the first phalange, but quite separate from the interior one; wings medium length; first and fifth remiges of equal length, the third and fourth the longest; tail with twelve feathers.

*Quiscalus major*.—The Great Crow Grackle. Plate xxviii. fig. 4. Black; head and neck highly iridescent; upper parts reflecting copper-green, under parts steel-blue; tail wedge-shaped; bill black; irides pale yellow. Sixteen inches long. Inhabits the United States.

Genus 7.—*NUCIFRAGA*.—*Brisson*.

*Generic Character*.—Bill long and straight, tapering to a point; upper mandible rounded, and longer than the under one, point obtuse and flattened; nostrils round, open, situated at the base of the bill, hid by hairs, which point forward; three toes before, and one behind; tarsus longer than the middle toe; wings pointed, fourth quill the longest.

*Nucifraga caryocatactes*.—The Nut-Cracker. Plate xxviii. fig. 11. Rusty-brown, speckled with triangular spots; crown of the head and wings darker brown; tail terminated with white; irides hazel; bill, feet, and claws, black. Thirteen inches long. Inhabits Europe.

Genus 8.—*PYRRHOCORAX*.—*Cuvier*.

*Generic Character*.—Bill medium size, compressed, and slender, slightly bent, with a small notch, or smooth; nostrils ovate, lateral, placed at the base of the bill, and hidden; legs long, strong, and naked below the knee; toes almost entirely separated; tarsus longer than the middle toe; claws strong and bent; wings wedge-shaped, the fourth and fifth quills longest.

*Pyrrhocorax graculus*.—The Red-legged Crow. Plate xxix\*. fig. 4. Described, vol. iii. p. 158, the Cornish Cough.

Genus 9.—*BARITA*.—*Cuvier*.

*Generic Character*.—Bill long, strong, convex above, and notched towards the tip; with a nasal furrow; nostrils longitudinal, covered above, and half closed by a horny substance; legs strong; tarsus longer than the intermediate toe; the external one united to the first joint; the internal toe free; hallux very strong; wings of medium length; the fourth or sixth quills longest.

*Barita strepera*.—The Black Barita. Plate xxix\*. fig. 2. Black; primaries white at the base; lower coverts of the wings and tail white; tail elongated, round, the feathers white at their base; apex black; wings reaching to the



middle of the tail; feet black. Nineteen inches long. Inhabits Norfolk Island.

*Genus 10.*—GLAUCOPIS.—*Forster.*

*Generic Character.*—Bill thick, robust, of medium size; upper mandible convex, arched, curved towards the point; it envelops the edges of the lower mandible, which has a fleshy wattle at its base; nostrils at the base of the bill; legs strong; tarsus longer than the middle toe; hallux with a crooked nail.

*Glaucopis cinerca.*—The Wattle-Bird. Plate xxx<sup>s</sup>. fig. 5. Dark bluish ash-coloured; tail wedge-shaped; bill black, with reddish-blue wattles at its base, which change to scarlet like those of the turkey. Fifteen inches long. Inhabits New Zealand.

*Genus 11.*—GRACULA.—*Linnaeus.*

*Generic Character.*—Bill middle size, strong, convex above, considerably compressed and narrow at the point, and notched in some of the species; nostrils open, lateral, and partially hid by the feathers; legs strong; tarsus the length of the middle toe; external toe attached at its base; the internal one separated; hallux short; third quill longest.

*Gracula religiosa.*—The Sacred Mino. Plate xxix. fig. 3. Iridescent black, changing in different lights to violet, blue, and green; with a white spot on the head, and a yellow, narrow, occipital band; a white spot on the middle wing feathers; bill red; irides hazel; legs and feet yellowish-orange; claws light brown. Ten inches and a half long. Inhabits India.

*Genus 12.*—BUPHAGA.—*Linnaeus.*

*Generic Character.*—Bill thick, obtuse, and strong, gibbous at point; the under mandible strongest; nostrils at the base of the bill, half covered by an arched membrane; tarsus longer than the middle toe; wings of medium length; first quills very short, second nearly as long as the third.

*Buphaga africana.*—The African Ox-Pecker. Plate xxvi<sup>s</sup>. fig. 1. Upper parts rust-coloured, under parts pale; feathers of the tail somewhat acuminate. Six inches and a half long. Inhabits Africa.

*Genus 13.*—BOMBYCIVORA.—*Temminck.*

*Generic Character.*—Bill thick, depressed, and trigonal at its base, convex below; upper mandible a little curved towards the point, with a slight notch; nostrils ovoid, open, situated at the base of the bill, hidden by hairs which incline forward; three toes before and one behind, the exterior one joined to that of the middle; wings of moderate length, the first and second quills the longest.

*Bombycivora garrula.*—The Bohemian Wax-Wing. Plate xxviii. fig. 10. Head crested; crest, neck, back, and breast, chestnut colour; rump, tail coverts, and hypochondria, ash-colour; crissum orange-yellow; forehead and cheeks reddish-brown; middle wing-feathers purplish-brown; remiges and quills dusky, which, with the middle wing-feathers, have spots of white; four of the secondaries have bright scarlet appendages; tail dusky, broadly tipped with yellow at its base; from the base of the bill, which is black, extending around the ophthalmic region, is a velvety black line. Length eight inches. Inhabits Europe, America, and Asia.

Genus 14.—PTILONORYNCHUS.—*Khul.*

*Generic Character.*—Bill strong, short, depressed at the base, slightly bent, and with a small notch at the point; nostrils lateral, round, at the base of the bill, hidden by feathers; legs strong, short; tarsus longer than the middle toe, which is attached to the exterior one the length of the first phalange; posterior claw strong, curved; the fourth and fifth quills longest.

*Ptilonorynchus nuchalis.*—The Ruffed Ptilonorynchus. Plate xxvii. fig. 6. Head and upper parts of the body and wings grayish brown, those on the head having a satiny lustre; nape of the neck with a pink or purplish red band, surrounded by a ruff of shining plumes, with their tips round and turning inwards; lower parts of the body yellowish-gray, tinged with brown; legs brownish-black. Length seventeen inches. Inhabits New Holland.

Genus 15.—CORACIAS.—*Linnaeus.*

*Generic Character.*—Bill straight, compressed, deeper than broad; the upper mandible bent near its tip; nostrils lateral and linear; legs short and strong; three toes before and one behind, entirely free; wings long, the second quill feather longer than the first.

*Coracias garula.*—The Garrulous Roller. Plate xxix. fig. 4. Described, vol. iii. p. 169.

Genus 16.—COLARIS.—*Cuvier.*

*Generic Character.*—Bill strong, short, depressed, dilated on the sides, greatly broader than deep, ridge rounded, tip bent, sometimes with a notch; under mandible somewhat concealed by the upper one; nostrils at the base of the bill, diagonal and long, half covered by a feathered membrane; legs short; tarsus shorter than the intermediate toe; the anterior ones attached at their base; wings long, the second quill longer than the others.

*Colaris Afra.*—The African Colaris, or Roller. Plate xxx\*. fig. 1. Reddish-brown above, lower parts lilac-coloured; tail dark green, tipped with bluish-black. Eight inches long. Inhabits Africa.

Genus 17.—ORIOIUS.—*Temminck.*

*Generic Character.*—Bill long, slightly bent from its base, where it is compressed; upper mandible surmounted by a ridge, slightly notched at the point; nostrils at the base of the bill, exposed, lateral, and horizontal; tarsus shorter than the middle toe, in some species it is of the same length, and is joined to the exterior toe; first quills very short, the third the longest.

*Oriolus galbula.*—The Golden Oriole. Plate xxix. fig. 5. Body and point of tail rich golden yellow; wings, tail, and cere, black; quills edged with white, which, with the secondaries, are tipped with yellow; bill orange-yellow; irides red; eyes surrounded by a black patch, extending to the base of the bill; legs gray. Ten inches long. Inhabits Europe and Africa.

Genus 18.—ICTERUS.—*Temminck.*

*Generic Character.*—Bill long, sometimes more than the length of the head, shape of an elongated cone, pointed, sharp, and somewhat compressed, having no distinct ridge or notch, base enveloped in feathers, margins indented; nostrils at the base of the bill, lateral, and covered by a horny

plate; tarsus at least the length of the middle toe; wings long, the third and fourth quills longest.

*Icterus icterocephalus*.—The Yellow-Headed Troopial. Plate xxxix\* \*. fig. 6. Black; head, neck, and breast, golden yellow; a black patch round the eyes; bill horn colour; some of the exterior wing-coverts pure white, tipped with black; tail four inches long slightly rounded; legs and feet black. Ten inches and a half long. Inhabits the United States.

*Icterus Phæniceus*.—The Red-winged Starling. Described, vol. iii. p. 211 note.

Genus 19.—YPHANTES.—*Vieillot*.

*Generic Character*.—Bill polished, nearly straight, pointed, slender, the edge straight; the upper mandible forming the base of a pointed cone, enveloped in feathers; nostrils dilated, covered by a membrane; tarsus short, annulated; wings medium length, second and third quills longer than the others; tail with twelve feathers.

*Yphantes Baltimore*.—Catesby's Baltimore. Plate xxvi\*. fig. 5. Head, throat, and upper part of the wings, black; lower interscapulum, tergum, and whole under parts, bright orange, deeper on the breast; exterior edges of the greater wing-coverts, and part of the primaries, white; tail slightly forked, exterior feathers shorter than the others; bill black, lower mandible blue towards the base. Seven inches long. Inhabits the United States.

See account of its habits, vol. iii. p. 218, &c. Described as the Baltimore Oriole.

*Yphantes spurius*.—The Orchard Baltimore. Described, vol. iii. p. 218.

Genus 20.—STURNUS.—*Linnaeus*.

*Generic Character*.—Bill straight, subulated, angulated, depressed, and somewhat obtuse; the base of the upper mandible resting on the forehead; nostrils lateral, situated at the base of the bill, and partly closed by an arched membrane; wings long, the first quill very short, the second and third longest; tarsus longer than the middle toe; feet with three toes before and one behind, the exterior joined at its base to the middle one.

*Sturnus vulgaris*.—The Starling or Stare. Plate xxix. fig. 6. Described, vol. iii. p. 241.

Genus 21.—PASTOR.—*Temminck*.

*Generic Character*.—Bill elongated, conical, considerably compressed, somewhat arched and edged, and slightly notched; nostrils at the base of the bill, lateral, ovoid, partly closed by a feathered membrane; legs strong; feet with three toes before and one behind, the exterior attached at the base to the middle one; first quills very small, second and third longest.

*Pastor roseus*.—The Roseate Pastor. Plate xxx\*. fig. 4. Head with a pendant crest, which, with the neck and upper parts of the breast, are of a velvet black, with iridescent reflections; the back and belly of a fine rosy hue; wings and tail brownish-black; under tail-coverts and thighs black; irides deep brown; legs flesh-red. Eight inches long. Inhabits Asia and Africa; visits Spain, Italy, and England.

Genus 22.—PARADISEA.—*Linnaeus*

*Generic Character*.—Bill of medium size, quadrangular, and somewhat

convex above, compressed, having a ridge between the frontal feathers; legs short; tarsus longer than the middle toe; lateral toe stronger and longer than the rest; wings with first five quills graduated, the sixth and seventh longest.

*Paradisea apoda*.—The Great Bird of Paradise. Plate xix. fig. 7. Cinnamon-coloured; head and throat iridescent golden-green; side feathers very long, slight of texture, and fawn-coloured; the two intermediate tail feathers long and setaceous. Total length two feet. Inhabits the Moluccas.

Genus 23.—LAMPROTORNIS.—*Temminck*.

*Generic Character*.—Bill of medium size, depressed at the base, with a ridge concealed in the frontal feathers, somewhat convex above, and compressed at the tip, which is slightly notched; nostrils basal, lateral, ovate, partly closed by an arched membrane, frequently hidden by feathers; legs long; tarsus longer than the middle toe; internal toe adhering at its base, the external one free; fourth and fifth quills longest.

*Lamprotornis gularis*.—The Gorget Bird of Paradise. Plate xxix\*. fig. 2. Black, with a highly iridescent lustre of purple and green, having a golden metallic lustre on the back and under parts; throat of a copper golden hue; head crested; tail long, wedge-shaped. Size, exclusive of the tail, about seven inches. Inhabits the Moluccas.

### ORDER III.—INSECTIVOROUS BIRDS.

The bill is of a medium size, or short in some genera; it is straight, rounded, or subulate; upper mandible curved, and notched at the tip; base for the most part beset with bristly hairs, directed forward; feet having three toes before and one behind, with parallel articulations; the exterior toe adhering at its base, or in some species to the first phalange of the middle toe.

Their voices, for the most part, melodious; and they feed on berries in the cold season.

Genus 1.—TURDUS.—*Linnaeus*.

*Generic Character*.—Bill medium-sized, with a few bristles at its base directed forward, slightly bending towards the point, which is rather compressed, with the upper mandible emarginated, and notched near the tip; nostrils basal, lateral, and ovate, partly hidden by a naked membrane; tarsus longer than the middle toe, to which the outer one is attached at its base; first quill short, the third and fourth the longest.

*Turdus musicus*.—The Thrush, or Thrustle. Plate xxix. fig. 8. Described, vol. iii. p. 235.

*Turdus torquatus*.—The Ring Ouzel. Plate xxix. fig. 9. Described, vol. iii. p. 239.

*Turdus merula*.—The Black Bird. Plate xxxii. fig. 1. Described, vol. iii. p. 238.

*Turdus Orpheus*.—The Mocking-Bird. Plate xxxii. fig. 2. Described, vol. iii. p. 244.

*Genus 2.—CINCLUS.—Bechstein.*

*Generic Character.*—Bill rather slender, slightly bent upwards, compressed at the sides; upper mandible emarginated at tip, and encompassing the lower one; nostrils basal, lateral, longitudinally cleft, and partly covered by a membrane; head small; wings short, first quill not quite the length of the second, which is also shorter than the third; three toes before and one behind, the exterior one attached at its base to the middle toe, which is longer than the tarsus.

*Cinclus aquaticus.*—The European Dipper. Plate xxx.\* fig. 8. Upper parts blackish-brown, feathers margined with grayish-black; throat, eyelids sides of the neck, and as low as the epigastrium, white; venter chestnut-brown, crissum darker; bill blackish-brown; legs dusky; irides yellowish-brown. Seven inches long. Inhabits Europe.

*Genus 3.—MENURA.—Shaw.*

*Generic Character.*—Bill broader than deep at its base, provided with setaceous plumes, directed forward, straight, and slender, slightly inclined at the tip, which has a small notch; upper mandible longer than the lower one; nostrils placed in the middle of the bill, oval, large, and protected by a membrane; claws same length as the toes, broad, obtuse, and convex above; wings short.

*Menura superba.*—The Superb Menura. Plate xxx\*. fig. 6. Brown above, reddish-brown on the wings and neck; cinereous brown below; tail erect, consisting of fourteen internal extremely thinly fibred webs, the external feathers also erect, beautifully clouded with chestnut and brown on their inner margins, silvery-grey externally, the tips reflected, dusky-brown and black; head crested; legs dark gray, claw of the hallux very long. Size of a small pheasant. Inhabits New South Wales.

*Genus 4.—PITTA.—Vieillot.*

*Generic Character.*—Bill of medium size, strong, hard, and compressed, with a slight curvature from its base, where the ridge is elevated, bent at the tip, with a slight notch; nostrils at the base of the bill, lateral, and partly closed by a naked membrane; legs very long, slender; tarsus frequently double the length of the middle toe, internal toe attached to the first joint; wings short, rounded, the three first quills equally graduated, the fourth and fifth longest; tail short, equal, or rounded.

*Pitta cyanura.*—The Blue-Tailed Pitta. Plate xxix\*. fig. 3. Chestnut-coloured above, straw-coloured beneath, and streaked with blue; head with black fillets; with a blue band on the breast, and another on the tail. Eight inches and a half long. Inhabits Guiana.

*Genus 5.—MYIOTHERA.—Illiger.*

*Generic Character.*—Bill long, straight, convex above, with the top slightly arched, bent at the tip, and notched; lower mandible arcuated in the centre, and a little bent upwards at the point; nostrils basal, lateral, and partly closed by a membrane; long legs, or of a medium length; the tarsus greatly longer than the middle toe; lateral toes nearly of equal length, the internal one attached the length of the first phalange; wings short, rounded, the

fourth and fifth quills the longest; tail short, and the tectrices of equal length, or graduated and long in others.

*Myiothera grallarius*.—The King Thrush. Plate xxix. fig. 9. Front ear coverts, back, wings, gula, jugulum, and tail, chestnut; under parts and gena pale reddish chestnut; breast and abdomen with lanceolate dark chestnut spots; back of the head and neck ash-colour; feathers with a pale streak in their centre; legs long, dull flesh-coloured; tibia half covered by feathers; tail very short. Eleven inches long. Inhabits Guiana.

Genus 6.—THAMNOPHILUS.—*Vieillot*.

*Generic Character*.—Bill short, robust, thick, somewhat gibbous; base widened, sides dilated, point somewhat compressed, obtuse, and considerably bent downwards, with a small notch near its tip; nostrils lateral, placed near the base of the bill, open, somewhat ovate or rounded; legs long and slender; tarsus considerably longer than the middle toe, to which the external toe is attached as far as the first joint; wings short, rounded; the fourth, fifth, and sixth quills of equal length, and longer than the others.

*Thamnophilus niger*.—The Bush Shrike. Plate xxix\*. fig. 1. Head furnished with a crest, composed of rather long dense black feathers, bristly near the base of the bill, covering the nostrils; the whole plumage is dull grayish-black, slightly tinged with blue on the rump and under parts; secondaries barred with umber-brown; toes long and slender, which, with the legs, are blackish-brown. Length eight inches. Inhabits South America.

Genus 7.—VANGA.—*Vieillot*.

*Generic Character*.—Bill long, undulated, hard, sharp at the edges, considerably hooked at its point, and sharp; nostrils lateral, placed near the base in the horn of the bill, concealed by a cartilage; tarsus as long, or in others longer than the middle toe; the external toe attached to the first joint; third quill longest.

*Vanga Cristata*.—The Crested Shrike. Plate xxvi. fig. 5. Black; culum white, with two lunated white spots behind the eyes on each side; large wing-coverts dark brown; crest very long and erect; nuchal bristles hardly perceptible.

Genus 8.—LANIUS.—*Linnaeus*.

*Generic Character*.—Bill of medium size, strong, straight from its base, and considerably compressed; upper mandible much bent towards its tip and hooked; base without cere, provided with strong nuchal bristles, directed forward; nostrils close to the base, lateral, nearly round, half closed by a concamerated membrane, nearly concealed by the bristles; tarsus longer than the middle toe; feet with three toes before and one behind, free; the third and fourth quills the longest.

*Lanius excubitor*.—The Great Shrike. Plate xxxii. fig. 3. Described, vol. iii. p. 90.

Genus 9.—PSARIS.—*Cuvier*.

*Generic Character*.—Bill thick, short, round, conical, and ridged at the top, with the base depressed, and the tip bent, slightly notched, and compressed; nostrils lateral, round, open, and remote from the base of the bill, placed in the horny substance; legs robust, tarsus short, the length of the

middle toe; the external toe attached to the first phalange; wings mid-sized; the third and fourth quills longest.

*Psaris personata*.—The Masked Psaris. Plate xxx\*. fig. 2. Upper parts ash-gray, paler below, and almost inclining to white; shoulders, quills, and secondaries, black; the wings are long in proportion; bill yellowish-brown; a narrow yellow-red circle round the eyes; tarsi and feet strong; of a bluish-black. Length seven inches and a half. Inhabits Mexico.

Genus 10.—SPARACTES.—*Illiger*.

*Generic Character*.—Bill strong, thick, somewhat depressed at the base, and considerably dilated at the margins; slightly bent and compressed, and notched at the point; without a distinct nasal furrow; lower mandible strong, broad, and obtuse at the tip; nostrils lateral, situated at the base of the bill, within a furrow in the corneous substance; legs robust; tarsus longer than the middle toe.

*Sparactes superbus*.—The Superb Shrike. Plate xxx†. fig. 3. Head with an upright crest of long narrow feathers; plumage black; throat scarlet, edged with yellow; abdomen yellow, streaked with red; quills margined with white; bill thick and gray. Seven inches long. Inhabits the South Sea Islands.

Genus 11.—OCYPTERUS.—*Cuvier*.

*Generic Character*.—Bill somewhat depressed at the base, and the point notched and compressed; upper mandible arched above, and slightly hooked at the point; nostrils lateral, remote from the base, and penetrating the horny substance, concealed by the nuchal bristles; legs and toes short; wings long, the second and third quills of the same length, and longer than the others.

*Ocypterus lucorynchos*.—The White-Bellied Ocypterus. Head, neck, throat, back, wings, and tail, brownish-black, with a bluish changing colour; ophthalmic region black; irides chestnut; bill lead-colour; breast, belly, and rump white; legs and feet strong, lead-coloured. Seven inches long. Inhabits Manilla.

Genus 12.—TRICOPHORUS.—*Temminck*.

*Generic Character*.—Bill short, strong, conical, compressed at the tip, and somewhat expanded at the base; upper mandible bent at its point, and slightly notched; base beset with long, strong nuchal bristles; legs short; tarsus not so long as the middle toe, the external one adhering the length of the second joint; fourth, fifth, and sixth quills longest.

*Tricophorus barbatus*.—The Bearded Tricophorus. Plate xlvii\*. fig. 7. Green above, glossed with ash-colour; tail with a rufous tinge; with a tuft of long yellow feathers under the throat, forming a beard; under parts dusky-green; base of upper mandible, occiput, and upper part of the neck beset with long nuchal bristles. Eight inches long. Inhabits Africa.

Genus 13.—EDOLIUS.—*Cuvier*.

*Generic Character*.—Bill robust, depressed at the base, point notched and compressed; upper mandible slightly arched, bent at the point, and a little hooked; lower mandible straight, turned up at the tip; base beset with long, stiff, nuchal bristles; nostrils lateral, partly covered with large fea-

thers and hairs, placed at the base of the bill; legs slender and short; fourth, fifth, and sixth quills longest; tail forked.

*Edolius Malabaricus*.—The Malabar Edolius. Plate xxx\*. fig. 7. Deep black, iridescent blue on the upper parts and breast, where the feathers are lanceolate; a long erect crest rises from the base of the bill, extending to the sinciput; exterior tail feathers with very long naked shafts, having spear-shaped plumes at their tips. Seven inches long. Inhabits India.

Genus 14.—CEBLEPYRIS.—*Temminck*.

*Generic Character*.—Bill short, strong, and thick, base expanding, point somewhat tumid and compressed; upper mandible convex, bent towards the point, and notched; lower mandible straight, nearly the length of the upper one; nostrils lateral, oval, at the base of the bill, hidden by thick-set hairs; legs short, slender; lateral toes unequal, and united at the base; fourth and fifth quills the longest.

*Ceblepyris Vaillantii*.—Le Vaillant's Ceblepyris. Plate xxx. fig. 5. Slate-gray above, under parts paler; breast and ophthalmic region dusky; quills brown, externally edged with white; tail doubly wedged. Six inches and a half long. Inhabits Africa.

Genus 15.—CORACINA.—*Vieillot*.

*Generic Character*.—Bill angular, thick, and strong, convex above, compressed at the point, slightly notched; nuchal bristles slender and short; nostrils basal, circular, the fore half open, and the other half closed by a membrane; legs strong, tarsus longer than the middle toe; fourth and fifth quills longest.

*Coracina cephaloptera*.—The Helmeted Chatterer. Plate xxxvii\*. fig. 6. Plumage blue-black, breast and remiges of the wings blackish-brown; bill dusky, irides reddish-brown, head surmounted by a very large helmet of reflected plumes; feathers of the neck thick, and terminating like a cravat; jugulum naked; feet, legs, and claws, lead-coloured. Thirteen inches long. Inhabits Brazil.

Genus 16.—QUERULA.—*Vieillot*.

*Generic Character*.—Bill much depressed, triangular, both mandibles tumid; upper mandible sloping, with a small notch at its tip; under mandible with the point turned up, and very thin; base with long nuchal bristles, both above and below; nostrils basal, covered with the bristles; tarsus length of the middle toe; exterior toe joined to the tarsus, as far as the first joint, internal toe free; wings long, first and eighth quills same length, the second shorter than the sixth, and the fourth the longest of the whole; tail with twelve feathers.

*Querula rubricollis*.—The Red-Throated Querula. Plate xxvii. fig. 8. Whole plumage dark umber-brown; throat of deep scarlet, extending from the chin to the jugulum; irides orange; bill brown; legs and feet dusky. Eleven inches long. Inhabits Cayenne.

Genus 17.—AMPELIS.—*Linnæus*.

*Generic Character*.—Bill short, somewhat depressed, deeper than broad, trigonal at its base, the tip acutely bent, and notched; nostrils lateral, roundish at the base, partly closed by a membrane; tarsus the length of the



middle toe, sometimes shorter; internal and external toes united to the middle toe the length of the second joint; second quill the longest.

*Ampelis Cotinga*.—The Purple-Breasted Chatterer. Plate xxxii\*. fig. 7. Bright cobalt-blue above, and beautiful purple beneath; throat with darker clouds; wings and tail black. Eight inches and a half long. Inhabits Brazil.

**Genus 18.—CASMARYHNCHOS.—Temminck.**

*Generic Character*.—Bill broad, considerably depressed, horny, and notched at the point, soft and flexible at the base; with a large nasal furrow; lower mandible thin and flexible; nostrils large, oval, open, placed near the point of the bill, provided with small feathers; tarsus longer than the middle toe; fourth and fifth quills longest.

*Casmaryhnchos carunculatus*.—The Carunculated Chatterer. Plate xxxii\*. fig. 8. White, with the rump, quills, and tail, pale yellow; forehead without feathers; bill black, with a fleshy caruncle at its base; legs black. Twelve inches long. Inhabits Brazil.

*Casmaryhnchos variegatus*.—The Variegated Chatterer. Plate xxix\*. fig. 7. Upper parts and thighs pale cinereous; head, to bottom of nucha, dull chestnut-brown; tergum dull green; wings blue-black; bill and legs slate-colour; irides orange-yellow; chin with several long fleshy wattles. Seven inches long. Inhabits Brazil.

**Genus 19.—PROCNIAS.—Illiger.**

*Generic Character*.—Bill broader than the forehead, sides considerably dilated, tip notched and much compressed, ridge slightly raised at the base; nostrils basal, tubular, margined by a membranous ring; tarsus longer than the middle toe; second and third quills longest.

*Procnias ventralis*.—The Blue Berry-Eater. Plate xlvii\*. fig. 2. Azure blue above, forehead and jugulum black; abdomen white; hypochondria with transversal dusky stripes. Six inches long. Inhabits Brazil.

**Genus 20.—RUPICOLA.—Cuvier.**

*Generic Character*.—Bill of middle size, strong, slightly arched, bent upwards at the point, and notched; lower mandible parallel, and acute; nostrils lateral, ovate, hidden by the feathers of the tuft; legs strong; tarsus length of the middle toe, and partly covered with feathers; the external toe attached to a little beyond the second phalange; first quill filiform, and considerably longer than the rest.

*Rupicola elegans*.—The Elegant Rupicola, or Hoopoe Hen. Plate xxxvii\*. fig. 8. Saffron-orange; quills brown, with a white bar across them; upper coverts erect and vaulted; tail fan-shaped, dusky, bordered with dull yellow; head surmounted by a semicircular erect crest, edged with lemon-yellow, within which is a file of lilac-colour; legs lemon-yellow. Ten inches long. Inhabits South America.

**Genus 21.—PHIBALURA.— Vieillot.**

*Generic Character*.—Bill very short, somewhat conical, and arcuated above, sides dilated; upper mandible notched at the point, under mandible straight; with a small nasal furrow; nostrils a little above the base, covered by a membrane, and surrounded by a narrow elevated edge; first and second quills longest; tail long, slender, and forked; tarsus about the same length as the middle toe.

*Phibalura flavirostris*.—The Yellow-Billed Phibalura. Plate xxix\*. fig. 3. Back sulphur-yellow, transversely barred with black; abdomen and breast white, barred with sulphur-yellow, and longitudinal lines of black; crissum yellow; head having a black crest, with crimson spots; ophthalmic region black; gula yellow; collum white, with transverse black bars; tail feathers olive-green at the base, and black at the tips, much forked. Eight inches long. Inhabits Brazil.

Genus 22.—PIPRA.—*Linnaeus*.

*Generic Character*.—Bill trigonal, short, expanded at the base; compressed and notched at the point; nostrils basal, lateral, half concealed by a membrane which is slightly feathered; wings and tail short; the two exterior toes attached to the middle one for half their length; third and fourth wing feathers longest.

*Pipra serena*.—The White-Fronted Manakin. Plate xlvii\*. fig. 8. Back, throat, pectus, tail, and wings, black; venter and crissum rich golden-yellow, with a patch of the same on the centre of the pectus; tergum royal blue; front white; bill black; legs and feet dusk-gray; irides chestnut.

Genus 23.—PARDALOTUS.—*Vieillot*.

*Generic Character*.—Bill very short, thick, dilated at the base; with a distinct ridge; mandibles of equal length, strong, convex, and somewhat obtuse at tip, the upper one being notched; nostrils lateral, basal, covered by a membrane; legs slender; tarsus longer than the middle toe.

*Pardalotus striatus*.—The Streaked Manakin. Plate xxxii\*. fig. 2. Grayish-brown above, cream-coloured below; top of the head black, with white stripes; between the bill and the eye a rich yellow spot; secondaries of the wings yellow at the tips. Four inches and a half long. Inhabits Van Diemen's Land.

Genus 24.—TODUS.—*Linnaeus*.

*Generic Character*.—Bill long, mandibles much depressed; point of upper mandible straight, and cleft at the tip; the lower mandible obtuse and truncated; nostrils open and round; base of bill beset with long nuchal bristles; toes lateral, unequal; the external one attached to the third joint, the internal to the second phalange; wings short, with the fourth quill the longest.

*Todus viridis*.—The Green Tody. Plate xxxii\*. fig. 4. Upper parts of a warm yellowish-green; white below; throat scarlet, pectus silver-gray; crissum yellow; axillæ and middle wing-coverts verdigris blue; upper mandible skin-colour, lower mandible pale yellow; legs ochre-yellow. Three inches and a half long. Inhabits North America.

Genus 25.—PLATYRHYNCHOS.—*Desmarest*.

*Generic Character*.—Bill broader than the face, and dilated at the base, expanding at the side, where it is greatly depressed and beset with nuchal hairs; nostrils round, covered by a feathered membrane; tarsus longer than the middle toe, to which the exterior one is united as far as the first phalange; nail of the hallux strong and a little hooked; third and fourth quills the longest.

*Platyrynchos Horsfieldi*.—Horsfield's *Platyrynchos*. Plate xxxvii\*. fig. 5. Upper parts, wings, and tail, dark blackish-brown; head crested, of blackish purple, which is also the colour of the throat and breast, changing into orange; the regio parotica, beautiful violet; tectrices and remiges clouded with bright gamboge-yellow; tail with a square yellow spot on each feather; base of the six central retrices the same colour; irides orange; legs grayish yellow. Six inches long. Inhabits Sumatra.

Genus 26.—MUSCIPETA.—Cuvier.

*Generic Character*.—Both mandibles of the bill considerably depressed, broader than deep; upper mandible with a sharp ridge, hooked at point and notched; lower mandible pointed, the base beset with long nuchal hairs, not unfrequently extending beyond the bill; nostrils open, placed at the base of the bill; side toes unequal, the external one attached to the second joint; first three quills graduated, the fourth and fifth the longest.

*Muscipeta regia*.—The Coast Muscipeta. Plate xxxix\*. fig. 8. Brown above, cream white beneath, with wavy streaks of brown; crest rust-coloured, black at the edges; a white streak over the eyes, and white under the chin; bill dusky; legs flesh-coloured. Seven inches long. Inhabits Cayenne.

Genus 27.—MUSCICAPA.—Linnæus.

*Generic Character*.—Bill medium-sized, sub-triangular, depressed at the base, strong, and compressed towards the tip, which is deflected; both mandibles are emarginate; base with long stiff nuchal bristles; nostrils basal, lateral, and ovoid, partly hid by hairs; tarsus same length as the middle toe; lateral toes nearly of equal length, the external one joined at its base to the middle toe; first quill very short, the second shorter than the third and fourth, the latter being longer than the rest.

*Muscicapa tuctuosa*.—The Pied Flycatcher. Plate xxxii\*. fig. 3. Head and upper parts of the body black, forehead and under parts pure white; wings brownish-black, the middle and greater coverts white; tail black. Five inches long. Inhabits Europe.

Genus 28.—MALURUS.—Vieillot.

*Generic Character*.—Bill slender, deeper than broad; upper mandible slightly arcuated, base with nuchal bristles; nostrils lateral, basal; exterior toes united as far as the second joint; wings rounded, very short; tail slender and long.

*Malurus cyaneus*.—The Superb Warbler. Plate xxxvii\*. fig. 1. Described, vol. iii. p. 263.

Genus 29.—SYLVIA.—Latham.

*Generic Character*.—Bill straight, slender, subulate, deeper than broad at the base; upper mandible frequently notched, the under one straight; nostrils lateral, ovoid, situated at the base of the bill, partly covered by a membrane; tarsus somewhat longer than the middle toe; first quill very short, wanting in some species, second and third nearly of the same length; wings short, coverts and scapulars abbreviated.

Section 1.—AQUATIC WARBLERS.—Vertex of the head depressed; wings

short, considerably rounded; tail long, graduated, frequently conical. Song of many of the species with a great variety of notes.

*Sylvia phragmitis*.—The Sedge Warbler. Plate xxxii. fig. 4. Crown, back, and wing-coverts, deep yellowish-brown, spotted with liver-brown; rump and upper tail-coverts paler, under parts cream-yellow; a broad pale yellow patch above the eyes; chin and throat white; tail brownish-cinereous, somewhat rounded; legs and feet blackish-brown. Four inches long. Inhabits Europe.

Section 2.—SYLVIAN WARBLERS.—Tail square, or slightly forked at the end.

*Sylvia luscinia*.—The Nightingale. Plate xxxii. fig. 5. Described, vol. iii p. 246.

*Sylvia rubecula*.—The Redbreast. Plate xxxii. fig. 7. Described, vol. iii. p. 254.

*Sylvia atricapilla*.—The Black-Cap Warbler. Plate xxxii. fig. 6. Described, vol. iii. p. 261.

*Sylvia phœnicurus*.—The Redstart. Plate xxxii. fig. 7. Forehead white; vertex and back part of the neck deep blue-gray; chin, gula, and jugulum, black; breast, rump, hypochondria, and side tail feathers, reddish-orange, the two middle rectrices are clove-brown; epigastrium and crissum grayish black, the second and sixth feathers being of equal length; feet and legs black.

Genus 30.—REGULUS.—Cuvier.

*Generic Character*.—Bill straight, slender, deeper than broad, compressed, edges inflected; nostrils basal, ovoid, covered by small nuchal bristles, directed forwards; first quills of the wings short, the second considerably shorter than the third, which is longer than the rest; tarsus longer than the middle toe, to which the outer one is joined at its base.

*Regulus auricapillus*.—The Gold-Crested Regulus. Plate xxxii. fig. 9. Described, vol. iii. p. 262.

Genus 31.—TROGLODYTES.—Cuvier.

*Generic Character*.—Bill slender, slightly compressed, emarginated, curved; nostrils basal, half covered by an arcuated membrane; wings short, rounded, with the first quill very short, the second considerably shorter than the third, the fourth and fifth of equal length, and longer than the rest; tail short, rounded, and carried erect; legs strong; tarsus same length as the middle toe, the external toes of equal length.

*Troglodytes Europæus*.—The Wren. Plate xxxiii. fig. 1. Described, vol. iii. p. 262.

Genus 32.—SAXICOLA.—Bechstein.

*Generic Character*.—Bill straight, slightly carinated, with the base dilated, and resting on the forehead; tip of the upper mandible a little bent, and emarginated; coronal region rounded and high; nostrils basal, lateral, oval, and partly concealed by a membrane; tarsus considerably longer than the middle toe; the external toe adhering at its base to the middle one; wings of medium length, first quill not half the length of the second, which is shorter than the third and fourth, these last being the longest; coverts and scapulars very short.

*Saxicola oenanthe*.—The Wheat-Ear. Plate xxxiii. fig. 2. Described, vol. iii. p. 264.

*Saxicola rubetra*.—The Whin-Chat. Plate xxxiii. fig. 3. Described, vol. iii. p. 264.

Genus 33.—ACCENTOR.—*Bechstein*.

*Generic Character*.—Bill strong, straight, of medium length, acuminated, edges of the mandibles sharp and inflected, the upper one emarginated; nostrils basal, bare, pierced in a large membrane; legs strong; the exterior toe attached at its base to the middle one; first quills very short, second shorter than the third, which is longer than the others.

*Accentor modularis*.—The Hedge Accentor, or Song Sparrow. Plate xxxiii. fig. 5. Described, vol. iii. p. 250.

Genus 34.—MOTACILLA.—*Latham*.

*Generic Character*.—Bill slender, straight, subulated, slightly carinated, emarginated, its base resting upon the forehead; edges of both mandibles inflected near the middle; forehead depressed; nostrils basal, lateral, oval, and partly concealed by a naked membrane; tarsus considerably longer than the middle toe, external toe united at its base, hallux strong and long in some species; first quills very short, the second the longest in the wing; one of the greater coverts as long as the wing, tail long, and square at its point.

*Motacilla alba*.—The Pied Wagtail. Plate xxxiii. fig. 6. Forehead, cheeks, sides of the neck, belly, and crissum, white; crown, nape, throat, breast, upper parts of the body, and middle tail feathers, black; lesser wing-coverts black, the greater ones bordered with grayish-white; the two outer tail feathers white. Seven inches long. Inhabits Europe. See general description of their habits, vol. iii. p. 265.

*Motacilla boarula*.—The Gray Wagtail. Plate xxix\*. fig. 1. Bluish-gray above, rump bright sulphur-yellow; a white streak over the eyes; throat black; under parts bright chrome-yellow; wings grayish-black, coverts tipped with white; tail with the middle feathers black, and the outer ones white. Seven inches long. Inhabits Europe.

*Motacilla flava*.—The Yellow-Wagtail. Plate xxxiii. fig. 7. Upper parts pale yellow; wing-coverts blackish-brown, margined and tipped with yellowish white; quills black brown, margined with pale yellow; middle tail-feathers black, margined with pale yellow; the two outer ones white; legs and feet dusky; hallux produced and slightly curved.

Genus 35.—ENICURUS.—*Temminck*.

*Generic Character*.—Bill elongated, dilated at the base, abruptly acuminated at the tip, which is attenuated and curved; nostrils situated in a groove, with an elevated membrane; tarsi slender; hallux strong and short; tail forked.

*Enicurus coronatus*.—The White-Crowned Enicurus. Plate xxxii\*. fig. 1. Black; crown white; a crescent-shaped undulated white stripe passes over the upper wing-coverts, and ends at the bastard; wings black; rump, venter, and crissum, white; tail much forked; feathers of unequal length, each with three bars of white, and tipped with the same; outer feathers wholly white; irides hazel; legs ochreous yellow; claw of the hallux large and hooked; bill dusky gray. Ten inches and a half long. Inhabits Java.

*Genus 36.—ANTHUS.—Bechstein.*

*Generic Character.* Bill straight, cylindrical, slender, subulate near the point; edges inflected towards the centre; base of upper mandible carinated, slightly bent down, and notched at the tip; nostrils basal, lateral, and ovate; partly hid by an arcuated membrane; tarsus usually longer than the middle toe, to which the external one adheres as far as the first joint; claw of the hallux longer than the toe; third and fourth quills the longest.

*Anthus pratensis.*—The Tit-Lark. Plate xxxiii. fig. 9. Upper parts dusky green, with the centre of the feathers brownish-black; under parts yellowish-white, spotted with blackish-brown upon the sides of the neck and breast; under parts white; hypochondria, with dark streaks; tail feathers blackish-brown, the exterior ones, with the edges of the web, white, and terminated by a long white spot; second feather with a small white spot at its tip. Five inches and a half long. Inhabits Europe.

*Genus 37.—NEOPS.—Vieillot.*

*Generic Character.*—Bill slender, much compressed at the sides, entire, pointed; upper mandible straight, lower mandible shorter, curved downwards in the middle and upwards at its tip, which is sharp; nostrils oval, covered by a membrane, and situated at the base of the bill; the external and internal toes are joined to the middle one as far as the first joint.

*Neops ruficauda.*—The Red-Tailed Neops. Plate xxvii. fig. 9. Chestnut-brown; the throat, abdomen, and crissum, mixed with brown and gray; crown, cheeks, and jugulum, spotted with white, having a white luniform list over the eyes; the middle wing-coverts blackish-brown in the centre, with a streak of black across the three external remiges, near the tip; external quills wood-brown; tail ferruginous; the middle ones black; upper mandible pale brown, lower one whitish; irides orange; legs and feet brown. Length, four inches and a half. Inhabits Cayenne.

## ORDER IV.—GRANIVOROUS BIRDS.

Bill more or less conical, short, and strong; culmen more or less depressed and dilated, advancing upon the forehead; mandibles mostly without notches; feet with three toes before and one behind, the anterior ones entirely divided; wings of medium length.

*Genus 1.—ALAUDA.—Linnaeus.*

*Generic Character.*—Bill subconic, short; mandibles of equal length, the upper one slightly arcuated; nostrils basal, lateral, ovate, and partly concealed by short reflected feathers; claw of the hallux much produced, and nearly straight; wings with the first quills short, or awanting; the third the longest; coronal feathers usually produced, and capable of being erected into a crest.

*Alda arvensis.*—The Sky-Lark. Plate xxxiii. fig. 10. Described, vol. iii. p. 254.

*Alda arborea.*—The Wood-Lark. Plate xxxiii. fig. 8. Described, vol. iii. p. 255.

Genus 2.—PARUS.—*Linnæus*.

*Generic Character*.—Bill strong, short, hard, subconic, and slightly compressed; nostrils basal and round, covered with reflected nuchal bristles; legs strong; toes divided to their origin; hallux furnished with a long hooked claw; quills of medium length, or almost deficient; the second shorter than the third; fourth and fifth longest.

Section I.—Having the first quill feathers of medium length. Inhabitants of woods.

*Parus major*.—The Great Titmouse. Plate xxxiii. fig. 12. Back olive-green; rump and wing-coverts gray, the latter tipped with white; head, throat, and lower part of the neck, black; cheeks and ear-coverts white; tail grayish-green, edged with slate-gray; breast and abdomen sulphur-yellow, with a black streak running down the mesial line; under tail-coverts white; legs blue-gray. Length, five and a half inches. Inhabits Europe. See general description of their habits, vol. iii. 257.

*Parus cæruleus*.—The Blue Titmouse. Plate xxxiii. fig. 11. Back grayish-blue, tinged with green; under parts pale-yellow; crown of the head azure-blue; front, list over the eyes, and cheeks white; ophthalmic streak black; nape and gular collar azure-blue; wings and tail pale Antwerp blue; the greater coverts tipped with white; legs and feet slate-colour. Four inches and a half long. Inhabits Europe.

*Parus palustris*.—The Marsh-Titmouse. Plate xxxiii. fig. 13. Upper parts yellowish-gray; breast and abdomen white, tinged with pale yellowish-brown; head, nape, and neck, purplish-black; cheeks cream-yellow; legs gray. Four inches and a half long. Inhabits Europe.

Section II.—The first quill feathers very short, or altogether wanting.

*Parus biarmicus*.—The Bearded-Titmouse. Plate xxxiii. fig. 14. Nape and back yellow-brown, tinged with orange; abdomen and epigastrium pale fawn-colour; head, neck, and breast, blue-gray, the latter tinged with lilac; bill orange-yellow; irides gamboge-yellow; base of the bill furnished with mnstaches of loose pendant feathers; scapulars wood-brown; quills blackish-gray, edged with white, secondaries edged with orange-brown; tail long, cuneiform, orange-brown; exterior feathers edged and tipped with white; legs and feet black. Six inches long. Inhabits Europe.

Genus 3.—EMBERIZA.—*Linnæus*.

*Generic Character*.—Bill conical, strong, hard, and sharp-pointed; edges of both mandibles inflected, and compressed towards the point; upper mandible narrower and more acute than the under one, its roof furnished with a hard bony knob; nostrils basal, round, partly hidden by small feathers at the base of the bill; toes entirely divided; hallux with a short or produced bent claw; tail forked or slightly rounded.

Section I.—Claws of the hallux short and hooked.

*Emberiza citrinella*. The Yellow Bunting. Plate xxxiv. fig. 2. Described, vol. iii. p. 259.

Section II.—Claws of hallux produced, and slightly bent.

*Emberiza paradisea*.—The Whidah Bunting. Plate xxxiv. fig. 1. Described, vol. iii. p. 283.

Genus 4.—TANAGRA.—*Linnaeus*.

*Generic Character*.—Bill short, strong, triangular at the base, carinated above, greatly compressed, and bent at the tip; upper mandible notched, and projecting beyond the lower one, edges inflected; under mandible straight, gibbous in the middle; nostrils basal, lateral, rounded, partly hidden by protruding feathers; tarsus same length as the middle toe; external toe connected at its base, the internal one free; second and third quills longest.

*Tanagra atra*.—The Black Tanager. Plate xxxiv. fig. 3. Head and neck black, the other parts dark ash-colour; quills and tail of a deeper blue; legs and bill black. Seven inches long. Inhabits Guiana.

Genus 5.—SALTATOR.—*Vieillot*.

*Generic Character*.—Bill thick at the base, robust, convex above, laterally compressed, and flattened at the sides; upper mandible arcuated, covering the sides of the lower mandible, curved, and notched at the point; lower mandible straight, somewhat shorter than the upper one; nostrils basal, small, and open; middle toe united to the base of the exterior one, the interior quite free; wings of medium length, the first and fourth quills longer than the rest.

*Saltator olivaceus*.—The Olive Saltator. Plate xxx. fig. 1. Crown, back, and tail, olive-green; cheeks and jugulum slate-gray; chin white, with a black stripe between it and the jugulum; venter and crissum deep ochre-yellow, approaching to fawn-colour; a white list over the eyes; irides orange; bill gray; legs dusky-yellow.

Genus 6.—PLOCEUS.—*Cuvier*.

*Generic Character*.—Bill strong, forming an acute cone, sharp, inflected, and compressed at the point, without a notch; edges of the mandibles inflected; nostrils basal, placed high in the bill, ovoid, and open; tarsus same length as the middle toe; the three anterior toes adhering at the base; the fourth quill longest.

*Ploceus Philippinus*.—The Philippine Weaver. Plate xxxiv. fig. 4. Brown above, whitish-yellow beneath; crown of the head and breast dull sulphur-yellow; throat burnt umber-brown. Five inches and a quarter long. Inhabits the Philippine Islands.

Genus 7.—LOXIA.—*Brisson*.

*Generic Character*.—Bill elongated, strong, and considerably depressed; both mandibles equally convex, and crossing each other at the points, when closed; nostrils round, lateral, and basal, hid by reflected hard nuchal feathers; the anterior toes quite free; first quill feathers longest; tail forked.

*Loxia curvirostra*.—The Common Crossbill. Plate xxxiv. fig. 5. Upper and under parts tile-red, intermixed with yellowish-gray; quills and tail bluish black, margined with cream-yellow; legs and toes brown. Six inches long. Inhabits north of Europe and America.

Genus 8.—PSITTIROSTRA.—*Temminck*.

*Generic Character*.—Bill short, greatly hooded, gibbous at the base; upper



mandible bent over the under one at the point ; under mandible broad and rounded, with an obtuse tip ; nostrils placed at the base of the bill, lateral, partly covered by a feathered membrane ; tarsus somewhat longer than the middle toe ; toes free, the lateral ones of equal length ; first quill obsolete, second shorter than the third.

*Psittirostra psittacea*.—The Sandwich-Island Parrot-Bill. Head and neck yellow ; rest of the plumage olive-brown.

Genus 9.—PYRRHULA.—*Brisson*.

*Generic Character*.—Bill very black, short, with the sides tumid, both mandibles convex, the upper one gibbous, overhanging the lower one at the tip ; culmen somewhat compressed, and resting on the forehead ; nostrils basal, lateral, round, in general concealed by the feathers at the base of the bill ; tarsus shorter than the middle toe ; the toes free from their origin ; wings short, with the fourth quill feather longest ; tail somewhat rounded or square.

*Pyrrhula vulgaris*.—The Bullfinch. Plate xxxiv. fig. 6. Described, vol. iii. p. 282.

Genus 10.—FRINGILLA.—*Illiger*.

*Generic Character*.—Bill straight, and perfectly conical, short, hard and sharp at the point ; culmen of the upper mandible gibbous, frequently advancing in an angle on the forehead, and very slightly inclined at the tip ; edges of under mandible a little inflected ; nostrils basal, placed near the frontal bone, and partly hidden by the feathers in front ; tarsus shorter than the middle toe ; lateral toes free from their origin ; wings short, the third and fourth quills the longest ; tails varied in form.

Section I.—With bills very thick, the sides gibbous, more or less dilated, and the ridge rounded.

*Fringilla Chloris*.—The Green Finch. Plate xxxiv. fig. 7. Upper parts rich green, passing into yellow, the feathers margined with ash-colour ; greater wing-coverts, and secondaries gray, the latter blackish in the centre ; quills dark-gray, outer edges yellow ; middle tail feathers dark-gray, margined with yellowish-gray ; outer feathers chrome-yellow ; bill pinkish-white ; legs pale wood-brown, tinged with flesh-coloured red ; tail slightly forked. Six inches and a half long. Inhabits Europe.

Section II.—Bill straight, and perfectly conical ; more or less short.

*Fringilla Cœlebs*.—The Chaffinch. Plate xxxiv. fig. 8. Described, vol. iii. p. 281.

*Fringilla cannabina*.—The Brown Linnet. Plate xxxiv. fig. 9. Described, vol. iii. p. 276.

*Fringilla Canaria*.—The Canary Finch. Plate xxxiv. fig. 10. Described, vol. iii. p. 269.

Section III.—The bill in this section is longer, and more produced than in the former two, with the tip very fine, sharp, and somewhat compressed.

*Fringilla linaria*.—The Lesser Red-Pole. Plate xxxvi. fig. 1. Crown, breast, hypochondria, and rump, crimson-colour ; abdomen roseate ; upper parts cinereous red, with longitudinal black spots ; wings, throat, and tail,

black; upper mandible blackish-brown; lower mandible straw-yellow; legs and feet dusky-brown. Five inches long. Inhabits Europe.

*Fringilla carduelis*.—The Goldfinch. Plate xxxvi. fig. 2. Described, vol. iii. p. 274.

Genus 11.—PHYTOTOMA.—*Gmelin*.

*Generic Character*.—Bill strong, conical, edged, with the margins of the mandibles serrated and equal; nostrils basal, lateral, ovoid; three toes before and one behind.

*Phytotoma rara*.—The White Plant-Cutter. Plate xxxvii\* fig. 1. Dusky-gray above, pale-gray on the lower parts; quills and tail feathers spotted with black; tail rounded. Size of a Quail. Inhabits Chili.

Genus 12.—HYREUS.—*Stephens*.

*Generic Character*.—Bill conical, thick, straight, somewhat serrated; nostrils ovate, basal; feet with three toes, two before and one behind, which is strong, with a hooked claw.

*Hyreus Abyssinicus*.—The Abyssinian Hyreus. Plate xxxvii\*. fig. 4. Black above; head, throat, and jugulum, red; wing-coverts brown; with white margins. Inhabits Abyssinia.

Genus 13.—COLIAS.—*Gmelin*.

*Generic Character*.—Bill short, thick, conical, somewhat compressed at the point; both mandibles convex, the upper covering the lower one; nostrils basal, lateral, partly concealed by feathers; tail very long and tapering; tarsus short; the hallux reversible; the anterior toes free; wings short; the third quill longest.

*Colias Capensis*.—The Cape Coly. Plate xxxvii\*\*. fig. 2. Body and tail ash-coloured above, cream-yellow beneath; outer edges of the exterior tail-feathers white; legs dusky. Six inches long. Inhabits the Cape of Good Hope.

## ORDER V.—ZYGODACTYLOUS BIRDS.

Bill varied in form, more or less curved, sometimes much hooked; and in other genera straight and angular; feet always with two toes before and two behind, the exterior hind toe frequently reversible.

The toes behind in pairs is a striking characteristic of this order. It is divided into two subdivisions.

Sub-Division I.—Bill more or less curved; the exterior hind toe reversible in some species.

Genus 1.—MUSOPHAGA.—*Temminck*.

*Generic Character*.—Bill short, robust, broad; ridge arcuated, notched at the point; tip of lower mandible angular; nostrils basal, frequently hid by feathers; legs strong; tarsus same length as the intermediate toe; the exterior reversible; lateral toes of equal length; fourth and fifth quills longest. Sixteen inches long. Inhabits Africa.

*Musophaga Africana*.—The African Touraco. Plate xxxii\*. fig. 5. Blu-

ish-green; head furnished with a helmet-shaped black crest; quill feathers crimson; tail bluish purple; abdomen, thighs, and under-coverts, brownish-black.

*Genus 2.—INDICATOR.—Vieillot.*

*Generic Character.*—Bill short, depressed, sides dilated; point notched and slightly bent; upper mandible ridged; nasal furrow large; nostrils basal, somewhat tubular; tarsus shorter than the external toe; the anterior toe united to the first joint; wings long; the third quill longer than the rest.

*Indicator Major.*—The Great Honey-Guide. Plate xxxvi. fig. 3. Described, vol. iii. p. 194.

*Genus 3.—CUCULUS.—Linnaeus.*

*Generic Character.*—Bill somewhat compressed, slightly curved, of the length of the head; nostrils basal, round, margined by a naked prominent membrane, and pierced in the margin of the mandible; wings of medium length, first quill short, the third longest; tarsus very short, legs feathered below the knee; hind toes free, the exterior reversible; tail more or less cuneiform.

*Cuculus canorus.*—The Common Cuckoo. Plate xxxvi. fig. 4. Described, vol. iii. p. 190.

*Genus 4.—COCCYZUS.—Vieillot.*

*Generic Character.*—Bill strong, compressed, with a distinct ridge, and slightly bent from its base; under mandible straight, sloping at the tip; nostrils basal, half covered by a naked membrane; legs slender, tarsus longer than the exterior toe; wings short, somewhat rounded, the first five feathers graduated.

*Coccyzus coruleus.*—The Blue Cuckoo. Plate xxxix\*. fig. 6. The whole plumage iridescent Antwerp-blue, with purple and green reflection; eyes orange, surrounded by a patch of the same colour; bill black; legs dusky.

*Genus 5.—CENTROPUS.—Illiger.*

*Generic Character.*—Bill thick, strong, compressed, deeper than broad; upper mandible carinated, and arched towards the point, nostrils basal, lateral, and cleft diagonally; legs long, strong; tarsus somewhat longer than the exterior toe, the two anterior ones adhering at their base; internal hind toe with a long subulate sharp claw.

*Centropus phasianus.*—The Pheasant Centropus, or Coucal. Plate xxxvii\*. fig. 3. Back and wings mottled with pale orange, brown, and black; bill, head, neck, and abdomen, blackish-brown; tail deep black, long, with transverse bars of iridescent-black. Seventeen inches long. Inhabits New Holland.

*Genus 6.—PHENICOPHOUS.—Vieillot.*

*Generic Character.*—Bill longer than the head, strong, thick, rounded, smooth, arcuated, the base furnished with divergent nuchal bristles; nostrils linear and lateral, remote from the base; orbits naked, papillose; tarsus longer than the external toe; wings short.

*Phenicophous leucogaster.*—The Tricoloured Malcoha. Plate xxxvii\*. fig. 7. Greenish-black, abdominal and tail feathers margined with white; throat

and neck sea-green; bottom of cheeks white; and a patch of orange round the eyes. Nine inches long. Inhabits Africa.

*Genus 7.—LEPTOSOMUS.—Vieillot.*

*Generic Character.*—Bill laterally compressed, and nearly triangular; keel prominent; upper mandible slightly bent, the lower one straight; nostrils placed in the middle of the mandible, partly closed by an elongation of the horny substance; tarsus length of the exterior toe, depressed, scaly; wings long, the fourth quill longest; tail long, equal.

*Leptosomus viridis.*—The African Cuckoo. Plate xxix\*\*. fig. 5. Crown, back, wings, tail, and circle round the eyes, rich iridescent olive-green, reflecting in different directions, crimson, purple, brown, and golden-yellow; the whole under parts blue-gray; irides orange; tail dusky-brown; legs yellow. Sixteen inches long. Inhabits Africa.

*Genus 8.—SCYTHROPS.—Latham.*

*Generic Character.*—Bill long, convex above, compressed laterally, considerably bent at the tip; upper mandible longitudinally grooved; nostrils basal, naked, and round; ophthalmic region naked; tarsus shorter than the middle toe, the two exterior ones united at the base; tail long, and graduated.

*Scythrops Novæ Hollandiæ.*—The New Holland Scythrops. Plate xxxvii. fig. 9. Lead-coloured, and the tail feathers transversely barred with black; bill four inches long. Seventeen inches long. Inhabits New Holland.

*Genus 9.—SAUROTHERA.—Vieillot.*

*Generic Character.*—Bill longer than the head, slender, laterally compressed, convex above; edges of the upper mandible straight, slightly dentated; point drooping suddenly; nostrils oblong, covered by a membrane; tarsus short, smooth, and annulated; front toes slightly attached at the base, the hind ones quite free; wings medium length; the bastard wing very short; the second and third quills the longest; tail with ten feathers.

*Saurothera vetula.* The Long-Billed Cuckoo. Plate xxvii. fig. 10. Upper parts yellowish-brown; throat gray; venter and crissum chestnut-brown; under side of the tail feathers white, finely barred with blue-black; irides yellow; space round the eyes orange; bill white, with nuchal bristles at its base; feet dull gray. Sixteen inches long. Inhabits St Domingo.

*Genus 10.—PTEROGLOSSUS.—Illiger.*

*Generic Character.*—Bill slender, longer than the head, arcuated above, externally serrated and curved at the point; nostrils vertical, round, and open; tarsus same length as the external toe, the two anterior toes adhering to the second joint; wings short, vaulted, the first quills graduated; tail long and graduated.

*Pteroglossus maculatus.*—The Spotted-Billed Aragou. Plate xxx. fig. 4. Head, back, sides of the neck, throat, and breast, deep black; wing-coverts saffron-yellow; upper parts and tail dusky sap-green; head divided from the neck by a band of primrose-yellow; quills blackish-brown; the tail tipped with orange-brown. Length, including the bill, twelve inches. Inhabits Brazil.

*Genus 11.—RAMPHASTOS.—Linnaeus.*

*Generic Character.*—Bill broader than the head at the base, arcuated above, serrated at the edges, and somewhat incurvated at the point, thin, transparent, and cellular; nostrils vertical, concealed behind the horny mass, surrounded by a membrane; tarsus same length as the external toe; the anterior toes adhering to the second joint; tail short.

*Ramphastos ariel.*—The Brazilian Toucan. Plate xxix. fig. 2. Upper surface, abdomen, wings, and tail, clear black; throat, neck, and cheeks, orange-yellow, with a straw-coloured border beneath; skin round the eyes red; a crimson band across the breast, as are also the upper and under tail-coverts; betwixt the bill and the head a black line, bounded by a yellow band; upper edge of the bill pale blue, other parts deep black; irides bright blue; legs and feet gray, claws black. Length, including bill, eighteen inches. Inhabits Brazil.

*Genus 12.—CROTOPHAGA.—Linnaeus.*

*Generic Character.*—Bill short, thick, compressed, upper mandible carinated, the edges angulated; nostrils basal, ovate, lateral; legs slender; the tarsus smooth, longer than the external toe; wings short, convex, the first quill short, the second and sixth same length, the fourth the longest of the whole; tail with eight broad feathers.

*Crotophaga ani.*—The American Keel-Bill. Plate xxx. fig. 3. Black, with an iridescent play of colours from violet, green, and pink; tail cuneiform. Nine inches long. Inhabits America.

*Genus 13.—TROGON.—Linnaeus.*

*Generic Character.*—Bill short, thick, arcuated, broader than high, bent downwards at the point, and crevulated on the margin, with long nuchal bristles at the base; nostrils basal, open; legs short; tarsus shorter than the external toe, partly covered with feathers below the knee; the exterior toe reversible; the fifth quill longest.

*Trogon Pavonius.*—The Quizel. Plate xxxvi. fig. 5. Head surmounted by a large crest of upright filamentary feathers, consisting of a mixture of green, golden-yellow, and crimson; throat, neck, breast, back, wing-coverts, and the four principal feathers of the tail, of a rich iridescent-green, reflecting, in different lights, the appearance of burnished gold; the shafts of all the feathers are of a deep ultramarine blue, and the wing-coverts hang dangling over the sides, extending beyond the abdomen; quills brownish-black; abdomen and crissum bright scarlet; bill and feet skin-colour, claws black; tarsus covered to the feet with dusky feathers; irides bright green; side tail feathers black, under side white. Length, exclusive of tail, seven inches; two middle tail feathers twenty inches long. Inhabits South America.

*Genus 14.—CAPITO.— Vieillot.*

*Generic Character.*—Bill long, straight at the base, broader than deep, compressed at the point; upper mandible bent at the tip, and longer than the under one; nostrils lateral, placed in the horny substance at the base of the bill, and hidden by stiff nuchal bristles; tarsus same length as the exterior toe; the two anterior toes attached the length of the second phalange; wings short, slightly rounded.

*Capito collaris*.—The collared Barbet. Plate xxxviii. fig. 3. Reddish-brown above, with a black collar round the neck; head black; throat and under parts white; tail rufous, and barred transversely with a darker colour. Seven inches and a half long. Inhabits Guiana.

Genus 15.—BUCCO.—*Linnaeus*.

*Generic Character*.—Bill robust, pointed, laterally compressed, and with long nuchal bristles at the base; upper mandible strong, emarginated, and incurvated; nostrils basal, lateral; tarsus shorter than the exterior toe; the anterior toe attached as far as second phalange.

*Bucco niger*.—The Black-Throated Barbet. Plate xxix.\*\* fig. 8. Crown, nape, throat, wings, and tail, black; the upper wing-coverts spotted with white; front scarlet; ophthalmic region extending half-way down the throat; sides of the neck, back, and whole under parts, white; legs and bill dusky. Six inches long. Inhabits the East Indies and Africa.

Genus 16.—POGONIAS.—*Illiger*.

*Generic Character*.—Bill short, robust, with the ridge much arcuated; edge of upper mandible strongly serrated, sometimes smooth, and at others furrowed; lower mandible not so deep as the upper one; nostrils basal, lateral, with rigid nuchal bristles at its base; tarsus same length as the exterior toe; the anterior one adhering as far as the joint of the second phalange.

*Pogonias sulcirostris*.—The Groove-Beaked Pogonias. Plate xxxvii\*. fig. 8. Body above, wings and tail, black; back with a white spot; throat, collum, and abdomen, scarlet, with a paler spot on the wings; hypochondria straw-yellow; quills dark burnt umber-brown; upper mandible with a longitudinal groove, and the lower one with several. Nine inches long. Inhabits Africa.

Genus 17.—PSITTACUS.—*Linnaeus*.

*Generic Character*. Bill short, thick, robust, gibbous, much arcuated both above and below; upper mandible greatly bent, and hooked at the point, and provided with a notch; under mandible short and truncated; having a cere at the base of the bill; head large; nostrils roundish, and placed within the cere; legs short, very strong; tarsus shorter than the external toe; the interior toes attached at their base.

*Sub-Genus 1*.—PSITTACUS.—Parrots.—Face covered with feathers.

*Psittacus cyanotus*.—The Brazilian Parrot. Plate xxxvi. fig. 6. Rich yellow-green above, and paler on the under parts, the feathers marginated with purple-brown; cheeks Antwerp-blue; crown yellow; wings edged with red; quills dull blue; outer tail feathers blue, the second red, and the rest green, tipped with yellow. Inhabits Brazil.

*Sub-Genus 2*.—PLYCTOLOPHUS.—*Vieillot*.—Cockatoos.—Head with a crest.

SECTION 1.—Crest pendulous.

*Psittacus rosaceus*.—The Rose-Crested Cockatoo. White, with an occasional tinge of rose-colour; crest orange-red; inferior wing and tail-coverts pale sulphur-yellow; bill bluish-black; legs lead-colour. Sixteen to eighteen inches long. Inhabits Sumatra.

## SECTION 2.—Crest turned upwards.

*Psittacus sulphureus*.—The Yellow-Crested Cockatoo. Plate xxxvi. fig. 8. White, crest bright sulphur-yellow; under surface of the wings and tail straw-coloured; cheeks occasionally the same; bill grayish-black; irides dusky-brown. Length fifteen inches. Inhabits New Holland.

*Sub-Genus 3.*—MACROCERCUS.—Maccaws.—*Vieillot*.—Face divested of feathers, or occasionally striated with transverse feathered lines; tail long, cuneiform, and acute.

*Psittacus Aracanga*.—The Red and Yellow Maccaw. Plate xxxvi. fig. 7. Scarlet; quills of a bright cobalt-blue; feathers on the lower part of the neck tinged with green at their edges; upper wing-coverts the same; larger wing-coverts light-yellow, tipped with green; face naked, white; upper mandible yellowish-white; lower mandible, claws, and legs, deep black. Two feet long. Inhabits Cayenne and Surinam.

*Sub-Genus 4.*—PALÆORNIS.—Parrakeets.—*Vigors*.—Cheeks clothed with feathers; tail long and graduated; the two middle feathers greatly lengthened.

*Psittacus Alexandri*.—The Alexandrine Parrakeet. Plate xxxvi. fig. 9. Described, vol. iii. p. 205.

FAMILY II.—Bill straight, angular, and generally cuneiform.

*Genus 18.*—PICUS.—*Linnaeus*.

*Generic Character*.—Bill about the length of the head, straight, conical, compressed, angular, and cuneiform at the point; nostrils basal, oval, open, concealed by the setaceous feathers at the base of the bill; tongue long, extensible, and vermiform; legs very strong; feet large; two toes before and two behind, armed with strong hooked claws; anterior toes adhering at their base, the posterior ones divided; tail with twelve feathers, the lateral ones being very short.

*Picus major*.—The Greater Spotted Woodpecker. Plate xxxvii. fig. 1. Black above, variegated with white; cheeks, throat, venter, and crissum, white; nape deep red; bill bluish-black; irides purplish-red; legs and feet gray. Nine inches long. Inhabits Europe.

*Picus minimus*.—The Least Woodpecker. Plate xxxvii. fig. 2. Upper parts pale umber-brown, with white spots on the shoulders; under parts brownish-yellow; bill and sides of the head black, the latter spotted with white; crown surmounted by a crest; legs and feet bluish-gray. Three inches long. Inhabits Java.

*Genus 19.*—GALBULA.—*Brisson*.

*Generic Character*. Bill long, nearly straight, or slightly bent at the tip, quadrangular and pointed; nostrils basal, ovate, partly covered by a naked membrane; legs short; the tarsus shorter than the external toe; feet strong; the anterior toes united as far as the joint of the third phalange.

*Galbula viridis*.—The Green Jacmar. Plate xxxvii\*. fig. 6. Irides golden green above; venter and crissum reddish; throat white; tail long, cuneiform, consisting of ten feathers; irides blue. Six inches and a half long. Inhabits Brazil.

Genus 20.—YUNX.—*Linnaeus*.

*Generic Character*.—Bill short, straight, conical, depressed, the ridge rounded, somewhat slender at the tip; nostrils basal, lateral, and partly closed by a membrane; the two anterior toes united at their base; posterior ones divided; tongue long, extensile, and vermiform, provided at its tip with a horny substance; tail with ten flexible soft feathers; wings of medium length; the first quill a little shorter than the second, which is the longest in the wing.

*Yunx torquilla*.—The Wryneck. Plate xxxvii. fig. 3. Described, vol. iii. p. 175.

## ORDER VI.—ANISODACTYLI.

Bill more or less arcuated, subulated and slender, frequently straight, feet with three toes before and one behind, the exterior one always adhering at its base to the middle toe; the hallux usually long; all the toes furnished with long and bent claws.

Genus 1.—OXYRHYNCHUS.—*Temminck*.

*Generic Character*.—Bill short, straight, triangular at its base, thin and subulate at the point; nostrils basal, lateral, naked, and half covered by a membrane; tarsus short, being about the length of the middle toe; three toes before, the lateral ones equal, the external toe attached at the base, the internal one free; fourth and fifth quills the longest.

*Oxyrhynchus flammiceps*.—The Bright Billed Oxyrhynchus. Plate xxxviii. fig. 5. Brownish-black above; wings olive-green; yellowish-white beneath, with dusky-brown spots; head surmounted by a crimson incumbent crest, its sides having three transverse yellowish lines. Seven inches long. Inhabits Brazil.

Genus 2.—SITTA.—*Linnaeus*.

*Generic Character*.—Bill straight, cylindrical, slightly compressed, and subulated; upper mandible a little longer than the lower one, and acuminate; tongue short, and armed with a horny point; basal, somewhat rounded, and partly hid by reflected nuchal bristles; feet with three toes before and one behind, the outer toe joined at its base to the central one; hallux same length as the middle toe, with a long hooked claw; tail with twelve feathers; wings short; the first quill very short, the third and fourth being the longest.

*Sitta Europæa*.—The European Nuthatch. Plate xxxvii. fig. 4. Described, vol. iii. p. 185.

Genus 3.—ORTHONYX.—*Temminck*.

*Generic Character*.—Bill very short, compressed, and nearly straight, with a slight notch at the point; nostrils open, situated in the middle of the bill, surrounded by bristles; tarsus longer than the middle toe; claws very long, with lateral furrows; wings very short; tail long and pointed.

*Orthonyx maculatus*.—The Spotted Orthonyx. Plate xxx. fig. 6. Dusky-



brown above, with black irregular spots; throat red, edged with black. Seven inches long. Inhabits New Holland.

Genus 4.—DENDROCOLAPTES.—*Herman.*

*Generic Character.*—Bill depressed, trigonal at the base, straight or bent, with an acute point; nostrils basal, lateral; tongue short, cartilaginous; tail conical, with stiff acuminate feathers; external toe adhering to the intermediate one as far as the joint of the second phalange, the internal toe very short; claws hooked, and with a longitudinal furrow.

*Dendrocolaptes procurvus.*—The Crooked Billed Dendrocolaptes. Plate xlvii\*. fig. 1. Head, neck, and scapulars, olive-brown, with interrupted white longitudinal stripes; wings and tail reddish-brown; breast, abdomen, and crissum, olive-brown, with white stripes; bill rufous, greatly curved. Ten inches and a half long. Inhabits Brazil.

Genus 5.—XENOPS.—*Illiger.*

*Generic Character.*—Bill short, slender, much compressed, subulate and acute; tips of both mandibles recurved; nostrils basal, lateral, and covered by a naked membrane; lateral toes of equal length; external toe adhering to the intermediate toe, as far as the second joint; claws strong, compressed, and hooked; tail enneiform.

*Xenops genibarbis.*—The Xenops. Plate xxxvii\*. fig. 4. Reddish-brown above, gray-brown on the under parts; gena, ophthalmic region, throat, and breast, white, with a white spot under the ear-coverts; median quills brown-black, with reddish margins. Four inches and a half long. Inhabits Brazil.

Genus 6.—ANABATES.—*Temminck.*

*Generic Character.*—Bill straight, not so long as the head, compressed, and deeper than broad at the base, somewhat bent at the point; nostrils basal, lateral, ovate, and hidden by a feathered membrane; tarsus longer than the middle toe; the exterior toe adhering to the length of the joint of the second phalange; the interior one joined at the base; wings short.

*Anabates leucophrus.*—The White-Browed Anabates. Plate xxx. fig. 7. Upper parts umber-brown; throat pale ochreous-yellow; cheeks, neck, breast, and abdomen, umber-brown, paler towards the crissum; tail rich ochre-red; a white streak extends over each eye, to nearly the occiput; bill yellow-brown; feet and legs dusky. Nine inches and a half long. Inhabits Brazil.

Genus 7.—OPETIORHYNCHUS.—*Temminck.*

*Generic Character.*—Bill somewhat longer than the head, slender and subulate, depressed at the base, and compressed at the tip; nostrils lateral, a little way from the base of the bill, half closed by a naked membrane; tongue short, cartilaginous; tarsus double the length of the middle toe; lateral toes of equal length, the exterior one adhering at the base; wings short; the first three feathers graduated, the third and fourth longest; tail short, and somewhat graduated.

*Opetiorhynchus rufus.* The Reddish Opetiorhynchus. Plate xxix.\*\* fig. 8. Reddish; darker on the upper parts, and inclining to pale-yellow beneath;

quills brownish; tail slightly rounded at the end. Eight inches and a half long. Inhabits South America.

Genus 8.—CERTHIA.—*Linnaeus*.

*Generic Character*.—Bill long, or of medium length in some species; slender, curved, triangular, and compressed; nostrils basal, horizontal, and half closed by a membrane; three toes before and one behind, the exterior adhering at its base to the middle one; claws much hooked, that on the hallux longest; tail graduated; shafts stiff and pointed; fourth quill longest.

*Certhia familiaris*.—The Common Creeper. Plate xxxvii. fig. 12. Yellowish-brown above, throat, breast, and belly white, the crissum ochre-yellow; upper mandible dusky, lower one white; tail grayish; legs and toes yellowish-brown. Five inches and a half long. Inhabits Europe.

Genus 9.—CÆREBA.—*Brisson*.

*Generic Character*.—Bill slightly arched, thick at the base, and sharp-pointed; edges of the mandibles inflected; tongue long, but not extensible; bifid and filamentous; tarsus longer than the middle toe; lateral toes equal; tail of medium size.

*Cæreba cyanea*.—The Cyanean Cæreba. Plate xxix\*. fig. 9. Throat, neck, breast, abdomen, and crissum, rich cobalt blue; wings golden-yellow; back, wings, and tail, black, with an oblique blue band; inside of the front, and crown of the head, bright green; ophthalmic region deep black; irides brown; bill black; feet flesh-colour; claws black. Five inches long. Inhabits Cayenne.

Genus 10.—TROCHILUS.—*Linnaeus*.

*Generic Character*.—Bill long, straight, arcuated in some species, tubular, very slender, with the base depressed and acuminate; upper mandible nearly enveloping the under one; tongue long, extensible, bifid, and tubular; nostrils open before, and covered by a membrane; leg very short; tarsus shorter than the middle toe; the three anterior toes almost divided; wings long, graduated; the first quill longest.

*Trochilus multicolor*.—The Harlequin Humming-Bird. Plate xxxvii\*. fig. 6. Crown of the head, chin, throat, breast, and upper part of the wings, of a rich, shining, golden-green; cheeks, collum, and back of the neck iridescent ultramarine blue; abdomen and crissum orange; lower part of the neck with a collar of intense black; separating the blue from the verdigris blue of the back; lower part of the wings and tail fawn-coloured brown; bill very long, which, with the legs, are pale fawn. Four inches long. Inhabits South America.

*Trochilus colubris*.—The Ruby-Throated Humming Bird. Plate xxxvii. fig. 7. Described, vol. iii. p. 298.

Genus 11.—NECTARINIA.—*Illiger*.

*Generic Character*.—Bill long, slender, subulate, arcuated, expanded, and depressed at the base; mandibles of equal length; the lower one inflected, and partly enveloped in the upper one; tongue long, bifid, extensible, and tubular; nostrils situated near the base, closed by a naked membrane; tarsus as long as the middle toe, in some species longer; the lateral toes at-

tached at the base; the first quill wanting, or very short, the third and fourth the longest.

*Nectarinia chalybea*.—The Chalybean Nectarinia. Plate xxxvii. fig. 5. Head, neck, breast, lesser wing-coverts, and back, rich golden-green; wings and tail dusky-brown; breast crimson, with a transverse band of steel-blue; abdomen white. Length four inches and a half. Inhabits the Cape of Good Hope.

Genus 12.—CLIMACTERIS.—*Temminck*.

*Generic Character*.—Bill short, much compressed, and subulate; mandibles of equal length, and pointed; nostrils situated near the base, and covered by a naked membrane; tarsus the length of the middle toe, which, with the hallux, is very long; claws long and hooked, furrowed on the sides; exterior toe attached as far as the second joint, the interior one as far as the first joint; third and fourth quills the longest.

*Climacteris scandens*.—The Climbing Climacteris. Plate xlvii\*. fig. 4. Dark brown above; rump and middle tail feathers lead-coloured; throat and neck, in front, white; breast and abdomen cream-yellow; hypochondria and under tail-coverts clouded with brown and white; wings brown, with two paler transverse bands. Five inches and three quarters long. Inhabits New Holland.

Genus 13.—TICHODROMA.—*Illiger*.

*Generic Character*.—Bill very long, slender, slightly arcuated, cylindrical, angular at the base, depressed at the point; nostrils basal, naked, and half closed by an arcuated membrane; the exterior toe attached at its base to the middle toe; claw on the hallux very long; tail round, with the shafts weak.

*Tichodroma phœnicoptera*.—The Wall-Creeper. Plate xxix\*. fig. 7. Lead-en-gray; upper wing-coverts and central quills crimson; remiges, quills, and tail, black; lower half of the outer feathers white; bill, throat, legs and feet, black. Six inches and three quarters long. Inhabits Italy.

Genus 14.—UPUPA.—*Linneus*.

*Generic Character*.—Bill very long, slightly arcuated, slender, triangular, and compressed; nostrils basal, lateral, ovoid, open; feet with three toes before and one behind; the exterior toe united to the middle one as far as the first joint; tail square, consisting of twelve feathers.

*Upupa epops*.—The Hoopoe. Plate xxxvii. fig. 8. Head surmounted by a crest, consisting of a double row of feathers, tipped with black; body ferruginous; wings and tail black, the former with five white bands, and the latter with one luniform band; bill black; feet dusky. Eleven inches long. Inhabits Europe.

Genus 15.—EPIMACHUS.—*Cuvier*.

*Generic Character*.—Bill considerably longer than the head, slender, arcuated, compressed and pointed; upper mandible slightly notched near the tip, and somewhat longer than the lower one; gape very wide, extending under the ophthalmic region; nostrils basal, lateral, open to the front, half closed by a feathered membrane; tongue short and cartilaginous; legs short; tar-

sus longer than the middle toe, the external toe united to the first joint; fourth and fifth quills longer than the others.

*Epimachus superbus*.—The Superb Epimachus. Plate xxix\*. fig. 5. Iridescent-black, reflecting violet and green; scapulars purplish-black on the inner webs; fine golden-green on the edges and tip.

Genus 16.—DREPANIS.—*Temminck*.

*Generic Character*.—Bill very long, rounded above, thick and triangular at the base, and subulate at the point; upper mandible longer than the under one; nostrils half shut above; tongue short, cartilaginous; tarsus double the length of the middle toe; the lateral toes of equal length; third, fourth, and fifth quills longer than the rest.

*Drepanis vestitaria*.—The Scarlet Drepanis. Plate xxix\*. fig. 6. Scarlet, with the wings and tail black; the bill greatly curved, which, as well as the legs, is straw-colour; tail feathers slightly pointed at their extremities. Five inches and a half long. Inhabits the Sandwich Islands.

Genus 17.—MELIPHAGA.—*Lewin*.

*Generic Character*.—Bill generally the length of the head, shorter in some species, compressed, and somewhat arenated; nostrils lateral, ovoid, covered by an arched membrane; tongue long, extensible, its tip furnished with cartilaginous filaments; the external toe united as far as the joint of the second phalange, the internal one as far as the first joint; hallux very strong and long, with a long bent claw.

*Meliphaga Phrygius*.—The Embroidered Meliphaga. Plate xxxvii. fig. 9. Black; nearly the whole feathers are margined with rich golden-yellow; round the eyes there is a naked granulated yellow skin; back and breast with numerous undulated yellow or whitish crescents. Nine inches long. Inhabits New Holland.

## ORDER VII.—ALCYONES.

Bill of medium size, long in some species, pointed, and nearly quadrangular, sometimes slightly arcuated, and at others straight; tarsus very short; three toes before, adhering, and one behind.

Genus 1.—MEROPS.—*Linnaeus*.

*Generic Character*.—Bill slightly curved, pointed, mandibles sharp at the edges; nostrils basal, lateral, ovoid, and hidden by protruded nuchal bristles; tarsus short; the three front toes united, the exterior one as far as the second joint, and the interior as far as the first joint of the intermediate toe; hallux broad at its base; the second quill the longest.

*Merops caeruleocephalus*. The Blue-Headed Bee-Eater. Plate xxxvii. fig. 10. Upper and under parts of a beautiful red, betwixt scarlet and crimson, with clouds of green; crown of the head, throat, rump, and crissum, verdigris-blue; remiges and quills green, the inner webs of the latter tinged with red; tail of a rich reddish-brown, the feathers tipped with green, the two middle feathers tapering, double the length of the others; a black stripe

from the bill passes below the eye to the margin of the blue; bill black; feet dusky yellow. Ten inches and a half long. Inhabits Asia.

*Merops erythropterus*.—The Red-Winged Bee-Eater. Plate xxxvii. fig. 11. Crown, neck, back, smaller wing-coverts, and middle tail feathers, of a rich green; throat golden-yellow; breast reddish-brown, black in the centre, and a cobalt-blue line at its top; abdomen and outer tail feathers fawn-colour; quills with a broad patch of reddish brown; bill black; two central tail feathers double the length of the others. Seven inches long. Inhabits Java.

Genus 2.—ALCEDO.—*Linnaeus*.

*Generic Character*.—Bill long, straight, quadrangular, pointed, sometimes, though rarely, depressed; edges of the mandibles sharp; nostrils basal, lateral, oblique, and nearly closed by a naked membrane; legs short; tibia naked; the exterior toe attached as far as the second joint, and the interior as far as the first joint of the intermediate toe.

*Alcedo ispida*.—The Common Kingfisher. Plate xxxviii. fig. 1. Described, vol. iii. p. 431.

Genus 3.—DACELO.—*Leach*.

*Generic Character*.—Bill thick, strong, quadrangular, and conical; mouth with a wide gape, extending to the eyes; upper mandible longer than the under one, and notched towards its point, on each side; nostrils oblong, partly closed by a feathered membrane; tarsus shorter than the middle toe; the external toe attached as far as the third joint of the intermediate one, and the internal toe as far as the first joint; wings of medium length.

*Dacelo gigantea*.—The Gigantic Dacelo. Plate xxix\*. fig. 2. Brown above, white beneath, with gray undulated bars on the abdomen; feathers of the head elongated; wing-coverts and rump green; tail with transverse black bars. Eighteen inches long. Inhabits New Holland.

## ORDER VIII.—CHELIDONES.

Bill very short, greatly depressed, and much dilated at the base; the upper mandible curved at the point; legs short; three toes before and one behind, which is frequently reversible; front toes free, or connected at the base by a short membrane; claws greatly hooked; wings long.

Genus 1.—HIRUNDO.—*Linnaeus*.

*Generic Character*.—Bill short, much depressed, and dilated at the base; upper mandible carinated and bent at the tip; gape extending backwards to the eyes; nostrils basal, and oblong, partly covered by a membrane; tarsus short, toes and claws long and slender, three before and one behind; the exterior toe adhering as far as the first joint of the intermediate one; wings long; the first quill longest; tail forked, consisting of twelve feathers.

*Hirundo rustica*.—The Chimney Swallow. Plate xxxviii. fig. 2. Described, vol. iii. p. 278.

*Hirundo urbea*.—The Martin. Plate xxxviii. fig. 2. Described, vol. iii. p. 279.

Genus 2.—CYPSELUS.—*Illiger*.

*Generic Character*.—Bill very short, depressed, dilated at the base, and triangular; the gape extending beyond the posterior angle of the eye; upper mandible deflected at the point; nostrils cleft longitudinally, at the edge of the ridge, open, with a prominent margin, beset with small feathers; tarsus very short and thick; four toes, all directed forward, entirely free, and consisting of two phalanges each, strong, and armed with thick and hooked claws; tail consisting of ten feathers; wings very long, the first quill being somewhat longer than the second.

*Cypselus unicolor*.—The One-Coloured Swift. Plate xxxviii. fig. 4. Dull black, with greenish reflections; throat paler; wings forked and very long, extending an inch and a quarter beyond the tail. Six inches and a quarter long. Inhabits Madeira.

Genus 3.—CAPRIMULGUS.—*Linnæus*.

*Generic Character*.—Bill a little curved, very small, depressed at the base and surrounded in most species by long stiff tapering bristles; upper mandible slightly bent at the tip; gape very wide; nostrils basal, tubular, covered by a membrane, surmounted by hairs, and surrounded by an elevated ring; wings long, the first quill longer than the second; tail round or forked, consisting of ten feathers; legs short, feet small, toes adhering as far as the first joint; middle claw long, and serrated at the edge, but smooth in some foreign species; hallux reversible.

*Caprimulgus Europæus*.—The European Goat-Sucker, or Night Jar. Plate xxxviii. fig. 5. Described, vol. iii. p. 276.

Genus 4.—PODARGUS.—*Illiger*.

*Generic Character*.—Bill broader than the head, short and abruptly acuminated towards the point, which is considerably bent, surrounded by stiff bristles; upper mandible spatuliform and carinated; nostrils linear, basal, and hidden by the nuchal bristles; wings shorter than the tail; tarsus short, strong; toes separate; claws nearly of equal length.

*Podargus cornutus*.—The Horned Podargus. Plate xxxix\*. fig. 4. Back and wings reddish-brown, freckled with black; scapulars covered with small white spots; head with a horizontal tuft of long irregular feathers rising above the auricles; bill surrounded by stiff bristles; throat white, with the feathers forming a kind of smooth beard, nearly enveloping the lower mandible; tail cuneiform, reddish-brown with wavy lines. Nine inches long. Inhabits Java.

## ORDER IX.—COLUMBÆ.

Bill of medium size, compressed; the base of the upper mandible covered by a soft skin in which the nostrils are situated; the point more or less bent; feet with three completely divided toes before, and one behind.

Genus 1.—COLUMBA.—*Linnæus*.

*Generic Character*.—Bill of medium size, compressed, curved at the tip;

base of the upper mandible covered with a soft inflated skin; nostrils longitudinal, situated in the middle of the membrane; feet with three toes before, free, the hallux articulated on the heel; wings of medium length, the second quill being the longest.

*Columba palumbus*.—The Ring Dove. Plate xxxviii. fig. 6. Described, vol. iii. p. 207.

*Columba turtur*.—The Turtle Dove. Plate lii. fig. 7. Head, neck, breast, and back, light wood brown, tinged with pearl gray; on each side of the neck is a patch of black feathers, margined with white scapulars and wing-coverts blackish, edged with buff-orange; quills brownish-black; two middle tail feathers clove-brown, the others tipped with white; a naked purplish red spot behind the eyes. Eleven inches long. Inhabits Europe.

*Columba livia*.—The Fau-Tail Pigeon. Plate xxxviii. fig. 9. A domesticated variety of this species.

The Carrier Pigeon. Plate xxxviii. fig. 11. Another variety of the *livia*. Described, vol. iii. p. 210.

*Columba Jambos*.—The Jambou Pigeon. Plate lii. fig. 8. Upper part and sides of the head, deep and brilliant red; the whole upper surface of the body, wings, and tail, bright green; throat deep brown; under surface white, with a rose-coloured spot on the breast; legs dark red; irides reddish hazel; bill yellowish. Nine inches and a half long. Inhabits Java and Sunatra.

#### Genus 2.—LOPHYRUS.—*Vieillot*.

*Generic Character*.—Bill straight, rather thin, and swelling a little at the point; the upper mandible with a furrow, and bent at the tip; the lower mandible with a groove, short, swelling at the point, and somewhat bent upwards; nostrils small, orbicular, and situated in the groove; tarsus long, robust, covered with round scales; anterior toes united at the base by a small membrane; tail with twelve feathers.

*Lophyrus coronatus*.—The Crowned Pigeon. Plate xxxviii. fig. 10. Clear bluish-gray; shoulders rust coloured; greater wing coverts with a white bar; ophthalmic region black; head surmounted by a large upright crest of thinly webbed feathers; bill black; legs and feet gray. Size of a turkey. Inhabits India.

### ORDER X.—GALLINÆ.

Bill strong, short, convex, and in some genera it is partly covered by a cere; upper mandible bending from its base, or only towards the tip and projecting over the point of the lower one; nostrils basal and lateral, pierced in a membranaceous space, and protected by a cartilaginous scale, naked in some and feathered in others; wings generally short and concave; tail consisting of from ten to eighteen feathers; tarsus long; feet with three toes before and one behind, united at the base by a membrane; the hallux articulated upon the tarsus, above the junction of the anterior toes.

#### Genus 1.—PAVO.—*Linnaeus*.

*Generic Character*.—Bill without a cere, convex above, thickened and

bent down towards the tip; nostrils open; cheeks partly bare; tail coverts very long; tail consisting of eighteen elongated, broad, and ocellated feathers, capable of being expanded like a fan; tarsus considerably larger than the middle toe, with a conical spur a little way above the hallux; head provided with a crest.

*Pavo Aldrovandi*.—The Aldrovandine Peacock. Plate xxxix. fig. 1. Upper parts and breast rich green; breast, abdomen, and crissum, dull bluish green with crescent-shaped black spots; wings iridescent Antwerp blue; the three outer quills, greater and middle wing-covert, dull fawn colour; neck long, golden green; cheeks gray, front blue; crown surmounted by a crest of fifteen gray plumes, the centre ones longest and green at the points; tail yellow-green, each feather ocellated near the point, blue in the centre and margined with reddish-fawn colour; bill, legs, and feet, gray. Size of common peacock. Inhabits the Cape of Good Hope.

Genus 2.—GALLUS.—Brisson.

*Generic Character*.—Bill of medium size, strong and naked at the base; upper mandible arcuated, convex, and bent at its tip; head surmounted by a fleshy crest, and wattles on the throat; ears without a cover of feathers; three toes before, united the length of the first joint; the hallux placed high upon the tarsus, and not resting on the ground, above which is a long conical spur; claws blunt; middle tail feathers arcuated; wings short, and concave.

*Gallus domesticus*.—The Domestic Cock. Plate xxxix. fig. 2. Described, vol. iii. p. 107.

Genus 3.—PHASIANUS.—Linnæus.

*Generic Character*.—Bill of medium length, strong; upper mandible convex, naked at the base, bent downward at the point; nostrils basal, lateral, covered by a cartilaginous scale; cheeks and ophthalmic region destitute of feathers, and covered with a verrucose skin; ears concealed by feathers; feet with three anterior toes united by a membrane as far as the first joint, the hind toe articulated upon the tarsus, above which is a conical spur in the males; claws blunt; the fourth and fifth quills longest.

*Phasianus Colchicus*.—The Common Pheasant. Plate xxxix. fig. 4. Described, vol. iii. p. 123.

*Phasianus pictus*.—The Golden Pheasant. Plate liii. fig. 5. Golden-yellow above, scarlet beneath; crest yellow; feathers on the occiput reddish-brown, varied with black lines; tail cuneiform, and bent downwards. Two feet nine inches long. Inhabits China.

Genus 4.—LOPHOPHORUS.—Temminck.

*Generic Character*.—Bill long, thick, broad at the base and greatly bent towards the point; upper mandible arcuated, extending considerably beyond the lower one, and sharply edged at its extremity; ridge elevated; nostrils basal, lateral, and half closed by a feathered membrane; tarsus covered on its upper part with feathers, and having a long and sharp spur; three toes in front united by membranes; hind toe, a little way up the tarsus, not resting on the ground; claws blunt; tail short and rounded.



*Lophophorus Cuvieri*.—Cuvier's *Lophophorus*. Plate xxxix\*. fig. 7. Iridescent-black, with violet reflections, the feathers with zigzag gray lines; rump and tail-coverts with a broad white zone; head surmounted by a crest of long thinly-webbed plumes; cheeks naked. Eighteen inches long. Inhabits India.

Genus 5.—POLYPLECTRON.—*Temminck*.

*Generic Character*.—Bill of medium size, slender, straight, and compressed; upper mandible bent near the point; nostrils lateral, situated in the middle of the bill, partly covered by a naked membrane; orbits and cheeks naked; legs slender; tarsus long; three anterior toes united by membranes; hallux elevated, above which are two or more conical spurs; tail long, rounded.

*Polyplectron chinquis*.—The Argus *Polyplectron*. Plate xxxix\*. fig. 3. Ash-coloured, with narrow dusky striæ, and spotted with white above; wings covered with numerous cobalt-blue eye-like spots; secondaries with glossy blue spots; under parts gray, with undulated dusky lines; tail-coverts with two shining green spots near their tips, and below which are crescent-shaped spots, and margined with black. Twenty-three inches long. Inhabits China.

Genus 6.—MELEAGRIS.—*Linnaeus*.

*Generic Character*.—Bill short, thick, and covered with a naked skin at the base; head and neck covered by a naked tuberculated skin; base of the upper mandible provided with a fleshy caruncle; throat with a longitudinal, pendulous, and carunculated wattle; tarsus of the male with a slender obtuse spur; wings short, rounded, and concave, the fourth and fifth quill the longest; tail consisting of eighteen feathers, capable of being expanded and elevated into a fan-shape.

*Meleagris gallopavo*.—The Common Turkey. Plate xxxix. fig. 3. Described, vol. iii. p. 118.

Genus 7.—ARGUS.—*Temminck*.

*Generic Character*.—Bill the length of the head, compressed, straight, and naked at the base; upper mandible arcuated, and bent towards the tip; nostrils lateral, situated near the middle of the bill, partly closed by a membrane; head, cheeks, and neck, naked; legs slender, the tarsus smooth; fore toes united by membranes; hallux jointed on the tarsus; tail long, consisting of twelve feathers, ascending, compressed, the two middle feathers long, tapering.

*Argus gigantus*.—The Gigantic Argus. Plate xxxix\*\*. fig. 1. Back and tail-coverts yellow fawn-colour, with ferruginous spots; secondaries with numerous eye-like spots; webs of the quills blue; tail blackish-brown, spotted with white; lower parts of the neck and under part of the body reddish brown. Five feet three inches long. Inhabits Surinam.

Genus 8.—NUMIDA.—*Linnaeus*.

*Generic Character*.—Bill short, thick, arcuated, with a warted membrane at its base, and a carunculated wattle suspended under the lower mandible; nostrils placed in the cere, divided by a cartilage; head naked in some species, clothed with feathers in others; the crown with a callous

horn or crest; tarsus smooth; three fore toes united by a membrane; the hallux articulated to the tarsus; tail short, bent downward.

*Numida meleagris*.—The Pintado, or Guinea Fowl. Plate xl. fig. 1. Described, vol. iii. p. 129.

Genus 9.—PAUXI.—*Temminck*.

*Generic Character*.—Bill short, strong, arcuated, compressed, and convex; base of the upper mandible dilated into a hard corneous substance; nostrils basal, lateral, open below; tarsus long, strong, and smooth; three anterior toes united by membranes; hallux articulated to the tarsus, touching the ground at its point; wings short.

*Pauxi galeata*.—The Galeated Curassow. Plate xxx. fig. 10. Described, vol. iii. p. 124.

Genus 10.—CRAX.—*Linnaeus*.

*Generic Character*.—Bill long, robust, compressed, incurved from the centre to the point, with a cere at its base; nostrils lateral, situated in the cere, partly covered, open in front; top of the head surmounted by a crest of arched protruding feathers; three anterior toes adhering at the base; hallux articulated to the tarsus; tail broad, pendulous.

*Crax alector*.—The Crested Curassow. Plate xl. fig. 2. Described, vol. iii. p. 123.

Genus 11.—PENELOPE.—*Linnaeus*.

*Generic Character*.—Bill medium size, broader than deep, compressed, and arcuated at tip; nostrils lateral, half covered by a membrane, and open in front; cheeks naked; a longitudinal wattle beneath the bill, extending down the throat, capable of being inflated or depressed at will, carunculated in the middle; tarsus long, reticulated; anterior toes strong, united by membranes; hallux parallel with the toes; wings short, the sixth quill the longest.

*Penelope marail*.—The Marail. Plate xxxix\*. fig. 6. Described, vol. iii. p. 125, as the Guan.

Genus 12.—TETRAO.—*Linnaeus*.

*Generic Character*.—Bill short, robust, arcuated above, convex, and bent downwards at the tip, naked at the base; nostrils basal, half closed by an arcuated scale above, and hidden by small feathers; tarsus clothed with feathers, which, in some species, extend the length of the claws; three toes before, united to the first joint; the hallux margined by asperities.

Section 1.—With the tarsus only feathered; edges of the toes deeply bordered with a fringed margin.

*Tetrao urogallus*.—The Cock of the Woods. Plate xl. fig. 3. Described, vol. iii. p. 134.

Section 2.—With tarsus and toes feathered; tail square at the end.

*Tetrao lagopus*.—The Ptarmigan. Plate xl. fig. 4. Described, vol. iii. p. 138.

Genus 13.—PETROCLES.—*Temminck*.

*Generic Character*.—Bill of medium length, compressed and slender in

some species; upper mandible straight, slightly bent towards the point; nostrils basal, partly closed by a membrane; front, or acrotarsium, of the tarsus feathered; the hinder part, or planta, naked; three anterior toes united the length of the first joint; hallux very small, and articulated high on the tarsus; tail subconic, in some species the two middle feathers elongated and filiform; wings long, acuminate, reaching to within a third of the tip of the tail, the first quill longest.

*Pterocles bicinota*.—The Double-Collared Pterocles. Plate xxxv. fig. 1. Upper parts dull chestnut colour, transversely barred with black; epigastrium, abdomen, and crissum, dusky, with transverse arrow-shaped umber-coloured bands; wings chestnut above, with the secondaries fawn-coloured; greater wing-coverts with transverse bands of dark burnt umber-brown, edged with white; legs and feet fawn, the front of the tarsus transversely barred with brown; breast with a collar of ochre-yellow, beneath which is another of blackish-brown; front of head gray. Ten inches long. Inhabits Africa.

Genus 14.—SYRRHAPTES.—*Illiger*.

*Generic Character*.—Bill short, conical, slender; upper mandible slightly bent, having a groove along the ridge; nostrils basal, lateral, partly covered by feathers; feet with three anterior toes only; tarsus and toes covered with woolly feathers; tail subconic, the two central feathers much elongated, and filiform at the tips; wings long, extending nearly as far as the point of the tail, with the first quill prolonged, and filiform.

*Syrrhaptes Pallasii*.—Pallas's Syrrhaptes. Plate xxxix\*. fig. 8. Described, vol. iii. p. 139, as the Heterochitous Grouse.

Genus 15.—ORTYX.—*Stephens*.

*Generic Character*.—Bill very short, robust, greatly arcuated, compressed, naked at the base, and bent at the point; nostrils basal, lateral, and partly closed by a membrane; legs strong; three toes before, united at the base by a membrane, and a strong hallux, which rests on the ground; tail long, wedge-shaped.

*Ortyx Californica*.—The Californian Quail. Plate xl. fig. 6. Dusky-brown, lead-coloured towards the tail; breast with a broad band of dark gray; front of head ash-gray; blackish-brown behind; head surmounted by a crest of five or six black feathers, an inch and a half long, curved forward at the point; back and neck with black margined feathers; throat black, surrounded by a gorget-shaped band of white feathers; a white stripe passes over the eyes; bill and legs dusky. Ten inches long. Inhabits California.

Genus 16.—PERDIX.—*Latham*.

*Generic Character*.—Bill short, strong, naked at the base; upper mandible convex, with the point bending considerably downwards; nostrils basal and lateral, placed in a large membrane, partly concealed by an arched naked scale; wings short, concave, fourth and fifth quills longest; tarsus long, furnished, in the male, with a short spur; feet with three anterior toes, united at the base by a membrane, and a hallux behind; tail consisting of from fourteen to eighteen feathers, slanting downwards.

This genus has been divided into four sections:—I. Males having one or two spurs. II. Tarsus provided with a callosity instead of a spur, or with-

out one. III. Bill deeper than broad; orbits naked; and having a short tail. IV. Tail very short, hidden by the feathers of the rump; first quill the longest.

*Perdix cinerea*.—The Common Partridge. Plate xl. fig. 5. Described, vol. iii. p. 142.

Genus 17.—CRYPTONYX.—*Temminck*.

*Generic Character*.—Bill short, thick, and compressed; mandibles of equal length, the upper one straight and a little bent at the tip; nostrils lateral, and longitudinally cleft, placed near the middle of the bill, and covered above by a broad naked membrane; tarsus long; feet with three anterior toes, united at the base; hallux placed high on the tarsus, and not touching the ground; without a claw; wings short.

*Cryptonyx coronatus*.—The Crowned Cryptonyx. Plate xxxix\*. fig. 3. Dark violet; back and rump dark green; crown white; temples naked; with an upright chestnut-coloured crest extending from the front to the sinciput; base of bill having six nuchal bristles. Ten inches long. Inhabits Sumatra.

Genus 18.—TINAMUS.—*Latham*.

*Generic Character*.—Bill slender, slightly concave above, depressed, broader than deep, tip obtuse; the ridge distinct, forming a large nasal furrow in the upper mandible; nostrils lateral, ovate, placed in the furrow; lower mandible somewhat arcuated in the centre; tarsus long, frequently with asperities behind; toes short, entirely divided; hallux very short; tail wanting, or very short; wings short, fourth, fifth, and sixth quills the longest.

*Tinamus sylvicolus*.—The Barred Tinamoo. Plate xl\*. fig. 1. Head brownish-ash colour; back wing-coverts, and tail, barred with waved stripes of black, alternating with dusky-brown and chestnut; chin and gula gray; throat, and sides of the neck, as far as the bottom of the gula, bright orange-brown; epigastrium, abdomen, and crissum, gray, with transverse undulated alternating bars of chestnut and black; upper mandible blue; tarsus dusky in front, dull chestnut behind. Nine inches long. Inhabits Brazil.

Genus 19.—HEMIPODIUS.—*Temminck*.

*Generic Character*.—Bill slender, straight, greatly compressed, having an elevated ridge, and bent towards the tip; nostrils basal, lateral, and partly closed by a naked membrane; tarsus long; feet with three anterior toes, and no hallux; tail with slender feathers, nearly concealed by the coverts above it, first quill the longest.

*Hemipodius tachydromus*.—The Andalusian Turnix. Plate xl\*. fig. 2. Back black, with zigzag black and red stripes; throat white; breast red, with yellow bordered feathers, which have a black spot near the point; crown of the head brown, with three reddish-yellow longitudinal bands. Six inches long. Inhabits Europe.

## ORDER XI.—ALECTORIDES.

Bill somewhat shorter than the head, or of the same length, strong, robust; the upper mandible convex, and frequently hooked at the point; tarsus long and slender; three toes before and one behind; the hallux articulated a little way up the tarsus.

*Genus 1.—PSOPHIA.—Linnæus.*

*Generic Character.*—Bill short, curved, much bent at the point; upper mandible considerably longer than the under one; nasal furrow broad, and extended; nostrils situated near the middle of the bill, wide, placed diagonally, and covered behind by a naked membrane; legs long and slender; the middle and external toe united, the internal one separated; the hallux articulated interiorly, and parallel with the other toes; wings short and concave; tail very short.

*Psophia crepitans.*—The Golden-Breasted Trumpeter. Plate xxxv. fig. 4. Black, with a gray back; breast iridescent-blue, with green reflections; orbits naked, red; feathers of the head short and downy; scale-shaped in front; pendulous, silky, and ferruginous, on the shoulders; scapulars long, pendant. Twenty-two inches long. Inhabits South America.

*Genus 2.—DICHOLOPHUS.—Illiger.*

*Generic Character.*—Bill longer than the head, thick, arcuated, depressed at the base, compressed at the tip, and a little hooked; gape wide, extending under the eyes; nostrils small, closed by a membrane; legs long and slender; toes short, thick, the anterior one united at the base by a membrane; the hallux articulated a little way up the tarsus, and not touching the ground; claws short, blunt, and strong; wings without a spine.

*Dicholophus cristatus.*—The Crested Dicholophus. Plate xxxv. fig. 2. Upper part of the head and back white; neck, throat, and breast, pale brown; long, with slender shafts. Inhabits Brazil.

*Genus 3.—GLARIOLA.—Brisson.*

*Generic Character.*—Bill short, convex, compressed near the point; upper mandible curved from its centre; nostrils basal, lateral, and obliquely cleft; legs feathered to the knee; tarsus long and slender; the exterior toe united to the intermediate one by a short membrane, the interior toe free; hallux articulated to the tarsus; claws long, subulate; wings very long.

*Glariolatorquata.*—The Collared Pratincole. Plate xxxix\*. fig. 2. Upper parts grayish-brown; throat reddish-white, bordered by a narrow black crescent-shaped band, reaching from the base of the bill on one side to the same point on the opposite side; quills and point of the tail feathers black; ophthalmic region red. Nine inches and a half long. Inhabits Europe.

*Genus 4.—PALAMEDEA.—Linnæus.*

*Generic Character.*—Bill short, convex, and somewhat conical; con-

pressed through its whole length ; greatly curved at the point, and having a large nasal furrow ; head small, covered with down, having a slender flexible horn rising from the forehead, pointing forward ; nostrils lateral, ovate, and open, situated near the middle of the bill ; legs short and thick ; three toes before, the lateral connected to the middle one by a short membrane ; the hallux formed for resting on the ground ; wings large, with a spur on the flexure of the wing.

*Palamedea cornuta*.—The Horned Screamer. Plate xl\*. fig. 3. Black above and white beneath ; horn on the forehead four inches long, tapering and flexible, inclosed in a sheath ; irides golden-yellow ; bill and legs black ; wings with two strong triangular spurs on the bar-tards. Two feet four inches long. Inhabits South America.

Genus 5.—CHAUNA.—Illiger.

*Generic Character*.—Bill shorter than the head ; convex and somewhat conical, slightly arcuated, and curved at the tip ; lores naked ; nostrils oblong, pierced through, and situated a little way from the base of the bill ; legs long, slender ; toes long, united by membranes ; wings with two retrousse spurs, one on the flexure, and the other on the axilla.

*Chauna chavaria*.—The Faithful Jacana. Plate xxxv. fig. 3. The whole upper and under parts grayish-white ; middle wing-coverts dark purplish-gray ; the larger coverts, secondaries, and upper quills, umber-brown ; the external quills gray ; throat with a broad belt, round its centre ; tail dark-gray, central feather brown ; head furnished with a double crest, feathers situated in the sinciput pendulous ; ophthalmic region orange ; irides orange-yellow ; bill yellow ; legs pale rose-colour. About thirty inches long. Inhabits America.

## ORDER XII.—CURSORES.

Bill of medium size, or short in some species ; legs long, naked above the knee ; and with two or three anterior toes only.

Genus 1.—STRUTHIO.—Linnæus.

*Generic Character*.—Bill straight, obtuse, depressed at the point ; which is somewhat rounded and angulated ; mandibles of equal length, flexible, and gape very wide ; nostrils longitudinal, situated near the middle of the bill ; legs very long, strong, and muscular, entirely divested of feathers ; feet with two toes directed forward, connected by a strong membrane at their base, the exterior being much shorter than the interior one, the latter only being furnished with a strong, obtuse, hoof-like claw ; the tibia very fleshy to the knee-joint ; the tarsus with large scales on the front, and reticulated behind, with a distinctly developed heel ; wing short, unsuited for flight, composed of long flexible plumes, divested of cohesion between their barbs, and having a double spur on the axilla.

*Struthio camelus*.—African Ostrich. Plate xl. fig. 7. Described, vol. iii. p. 29.

*Genus 2.—RHEA.—Brisson.*

*Generic Character.*—Bill nearly straight, slightly hollowed in the middle, of medium length, soft, strong at the base, depressed, and covered by a membrane; rounded at the point; nostrils towards the point, longitudinally cleft and open; legs long; front of tarsus furnished with large scales, and small circular ones behind, with a distinctly developed heel at bottom; feet with three anterior toes, furnished with strong, long, obtuse claws, ridged on their sides; wings short, provided with plumes of different lengths, and having a spur at their point; without a tail.

*Rhea Americana.*—American Ostrich. Plate xli. fig. 5. Described, vol. iii. p. 39, as the Emu.

*Genus 3.—DROMAIUS.—Vieillot.*

*Generic Character.*—Bill straight, the edges much depressed, somewhat carinated at the top, and rounded at the point; nostrils large, oblique, situated forward near the edges of the upper mandible, and covered by a membrane; legs strong; tarsus scaly, with a heel at bottom; feet with three toes directed forward, furnished with strong, slightly bent claws; wings very short.

*Dromaius ater.*—Emu. Plate xxxvi. fig. 2. Described, vol. iii. p. 42.

*Genus 4.—CASUARIUS.—Brisson.*

*Generic Character.*—Bill straight, of medium length, narrow, compressed, with a keeled ridge; crown and front surmounted by an upright, sub-conic, bony crest, somewhat bent towards the point, the tip turned down; lower mandible soft, flexible, and angular near the point; nostrils round, situated in the lateral part, near the point of the bill; legs robust, muscular; tibia naked a little way above the knee; tarsus reticulated, with a heel at base not much developed; feet with three anterior toes, furnished with strong, smooth, conical nails; intermediate toe longest, external and internal toes nearly of equal length; wings short, not fitted for flight; the remiges resembling the barbs of feathers.

*Casuarus galcatus.*—Galeated Cassowary. Plate xli. fig. 1. Described, vol. iii. p. 39.

*Genus 5.—OTIS.—Linnæus.*

*Generic Character.*—Bill of medium length, nearly straight, compressed; point of upper mandible slightly arcuated; nostrils lateral, oval, open, and removed from the base; legs long, naked above the knee; tarsus reticulated; feet with three anterior toes only, united at the base, and bordered by membranes; wings of medium length; the third quill longest.

*Otis tarda.*—The Great Bustard. Plate xli. fig. 3. Described, vol. iii. p. 131.

*Genus 6.—CURSORIUS.—Latham.*

*Generic Character.*—Bill shorter than the head, depressed at the base, somewhat curved near the point, and sharp at the tip; nostrils ovate, with a small callosity behind them; legs long and slender; feet with three anterior toes only, entirely divided, the interior one shortest; claws small, obtuse; wings extending beyond the tail; second quill the longest.

*Cursorius Asiaticus*.—The Coromandel Courier. Plate xxx. fig. 2. Crown of the head, neck, breast, and abdomen, bright chestnut; wings, back, and tail-coverts, yellow fawn-colour; crissum and tail dull white; venter with a black longitudinal streak; a black streak reaches from the base of the bill across the eyes, to the nape of the neck, over which is another streak of white; bill gray; quills black; legs and feet pale yellow-green. Eight inches long. Inhabits Coromandel.

## ORDER XIII.—GRALLATOIRES.

Bill varied in its form; generally straight, in the shape of an elongated cone, compressed, and sometimes, though seldom, depressed; legs long, slender, frequently naked above the knee; feet with three toes before and one behind; the hallux articulated, on a level with the anterior toes; sometimes a little higher.

Sub-Division I.—Having three toes only.

Genus 1.—*EDICNEMUS*.—*Temminck*.

*Generic Character*.—Bill somewhat longer than the head, straight, robust, compressed at the point, with a carinated ridge; lower mandible forming an angle with the upper one; nostrils cleft longitudinally, and open in front, situated in the middle of the bill; legs long and slender; tarsus with a distinct heel; feet with three anterior toes only, united as far as the second joint by a membrane, which extends along the toes; tail cuneiform.

*Edicnemus crepitans*.—Common Thick-Knee. Plate xlvii\*. fig. 6. Head, neck, and upper parts of the body, pale tawny brown; under parts the same, but paler; venter, and crissum, cream-yellow; the whole plumage with longitudinal brown streaks down the middle of each feather; a pale streak both above and below the eyes; bill yellow at the base, black at the tip; quills black; legs yellow; claws black. Sixteen inches long. Inhabits Europe.

Genus 2.—*CALIDRIS*.—*Illiger*.

*Generic Character*.—Bill of medium size, slender, straight, soft, and flexible throughout, compressed from the base to the point, depressed towards the point, which is flattened and obtuse; nostrils lateral, and longitudinally cleft; legs slender, tarsus longer than the foot; feet with three anterior toes, divided nearly from the base; wings of medium size, the first quill the longest.

*Calidris asenaria*.—Sanderling. Plate xli. fig. 4. Described, vol. iii. p. 348.

Genus 3.—*FALCINELLUS*.—*Cuvier*.

*Generic Character*.—Bill arcuated, soft, compressed throughout, depressed at the point, with an elongated nasal furrow; nostrils basal, lateral, linear; tarsus longer than the middle toe; feet with three anterior toes only.

*Falcinellus pygmaeus*.—Pigmy Curlew. Plate xli\*. fig. 7. Described, vol. iii. p. 313.



*Genus 4.—HIMANTOPUS.—Brisson.*

*Generic Character.*—Bill long, slender, retrousse, depressed at the base, and compressed at tip; mandibles laterally grooved about half their length; nostrils lateral, linear, oblong; legs very long and slender; feet with three anterior toes, the middle one united by a broad membrane to the inner toe by a rudimentary one; claws small and flat; wings very long, the first quill longer than the rest.

*Himantopus melanopterus.*—Black-Winged Long Shank. Plate xl<sup>t</sup>. fig. 6. Crown, back of the head, neck, back, and wings, iridescent-black; nape and occiput spotted with white; tail ash-coloured; face, neck, and under parts, white with a rosy tint. Fourteen inches long. Inhabits Europe.

*Genus 5.—HÆMATOPUS.—Linnaeus.*

*Generic Character.*—Bill long, robust, channelled, compressed, point cuneiform and much compressed; nostrils lateral, situated in the channel; legs stout and muscular; feet with three anterior toes only, the exterior one united to the middle one the length of first joint; interior toe marginated by a rudimentary membrane; wings extending to the end of the tail, the first quill longest.

*Hæmatopus ostralegus.*—Oyster Catcher. Plate xli. fig. 5. Upper parts and tail deep black; rump, middle wing feathers, breast, abdomen, and crissum, white; ophthalmic region, bill, and legs, orange. Fifteen and a half inches long. Inhabits European coasts.

*Genus 6.—CHARADRIUS.—Linnaeus.*

*Generic Character.*—Bill somewhat shorter than the head, slender, straight, and compressed; mandibles gibbous, and subconic towards the point; nostrils situated in the nasal furrow; legs slender; tibia half naked; feet with three anterior toes, the exterior one connected with the middle toe by a short membrane, the interior one quite free; tail slightly rounded or straight; wings as long as the tail, the second quill longest.

*Charadrius plumialis.*—Golden Plover. Plate xli. fig. 6. Described, vol. iii. p. 349.

Sub-Division II.—Feet furnished with four toes.

*Genus 7.—VANELLUS.—Brisson.*

*Generic Character.*—Bill short, slender, straight, slightly gibbous towards the point; nostrils lateral, and cleft longitudinally; legs slender; tibia half naked; feet with three toes before and one behind, the central toe connected with the external one by a short membrane; the hallux very short, or rudimentary, placed higher than the toes; wings longer than the tail, the third and fourth quills longest.

*Vanellus cristatus.*—Lapwing. Plate xlii. fig. 1. Described, vol. iii. p. 351.

*Genus 8.—STREPSILAS.—Illiger.*

*Generic Character.*—Bill of medium size, subconic, straight, strong at the base, slightly retrousse, a little truncated and hard at tip; ridge depressed; nostrils basal, lateral, partly closed by a membrane; legs strong; tibia partly naked above the knee; feet with three toes before and one behind, the anterior ones connected at the base by a very short membrane; the hallux arti-

culated to the tarsus, and not resting on the ground; wings acuminate, the first quill the longest.

*Streptilas collaris*.—Turnstone. Plate xlii. fig. 2. Described, vol. iii. p. 352.

*Genus 9.—GRUS.—Pallas.*

*Generic Character*.—Bill length of the head, longer in some species, robust, straight, compressed, somewhat obtuse at tip; lateral base of the mandible deeply furrowed; ridge elevated; nostrils situated in the middle of the bill, closed at the back by a membrane; ophthalmic region and base of the bill naked, and papillose, or covered with feathers; legs long; lower half of the tibia naked; feet with three toes before and one behind, the intermediate one united to the external toe by a small rudimentary membrane, the interior one free; hallux articulated higher up on the tarsus; the remiges as long as the quills, the second, third, and fourth quills longest.

*Grus cinerea*.—Common Crane. Plate xlii. fig. 3. Described, vol. iii. p. 304.

*Genus 10.—ANTHROPOIDES.—Vieillot.*

*Generic Character*.—Bill about the length of the head, laterally compressed, entire, thick, convex, and furrowed near the point; nostrils concave, ovoid, open, situated in the ridge of the bill, and covered behind by the membrane; tarsus long, smooth, and reticulated; feet with three toes, united at the base by a membrane, the interior one free; wings long, first, second, third, and fourth quills longer than the others; the second is prolonged beyond the first.

*Anthropoides pavonina*.—Crowned Crane. Plate xlii. fig. 5. Described, vol. iii. p. 318.

*Genus 11.—ARAMUS.—Vieillot.*

*Generic Character*.—Bill somewhat longer than the head, straight, hard, and bending slightly at the point; lower mandible somewhat turned in front and concave behind, angular and pointed; nostrils lateral, remote from the base of the bill; legs robust, long; feet with three toes before, quite divided, with a long hallux resting on the ground, nails long and bent; wings medium sized, the third quill the longest.

*Aramus scolopacea*.—The Scolopaceous Heron. Plate xli. fig. 8. Head, neck, and breast, reddish-fawn colour, the centre of each feather being white; wings, back, tail, tibial feathers, and crissum, chestnut-brown; the wing-coverts spotted with white; throat and cheeks white; irides yellow; bill brown; legs dusky brown. Twenty-five inches long. Inhabits Cayenne.

*Genus 12.—ADREA.—Linnaeus.*

*Generic Character*.—Bill as long as the head, longer in some species, straight, compressed, and pointed; upper mandible slightly sulcated, and ridge rounded; nostrils lateral, situated near the base of the bill, longitudinally cleft in the groove, and partly hid by a membrane; orbits and lores naked; legs long, slender, the lower part of the tibia without feathers; feet with three toes before, the middle one connected with the outer by a short

membrane; claws long, bent, and compressed, the middle one laterally dentated. Hallux long, resting on the ground.

Section I.—Bill longer than the head; upper mandible nearly straight; a considerable portion of the tibia naked.

*Ardea cinerea*.—The Common Heron. Plate xlii. fig. 4. Described, vol. iii. p. 323.

*Ardea garzetta*.—The Little Egret. Plate xlii. fig. 6. Described, vol. iii. p. 326.

Section II.—Bill about the length of the head, greatly compressed; upper mandible slightly bent.

*Ardea stellaris*.—The Common Bittern. Plate xliii. fig. 2. Described, vol. iii. p. 331.

Genus 13.—CICONIA.—*Temminck*.

*Generic Character*.—Bill long, straight, robust, cylindrical, shape of an elongated cone, ridged, rounded, parallel with the head; under mandible slightly retrousse; nostrils situated towards the base of the bill, longitudinally cleft in a groove; ophthalmic region naked; legs long; feet with three toes before, united the length of the first joint; hallux articulated, parallel with the toes; wings of medium size, third and fourth quills the longest.

*Ciconia alba*.—The Common Stork. Plate xliii. fig. 3. Described, vol. iii. p. 310.

Genus 14.—ARGALA.—*Brown*.

*Generic Character*.—Bill greatly longer than the head, very strong, conical, and slightly curved from the base, which is as thick as the head, tapering to an obtuse point; ridge but little elevated; nostrils ovate, situated near the base of the bill; head and neck divested of feathers; neck with a long naked fleshy pendulous appendage; nape covered with down in place of feathers; legs long; tibia wholly naked; feet with three anterior toes united to the first joint by a scalloped membrane; hallux rather long, and resting on the ground; wings of medium length, the first quill longest.

*Argala gigantea*.—Gigantic Argala, or Adjutant. Plate xlv. fig. 1. Described, vol. iii. p. 319.

Genus 15.—MYCTERIA.—*Latham*.

*Generic Character*.—Bill very long, thick, smooth, laterally compressed, acute; upper mandible trigonal, straight; lower mandible more thickened and retrousse; nostrils longitudinal, narrow, situated remote from the base of the bill; legs long, strong; three quarters of the tibia naked; feet with three anterior toes, slightly united at their base by a membrane; hallux situated high on the tarsus, with its point resting on the ground; wings long, the third, fourth, and fifth quills longest.

*Mycteria Americana*.—The American Jabiru. Plate xxxix. fig. 7. Described vol. iii. p. 320.

Genus 16.—ANASTOMUS.—*Illiger*.

*Generic Character*.—Bill thick, greatly compressed, gaping towards the middle, margin of the upper mandible serrated on its outer half; upper

and under mandibles with an elevated ridge, bordered by a furrow; nostrils linear, situated near the base of the bill; legs long, slender; feet with three anterior toes, the exterior ones united by a short membrane; hallux articulated on the same level as the claws; wings rather long, first and second quills longest.

*Anastomus Coromandelianus*.—Coromandel Anastomus. Plate xl\*. fig. 4. White; wings below the middle feathers iridescent-black; ophthalmic region black; irides orange; bill and legs yellow. Fifteen inches long. Inhabits India.

Genus 17.—SCOPUS.—Brisson.

*Generic Character*.—Bill compressed, bent at the tip; upper mandible with an elevated ridge and a groove under it, lower mandible with a produced ridge extending half its length; nostrils oblique near the base of the bill; tarsus longer than the middle toe; feet with three anterior toes, the outer ones connected by a membrane the length of the first joint; hallux resting on the ground; wings of medium length, third, fourth, and fifth quills longest.

*Scopus umbretta*.—The Tufted Umbrella. Plate xlii\*. fig. 5. Yellowish umber-coloured, paler below; head surmounted by a large pendulous tuft of loose feathers; tail with several transverse broken bands; throat gray; bill lead-coloured; legs dusky. Twenty inches long. Inhabits Africa.

Genus 18.—PHŒNICOPTERUS.—Linnæus.

*Generic Character*.—Bill thick, strong, deeper than broad, naked at the base; the upper mandible nearly straight about half its length, where it is slightly arcuated, and from whence it suddenly bends downwards to within about two thirds its length, where it becomes suddenly hooked, and terminates with a lanceolate point; the under edge corresponds somewhat in form with the upper side, where it is sharp and cutting; from nearly the base, rises a notched ridge which traverses the middle of the mandible and ends near the tip, beneath this it is hollowed, with some wavy striæ next the base; under mandible wavy and arcuated above and beneath, with a longitudinal ridge in its centre, suddenly drawn to a point at tip, when closed, the under mandible envelopes the upper one the length of the ridge; nostrils oblong, ovate, longitudinal, situated near the base of the bill; legs very long, with three anterior toes webbed to their points; the hallux small, articulated high on the tarsus; wings of medium size, the second quill the longest.

*Phœnicopterus ruber*.—The Red Flamingo. Plate xliii. fig. 4. Described, vol. iii. p. 336.

Genus 19.—RECURVIROSTRA.—Linnæus.

*Generic Character*.—Bill very long, slender, and weak, depressed, and retrousse at the point; upper mandible longitudinally channelled, and the under one laterally; nostrils linear, situated near the base of the bill, elongated; legs long, and strong in proportion to the weight of the bird; feet with three anterior toes, united their whole length; hallux short, articulated high on the tarsus; wings acuminate, the first quill longest.

*Recurvirostra avocetta*.—The Avocet: Plate xliii, fig 5. Described, vol. iii, p. 342.

Genus 20.—CANCROMA.—*Linnaeus*.

*Generic Character*.—Bill somewhat longer than the head, depressed, broader than deep, dilated towards the middle, the ridge prominent, with a groove on each side; upper mandible like a boat turned keel upwards; the lower one pointed, the edges strong and sharp; nostrils diagonal, situated in the nasal groove; three toes before, united at their base by a small membrane; hallux nearly parallel with the toes; wings of medium length, first and sixth quills equal, the second, third, and fourth, longer than the others.

*Cancroma cochlearia*.—The Boat Bill. Plate xliii, fig. 4. Back, back of the neck, wing-coverts, and tail, silvery-gray; cheeks, throat, upper part of the breast, quills, and tibia, white; abdomen and crissum chestnut-brown; head large; sinciput furnished with a long pendulous crest of dark gray feathers; front, chin, and legs, green; a scarlet circle round the eyes. Twenty-two inches long. Inhabits South America.

Genus 21.—PLATALEA.—*Linnaeus*.

*Generic Character*.—Bill very long, much compressed, and dilated towards its margins and point, which is spatuliform, or spoon-shaped; upper mandible channelled; nostrils approximate, open, bordered by a membrane remote from the bill; face and head wholly, or partially, without feathers; legs long; lower half of tibia naked; feet with three long anterior toes, connected the length of the second joint by membranes; the hallux long, and resting on the ground; wings medium length; the second quill longest.

*Platalea leucorodia*.—The White Spoonbill. Plate xlii\*, fig. 8. Described, vol. iii, p. 334.

*Platalea agaga*.—The Roseate Spoonbill. Plate xliii, fig. 6. Described, vol. iii, p. 335.

Genus 22.—TANTALUS.—*Linnaeus*.

*Generic Character*.—Bill very long, straight, laterally compressed, destitute of a nasal furrow, base as thick as the head, sharp and curved at the tip; upper mandible arched, sides dilated, tip compressed, cylindrical, and slightly notched; under mandible equal with the superior one, inflated at the base, and slightly bent towards the tip; both mandibles greatly inflected, and sharp; face destitute of feathers; nostrils longitudinal and oblong, cleft in the horny substance; legs very long; tarsus double the length of the middle toe; three anterior toes united by a broad scalloped membrane; hallux long, and resting on the ground; wings long, first and second quills the longest.

*Tantalus leucocephalus*.—The White-headed Tantalus. Plate xxxv, fig. 5. Head, neck, back, scapulars, and middle wing-coverts, white; secondaries rose-coloured, the lower ones tipped with white, rest of the wings dark iridescent gray-blue, reflecting purple and green; smaller wing-coverts tipped with white; breast with a transverse belt of waved black bars; face, throat, and bill, saffron-yellow; irides orange; legs yellow and violet. Four feet long. Inhabits Ceylon.

Genus 23.—IBIS.—*Lacpede*.

*Generic Character*.—Bill long, slender, arcuated, broad at the base, tip obtuse, depressed, and rounded; upper mandible furrowed its whole length; nostrils oblong, straight, near the base of the bill, perforated in the membrane which covers the furrow; face, and frequently part of the head and neck, destitute of feathers; lower half of the tibia naked; tarsus about the same length as the middle toe; three anterior toes, united the length of the first joint; hallux long, resting on the ground; wings of medium length, first quill longest.

*Ibis religiosa*.—The Sacred or Egyptian Ibis. Plate xlv. fig. 2. Described, vol. iii. p. 315.

Genus 24.—NUMENIUS.—*Brisson*.

*Generic Character*.—Bill long, slender, arcuated, compressed, hard, and slightly obtuse at the point; upper mandible projecting a little beyond the under one, rounded at the tip, with a groove three-fourths of its length; nostrils lateral, linear, and situated in the furrow; legs slender, long; tibia half naked; three anterior toes, united the length of the first joint by a membrane; the hallux short, articulated a little way from the bottom of the tarsus, nail touching the ground; wings long, the first quill longer than the others.

*Numenius arquata*.—The Curlew. Plate xlv. fig. 3. Described, vol. iii p. 343.

Genus 25.—TRINGA.—*Brisson*.

*Generic Character*.—Bill of medium size, soft and flexible, long in some species, and slightly arcuated, tip straight or curved, compressed at the base, depressed, dilated, and obtuse at the tip; both mandibles grooved nearly to their extremities; nostrils lateral, placed in the membrane which clothes the nasal furrow; legs long, slender; lower half of tibia naked; three entirely divided anterior toes, in some species, however, the outer toe is connected by a membrane; hallux articulated on the tarsus a little way higher than the toes; wings of medium length, the first quill longest.

## Section I.—With the anterior toes entirely divided.

*Tringa cinerea*.—The Red Knot. Plate xxxv. fig. 6. Head and upper parts yellow ash-colour, with arrow-shaped brown bars, and clouded with rust-colour; face, throat, breast, and abdomen, rich chestnut; venter, crissum, and tail-coverts, white; quills and bill black; legs dusky-brown. Nine and a half inches long. Inhabits Europe and America.

Section II.—Intermediate and exterior toe united the length of the first joint.

*Tringa pugnax*. The Ruff. Plate xlv. fig. 1. Described, vol. iii. p. 343, and 355.

Genus 26.—TOTANUS.—*Bechstein*.

*Generic Character*.—Bill of medium length, straight, a little recurved in some species, point hard and acuminated; both mandibles furrowed at the

base, the tip of the upper one slightly bent over the under one; nostrils linear, longitudinal, situated in the furrow; legs long, slender; tibia partly naked; feet with three anterior toes, the exterior united to the intermediate one, extending sometimes to the second joint; wings of medium length, first quill the longest.

Section I.—Bill straight.

*Totanus hypoleucos*.—The Sandpiper. Plate xlv. fig. 4. Described, vol. iii. p. 318.

Section II.—Bill a little recurved, straight at the point.

*Totanus glottis*.—The Greenshank. Plate xlv. fig. 5. Described, vol. iii. p. 351.

Genus 27.—LIMOSA.—Brisson.

*Generic Character*.—Bill very long, recurved, soft, flexible, depressed and flattened towards the tip; both mandibles longitudinally channelled; point dilated and obtuse; nostrils linear, longitudinal, situated in the groove, and covered by a membrane; legs long; tibia partly naked; feet with three anterior toes, the exterior united to the middle toe by a membrane as far as the first joint; hallux articulated on the tarsus; wings long; the first quill longer than the others.

*Limosa rufa*.—The Red Gadwit. Plate xlv. fig. 6. Described, vol. iii. p. 317.

Genus 28.—SCOLOPAX.—Linnaeus.

*Generic Character*.—Bill long, straight, compressed, tapering, soft, with the tips turgid; both mandibles with a groove extending half their length, the tip of the upper mandible hooked, projecting over the lower one; nostrils basal, linear, covered by a membrane; legs slender; tibia partly naked in some species; feet with three anterior toes, the exterior one united to the intermediate toe, the length of the first joint, by a short membrane; hallux articulated on the tarsus, wanting in some species; wings of medium length; the first quill longest.

Section I.—Tibia wholly feathered.

*Scolopax rusticola*.—The Woodcock. Plate xlv. fig. 7. Described, vol. iii. p. 314.

Section II.—Lower part of tibia naked.

*Scolopax gallinago*.—The Common Snipe. Plate xlv. fig. 8. Described, vol. iii. p. 316.

Section III.—Intermediate and exterior toes united by a membrane. Exemplified in the red-breasted snipe.

Genus 29.—RYNCHIEA.—Cuvier.

*Generic Character*.—Bill longer than the head, gibbous towards the point, and greatly compressed, inflected towards the tip; upper mandible with a groove, lower mandible channelled near the point; nasal furrow extending to the middle of the bill; nostrils linear; tarsus longer than the intermediate toe; three anterior toes entirely divided, hallux articulated on the tarsus; wings short, concave; second and third feathers longest.

*Rynchæa Capensis*.—The Cape Stupe. Plate xxxv. fig. 8. Reddish-brown above, variegated with different streaks of ash-colour, black, and brown; breast, abdomen, and crissum, white; bill and legs dusky. Ten inches long. Inhabits the Cape.

Genus 30.—EURYPYGA.—*Illiger*.

*Generic Character*.—Bill long, hard, straight, compressed, and tumid at the tip; nasal furrow deep; sides of the lower mandible sulcated; tip of upper mandible with a small notch; nostrils basal, linear, oblong; legs long, tibia partly naked; tarsus longer than the intermediate toe; feet with three anterior toes, the external one united by a membrane the length of first joint, the internal free; hallux articulated on the tarsus, long, and the point resting on the ground; wings of medium length; first and fourth quills longest.

*Eurypyga Helias*.—The Variegated Helias. Plate xxxv. fig. 9. Head gray; neck ferruginous, throat white; back, breast, tail, and scapulars gray, transversely clouded and barred with black and gray; wings variegated with ochre-yellow, gray, green, and scarlet; bill and legs dusky. Fifteen inches long. Inhabits Guiana.

Genus 31.—RALLUS.—*Linnaeus*.

*Generic Character*.—Bill somewhat longer than the head, slender, and slightly arcuated, or straight in some species, compressed at the base, cylindrical at the tip; upper mandible grooved; nostrils situated a little remote from the base, placed in the furrow, and half closed by a membrane; legs long, strong, tibia partly naked; three anterior toes long, and completely divided; hallux short, articulated on the tarsus, and the point touching the ground; wings concave, rounded; first quill same length as the fifth; the third and fourth the longest of the whole.

*Rallus aquaticus*.—The Water Rail. Plate xlii\*. fig. 1. Described, vol. iii. p. 358.

Genus 32.—GALLINULA.—*Brisson*.

*Generic Character*.—Bill shorter than the head, compressed, conical, deeper than broad at the base; ridge resting on the forehead, and dilated into a naked plate in some species; tips of mandibles compressed, and of equal length, the upper one a little curved, the lower one forming an angle; nostrils remote from the base, lateral, longitudinal, half closed by a membrane, which clothes the nasal furrow; legs long; tibia partly naked; feet with three long lateral toes, completely divided, and provided with a narrow edging; hallux articulated on the tarsus, its point touching the ground.

Section I.—Ridge of the bill extending on the forehead, but not dilated.

*Gallinula crex*.—The Land Rail. Plate xlv. fig. 9. Described, vol. iii. p. 358.

Section II.—Ridge of upper mandible dilated into a plate on the forehead.

*Gallinula Chloropus*.—The Water Hen. Plate xlv. fig. 2. Described, vol. iii. p. 358.

Genus 33.—PARRA.—*Linnaeus*.

*Generic Character*.—Bill as long as the head; straight, slender, and con-



siderably compressed, somewhat arched from the middle, and tapering to a point in both mandibles; base depressed, and elevated to a crest on the front; upper mandible projecting beyond the under one at the tip; nostrils oval, lateral, situated near the centre of the bill; legs very long; tibia naked three quarters of its length; tarsus thickening as it descends; feet with three very long anterior toes, entirely free, furnished with long straight claws; hallux parallel with the toes, rather long, and furnished with an extremely long, straight, subulate claw, slightly retrousse at the tip; wings short, armed with a short spine at the axilla; the second and third quills the longest.

*Parra Jacana*.—The Chestnut Jacana. Plate xliii. fig. 1. Back, throat, upper wing-coverts, and scapulars, rich chestnut-coloured; under parts black, iridescent, changing to purple; bill yellow, carunculated at the base. Ten inches long. Inhabits South America.

Genus 34.—PORPHYRIO.—*Brisson*.

*Generic Character*.—Bill of medium size, robust, hard, conical, nearly as deep as long, somewhat shorter than the head; upper mandible depressed and dilated towards the base; nostrils lateral, nearly round and pervious, placed near the centre of the bill; legs long, strong; tibia half naked; three anterior completely divided toes, which in some species are very long, and margined by a narrow membrane; hallux long, articulated on the tarsus; all the toes have long bent claws; wings concave, rounded; the second and third quills the longest.

*Porphyrio tavoua*.—The Martinico Porphyrio. Plate xlii\*. fig. 9. Head, neck, breast, and abdomen, deep iridescent Antwerp-blue, with purple reflections; back, scapulars, rump, and tail, deep sea-green, clouded with black; lesser middle wing-coverts and quills azure-blue; crissum and tibia black; under tail-coverts white; irides, frontal plate, and three quarters of the bill, scarlet, tipped with yellow; legs ash-yellow. Fourteen inches long. Inhabits Martinique and the United States of America.

## ORDER XIV.—PINNATIPEDES.

Bill of medium size, straight; upper mandible slightly bent at the point; legs of medium length, straight; tarsi slender, or compressed; feet with three anterior toes, having rudimentary webs along their sides; hallux articulated anteriorly on the tarsus.

Genus 1.—FULICA.—*Linnaeus*.

*Generic Character*.—Bill somewhat shorter than the head, strong, conical, straight, compressed, deeper than broad at the base; the ridge projecting in front of forehead, dilated into a plate; the upper mandible slightly curved, and widened at the base, the lower one forming an angle; nostrils lateral, longitudinally cleft, and situated in the middle of the bill, half closed by an inflated membrane; legs long; tibia partly naked; three anterior toes very long, connected at the base, and edged by a scalloped membrane; wings concave, rounded; the first and fifth quills longest.

*Fulica atra*.—The Common Coot. Plate xxx\*. fig. 3. Described, vol. iii. p. 359.

Genus 2.—*PODOA*.—*Illiger*.

*Generic Character*.—Bill as long as the head, straight, cylindrical, pointed; ridge distinct, reaching three quarters the length of the bill; upper mandible with a small notch at its tip; nostrils lateral, oblong, situated near the centre of the bill; legs short, strong, placed far back; tarsus rounded; three anterior toes, with a scalloped membrane at their edges; hallux short, nails long, bent; wings of medium length, second and third quills longest.

*Podoa Senegalensis*.—The Senegal Podoa. Plate xlii\*. fig. 6. Crown, nape, back of the neck, back, wings, and tail, brownish ash-coloured, spotted with white; under parts white, transversely barred with dark brown; throat a-h-brown, spotted with white; tail long; bill and legs orange; irides yellow. Twenty inches long. Inhabits Senegal.

Genus 3.—*PHALAROPUS*.—*Brisson*.

*Generic Character*.—Bill long, slender, weak, slightly curved, depressed at the base; both mandibles channelled at the point, the upper obtuse, bent down at its tip on the lower one; point of the' under mandible subulate; nostrils basal, linear, and placed in the groove; legs of medium length; three anterior toes connected by scalloped and serrated membranes; hallux small, weak, and articulated on the tarsus considerably above the toes, the nail touching the ground; wings long, first and second quills longest.

Section I.—Bill slender, depressed at the base, and subulate at the point.

*Phalaropus hyperboreus*.—The Red Phalarope. Plate xxxv. fig. 10. Crown of the head and back gray; wings brown ash-colour; scapulars ferruginous, tipped with gray; a black belt extends from the ophthalmic region along the side of the neck, with a ferruginous patch at its base; breast cream-yellow; chin, throat, abdomen, and crissum, white; irides reddish brown; bill and legs steel-gray. Eight and a half inches long. Inhabits the United States.

Section II.—Bill depressed through its whole extent, and compressed at the tip.

*Phalaropus platyrhynchus*.—The Gray Phalarope. Plate xlv. fig. 4. Ash-coloured above, with a black fillet on the nape, and a transverse white band on the wings; middle of the back brown; upper mandible horn-colour, lower one orange at the base; a black patch under the eyes; legs black. Eight inches long. Inhabits Europe.

Genus 4.—*PODICEPS*.—*Latham*.

*Generic Character*.—Bill of medium size, the length of the head, hard, compressed, conical, and pointed; tip of upper mandible with a slight slope; nostrils oblong, ovate, lateral, concave, situated in the middle of the bill, open in front, and closed behind by a membrane, and pervious; legs placed very far back; tibia partly concealed in the venter; tarsus greatly compressed; anterior toes much depressed, flattened at the base, united by a membrane; the hallux short, placed high on the tarsus; toes provided with flat, oblique, depressed, nails; wings of medium length, first, second, and third quills the longest; destitute of a tail.

*Podiceps cristatus*.—The Crested Grebe. Plate xlv. fig. 5 Described, vol. iii. p. 360.

## ORDER XV.—PALMIPEDES.

Bills much varied in form ; legs short, generally placed far back ; anterior toes wholly or partially connected by webs, and in some of the families the whole four are united by one membrane ; the hallux articulated to the tarsus on the interior side ; some genera are devoid of a hallux.

### Genus 1.—CEREOPSIS.—*Latham*.

*Generic Character*.—Bill very short, robust, its depth at the base being nearly equal to its length, covered by a cere, which extends over two-thirds of the upper mandible, which is arcuated, and bent over the under one, and somewhat truncated ; nostrils very large, open, placed in the middle of the bill ; the cere extending upwards, over the forehead, nearly to the crown ; tibia very short ; tarsus longer than the middle toe ; three anterior toes palmed by deeply serrated membranes ; hallux short, placed high on the tarsus ; claws short, strong, slightly bent ; wings furnished with an obtuse spur.

*Cereopsis Nova Hollandia*.—The New Holland Cereopsis. Plate xlii\*. fig. 7. Ash-gray ; scapulars with wedge-shaped black spots ; tail and quills black ; cere yellow ; irides red ; venter blue ; bill and feet gray ; legs orange. Two and a half feet long. Inhabits New Holland.

### Genus 2.—CHIONIS.—*Forster*.

*Generic Character*.—Bill strong, straight, hard ; convex, compressed, sloping towards the point ; base of the upper mandible sharp at tip and more than half covered by a moveable horny sheath, furrowed longitudinally ; nostrils small, situated near the margin and partly covered by the sheath ; cheeks naked, covered by a warty skin ; legs short ; tarsus not so long as the middle toe ; three anterior toes having a rudimentary membrane, the exterior and middle one joined the length of the first joint ; hallux long, placed high, the nail only touching the ground ; wings of medium length, the first quill longest.

*Chionis Forsteri*.—Sheath-Bill. Plate xlii\*. fig. 2. Snow-white ; bill, cheeks, and ophthalmic region, yellow ; legs flesh-coloured ; nails black. Eighteen inches long. Inhabits New Zealand.

### Genus 3.—RHYNCHOPS.—*Linnaeus*.

*Generic Character*.—Bill long, flattened on the sides, and truncated at the apex in the form of a blade ; the edges of the upper mandible approaching, and hollowed in the form of a gutter ; under mandible much longer than the upper one ; nostrils lateral, marginal, and remote from the base, and situated on the lower edge of the upper mandible ; legs short ; tibia partly naked ; anterior toes short, united to their points by a membrane ; hallux very short, articulated to the tarsus ; claws short and curved ; wings long, the first quill longest ; tail short, furcated, and much shorter than the wings.

*Rhynchops flavirostris*.—Yellow-Billed Cut-Water. Plate xlii\*. fig. 3. Head, back, and wings, dusky-brown; a longitudinal white stripe along the wings; other parts of the plumage white; bill and legs yellow. Eighteen inches long. Inhabits Senegal.

Genus 4.—STERNA.—*Linnaeus*.

*Generic Character*.—Bill as long as the head, longer in some species, nearly straight, strong, and tapering; mandibles with sharp edges, equal in length, the upper one a little inclined towards the point; nostrils longitudinal, pervious, situated in the middle of the bill; legs short; tibia partly naked; tarsus short, three anterior toes connected by a membrane; hallux short, placed high on the tarsus; tail forked; wings long and pointed, first quill the longest.

*Sterna Dougallii*.—The Roseate Tern. Plate xlv. fig. 6. Front, crown, and back of the neck, black; back, wings, and tail, silver-gray; breast of a rosy hue; bill and legs orange; two middle tail-feathers long, forked, and narrow. Sixteen inches long. Inhabits Europe.

Genus 5.—LARUS.—*Linnaeus*.

*Generic Character*.—Bill long, or medium size, strong, hard, compressed, somewhat inflated towards the point, and bent at the tip; under mandible abruptly angulated near the point; nostrils lateral, longitudinally cleft, oblong, pervious, and situated near the middle of the bill; legs of medium length; tibia partly naked; tarsus long; three anterior toes connected by webs to their tips; hallux short, articulated a little higher than the toes; tail-feathers of equal length; wings long, first and second quills longest.

*Larus Sabini*.—Sabines Gull. Plate xlv. fig. 7. Head, neck, throat, and lower half of the bill, lead-coloured gray; wings, back, and tail-coverts, silver-gray; under parts grayish-white; gray of the neck with a band of black encircling the neck; quills black, barred with white; irides black; tip of bill cream-yellow; legs dark gray. Fifteen inches long. Inhabits Greenland.

Genus 6.—LESTRIS.—*Illiger*.

*Generic Character*.—Bill of medium size, hard, strong, cylindrical, somewhat tumid towards the point, and slightly hooked at tip; upper mandible covered at its base by a cere; the lower one angulated; nostrils linear, lateral, situated in the middle of the bill; tibia partially naked; tarsus long; the three anterior toes completely connected by webs; hallux very short, and highly articulated on the tarsus; claws considerably hooked; tail somewhat rounded; wings long, first and second quills longest.

*Lestris catarractes*.—Brown Squa Gull. Plate xlv. fig. 8. Deep brown above, edged with dull rusty; under parts same colour, but lighter; head and throat mixed with gray; bill dusky; legs and toes scaly-black. Twenty-one inches long. Inhabits the North Seas.

Genus 7.—PROCELLARIA.—*Linnaeus*.

*Generic Character*.—Bill broad, and laterally compressed at the base; point compressed and arched; both mandibles grooved and abruptly inflected towards their points; nostrils prominent, placed at the surface of the bill,

united and concealed in a tube, which either forms a single aperture, or two distinct orifices; legs of medium size, but long in some species; tibia about half naked; tarsus compressed; three anterior toes entirely webbed and long; hallux represented by a pointed claw only; claws short, flat; wings long, first and second quills longest.

Section I.—Petrels.—Bill robust, hooked, bulging towards the point; nostrils united in a tube, or furrow, on the surface of the bill; tail conical or somewhat rounded.

*Procellaria glacialis*.—The Fulmar Petrel. Plate xlvii\*. fig. 1. Described, vol. iii. p. 382, &c.

Section II.—Puffin Petrels.—Bill usually longer than the head, slender, much compressed at the tip; nostrils opening in a double orifice near the surface of the bill.

*Procellaria obscura*.—Dusky Petrel. Plate xxxv. fig. 11. Described, vol. iii. p. 382, &c.

Section III.—Swallow Petrels.—Bill greatly compressed and shorter than the head; nostrils in a single tube, with two orifices; tail square at point or very slightly forked.

*Procellaria pelagica*.—The Stormy Petrel. Plate xlvi. fig. 2. Described, vol. iii. p. 382.

#### Genus 8.—PACHYPTILA.—*Illiger*.

*Generic Character*.—Bill thick, robust, greatly depressed, very broad; upper mandible inflated on the sides; interior margins furnished with cartilaginous plates; ridge distinctly formed, compressed, and hooked at its termination; nostrils basal, having two orifices, situated in a short tube; three anterior toes, adhering by deeply divided membranes; hallux represented by a short claw.

*Pachyptila Vittata*.—Forster's Pachyptila. Ash-gray above, white in the under parts; quills, tail-feathers at the tip, and band on the wings when expanded, brownish-black. Twelve inches long. Inhabits the Southern Hemisphere.

#### Genus 9.—HALADROMA.—*Illiger*.

*Generic Character*.—Bill short, straight, compressed, sharp at the edges, and furrowed longitudinally, hooked at the tip; lower mandible furnished with a small pouch, capable of extension; nostrils distinct, their base concealed under a tube; legs short, with three anterior toes only, which are palmated; wings short.

*Haladroma urinatrix*.—The Diving Haladroma. Blackish-brown above; chin black, and white on the under parts. Eight and a quarter inches long. Inhabits New Zealand.

#### Genus 10.—DIOMEDEA.—*Linnaeus*.

*Generic Character*.—Bill long, straight, robust, thick, sutured, laterally compressed, abruptly curved at its point; upper mandible channelled on the side, and much bent at the point; lower mandible truncated; nostrils situated in the groove, tubulars, lateral, remote from the base, covered behind

by a membrane, and open in front; legs short, tibia half naked; feet with three anterior toes only, long and webbed to their extremities, lateral ones margined; nails short, blunt; wings long, narrow; quills short, and the secondaries long.

*Diomedea exulans*.—The Wandering Albatross. Plate xlv. fig. 3. Described, vol. iii. p. 370.

Genus 11.—ANSER.—*Ray*.

*Generic Character*.—Bill as short, or shorter than the head; deeper than broad at the base, and narrowed towards its extremity; nostrils large, elliptical, longitudinal, placed near the middle of the bill; neck longer than in the *Anas*, and shorter than in the *Cygnus*; legs longer than the former, and placed farther forwards, near the centre of gravity; three anterior toes entirely connected by a membrane, hallux articulated on the tarsus, without any connecting membrane; wings long; first and second quills the longest.

*Anser leucopsis*.—The Barnacle Goose. Plate xlv. fig. 6. Upper parts barred with bluish-gray, black, and white; crown, back of the neck, shoulders, throat, breast, and tail, black; face, cheeks, and chin, under parts, white; tibia marked with dusky lines; legs and feet dusky, very short and thick. Twenty-six inches long. Inhabits the arctic regions.

*Anser ruficollis*.—The Red-Breasted Goose. Plate xlv. fig. 5. Front, crown, nape, and back parts of the neck, black; and a black patch under the eyes; a white space between the eye and bill; two stripes of white, extending from the back of the eyes to the bottom of the neck; neck, and upper part of the back, deep rusty-red; back and wings dusky; lower part of breast and abdomen black; venter and crissum white; bill brown; legs dusky. Twenty-one inches long. Inhabits the arctic regions.

*Anser Cyonoides*.—The Chinese Goose. Plate xlv. fig. 4. Back and upper parts brownish-gray, edged with a lighter colour; throat and breast yellow-brown; a dark brown broad stripe, extending from the nape to the bottom of the neck; bill orange at the base, with a large knob at the base of the upper mandible; a white fillet extends from the base of the bill on each side in front of the eyes; irides reddish-brown; abdomen and crissum white; legs orange. Three feet long. Inhabits China.

Genus 12.—CYGNUS.—*Ray*.

*Generic Character*.—Bill equal in breadth throughout, very deep at the base, its depth being greater than its breadth; generally furnished with a callous knob at the base; nostrils oval, placed near the middle of the bill; neck very long; cheeks naked; legs placed far behind the centre of gravity; feet with three lateral toes, entirely connected by a web; hallux short and free, nails small; wings long; the second and third quills the longest.

*Cygnus atratus*.—The Black Swan. Plate xlv. fig. 7. Described, vol. iii. p. 409.

*Cygnus olor*.—The Tame Swan. Plate xlv. fig. 8. Described, vol. iii. p. 406.

Genus 13.—ANAS.—*Linnaeus*.

*Generic Character*.—Bill of medium size, broader at the base than deep, straight, depressed, and nearly of equal breadth throughout; upper mandible

ble hooked and with a flat nail at the tip ; nostrils placed near the base, towards the upper surface of the bill ; cheeks covered with feathers ; legs short, placed behind the centre of gravity ; wings of medium length, first and second quills the longest ; feet with three anterior toes, entirely webbed to their points ; hallux free, short, connected in some species by a rudimentary web.

Section I.—Hallux without a membrane.

*Anas tadorna*.—The Sheldrake. Plate xlvii. fig. 1. Described, vol. iii. p. 423.

*Anas Penelope*.—The Widgeon. Plate xlvii. fig. 1. Described, vol. iii. p. 423.

*Anas clypeata*.—The Shoveler. Plate xlvii. fig. 3. Back brown ; abdomen and sides chestnut-bay ; head and upper part of the neck iridescent-black, with green reflections ; lower part of the neck, breast, and scapulars, white ; wing-coverts sky-blue, terminated with white tips which form an oblique stripe across the wings ; bill black, much spread out at the point ; inner sides of both mandibles with pectoral margins ; irides bright yellow ; legs and feet red. Eighteen inches long. Inhabits Europe.

Section II.—Hind toe furnished with a loose membrane.

*Anas mollissima*.—The Eider Duck. Plate xlvii. fig. 2. Described, vol. iii. p. 425.

*Anas clangula*.—The Golden-Eye. Plate xlvii. fig. 5. Described, vol. iii. p. 424.

Genus 14.—MERGUS.—*Linnaeus*.

*Generic Character*.—Bill of medium size, or long in some species, slender, shape of an elongated cone, and nearly cylindrical, broad at the base ; point of upper mandible considerably hooked, and provided with a flat nail ; edges of both mandibles furnished with a row of reflected serri ; nostrils lateral, open, situated near the middle of the bill ; legs short, strong, placed far back ; feet with three anterior toes webbed to their points ; hallux thick, articulated high on the tarsus, and not resting on the ground ; wings of medium length, first quill the longest of the whole.

*Mergus merganser*.—The Goosander. Plate xlvii. fig. 6. Described, vol. iii. p. 403.

Genus 15.—PELECANUS.—*Linnaeus*.

*Generic Character*.—Bill very long, straight, broad, greatly depressed ; upper mandible flattened above, terminated by a long hooked nail ; lower mandible formed of two long, slender, flexible branches, united together only at the tip ; intermediate space occupied by a widely dilatible membranous pouch, extending some way down the throat ; upper mandible forms a slight projection, bounded on either side by a narrow groove, in which the nostrils are situated, and so small as to be hardly perceptible ; eyes surrounded by a naked space ; neck rather long ; legs short, strong ; tibia partly naked in some species ; feet with three anterior toes, and the hallux long, placed on the side of the tarsus, on a level with the toes, the whole connected by a web and provided with small hooked nails.

*Pelecanus onocrotalus*.—The Pelican. Plate xlvii. fig. 7. Described, vol. iii. p. 365.

## Genus 16.—CARBO.—Meyer.

*Generic Character.*—Bill of medium length, long in some species, straight, robust, compressed, and rounded at the top; upper mandible slightly retrousse, and grooved, greatly hooked at the point; lower mandible compressed and sub-truncated; base of the bill invested by a membrane, extending a little way down the throat, which with the face is naked; nostrils basal, linear, oblique, and involved in the membrane; legs strong, short; three anterior toes and hallux, connected by the membrane, and webbed to their points; middle claw serrated; wings of medium length, the second and third quills longest.

*Carbo cormoranus.*—The Cormorant. Plate xlvii. fig. 8. Described, vol. iii. p. 373.

*Carbo graculus.*—The Shag. Plate xlviii. fig. 2. Described, vol. iii. p. 376.

## Genus 17.—TACHYPETES.—Vieillot.

*Generic Character.*—Bill longer than the head, strong, entire, with a suture close by the ridge; both mandibles bent downwards, greatly hooked, lower mandible compressed, upper mandible with a notch near its tip; nostrils basal, linear, elongated, situated in the groove; legs strong and short; tarsus half covered by feathers, placed far back; feet with three short anterior toes, connected to the first joint by a membrane; hallux placed on the side, of medium length, and connected with the toes by a small membrane; the wings very long, first and second quills the longest; tail long and forked.

*Tachypetes aquilus.*—The Frigate Bird. Plate xxxix\*. fig. 8. Described, vol. iii. p. 376.

## Genus 18.—SULA.—Brisson.

*Generic Character.*—Bill much longer than the head, strong, very broad at the base, and tapering to the point in the form of a cone, compressed towards the tip, which is obliquely curved; gape very wide, extending behind the eyes; under mandible slightly inflated near the point; the edges of both mandibles serrated; face and throat naked; nostrils basal, linear, situated in the ridge and concealed by a membrane; legs short, strong, placed far behind; tarsus covered with feathers at top; three anterior toes, and hallux connected by a web, the latter long, articulated on the side of the tarsus; claw of the middle toe serrated; wings long, first and second quills longest.

*Sula alba.*—The Soland Goose. Plate xlviii. fig. 1. Described, vol. iii. p. 379.

## Genus 19.—PLOTUS.—Linnæus.

*Generic Character.*—Bill long, quite straight, slender, fusiform, and sharp pointed; edges of upper mandible dilated at the base, compressed, and inflected on the other parts; under mandible inflated near the point, and slightly retrousse at the tip; edges of both mandibles finely serrated; face and throat naked; nostrils basal, linear, oblong, ovate, situated in the groove and concealed; legs short, strong, tarsus partly covered with feathers at the top; feet with three anterior toes, and the hallux articulated at the side of the tarsus, the whole connected by one web to their points; nails strong,



short, and much hooked ; wings long, the second and third quills longest ; tail conical.

*Plotus melanogaster*.—The Black-Bellied Darter. Plate xxxix\*. fig. 5. Described, vol. iii. p. 377.

Genus 20.—PHAETON.—*Linnaeus*.

*Generic Character*.—Bill longish, thick, strong, hard, sharp pointed at the edges, greatly compressed, with a slight curvature from its base ; edges of both mandibles widened at their base, compressed, and serrated, from theuce to the tip ; under mandible slightly curved, on its lower margin three-fourths its length, and acutely tapering to the point ; nostrils near the base, lateral, pervious, and partly concealed by a membrane ; legs very short, strong, placed far back ; three anterior toes, connected to their tips by a membrane ; the hallux small, short, placed behind, and free ; wings long, first and second quills longest ; tail short, but having two long filamentous central feathers, which are slightly forked.

*Phaeton phenicurus*.—The Red-Tailed Tropic Bird. Plate xxxix\*\*. fig. 4. Described, vol. iii. p. 377.

Genus 21.—COLYMBUS.—*Latham*.

*Generic Character*.—Bill as long as the head, strong, compressed, acutely pointed, and somewhat cylindrical ; upper mandible longer than the under one ; nostrils situated at the base of the bill, concave, and half-closed by a membrane ; legs placed far behind ; tarsus strong, compressed ; three anterior toes very long, united to their tips by a web ; hallux short, articulated interiorly, united by a rudimentary membrane ; wings of medium length ; the third quill the longest ; tail very short and rounded.

*Colymbus glacialis*.—The Great Northern Diver. Plate xlvi. fig. 3. Described, vol. iii. p. 397.

Genus 22.—URIA.—*Brisson*.

*Generic Character*.—Bill of medium size, short in some species, straight, pointed, and compressed ; upper mandible slightly bent towards the point, the lower one forming an angle, a little open ; nostrils basal, lateral, concave, oblong, ovate, longitudinal, half concealed by a broad membrane covered with feathers and pervious ; legs short, placed far back ; feet with three anterior toes only, webbed to their points ; wings short, narrow ; first and second quills longest.

*Uria gyllé*.—The Black Guillemot. Plate xlvi\*. fig. 9. Described, vol. iii. p. 298, &c.

Genus 23.—MERGULUS.—*Vieillot*.

*Generic Character*.—Bill shorter than the head, a little arcuated, conico-convex, a little open between the mandibles ; upper mandible slightly bent towards the point ; lower mandible straight half way from its base, where it forms an acute angle, and suddenly tapers to a point ; base of both mandibles clothed with feathers ; nostrils round, partly covered by the feathers of the capistrum ; legs short, placed far behind ; feet with three anterior toes only, united to their points by a web ; claws long and sharp ; wings short ; the first and second quills longest ; tail short and pointed.

*Mergulus alle.*—The Little Auk. Plate xlviii. fig. 4. Described, vol. iii. p. 398.

Genus 24.—PHALERIS.—*Temminck.*

*Generic Character.*—Bill shorter than the head, depressed, somewhat dilated on the sides, quadrangular and slightly notched at the tip; the lower mandible angulated on its lower side; nostrils remote from the base, placed on the edge of the upper mandible, linear, and half concealed by a membrane; legs short; tarsus scaly; feet with three long anterior toes only, united to their tips by a serrated membrane; nails long and bent; wings of medium length; the first quill longest.

*Phaleris cristatella.*—The Tufted Stariki. Plate xlvii\*. fig. 5. Brownish ash-coloured; venter and crissum white; wings brownish; front surmounted by an upright crest of arched feathers; face and cheeks with long filamentous, silky feathers; bill scarlet; legs and feet dusky-yellow. Twelve inches long. Inhabits America and Asia.

Genus 25.—MORMON.—*Illiger.*

*Generic Character.*—Bill shorter than the head, much compressed, deeper than long; both mandibles arcuated, transversely furrowed, with a notch near the tip; ridge of the upper mandible elevated above the level of the coronal surface; nostrils lateral, linear, remote from the base, placed on the margin of the upper mandible; nearly concealed by a large membrane; legs short, placed very far behind; feet with three anterior toes only, webbed to their points, rather long and hooked nails; wings short; first and second quills longest.

*Mormon fratercula.*—The Puffin. Plate xlviii. fig. 6. Described, vol. iii. p. 401.

Genus 26.—ALCA.—*Linnaeus.*

*Generic Character.*—Bill straight, broad, much compressed, and greatly bent towards the tip; basal half of both mandibles covered with feathers, grooved transversely towards the venter and point; upper mandible hooked; the under mandible slightly concave next the base, and forming an acute angle at a distance from the point, from whence it becomes abruptly pointed; nostrils linear, marginal, situated near the centre of the bill, nearly covered by a membrane, and hid by feathers; legs short, placed far behind; tarsus, while in a sitting posture, horizontal; feet with three anterior toes only, connected to their points by scalloped webs; nails short, slightly hooked and retrousse; wings very small; first quill longest.

*Alca impennis.*—The Great Auk. Plate xlviii. fig. 5. Described, vol. iii. p. 394. and 398.

Genus 27.—SPHENISCUS.—*Brisson.*

*Generic Character.*—Bill shorter than the head, straight, laterally compressed, very thick, strong, hooked at the point, and obliquely grooved; edges of both mandibles inflected, the under one covered with feathers at its base, and sub-truncated at its tip; nostrils small, linear, situated in the furrow, near the middle of the bill; legs very short, thick, placed very far behind; feet with three anterior toes, webbed to their tips; hallux articulated

on the inside of the tarsus, very short and thick; nails long and slightly bent; wings very short, fin-shaped, and destitute of plumes.

*Spheniscus chrysocome*.—The Crested Penguin. Plate *xlvii\**. fig. 10. Described, vol. iii. p. 393.

*Genus 28.*—APTENODYTES.—*Forster*.

*Generic Character*.—Bill longer than the head, slender, subulate; upper mandible with an oblique furrow, which is wide at the base, enveloped in a smooth skin; nostrils near the centre of the bill, placed high; legs very short, situated far back; feet with three long anterior toes, connected to their tips by a web; hallux short, articulated at the inner joint of the tarsus, and directed forward; nails nearly straight; wings short, fin-shaped, having quill feathers only.

*Aptenodytes Patagonica*.—The Patagonian Penguin. Plate *xlvii\**. fig. 12. Described, vol. iii. 394.

ORDER XVI.—INERTES.

Bill of varied forms; body thick, covered with down, and distinctly webbed feathers; legs placed far behind; tarsus short; feet with three anterior toes divided to the base; hallux short, articulated exteriorly; claws thick and sharp; wings not fitted for flight.

*Genus 1.*—APTERYX.—*Shaw*.

*Generic Character*.—Bill very long, straight, slightly bent from the base, subulate; inflected and gibbous at the tip, soft and furrowed throughout; base covered by a hairy cere; nostrils situated near the point of the bill, at the end of a furrow; legs short; wings rudimentary, and provided with a spur at their termination.

*Apteryx Australis*.—The Southern Apteryx. Plate *xlvii\**. fig. 11. Back of neck, shoulders, back, rump, and sides, dusky-brown; the rest of the plumage cinereous-gray; bill and legs yellowish. Two feet and a half long. Inhabits New Zealand.

*Genus 2.*—DIDUS.—*Linnaeus*.

*Generic Character*.—Bill long, very strong, broad, and compressed, much bent at the point, and transversely furrowed; lower mandible straight, gibbous, and turned upwards towards the point; nostrils situated in the middle of the bill, diagonal, and placed in a furrow; tarsus short, very strong; feet with three anterior toes, divided to their origin; hallux short; claws short, strong, and bent; wings short, not formed for flight.

*Didus ineptus*.—The Dodo. Plate *xlviii*, fig. 7. Described, vol. iii. p. 43.

## CLASS THIRD.

### REPTILES.

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VERTEBRATED animals with cold red blood, the skin either naked or protected by scales.

#### OF REPTILES.

For the functions of Frogs, &c. See vol. iv. p. 87, &c.

For the functions of Lizards, &c. See vol. iv. p. 113, &c.

For the functions of Serpents, &c. See vol. iv. p. 147, &c.

The classification of Reptiles adopted by Cuvier, is that of Brogniart, who derived his orders from the varieties of construction in the chief organs, such as those of generation and respiration, taken in conjunction with the animal functions. They are divided into four orders, namely:—

I. CHELONIANS, or Tortoises.—Body covered with a shield or plate.

II. SAURIANS, or Lizards.—Body covered with scales.

III. OPHIDIANS, or Serpents.—Destitute of feet.

IV. BATRACHIANS, or Frogs.—Body covered with a naked and loose skin.

#### ORDER I.—CHELONIA.

Heart having two auricles; body enveloped in two plates or shields, formed of the ribs or sternum; and with four feet.

Division I.—Inhabits the land.

Genus 1.—TESTUDO.—*Brogniart.*

*Generic Character.*—Superior shell gibbous, sustained by a bony frame, and adhering through the greater portion of its sides to the under shell; feet with short toes, attached together to nearly the nails, which, together with the head, can be withdrawn within the shell; anterior feet with five nails, posterior feet with four nails, the whole of them conoid and thick.

*Testudo geometrica.*—Geometrical Tortoise. Plate lxii. fig. 1. Shell black, ovate; scutellæ ornamented with yellow radiæ, diverging from a yellow disc, which is composed of thirteen or fourteen pieces; marginal divisions from 24 to 26. Twelve inches long. Inhabits Africa.

Division II.—Fluviatile Tortoises

Genus 2.—EMYS.—*Brogniart.*

*Generic Character.*—Upper shell gibbous, divided into large scutellæ; feet

with distinctly defined toes, furnished with crooked nails; toes more or less palmated, five on the anterior feet, and four on the posterior feet.

*Emys Europæa*.—Speckled Tortoise. Plate lxii. fig. 2. Shell ovate, a little convex, smooth, black, ornamented with yellow radiated dots; disc composed of 13 scutellæ, and the margin of 25; under shell cream-yellow, brown at the joints; the skin of the neck lax and wrinkled. Fifteen inches long. Inhabits Europe.

Genus 3.—CISTUDA.—*Fleming*.

*Generic Character*.—Upper shell emarginate in front, having two notches behind; under shell with one or two moveable divisions; lips horny.

Division III.—Marine Tortoises.

Genus 4.—CHELONURA.—*Fleming*.

*Generic Character*.—Extremities incapable of being withdrawn under the shield; back plate carinated, with acute processes behind; tail about the length of the shield.

*Chelonura Serpentina*.—Snake Tortoise. Oblong-ovate, considerably depressed, with a double carina, posterior margin rounded, and acutely serrated; tail the same length as the body. Four feet long. Inhabits North America.

Genus 5.—CHELONIA.—*Brongniart*.

*Generic Character*.—Feet produced, in the shape of scaly fins; toes elongated, and unequal, covered with scales, and united by a membrane, their exterior edge provided with small nails, and terminated by laminated scales.

*Chelonia mydas*.—The Green Turtle. Plate lxii. fig. 2. Shell pale brown, with variegated undulations, heart-shaped, pointed at the extremity, with 13 dorsal scutellæ, and 25 marginal plates. Six feet long. Inhabits the West Indian Seas.

Genus 6.—CHELYS.—*Duméril*.

*Generic Character*.—Lips fleshy, mouth cleft across, with a produced snout; toes webbed; hind feet with a protuberance occupying the place of webs, but destitute of a claw; limbs of the animal not contained within the shell.

Genus 7.—TRICONYX.—*Geoffroy*.

*Generic Character*.—Back plate destitute of scales, but covered with a coriaceous skin, studded near each extremity with hard knobs; lips fleshy; nostrils prolonged into a cylindrical tube; three only of the five toes furnished with nails.

## ORDER II.—SAURIA.

Body elongated, covered with scales; four feet for the most part; some have claws, and others are without them; tail more or less elongated; mouth furnished with teeth.

## TRIBE I.—CROCODILIDÆ.

*Genus 1.—GAVIALA.—Cuvier.*

*Generic Character.*—Muzzle contracted, cylindrical, greatly elongated, spatuliform towards the point, tip acute; teeth nearly equal; hind legs serrated on the external margin; feet palmated to the claws.

*Gaviala Gangetica.*—Gangetic Crocodile. Plate lxii. fig. 4. Muzzle as long as the head, contracted; superior jaw with 28 teeth on either side, lower jaw with 25; neck protected by two carinated plates; eyes very large; cranium with a deep indentation behind the eyes. Eighteen feet long. Inhabits India.

*Genus 2.—CROCODILUS.—Cuvier.*

*Generic Character.*—Muzzle oblong, conoid, depressed; teeth of unequal length, fourth tooth in the under jaw lying along a groove in the upper; legs serrated; feet palmated.

*Crocodilus vulgaris.*—The Common Crocodile. Plate lxii. fig. 5.—The Egg, fig. 6. Described, vol. iv. p. 116.

*Genus 3.—ALLIGATOR.—Cuvier.*

*Generic Character.*—Snout broad and blunt; teeth unequal, the fourth on each side of the lower jaw produced, and received into a cavity in the upper one; feet half webbed, and not denticulated.

*Alligator scleros.*—The Alligator. Plate lxiii. fig. 1. Described, vol. iv. p. 116.

## TRIBE II.—LACERTINIDÆ.

*Genus 4.—MONITOR.—Cuvier.*

*Generic Character.*—Scales on the head, abdomen, and tail, small and imbricated; tail laterally compressed; teeth in both jaws, but having none on the palate.

Section I.—Tail flattened with a carinated ridge.

Section II.—Tail nearly rounded, with a dentated ridge on its upper side. Inhabits New Holland.

Section III.—Tail nearly rounded, without a ridge.

*Genus 5.—DRACÆNA.—Cuvier.*

*Generic Character.*—Head furnished with angular plates; scales on the back large, broad, and carinated, which are strongly serrated on the tail; scales on the throat small; abdominal and caudal scales rectangular; tail round at its base, and compressed towards its point; tongue bifid.

*Dracæna Guianensis.*—The Guiana Dracæna. Plate lxiii. fig. 2. Head small, tapering; neck thick, body round, and the tail very long; colour brown, inclining to chestnut, paler on the abdomen, which is marked with numerous small yellow spots. Inhabits Guiana.

*Genus 6.—TEIUS.—Merrem.*

*Generic Character.*—Back scales smooth and small, a row of pores under

the thighs; tail compressed, carinated in some species, and smooth in others; abdominal scales elongated; teeth notched; tongue forked.

Section I.—Tail carinated.

Section II.—Tail divested of carina, and compressed towards the point.

Genus 7.—AMEIVA.—Cuvier.

*Generic Character.*—Head pyramidal; tongue bifid; tail cylindrical; with transverse rows of square scales throughout; those of the abdomen broader than long; scales of the throat small.

*Ameiva lemniscata.*—The Striped Ameiva. Plate lxiii. fig. 3. Dusky blue, with eight longitudinal stripes above; sides and outside of thighs, with small white spots; under the thighs a range of tubercles. Inhabits Africa.

Genus 8.—LACERTA.—Cuvier.

*Generic Character.*—Palate provided with two rows of teeth; neck having a transverse collar of large scales, separated from those of the abdomen by very small ones; bone of the cranium protruding on the temples and orbits.

Genus 9.—TACHYDROMUS.—Cuvier.

*Generic Character.*—Body and tail very much elongated; back with rows of square scales; skin of the thighs having spiracles; with two anal vessels.

TRIBE III.—IGUANIDÆ.

Having the general form of the lizard; tongue not extensible, but fleshy and thick, with a notch at the tip.

Genus 10.—CORDYLUS.—Cuvier.

*Generic Character.*—Head simple, without teeth in the palate; back and abdomen covered with transverse rows of large scales; a line of large spiracles on the thighs.

Genus 11.—STELLIO.—Daudin.

*Generic Character.*—Head produced behind; without palate teeth; ears rounded and spinous; body covered with sharp pointed scales; thighs without spiracles; tail long, acute.

Genus 12.—MASTIGURA.—Fleming.

*Generic Character.*—Destitute of palate teeth; scales of the body smooth, and of uniform size; tail scales larger and spinous; spiracles under the thighs.

Genus 13.—AGAMA.—Daudin.

*Generic Character.*—Head tumid; skin of the throat wrinkled transversely, and capable of being inflated; body oblong, ventricose, covered with small carinated scales, raised into rough tubercles; longer near the ears.

*Agama muricata.*—Muricated Agama. Plate lxiii. fig. 4. Brownish-gray; upper parts with transverse dusky bars, which are most conspicuous on the legs and tail; scales all muricated; tail very long. Twelve inches long. Inhabits New South Wales.

*Genus 14.—TRAPELUS.—Cuvier.*

*Generic Character.*—Head tumid; body oblong; scales small, smooth, without any appearance of spines.

*Genus 15.—CALOTES.—Cuvier.*

*Generic Character.*—Scales on the body imbricated, with marginal edges; ridge of the back furnished with a longitudinal carina, extending to the middle of the tail.

*Genus 16.—LOPHYRUS.—Dumeril.*

*Generic Character.*—Scales on the body, having the appearance of shagreen dorsal carina prolonged upon the tail, which is compressed.

*Genus 17.—BASILISCUS.—Daudin.*

*Generic Character.*—Jaw-teeth strong, compressed, without any palate teeth; thighs with a row of spiracles; skin on the neck loose, without any pouch; crests scalloped, supported by long bony apophyses like the fins of fishes, extending from the bottom of the neck to the middle of the tail, covered by thin translucent scales; scales of the abdomen and tail small, square.

*Basiliscus mitratus.*—The Mitred Basilisk. Plate lxxiii. fig. 5. Described, vol. iv. p. 138.

*Genus 18.—DRACO.—Linnaeus.*

*Generic Character.*—Incisive teeth  $\frac{1}{4}$ , canines  $\frac{1}{2}$ , long and pointed; molars  $\frac{3}{3}$ — $\frac{3}{3}$  triangular; throat with a long gular pouch under it; tail long and carinated; no femoral spiracles; nape of neck with a small dentation; six false ribs supporting a wing-shaped extension of the skin; body covered with imbricated scales.

*Draco lineatus.*—The Flying Dragon. Plate lxxiii. fig. 6. Described, vol. iv. p. 144.

*Genus 19.—IGUANA.—Cuvier.*

*Generic Character.*—Head plated; jaws with a row of compressed, triangular, and serrated teeth; with two small rows on the posterior margin of the palate; body and tail provided with small imbricated scales; back with a carina of pointed scales; throat with an inflated, laterally compressed, and pendulous appendage; a row of femoral spiracles.

*Genus 20.—POLYCHRUS.—Cuvier.*

*Generic Character.*—Head covered with small plates; maxillary teeth sharp and serrated, having small ones in the palate; throat capable of inflation and extension; back without a crest; body and tail with small scales.

*Genus 21.—ANOLIUS.—Cuvier.*

*Generic Character.*—Generally provided with a gular pouch; teeth sharp and serrated, with small ones in the palate; claws greatly hooked; tail shagreened with small scales.

## Section I.—Tail crested.



## Section II.—Tail round.

## TRIBE IV.—GECKOTIDÆ.

Genus 22.—GECKO.—*Daudin*.

*Generic Character*.—Body and head depressed ; eyes large ; tongue fleshy and not extensible ; jaws with a row of numerous small and close teeth ; skin covered with small shagreen-like scales, and frequently tuberculated below with smaller flat and imbricated scales ; tail with transverse folds completely encircling it ; toes widened in their whole length, or at their extremity only, having plicated or scaly skin.

*Sub-Genus I*.—PLATYDACTYLI.—Toes widened throughout, and provided below with transverse scales.

*Sub-Genus II*.—HEMIDACTYLI.—Base of the toes with an oval disc, formed underneath by a double row of scales ; the second phalange emanates from this disc, it is weak, and supports the last, or nail joint ; all the toes provided with nails ; anal region with a row of spiracles on both sides ; tail with large scales underneath.

*Sub-Genus III*.—THECKADACTYLI.—Toes expanded through their whole length, and provided with transverse scales, which are divided by a longitudinal groove ; hallux without a nail ; tail with small scales both above and below ; destitute of femoral pores.

*Sub-Genus IV*.—PTYODACTYLI.—Toes divided at the point only ; striated beneath ; nails hooked and placed in a fissure.

*Gecko Caudiverbera*.—The Scallop-Tailed Gecko. Plate lxiv. fig. 1. Described, vol. iv. p. 137.

*Sub-Genus V*.—PHYLLURI.—Toes not widened ; tail depressed and cordiform.

## TRIBE V.—CHAMÆLEONIDÆ.

Genus 23.—CHAMÆLEON.—*Cuvier*.

*Generic Character*.—Body compressed ; back carinated, entirely covered with papillose, shagreen-like scales ; tail round, long, and prehensile ; feet with five toes each, the anterior ones having two toes in front and three behind, and the posterior ones with three toes before and two behind, all united as far as the nails by a membrane ; tongue fleshy, cylindrical, and capable of much extension ; teeth with three lobes ; eyes large, having separate movements, and nearly covered with the eyelids ; divested of external ears ; occiput produced ; lungs comprehensive.

*Chamæleon vulgaris*.—The Common Chameleon. Plate lxiv. fig. 2. Described, vol. iv. p. 140.

## TRIBE VI.—SCINCIDÆ.

Legs very short ; tongue not extensible ; body covered with imbricated scales.

Genus 24.—SCINCUS.—*Daudin*.

*Generic Character*.—Body elongated, covered with imbricated glistening

scales of an oblong or rounded shape; tongue fleshy, somewhat extensible, and slightly cleft at tip; jaws provided with small close-set teeth, and two rows in the palate; toes free, without nails.

*Scincus occiduus*.—The Galley-Wasp. Plate lxiv. fig. 3. Body pale ferruginous, with white transverse fillets; tail short; molar teeth rounded, and two small lobes before the tympanum. Fifteen inches long. Inhabits Jamaica.

Genus 25.—SEPS.—*Daudin*.

*Generic Character*.—Body, neck, and tail, cylindrical and much elongated; covered with rounded elliptical scales; tongue short, slightly cleft at the point; feet small, the anterior and posterior ones far apart; toes varying from three to five.

Genus 26.—BIPES.—*Lacepede*.

*Generic Character*.—Destitute of fore-feet; the scapulars and clavicles being concealed under the skin; feet slightly divided in some species, and completely attached in others.

Genus 27.—CHALCIDES.—*Daudin*.

*Generic Character*.—Head somewhat obtuse; no distinct neck; body greatly elongated; four short feet, furnished with from one to three toes; scales not imbricated, but arranged in transverse bands.

Genus 28.—CHIROTES.—*Cuvier*.

*Generic Character*.—With fore-feet only; head obtuse; no distinct neck; body greatly elongated; with from one to five toes on the feet.

### ORDER III.—OPHIDIA.

Heart with two auricles; body greatly elongated, cylindrical, and destitute of feet: for the most part covered with scales.

#### TRIBE I.—ANGUINES.

Teeth small, nearly of equal length; tongue with a luniform notch; ribs united in a greater or smaller degree so as to supply the place of a sternum, or breast-bone; eyes provided with three eyelids.

Genus 1.—OPHISAURUS.—*Daudin*.

*Generic Character*.—With an external visible tympanum; maxillary teeth conical; palate provided with two small groups of teeth.

Genus 2.—ANGUIS.—*Cuvier*.

*Generic Character*.—Tympanum hid under the skin; maxillary teeth compressed and hooked; palate destitute of teeth.

*Anguis fragilis*.—The blind Worm. Plate lxiv. fig. 4. Yellow above, with metallic reflections; dusky below, scales smooth and shining; back with three longitudinal dorsal lines, which change into spots by age, and alternately disappear; tail longer than the body.

*Genus 3.—ACONTIAS.—Cuvier.*

*Generic Character.*—Without sternum or pelvis; teeth conic; second lobe of the lungs merely rudimentary.

## TRIBE II.—SERPENTES.

Having no sternum, nor scapular bones, and without a third eyelid.

## SUB-DIVISION I.—Jaws not capable of dilation.

*Genus 4.—AMPHISBÆNA.—Linnaeus.*

*Generic Character.*—Body encompassed by circular annulations of quadrangular scales; a row of spiracles before the anal region; teeth few, and in the jaws only; oviparous.

*Genus 5.—TYPHLOPS.—Schneider.*

*Generic Character.*—Snout depressed, provided with plates; tongue long, bifurcated; eyes scarcely visible; body covered with small imbricated scales; anus near the extremity of the body.

## SUB-DIVISION II.—Jaws capable of great dilation.

*Genus 6.—TORTRIX.—Oppel.*

*Generic Character.*—Abdominal scales, and those under the tail, larger than the others; tongue thick and short; tail very short.

*Genus 7.—BOA.—Linnaeus.*

*Generic Character.*—Anal region provided with a hook on each side; body compressed, inflated towards the middle; tail prehensile; scales small, and particularly so upon the back of the head.

*Boa constrictor.*—The Great Boa. Plate lxiv. fig. 6. Described, vol. iv. p. 187.

*Genus 8.—ERIX.—Daudin.*

*Generic Character.*—Under the body and tail a row of longitudinal scales of a large size; head with nine plates; teeth small and pointed.

*Genus 9.—ERPETON.—Lacepede.*

*Generic Character.*—Head with large plates, having two soft protuberances covered with scales, at the point of the muzzle; those of the abdomen smaller; the scales under the tail different from the others.

*Genus 10.—PYTHON.—Daudin.*

*Generic Character.*—Anal region furnished with lateral hooks; neutral plates narrow; plates of the head large and numerous.

*Genus 11.—HURRIA.—Daudin.*

*Generic Character.*—Body with a single row of longitudinal plates underneath; tail with a double row.

*Genus 12.—DIPSAS.—Laurenti.*

*Generic Character.*—Head broader than the body, which is compressed;

ridge of the back provided with larger scales than those on the rest of the animal.

*Genus 13.—COLUBER.—Cuvier.*

*Generic Character.*—Abdomen with transverse plates, subdivided under the tail, or forming a double row; head depressed, with nine larger plates; teeth nearly equal; destitute of poison fangs.

*Genus 14.—ACROCHORDUS.—Hornsted.*

*Generic Character.*—Body much thicker than the tail, both are covered with small uniform tuberculous scales; jaws provided with two rows of teeth.

*Genus 15.—PSEUDOBOA.—Oppel.*

*Generic Character.*—Head short, covered with large plates; occiput somewhat prominent; plates of the abdomen single, back carinated with a longitudinal row of broad scales.

*Genus 16.—TRIMERESURUS.—Lacepede.*

*Generic Character.*—Head with large plates; those under the tail and near the vent single, but double towards the extremity.

*Genus 17.—HYDROPHIS.—Cuvier.*

*Generic Character.*—Head small, covered with large plates; abdomen provided with a row of scales larger than the others; tail compressed.

*Genus 18.—PELAMIS.—Cuvier.*

*Generic Character.*—Abdomen and head with larger plates than the body; occiput tumid; scales of the body small and equal; tail compressed.

*Genus 19.—CHERSYDRUS.—Cuvier.*

*Generic Character.*—Head small, obtuse; back triangular and carinated; body thicker in the centre, and tapering abruptly towards the tail; head and body covered with small scales; abdomen carinated.

*Genus 20.—CROTALUS.—Linnæus.*

*Generic Character.*—Head broad, triangular, and depressed; scales carinated; tongue bifurcate; a depression behind the nostrils; upper maxillary bones with isolated fangs; tail with transverse plates; extremity provided with a rattle of hollow, rigid, articulated, and moveable, plates.

\* Scales of the head and back the same.

*Crotalus horridus.*—The Rattlesnake. Plate lxiv. fig. 7. Described, vol. iv. p. 175.

*Genus 21.—SCYTALUS.—Latreille.*

*Generic Character.*—Upper jaw provided with poisonous fangs; body and tail with a row of transverse plates.

*Genus 22.—ACANTHOPHIS.—Daudin.*

*Generic Character.*—Anterior part of the head with large plates; upper

jaw with poisonous fangs ; back part of the head tumid, and with scales the same as on the back ; under the tip of the tail are double plates, and terminated by a pointed spur.

*Genus 23.*—LANGAHA.—*Bruguiere.*

*Generic Character.*—Head with seven large plates, and a central one between the eyes ; muzzle long and acute ; upper jaw greatly longer than the under one, with poisonous fangs ; body covered above anteriorly with small scales, and having plates behind the vent surrounding the tail, which towards its tip is provided with small scales.

*Genus 24.*—TRIGONOCEPHALUS.—*Oppel.*

*Generic Character.*—Head broad behind, and in some species covered with scales like those of the back, in others they are granulated ; with depressions behind the nostrils ; upper jaw with poisonous fangs ; tail frequently terminated by a small horny spur.

*Genus 25.*—PLATURUS.—*Latreille.*

*Generic Character.*—Head covered with large plates ; upper jaw with poisonous fangs ; tail compressed, provided with two rows of plates, terminated by two large ones.

*Genus 26.*—NAIA.—*Laurenti.*

*Generic Character.*—Plates of the head larger than those of the body ; those on the body longest near the head ; occiput furnished with a hood ; upper jaw with poisonous fangs.

*Naiu vulgaris.*—The Spectacle Snake. Plate lxx. fig. 1. Described, vol. iv. p. 181.

*Genus 27.*—ELAPS.—*Schneider.*

*Generic Character.*—Head with large plates ; jaws provided with poison fangs, capable of but little dilation ; head behind of same breadth as the neck.

*Genus 28.*—COBRA.—*Laurenti.*

*Generic Character.*—Head from behind the eyes to the mouth, sub-triangular with carinated scales ; upper jaw with poisonous fangs.

*Genus 29.*—VIPERA.—*Cuvier.*

*Generic Character.*—Head with granulated scales ; upper jaw with poisonous fangs ; plates under the tail sub-divided.

TRIBE III.—NAKED SERPENTS.

*Genus 30.*—CÆCILIA.—*Linnaeus.*

*Generic Character.*—Body cylindrical ; skin not protected by scales, but having longitudinal folds ; eyes extremely small.

*Cæcilia glutinosa.*—The White-Sided Cæcilia. Plate lxxv fig. 2. Head long and tumid ; nostrils wide ; deep brown, with a white longitudinal stripe on each side, disposed so as to form a slight carina. Twelve inches long. Inhabits South America.

## ORDER IV.—BATRACHIA.

Heart with one auricle; body covered with a naked cuticle; provided with lungs in the natural state; but with branchiæ, like fishes in their immature condition before they are transformed.

Genus 1.—RANA.—*Linnaeus*.

*Generic Character*.—Body slender; fore-legs short; feet with generally four toes, free; hind-legs long; muscular feet with five toes, usually palmated to the extremities; skin smooth; upper jaw provided with a row of small teeth, and an interrupted transverse one in the middle of the palate; males with a thin extensible membrane under the ear, which is inflated with air when they croak.

*Rana esculenta*.—The Green Frog. Plate lxx. fig. 3. Described, vol. iv. p. 93.

Genus 2.—HYLA.—*Cuvier*.

*Generic Character*.—Body somewhat compressed, elongated, and smooth; tongue short and thick; fore-feet provided with four toes, free; hind-feet with five, all clawless, but in their stead, ventricular tubercles; male with a pouch under the throat, capable of being inflated.

*Hyla arborea*.—The Tree Frog. Plate lxx. fig. 11. Described, vol. iv. p. 95.

Genus 3.—BUFO.—*Cuvier*.

*Generic Character*.—Head with a broad projection behind the ears; jaws without teeth; body thick, short, and broad, covered with warted papillæ above, from which exudes a fetid fluid; eyes large and projecting; fore feet with four free toes; hind feet short, with five toes, mostly palmated.

*Bufo calamita*.—The Mephitic Toad. Plate lxx. fig. 6. Olive-green above, with brown spots, reddish warts, and a line of sulphur-yellow down the middle of the back; pale-gray beneath. Inhabits Europe.

*Bufo cornutus*.—The Horned Toad. Plate lxx. fig. 10. Described, vol. iv. p. 109.

Genus 4.—PIPA.—*Laurenti*.

*Generic Character*.—Body considerably depressed; head large and triangular; destitute of a tongue; tympanum concealed under the skin; eyes small, situated towards the margin of the upper jaw; toes of the fore feet with four toes free, and furnished with radiated somewhat obtuse points; largest of the male very long and triangular; hind feet with five toes webbed to the points, and furnished with nails.

*Pipa Surinamensis*.—The Surinam Pipa. Plate lxx. fig. 8. Described, vol. iv. p. 109.

Genus 5.—SALAMANDRA.—*Brongniart*.

*Generic Character*.—Head depressed; body elongated; tail long, cylindrical in some species, and depressed in others; ears hidden, and with a mi-

nute cartilaginous plate upon the orifice; jaws with numerous small teeth, and two longitudinal rows of similar teeth in the palate; tongue short, thick, adhering to the under jaw; without a third eyelid; fore feet with four toes; hind feet with five.

Section I.—TERRESTRIAL.—Tail in the adult state rounded.

*Salamandra terrestris*.—The Salamander. Plate lxx. fig. 8. Described, vol. iv. p. 133.

Genus 6.—PROTEUS.—*Laurenti*.

*Generic Character*.—Body elongated, cylindrical; tail compressed; tongue short and thick, attached, except at the point; eyes excessively small, concealed by the skin; fore feet with three divided toes; hind feet with two, free, all destitute of claws; furnished with interior lungs and persistent branchiæ.

*Proteus anguinus*.—Proteus, Plate lxx. fig. 9. Body smooth, pale gray; tail compressed; branchiæ scarlet or carmine-red. Twelve inches long. Inhabits subterranean streams in Carneola.

Genus 7.—SIREN.—*Linnaeus*.

*Generic Character*.—Body elongated, cylindrical; tail compressed; tongue short, thick, and attached; two feet only, placed far forward, with four toes; having internal lungs and persistent branchiæ.

*Siren lacertina*.—The Siren. Plate lxxiv. fig. 5. Body black, speckled with white, eel-shaped; white beneath; sides wrinkled; tail provided with a soft adipose fin. Two feet long. Inhabits Carolina.

# CLASS FOURTH.

## FISHES.

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VERTEBRATED animals with cold red blood, and respire by means of gills or branchiæ, and progressing in water by means of fins.

For an account of the physiology and general characters of fishes, see vol. iii. p. 440, 487, 527, &c.

There have been many attempts at the classification of fishes, both by artificial systems and also from natural arrangements, but that of Cuvier seems the best which has yet been adopted. It is that system which we have given in the following outline.

Cuvier divides all fishes into two sub-classes, namely :—

### SUB-CLASS I.—CARTILAGINOUS FISHES.

It consists of three orders :

ORDER I. CYCLOSTOMI.—II. SELACHII.—And, III. STURIONES.

### SUB-CLASS II.—OSSEOUS FISHES.

It consists of six orders :—

IV. PLECTOGNATHI.—V. LOPHBRANCHII.—VI. MALACOPTERYGII ABDOMINALES.—VII. MALACOPTERYGII SUBRACHIATI.—VIII. MALACOPTERYGII APODES.—IX. ACANTHOPTERYGII.

### SUB-CLASS I.—CARTILAGINOUS FISHES.

#### ORDER I.—CYCLOSTOMI.

Jaws fixed in an immoveable ring; branchiæ adhering, with numerous openings.

This order consists of three genera; namely, 1. *Petromyzon*; 2. *Ammonoetes*; and 3. *Gastrobranchus*; of which we have figured,

*Petromyzon fluviatilis*.—The Lesser Lamprey. Plate liii. fig. 1. Described, vol. iii. p. 510.

*Gastrobranchus cæcus*.—The Glutinous Hag. Plate liii. fig. 2. Body silvery iridescent-white, with reddish reflections towards the head and tail; furnished with a double row of lateral pores. Six inches long. Inhabits the European seas.

#### ORDER II.—SELACHII.

Branchiæ toothed, the openings numerous, without lids or membranes; palatine and postmandibular bones provided with teeth, instead of jaws.



This order consists of twenty-two genera, which are divided into three tribes: viz.

TRIBE I.—SQUALIDES.

1. *Scyllium*; 2. *Caracharias*; 3. *Lamna*; 4. *Zygæna*; 5. *Gallens*; 6. *Mustelus*; 7. *Notidanus*; 8. *Selache*; 9. *Cestracion*; 10. *Spinax*; 11. *Centrina*; 12. *Seymnus*; 13. *Squatina*; 14. *Pristis*.

TRIBE II.—PLATYSOMI.

15. *Rhinobatus*; 16. *Torpedo*; 17. *Raia*; 18. *Trygon*; 19. *Myliobatus*; 20. *Cephaloptera*.

TRIBE III.—CHIMÆRÆ.

21. *Chimæra*; 22. *Callorhynchus*. Of which we have figured,

*Scyllium catulus*.—The Spotted Shark, or Dog-Fish. Plate liii. fig. 3. Described, vol. iii. p. 492.

*Caracharius vulgaris*.—The White Shark. Plate liii. 4. Described, vol. iii. p. 491.

*Lavinia cornubiensis*.—The Porbeagle Shark. Plate liii. fig. 5. Blue-black above, silvery-white below; tail semilunar, carinated on each side; caudal lobes nearly equal; teeth small, with two basal processes. Eight feet long. Inhabits the European seas.

*Zygæna vulgaris*.—The Hammer-Headed Shark. Plate liii. fig. 6. Body long, dark brown above, and white in the under parts; upper dorsal fin scythe-shaped, the second one small, and near the tail. Fifteen feet long. Inhabits the Mediterranean.

*Selache maximus*.—The Basking Shark. Plate liii. fig. 7. Described, vol. iii. p. 491.

*Squatina levis*.—The Angel Shark. Plate liii. fig. 1. Described, vol. iii. p. 492.

*Pristis antiquorum*.—The Saw-Fish. Plate liv. fig. 2. Horny beak, provided with 24 large teeth on each side; body dusky above, pale gray below. Fifteen feet long. Inhabits the European seas.

*Torpedo vulgaris*.—The Torpedo. Plate liv. fig. 3. Described, vol. iii. p. 492.

*Cephaloptera diabolis*.—The Devil Ray. Plate liv. fig. 4. Black; tail very acute; a dorsal fin at the commencement of the tail. Four feet broad. Inhabits the Indian seas.

*Chimæra monstroso*.—The Northern Chimæra. Plate liv. fig. 5. Body compressed, silvery-white, marbled with deep chestnut-brown; head large, with two incisory teeth in each jaw. Four feet long. Inhabits the North seas.

*Callorhynchus Australis*.—The Southern Callorhynchus. Plate liv. fig. 6. Silvery; the back pale reddish fawn-colour, and the fins of the same colour. Four feet long. Inhabits the South seas.

ORDER III.—STURIONES.

Branchiæ free, their openings greatly cleft, with an operculum; but the membrane devoid of rays.

This order consists of the following genera, namely, 1. *Acipenser*. 2. *Spatularia*: of which we have figured the following species.

*Acipenser sturio*.—The Sturgeon. Plate liv. fig. 7. Described, vol. iii. p. 513.

*Spatularia reticulata*.—The Reticulated *Spatularia*. Plate liv. fig. 8. Head and snout nearly as long as the body and tail, and covered with reticulated striæ; body sub-cylindrical, tapering to the tail; lateral lines conspicuous; dorsal fin near the tail, which is luniform.

#### SUB-CLASS II.—OSSEOUS FISHES.

### ORDER IV.—PLECTOGNATHI.

Bones fibrous; upper jaw formed by the intermaxillary bone, which is immovably attached upon the side of the maxillary bone; palatine arch adhering to the cranium; branchial cleft simple.

This order consists of eight genera.

#### TRIBE I.—GYMNODONTES.

1. *Diadon*; 2. *Tetraodon*; 3. *Cephalus*.

#### TRIBE II.—SCLERODERMI.—*Cuvier*.

4. *Balistes*; 5. *Monocanthus*; 6. *Aluterus*; 7. *Triacanthus*; 8. *Ostracion*; of which we have figured the following species.

*Diadon orbicularis*.—The Orbicular *Diadon*. Plate lv. fig. 1. Described, vol. iii. p. 523.

*Tetraodon lineatus*.—The Lineated *Tetraodon*. Plate lv. fig. 2. Described, vol. iii. p. 523.

*Cephalus brevis*.—The Short Sun-Fish. Plate lv. fig. 3. Described, vol. iii. p. 519.

*Balistris vetula*.—The Old Wife File-Fish. Plate lv. fig. 4. Described, vol. iii. p. 522.

*Aluterus monoceros*.—The One-Horned *Aluterus*. Plate lv. fig. 5. Ash-coloured, with irregular brown undulated patches. One foot long. Inhabits the Eastern and American seas.

*Ostracion cornutus*.—The Horned Trunk-Fish. Plate lv. fig. 6. Quadrangular; yellow-fawn colour; deeper on the abdomen; head with two horizontal horns; and two curved round horns pointing backward, placed on each side of the anal fin. Ten inches long. Inhabits the Indian seas.

### ORDER V.—LOPHOBRANCHII.

Jaws entire; branchiæ in the form of small round tufts, disposed in pairs along the branchial arches.

This order consists of four genera, as follow. 1. *Syngnathus*; 2. *Hippocampus*; 3. *Solenostomus*; 4. *Pegasus*: of which we have figured the following species.

*Syngnathus acus*.—The Great Pipe Fish. Plate lv fig. 7. Described, vol. iii, p. 521.

*Hippocampus foliatus*.—The Australian Hippocampus. Plate lv. fig. 8. Body somewhat heptagonal, with foliated appendages on the head, neck, back, tail, and breast; fawn coloured, speckled with grayish-white; fins soft and transparent. Ten inches long. Inhabits the Australian coast.

*Pegasus Draco*.—The Dragon Pegasus. Plate lv. fig. 9. Breast somewhat quadrangular, with several radiated bony plates; each side of the abdomen with a lengthened cirrus; tail long, narrow, enveloped in a case of eight scaly annulations; pectoral fins large, with the margins scalloped. Four inches long. Inhabits the Indian seas.

## ORDER VI.—MALACOPTERYGII ABDOMINALIS.

With a bony skeleton; jaws complete; pectinated branchiæ; rays of the fins soft, with the exception of the first rays of the dorsal or pectoral fins, which are sometimes hard; ventral fins placed far behind on the abdomen.

This order contains sixty-nine genera, namely:—

### TRIBE I.—SALMONIDES.

1. Salmo; 2. Osmerus; 3. Coregonus; 4. Argentina; 5. Curimata; 6. Anasotomus; 7. Serrasalmus; 8. Piabucus; 9. Tetragonopterus; 10. Myletes; 11. Hydrocynus; 12. Citharinus; 13. Saurus; 14. Scopelus; 15. Aulopus; 16. Gasteropelecus; 17. Sternoptix.

### TRIBE II.—CLUPEÆ.

18. Clupea; 19. Megalops; 20. Engraulis; 21. Thrissa; 22. Pristigaster; 24. Notopterus; 25. Elops; 26. Chirocentrus; 27. Erythrinus; 28. Amia; 29. Sudis; 30. Lepisosteus; 31. Polypterus.

### TRIBE III.—ESOCES.

32. Esox; 33. Galaxias; 34. Microstoma; 35. Stomias; 36. Chauliodus; 37. Salanx; 38. Belone; 39. Scomberesox; 40. Hemiramphus; 41. Exocetus; 42. Mormyrus.

### TRIBE IV.—CYPRINIDÆ.

43. Cyprinus; 44. Barbus; 45. Gobio; 46. Tinca; 47. Cirrhinus; 48. Abramis; 49. Labeo; 50. Leuciscus; 51. Gonorhynchus; 52. Cobitis; 53. Anableps; 54. Pœcilia; 55. Lebias; 56. Cyprinodon.

### TRIBE V.—SILURIDÆ.

57. Silurus; 58. Schilbe; 59. Synodontis; 60. Pimeledus; 61. Bagrus; 62. Ageneiurus; 63. Doras; 64. Macropteronotus; 65. Plotosus; 66. Callichrys; 67. Malapterurus; 68. Platystacus; 69. Hypostomus: of which we have figured the following species.

*Serrasalmus rhombus*.—The Rhombic Salmon. Plate lvii. fig. 7. Dull-red above, with some irregular dusky spots; sides and abdomen silvery-white, the latter carinated and serrated; tail luniform, with a black fillet at its edge; a three-spiked spine placed before the dorsal fin. Inhabits the rivers of Surinam.

*Engraulis encrasicolus*.—The Anchovy. Plate lvi. fig. 4. Back dusky brown; sides and belly of a shining silvery hue; fins short, transparent, the dorsal one opposite the ventral fins; tail forked. Three inches long. Inhabits the European seas.

*Polypterus Bichir*.—The Nilotic Polypterus. Plate lvii. fig. 8. Body deep green, with several spots of black; some individuals are immaculate; scales very large. Inhabits the Nile.

*Belone vulgaris*.—The Chinese Gar-Fish. Plate lvi. fig. 2. Bluish-green above; silvery-white below. Two feet long. Inhabits the European seas.

*Xocetus exiliens*.—The Mediterranean Flying Fish. Plate lvii. fig. 3. Back brown; silvery-white beneath, covered with large scales; ventral fins long, placed behind the middle of the abdomen. Fifteen inches long. Inhabits the Mediterranean.

*Cyprinus auratus*.—The Golden Carp. Plate lvii. fig. 4. Rich metallic golden-yellow, approaching to scarlet on the upper parts; silvery below; fins carmine-red; tail sometimes trifid; anal fin double. Six inches long. Inhabits the Lakes of Southern China.

*Barbus vulgaris*.—The Barbel. Plate lvi. fig. 7. Snout red; dark silvery gray on the upper parts, and paler below; scales rounded; second ray of the dorsal fin strong and serrated; ventral fins pale reddish-brown, tipped with yellow; tail forked, of a purple tinge. Eight feet long. Inhabits the rivers of Southern Europe.

*Abramis vulgaris*.—The Bream. Plate lvi. fig. 5. Olive-green above, paler below; fins dusky. Two and a half feet long. Inhabits the lakes and rivers of Europe.

*Anableps tetraphthalmus*.—The Four-Eyed Anableps. Plate lvii. fig. 5. Yellowish-gray, with longitudinal lines on the sides. Ten inches long. Inhabits the rivers of Guiana.

*Pimelodus Bagarius*.—Bagarus's Pimelodus. Plate lvii. fig. 6. Tail fin divided into two bony long pointed lobes; body opaque, scabrous, variegated with black irregular marks. Six feet long. Inhabits the Ganges.

*Macropteronotus magur*.—The Magur *Macropteronotus*. Plate lvii. fig. 1. Tail and back fins distinct; body shaped like the head of a lance; olive-green above, and dirty-yellow below; the fins are edged with red. Ten inches long. Inhabits the Ganges.

*Platystacus chaca*.—The Chaca *Platystacus*. Plate lvii. fig. 8. Skin with scattered fleshy projections, ragged, and the surface clouded with green and black above, and black and yellow beneath; fins spotted with black; head much depressed and blunt. Eight inches long. Inhabits the Ganges.

*Hypostomus flavus*.—The Yellow Hypostomus. Plate lviii. fig. 1. Orange-yellow, spotted with brown; tail with bars of the same colour; head large, rough with small points. Ten inches long. Inhabits the Indian seas.

## ORDER VII.—MALACOPTERYGII SUBBRACHIATI.

Jaws entire; branchiæ pectinated; ventral fins either before the pectorals, between them, or a little behind.

This order contains twenty-two genera.

TRIBE I.—GADITES.

1. *Morrhua*; 2. *Merlangus*; 3. *Merluccius*; 4. *Lota*; 5. *Mustela*; 6. *Brosmus*; 7. *Phycis*; 8. *Raniceps*; 9. *Lepidoleprus*; 10. *Macrourus*.

TRIBE II.—PLEURONESTES.

11. *Platessa*; 12. *Hippoglossus*; 13. *Rhombus*; 14. *Solea*; 15. *Monochirus*; 16. *Achirus*.

TRIBE III.—DISCOBOLI.

17. *Lepadogaster*; 18. *Gobiesox*; 19. *Cyclopterus*; 20. *Liparis*; 21. *Echeneis*; 22. *Ophicephalus*: of which we have figured the following species.

*Brosmus vulgaris*.—The Torsk. Plate lviii. fig. 2. Back and sides yellowish-gray, softening into white on the abdomen; head small, blackish-brown; tail rounded. Three feet long. Inhabits the North seas.

*Macrourus rupestris*.—The Long-Tailed Macrourus. Plate lviii. fig. 3. Silver-gray above, and nearly white beneath; body tapering gradually to a long and pointed tail. Three feet long. Inhabits the North seas.

*Platessa carnaria*.—The Flesh-Coloured Fluke. Plate lviii. fig. 4. Irides orange, nictitating membrane green; body smooth, covered with very small smooth adherent scales, flesh-coloured, with regular deep rose-coloured distinct spots; under side smooth, convex, silvery-white. Five and a half inches long. Inhabits the Frith of Forth.

*Gobiesox bimaculatus*.—The Two-Spot-Sucker. Plate lviii. fig. 5. Body taper, rose-coloured, with small white spots, and a black spot on each side of the abdomen. Two inches long. Inhabits the European seas.

*Cyclopterus lumpus*.—The Lump-Sucker. Plate lviii. fig. 6. Described, vol. iii. p. 520.

*Liparis Montagu*.—The Diminutive Lump-Sucker. Plate lviii. fig. 7. Body brownish-purple above, and pale reddish-white beneath; dorsal and caudal fins separate. Two inches long. Inhabits the British seas.

*Echeneis Remora*.—The Remora. Plate lviii. fig. 8. Umber-brown above, paler below; under jaw projecting beyond the upper one; tail semi-lunar. Eighteen inches long. Inhabits the Mediterranean.

*Ophicephalus punctatus*.—The Punctated Ophicephalus. Plate lviii. fig. 9. Brownish-black above, paler beneath; with numerous black dots; dorsal and abdominal fins long. Ten inches long. Inhabits the lakes of India.

## ORDER VIII.—MALACOPTERYGII APODES.

Body lengthened, with a thick skin, and having no ventral fins.

This order contains fifteen genera, namely:—1. *Anguilla*; 2. *Conger*; 3. *Ophisurus*; 4. *Muraena*; 5. *Sphagebranchus*; 6. *Aptericthus*; 7. *Synbranchus*; 8. *Alabes*; 9. *Gymnotus*; 10. *Carpus*; 11. *Sternaclius*; 12. *Leptocephalus*; 13. *Ophidium*; 14. *Fierasfer*; 15. *Ammodytes*; of which we have figured the following species.

*Conger vulgaris*.—The Conger Eel. Plate lviii. fig. 10. Blackish-brown above, and silvery-white beneath; dorsal and anal fins having black edges. Six feet long. Inhabits the Northern seas.

*Muræna catenata*.—The Chain-Striped Muræna. Plate lviii. fig. 11. Brown; with interrupted, white, transverse, chain-like bands; thickly freckled with brown. Fifteen inches long. Inhabits Surinam.

*Gymnotus electricus*.—The Electrical Gymnotus. Plate lviii. fig. 12. Described, vol. iii. p. 536.

*Leptocephalus Morrisii*.—Morris' Leptocephalus. Plate lix. fig. 1. Pale-grayish-yellow, semipellucid; margins of back and belly with small black spots. Six inches long. Inhabits the coasts of England.

## ORDER IX.—ACANTHOPTERYGII.

The first rays of the dorsal, ventral, and anal fins supported by a simple spinous process.

This order contains one hundred and sixty-eight genera as follow :—

### TRIBE I.—TÆNIOIDES.

#### Section I.—Snout short.

1. Cepola; 2. Lophotes; 3. Regalecus; 5. Trachipterus; 4. Gymnetrus; 6. Gymnogaster; 7. Trichiurus; 8. Lepidopus; 9. Stylephorus.

### TRIBE II.—GOBIOIDES.

10. Blennius; 11. Pholis; 12. Salaria; 13. Clinus; 14. Gunnellus; 15. Opistognathus; 16. Anarchias; 17. Gobius; 18. Gobioides; 19. Tænioides; 20. Periophthalmus; 21. Eleotris; 22. Sillago; 23. Callionymus; 24. Comephorus.

### TRIBE III.—LABROIDES.

25. Labrus; 26. Julis; 27. Crenilabrus; 28. Coriscus; 29. Cheilinus; 30. Epibulus; 31. Gomphosus; 32. Novacula; 33. Chromis; 34. Scarus; 35. Labrax.

### TRIBE IV.—PERCOIDES.

#### Section I.—Dorsal fin continuous.

36. Smaris; 37. Boops; 38. Sargus; 39. Daurada; 40. Pagrus; 41. Dentex; 42. Lutianus; 43. DiaCOPE; 44. Cirrhitus; 45. Bodianus; 46. Seraraons; 47. Plectropomus; 48. Cantharus; 49. Cichla; 50. Pristopomus; 51. Scolopsis; 52. Diagramma; 53. Cheilodactylus; 54. Micropterus; 55. Grammistes; 56. Priacanthus; 57. Polyprion; 58. Holocentrus; 59. Acerina; 60. Stelliferus; 61. Scoropæna; 62. Synanceia; 63. Pterois; 64. Tænianotus; 65. Atherina; 66. Sphyræna; 67. Paralepis; 68. Mullus; 69. Pomatomus; 70. Mugil; 71. Perca; 72. Centropomus; 73. Euoplosus; 74. Prochilus; 75. Sandrus; 76. Terapon; 77. Apogon; 78. Cingla; 79. Umbrina; 80. Lonchurus; 81. Sciaena; 82. Pogonias; 83. Otolithes; 84. AncyloDon; 85. Percis; 86. Trachinus; 87. Uranoscopus; 88. Trigla; 89. Peristedion; 90. Dactylepterus; 91. Cephalacanthus; 92. Monocentris; 93. Cottus; 94. Aspido-

phorus; 95. *Platycephalus*; 96. *Batrachus*; 97. *Lophius*; 98. *Antennarius*;  
99. *Malthe*.

TRIBE V.—SCOMBEROIDES.

100. *Scomber*; 101. *Thynnus*; 102. *Orcynus*; 103. *Caranx*; 104. *Citula*;  
105. *Seriola*; 106. *Nomeus*; 107. *Seleue*; 108. *Gallus*; 109. *Argyreus*;  
110. *Vomer*; 111. *Tetragonurus*; 112. *Macragnathus*; 113. *Mastacembelus*;  
114. *Gasterosteus*; 115. *Spinachia*; 116. *Centronotus*; 117. *Lichia*; 118. *Blepharis*;  
119. *Zeus*; 120. *Carpos*; 121. *Equula*; 122. *Mene*; 123. *Atropus*;  
124. *Trachichthys*; 125. *Chrysotosus*; 126. *Xiphias*; 127. *Istiophorus*; 128.  
*Centrolophus*; 129. *Oligopodus*; 130. *Coryphæna*; 131. *Pteraclis*; 132.  
*Amphacanthus*; 133. *Acanthurus*; 134. *Aspisurus*; 135. *Prionurus*; 136.  
*Naseus*.

TRIBE VI.—SQUAMIPENNES.

137. *Chaetodon*; 138. *Chelmon*; 139. *Platax*; 140. *Hemiochus*; 141. *Ephiphus*;  
142. *Chetodipterus*; 143. *Holocanthus*; 144. *Acanthopodus*; 145.  
*Ospbroemus*; 146. *Trichopodus*; 147. *Toxotes*; 148. *Kurtus*; 149. *Anabas*;  
150. *Cæsius*; 151. *Brama*; 152. *Stromateus*; 153. *Fiatola*; 154. *Seserinus*;  
155. *Pimblepterus*; 156. *Kyphosus*; 157. *Plectrohynchus*; 158. *Glyphisodon*;  
159. *Pomacentrus*; 160. *Amphiprion*; 161. *Premnas*; 162. *Temnodon*;  
163. *Eques*; 164. *Polyneinus*.

TRIBE VII.—FISTULARIIDE.

165. *Fistularia*; 166. *Aulostomus*; 167. *Centriscus*, 168. *Amphisila*: of  
which we have figured the following species.

*Cepola Tænia*.—The Band-Fish. Plate lix. fig. 2. Dusky above, with  
some remote reddish spots along the sides; and shining silvery waved-bands  
beneath. Four feet long. Inhabits the Mediterranean.

*Stylephorus chordatus*.—The Cordated Stylephorous. Plate lix. fig. 3.  
Silvery, mottled with reddish-brown. Two feet long, exclusive of the fila-  
ment. Inhabits the gulf of Mexico.

*Blennius ocellaris*.—The Ocellated Blenny. Plate lix. fig. 4. Dark  
blue-green on the back, and paler below; marked with several clouds  
on the upper parts; dorsal fin having a round dusky spot, surrounded by  
white.

*Anarchicas lupas*.—The Wolf-Fish. Plate lix. fig. 5. Described, vol.  
iii. p. 536.

*Gobius shangua*.—The Shangua Gobius. Plate lix. fig. 6. Body slip-  
pery, olive-green, clouded with black dots above; abdomen white; tail fin  
with beautiful square spots of black; eyes small, protuberant, and approach-  
ing closely. Six inches long. Inhabits the Estuaries of the River Ganges.

*Cathionymus Lyra*.—The Gemmeous Dragonet. Plate lix. fig. 7. De-  
scribed, vol. iii. p. 532.

*Julis micolepidotus*.—The Micolepidotus Julis. Plate lix. fig. 8. Head  
and back of a yellow-brown; sides and belly silvery; scales minute, covering  
the operculi; fins pale-brown.

*Crenilabrus gibbus*.—The Gibbous Wrasse. Plate lix. fig. 9. Back ar-  
cuated, carinated, sloping abruptly to the snout; sides spotted with blue and  
orange. Eight inches long. Inhabits the British seas.

*Cheilinus fuscatus*.—The Banded Gilt-Head. Plate lix. fig. 10. Body broad, compressed; yellow, with six brown transverse fillets; lateral line interrupted.

*Chromis Surinamensis*.—The Surinam Gilt-Head. Plate lx. fig. 1. Yellow, transversely spotted with red; each side with five large black spots; tail slightly semilunar. Inhabits the South American seas.

*Scarus viridis*.—The Green Scarus. Plate lx. fig. 2. Yellowish or grass green; bordered with sea green; caudal fin straight. Twelve inches long. Inhabits the Chinese seas.

*Boops chrysurus*.—The Gold-Tailed Sparus. Plate lx. fig. 3. Described, vol. iii. p. 533.

*Serranus tigrinus*.—The Spotted Holocentrus. Plate lx. fig. 6. Back brown; sides blue; abdomen silvery, with numerous black bands and spots; rounded in the fins. Twelve inches long. Inhabits the Indian seas.

*Holocentrus sogo*.—The Sogo Holocentrus. Plate lx. fig. 5. Body silvery-red, with longitudinal yellow streaks on each side; fins elongated, bright red; tail greatly forked. Twelve inches long. Inhabits the North and South seas.

*Pterois antennata*.—The Antennated Pterois. Plate lx. fig. 8. Head provided with two great tentacula over each eye; body with brown and yellow transverse stripes, and a brown band over the eyes. Twelve inches long. Inhabits the rivers in Amboyna.

*Mullus surmuletus*.—The Surmullet. Plate lx. fig. 10. Of a reddish silvery metallic lustre, with longitudinal golden bands. Fourteen inches long. Inhabits the seas of Northern Europe.

*Mugil auratus*.—The Tang. Plate lx. fig. 4. Brown above; sides white, with yellow bands; fins fawn-coloured. Twelve inches long. Inhabits the Mediterranean.

*Trachinus draco*.—The Dragon Weever. Plate lx. fig. 9. Brownish-yellow; first dorsal fin black, and having five rays. Twelve inches long. Inhabits the seas of Northern Europe.

*Uranoscopus scaber*.—The Star-Gazer. Plate lx. fig. 7. Back brown; sides gray; abdomen white; interior lip of the lower jaw with a long filament; lips with smaller cirri. Twelve inches long. Inhabits the Northern seas.

*Trigla hirundo*.—The Swallow Gurnard. Plate lxi. fig. 1. Brown; snout slightly notched; pectoral fins equal to a third of the body in length, spotted with blue. Two feet long. Inhabits the European seas.

*Dactylopterus volitans*.—The Flying Gurnard. Plate lxi. fig. 7. Crimson-red above, whitish beneath; first dorsal fin and tail pale lilac. Twelve inches long. Inhabits the Mediterranean.

*Cottus gobio*.—The River Bullhead. Plate lxi. fig. 2. Described, vol. iii. p. 534.

*Lophius piscatorius*.—The Fishing-Frog. Plate lxi. fig. 6. Described, vol. iii. p. 519.

*Antennarius listrio*.—The Harlequin Angler. Plate lxi. fig. 5. Drab-coloured, marbled with deep brown or dusky patches. Twelve inches long. Inhabits the Indian and American seas.

*Caranx ruber*.—The Red Mackrel. Plate lxi. fig. 3. Rose-red, with the sides and abdomen silvery; tail deeply forked. Fourteen inches long. Inhabits the Indian and American seas.



*Istiophorus platypterus*.—The Broad-Finned Sword-Fish. Plate lxi. fig. 8. Described, vol. iii. p. 530.

*Coryphæna Hippuris*.—The Common Coryphæna. Plate lxi. fig. 9. Of a vivid silvery hue, with yellow spots; fins rich yellow; tail forked. Four feet long. Inhabits the Mediterranean.

*Platyx Teira*.—The Long-Finned Chatodon. Plate lxi. fig. 10. Silvery white, with three black bands; dorsal and anal fins extremely long and arenated; ventral fins black. Inhabits the seas of Arabia and India.

*Equus Americanus*.—The Knight Fish. Plate lvi. fig. 9. Back brown; sides and abdomen yellow; three oblique black bands; a narrow one passing over the eyes, the second one, which is greatly broader, commences on the crown and terminates under the throat; the third on the dorsal fin, and is continued to the tip of the caudal fin. Twelve inches long. Inhabits the American seas.

*Aulostomus Chinensis*.—The Chinese Gar-Fish. Plate lvi. fig. 2. Described, vol. iii. p. 521.

## MOLLUSCA.

# INVERTEBRAL ANIMALS.

INVERTEBRAL animals are those which are destitute of a spine, or back bone. This great division of animated beings possess few positive characters which they have in common. Some have their bodies protected by a shelly covering; others have no other defence than a soft and tender skin; while others have their members surrounded by crustaceous plates. The nervous and circulating systems are less perfect than in animals with a spine; and few of them have red blood. The spinal chord is represented in molluscons animals by ganglions of the nervous filaments. None of the invertebral animals possess all the senses; and the sexes are frequently united in the same individual; while, in others, the species is continued by a process somewhat resembling vegetation.

Cuvier arranges invertebral animals into three great divisions. 1st, Those destitute of a skeleton, which are termed *Mollusca*. 2d, Animals whose trunk is divided into rings, these are called *Articulata*. 3d, Those animals known by the name of *Zoophytes*, which Cuvier calls *Radiata*.

### DIVISION II.—MOLLUSCA.

Class I. *Mollusca*.—II. *Conchifera*.—III. *Tunicata*.—IV. *Cirripida*.

### DIVISION III.—ARTICULATA.

Class V. *Annelides*.—VI. *Crustacea*.—VII. *Arachnides*.—VIII. *Myriapoda*.  
IX. *Insecta*.

## DIVISION. IV.—RADIATA.

Class X. *Echinodermata*—XI. *Entozoa*.—XII. *Acalepha*.—XIII. *Polypi*.  
XIV. *Infusoria*.

The arrangement adopted is that of Lamarck, but reversed in the order.

## ORDER I.—HETEROPODA.

Head distinct, with two eyes, but destitute of arms arranged around the head; body free, elongated, fitted for swimming horizontally; no foot under the abdomen or throat for walking; one or more fins, without any regular order, and not arranged in pairs as in fishes.

This order consists of three genera, namely;—1. *Phylliroe*; 2. *Pterotrochea*; 3. *Carinaria*; of which we have figured,

*Carinaria fragilis*.—The Fragile *Carinaria*. Plate lxxii. fig. 1. Shell excessively thin, hyaline, striated longitudinally, destitute of a dorsal keel. Inhabits the African seas.

## ORDER II.—CEPHALOPODA.

Head emanating from the bag-shaped mantle, and surmounted by inarticulated arms; provided with suckers, and investing the mouth; two sessile eyes; mouth provided with two horny mandibles; three hearts; the sexes in separate individuals.

This order contains thirty-three genera.

1. *Sepia*.

2. *Loligo vulgaris*.—The Common *Loligo*, or Cuttle Fish. Plate lxxiii. fig.

3. Described, vol. iv. p. 413.

3. *Loligopsis Octopus vulgaris*.—The Common *Octopus*. Plate lxxiii. fig. 5. The body smooth; cups widely set and arranged in a double row, and having eight simple elongated arms. Inhabits the European seas.

4. *Octopus*.

5. *Argonauta Argo*.—The *Argus Argonauta*, or Paper *Nautilus*. Plate lxxii. fig. 2. Shell white, involute, extremely fragile, sides with undulated ridges, and absolutely striate; keel with small tubercles. Inhabits the Mediterranean.

6. *Baculites Faugusii*.—Faugus's *Baculites*. Plate lxxii. fig. 3. Erect, cylindrical, opposite sides smooth and depressed; sutures with lobed dentations.

7. *Turrilites costulata*.—The Ribbed *Turrilites*. Plate lxxii. fig. 4. Erect, turritid; volutions convex, with transverse ribs, each with a tubercle at its base.

8. *Ammonoceratites glossoidea*.—The Glossy *Ammonoceratites*. Plate lxxii. fig. 5. Large, thick, cylindrical, arcuated, laterally depressed; inside flatly concave; apex compressed, tongue-shaped. Nineteen inches two lines long. Fossil, East Indies, and in Mount St Catherine, near Rouen.

9. *Orbulites striata*.—The Striated *Orbulites*. Plate lxxii. fig. 6. Un-

bilicated; volutions hidden, transversely and minutely striated and ribbed; back acute. One inch and a half long. Fossil.

10. *Ammonites armatus*.—The Armed Ammonites. Plate lxxii. fig. 7. Subcarinated, volutions depressed at their inner margins; with strong transverse striæ and clavate ribs. Fossil.

11. *Nautilus umbilicatus*.—The Umbilicated Nautilus. Plate lxxii. fig. 8. Suborbicular; the centre of the volutions umbilicated; aperture round, heart-shaped; pale fawn-coloured, with chestnut undulated transverse clouds. Six inches long. Inhabits the Indian Ocean.

12. *Nummulites complanatus*.—The Flat Nummulites. Plate lxxii. fig. 9. Orbicular, broad, depressed at the sides, and smooth; margin undulated. One inch and a half long. Fossil in France.

13. *Vorticialis strigilata*.—The Creased Vorticialis. Plate lxxii. fig. 10. Somewhat depressed, transversely ribbed, and spirally striated. Fossil.

14. *Polystomella crispa*.—The Wrinkled Polystomella. Plate lxxii. fig. 11. Shell discoid, multilocular, with invisible volutions; with numerous transverse ribs; aperture formed by variously disposed holes.

15. *Siderolites calcitrapoides*.—The Chalk Siderolites. Plate lxxii. fig. 12. With four lobes, and punctated throughout. Fossil in the mountain of St Peter, at Maestricht.

16. *Discorbis visicularis*.—The Visicular Discorbis. Plate lxxii. fig. 13. Volutions nodulous, subvisicular; the internal volution hidden by the nodules. Fossil at Grignon. \*

17. *Placentula astricans*.—The Star-Shaped Placentula. Plate lxxii. fig. 14. Volutions convex; partitions radiating from the centre. Fossil.

18. *Lenticulites rotulata*.—The Rolled Lenticulites. Plate lxxii. fig. 15. Orbicular; margin acute; disc globular. Fossil at Mendon.

19. *Rotulites trochidiformis*.—The Trochus-Shaped Rotulites. Plate lxxii. fig. 16. Shell conoid; volutions carinated; lower one granulated. Fossil at Grignon.

20. *Melonites sphæroidea*.—The Round Melouia. Plate lxxii. fig. 17. Entirely globular. Fossil.

21. *Gyrogonites medicaginula*.—Somewhat spherical, with transverse keels, and a spiral extremity. Fossil at Montmorency.

22. *Miliola ovata*.—The Oval Miliola. Plate lxxii. fig. 18. Ovate, small. Fossil at Grignon.

23. *Orbiculina uncinata*.—The One Sinused Orbiculina. Plate lxxii. fig. 9. Spirally striated, and the volutions separated by a deep sinus. Fossil.

24. *Cristellaria squammula*.—The Scaled Cristellaria. Plate lxxii. fig. 20. Shell externally covered with minute scale-like marks. Fossil.

25. *Renulites opercularis*.—The Lip-Shaped Renulina. Plate lxxii. fig. 21. Semilunar, flat, with arcuated concentric ridges. Fossil at Grignon.

26. *Lituolites nautiloidea*.—The Nautilus-Shaped Lituola. Plate lxxii. fig. 22. Discoid, tailed, ribbed; septa with six perforations. Fossil at Mendon.

27. *Spirolina clavata*.—The Club-Shaped Spirolina. Plate lxxii. fig. 23. Club-shaped, spiral, smooth, ending in a lengthened erect body. Fossil.

28. *Spirula Peronii*.—Peron's Spirula. Plate lxxii. fig. 24. Pale sulphur-yellow, very fragile, horn-shaped; diameter about one inch. Inhabits the West Indian seas.

29. *Conilites pyramidata*.—The Pyramidal Conilites. Plate lxxii. fig. 25. Pyramidal; with the concave bands contracted. Fossil.

30. *Hippurites curro*.—The Bent Hippurites. Plate lxxii. fig. 26. Conical, curved, rough; lower part truncated and flat.

31. *Nodosaria radricula*.—The Shining Nodosaria. Plate lxxii. fig. 27. Erect, oblong, and attenuated; with five globular volutions. Two lines long. Inhabits the Adriatic.

32. *Orthocera Raphanus*.—The Radish-Root Raphanus. Plate lxxii. fig. 28. Erect, conically elongated, with longitudinal continuous ribs; white. Inhabits the Mediterranean sea.

33. *Belemnites subconicus*.—The Subconic Belemnites. Plate lxxii. fig. 29. Lower part somewhat cylindrical; the upper part conical and attenuated. Fossil, found in Britain in chalk marl.

### ORDER III.—TRACHELIPODA.

Posterior part of the body spirally convoluted, separated from the feet, and constantly enveloped in a shell; foot free, depressed, attached to the lower base of the neck, on the anterior part of the body, and forming a member of locomotion; shell spiral, and enveloping.

1. *Conus generalis*.—The General Cone. Plate lxxiii. fig. 1. Shell oblong, turbinated, with reddish-brown or orange clouds, and interrupted fillets; spire marginated. Two and a half inches long. Inhabits the Indian seas.

2. *Olivæ cruenta*.—The Bloody Olive. Plate lxxiii. fig. 2. Shell pale fawn-coloured, with large triangular spots of purple, edged with deeper fawn; two dark brown spots on the edge of the outer lip; suture of the spire deep; pillar plaited to nearly the top. One inch and a half long. Inhabits the Indian seas.

3. *Ancillaria cinnamomea*.—The Cinnamon Ancillaria. Plate lxxiii. fig. 3. Shell chestnut-brown, with white bands above; varice of the columella reddish, and somewhat striated. One inch long. Inhabits Trincomalee.

4. *Terebellum subulatum*.—The Awl-Shaped Terebellum. Plate lxxiii. fig. 4. Shell cylindrical, thin, and glossy; spire subulate; columella smooth, truncate at the base. One inch long. Inhabits the Indian seas.

5. *Cypræa exanthema*.—The Measly Cypræa. Plate lxxiii. fig. 8. Oblong-ovate, brown, thickly studded with round eye-like white spots; dorsal line grayish; marginal teeth dark brown. Four inches long. Inhabits the West Indies.

6. *Ovula oviformis*.—The Egg-Shaped Ovula. Plate lxxiii. fig. 5. Shell ovate, much inflated, ventricose in the centre, very glossy, extremely white; extremities prominent; mouth orange within. Four inches long. Inhabits the Indian seas.

7. *Volvaria cylindrica*.—The Cylindric Volvaria. Plate lxxiii. fig. 11. Shell cylindrical, white, with one plait on the columella. Half an inch long. Inhabits the British seas.

8. *Marginella cærulesceus*.—The Bluish Marginella. Plate lxxiii. fig. 6. Shell bluish-white; spire short, and acute; lip brownish purple within; columella with four plaits. One inch long. Inhabits the Indian ocean.

9. *Voluta respertilio*.—The Bat Volute. Plate lxxiii. fig. 7. Shell emarginated with acute spines on the volutions; summit slightly obtuse; columella four plaited. Three inches long. Inhabits the Indian seas.

10. *Mitra pontifica*.—The Pontifical Mitra. Plate lxxiii. fig. 9. Turritid, ovate; covered with a yellow-olive epidermis, beneath which are interrupted fillets of orange spots; spire crowned with tubercles. Inhabits the Chinese sea.

11. *Colombella mercatoria*.—The Merchant Colombella. Plate lxxiii. fig. 10. Ovate, white, sulcated, transversely clouded with brown, or yellow-orange; outer lip with internal dentations. One inch long. Inhabits the West Indian seas.

12. *Terrebra vittata*.—The Filleted Terebra. Plate lxxiii. fig. 12. Pale fawn-coloured, smooth; body and volutions transversely striated at the top, and with transverse purplish fillets, occupying nearly its lower half. One inch long. Inhabits the Indian ocean.

13. *Eburna Zeylanica*.—The New Zealand Eburna. Plate lxxiii. fig. 13. Smooth, white, with irregular large purplish spots; apex acute, tipped with lilac; sutures with an elevated line. Two and a half inches long. Inhabits the South seas.

14. *Buccinum undatum*.—The Waved Buccinum. Plate lxxiii. fig. 14. Ovato-conical, ventricose; obliquely sulcated, striated transversely and longitudinally; covered with a yellow-olivaceous epidermis; volutions convex; aperture white or yellow. Four inches long. Inhabits the European seas.

15. *Dolium perdix*.—The Partridge Dolium. Plate lxxiii. fig. 15. Ovate, oblong, thin, reddish brown, clouded and spotted with white; thickly ribbed and convex. Four inches long. Inhabits the Tropical seas.

16. *Harpa rosea*.—The Roseate Harpa. Plate lxxiii. fig. 16. Oblong-ovate, flesh-coloured, with roseate interrupted bands; ribs remote; columella of a fine rosy hue. Two inches long. Inhabits the Indian ocean.

17. *Concholepas Peruvianus*.—The Peruvian Concholepas. Plate lxxiii. fig. 17. Three inches long, and very thick, with an umber-brown back, and white inside. Inhabits the coasts of Peru.

18. *Monoceros cingulatum*.—The Banded Monoceros. Plate lxxiii. fig. 18. Cylindrical; volutions flattened on their upper edges; with transverse spiral brown bands. Inhabits the coast of Malabar.

19. *Purpura Persica*.—The Persian Purpura. Plate lxxiii. fig. 19. Transversely sulcate, and striated between the ridges; dark burnt-umber brown; ridges cream-yellow, with distant spots of very dark umber-brown; upper ridge and the superior edges of the volutions mucronate; inside sulcated and striated. Inhabits the Isle of France.

20. *Recinula horrida*.—The Rugged Recinula. Plate lxxiii. fig. 20. External surface covered with strong, obtuse, black tubercles; the interstices being white and transversely striated; inside of both lips of a rich purple; outer lip with five triangular grooved radii, between which, at their base, the margin is crenulated. One inch and a half long. Inhabits the East Indian seas.

21. *Cassis arebola*.—The Patched Cassis. Plate lxxiii. fig. 21. Smooth, shining, white, with square orange tessellated spots; spire short and conical, with decussated striæ; lower part of columella rugose. Two and a half inches long. Inhabits the Indian ocean.

22. *Cassidaria Thyrena*.—The Thyrean Cassidaria. Plate lxxiii. fig. 22. Ovate, transversely grooved, reddish-fulvous; volutions convex; apex with one tubercle. Three inches and a half long. Inhabits the Mediterranean sea.

23. *Strombus auris Diana*.—Diana's Ear Strombus. Plate lxxiii. fig. 23. Oblong-ovate; spire acute, tuberculated, and transversely striated; base recurved; outer lip thick; anterior lobe with a finger-like termination. Three inches and a quarter long. Inhabits the Indian ocean.

24. *Pterocera chiragra*.—The Knotty Pterocera. Plate lxxiii. fig. 24. Ovate, tuberculated, with six digitated, canaliculated rays, which are closed over in the adult shell; outer lip internally striated. Six inches and a half long, exclusive of the digitated lobes. Inhabits the Indian ocean.

25. *Rostellaria pes pelecani*.—The Pelican's Foot Rostellaria. Plate lxxiii. fig. 25. Turritid, flesh-coloured or white; body and volutions longitudinally ribbed, and crowned with papillæ; base of body papillose. One inch and a half long. Inhabits the European seas.

26. *Triton variegatum*.—The Variegated Triton. Plate lxxiii. fig. 26. Elongated, conical, tubiform; suture of the spire crenulated; pillar tip grooved obliquely; pale purple, elegantly clouded and spotted with brown. Sixteen inches long. Inhabits the Indian and American seas.

27. *Murex spiralis*.—The Spiral Murex. Plate lxxiii. fig. 27. Body roundish; separated from the spire by a narrow ridge; spire depressed; upper volutions rounded, and terminating in an obtuse apex; canal very long and curved; flesh-coloured, substriate, with remote brown irregular spots. Three inches long. Inhabits the Chinese seas.

28. *Ranella spinosa*.—The Prickly Ranella. Plate lxxiv. fig. 1. Ovate, depressed, with acute, short, distinct, mucicated tubercles; fawn-coloured; varices lateral, with elongated spines; beak sulcated; outer lip internally crenated. Two inches and an eighth long. Inhabits the Indian ocean.

29. *Struthiolaria nodulosa*.—The Nodulous Struthiolaria. Plate lxxiv. fig. 2. Ovate, grooved and striated transversely; top of volutions flattened and nodulous; cream-yellow, with undulated brownish-yellow longitudinal lines; lip yellow-orange within. Three inches long. Inhabits New Zealand.

30. *Pyrula ficus*.—The Fig Pyrula. Plate lxxiv. fig. 3. Spire very short; volutions rounded above; yellow-brown, spotted with dark brown; and covered with decussated striæ. Three inches long. Inhabits the Indian ocean.

31. *Fusus corneus*.—The Horny Fusus. Plate lxxiv. fig. 5. Elongated, with eight convex volutions, striated spirally, and covered by an olivaceous epidermis; beak long, oblique. Three inches long. Inhabits the seas of Northern Europe.

32. *Fasciolaria trapezium*.—The Quadrangular Fasciolaria. Plate lxxiv. fig. 6. Ventricose, obtusely angled; volutions nodulous; reddish fawn-coloured, with transverse, double, slightly undulated lines; inside of aperture with reddish striæ. Six inches long. Inhabits the Indian ocean.

33. *Cancellaria reticulata*.—The Reticulated Cancellaria. Plate lxxiv. fig. 4. Oval, strong, ventricose, with distant, coarse, reticulated striæ; sometimes with yellow or orange bands; pillar with three plaits; aperture white. Two inches long. Inhabits the Atlantic ocean.

34. *Turbinella pyrum*.—The Pear-Shaped Turbinella. Plate lxxiv. fig.

8. Pear-shaped; yellowish-white, with irregular reddish-brown spots; spire short, mucronate; apex mammilliform; beak long; columella with four plaits; in adult specimens, the shell is covered with a very thick opaque yellow-brown epidermis. Six inches long. Inhabits the Indian ocean.

35. *Pleurotoma Nodifera*.—The Javanese Pleurotoma. Plate lxxiv. fig. 7. Fusiform, turritid; volutions somewhat angulated, upper ones smooth; under volutions and body transversely striated with angulated oblique nodules at the suture; outer lip deeply crenulated, with a large notch; reddish yellow. One inch and a half long. Inhabits the seas around Java.

36. *Cerithium semigranulosum*.—The Semigranulated Cerithium. Plate lxxiv. fig. 9. Fusiform, turritid; apex acute; transverse minute striæ, and sulcated granulations; the suture with double spiral rows of large granules; colour reddish brown. One inch and a half long. Inhabits the seas of New Holland.

37. *Turritella terebra*.—The Augur Turritella. Plate lxxiv. fig. 11. Greatly turritid, with acute, transverse striæ; yellowish-brown; apex usually reddish. Two inches long. Inhabits the European seas.

38. *Phasianella puellus*.—The Childish Phasianella. Plate lxxiv. fig. 12. Smooth, glossy; volutions inflated; skin coloured with spots of crimson or rich reddish-brown. One quarter of an inch long. Inhabits the coast of Britain.

39. *Planaxis sulcata*.—The Furrowed Planaxis. Plate lxxiv. fig. 16. Imperforate, transversely furrowed; grayish-white, and spotted with black, forming oblique longitudinal fasciæ; outer lip internally crenulated and striated. One inch long. Inhabits the American seas.

40. *Turbo setosus*.—The Bristly Turbo. Plate lxxiv. fig. 17. Thick, transversely and deeply sulcated, and longitudinally striated; spire short; volutions rounded; lip crenulated; variegated with white, green, and brown; inside pearlaceous. Two inches long. Inhabits the Indian seas.

41. *Monodonta coronaria*.—The Thick-lipped Monodonta. Plate lxxiv. fig. 10. Covered with numerous, small, scabrous, acute, tubercles; outer lip very thick; apex blunt, white; the columella reddish. One inch and a quarter long. Inhabits the Chinese seas.

42. *Trochus Zizyphinus*.—The Magician Trochus. Plate lxxiv. fig. 2. With strong transverse striae; colour livid, with undulated streaks of reddish flesh-colour, or brownish carnation. One inch long. Inhabits the European seas.

43. *Rotella restrarius*.—The Kindred Rotella. Plate lxxiv. fig. 18. Pale skin-coloured, or citron-coloured, the upper part of body and spire spotted with dark brown. Half an inch long. Inhabits the Indian ocean.

44. *Solarium perspectivum*.—The Perspective Solarium. Plate lxxiv. fig. 23. Cream-yellow, with brown or chestnut, and white bands on the sutures of the volutions; umbilicus ample, and crenulated. Two and a half inches broad. Inhabits the Indian ocean.

45. *Delphinula laciniata*.—The Fringed Delphinula. Plate lxxiv. fig. 22. Umbilicus large, surrounded by large vaulted scales, in spiral rows; also with strong waved spiral striæ; brownish-red, variegated with white. Two inches long. Inhabits the Indian seas.

46. *Scalaria pretiosa*.—The Weatletrap, or Precious Scalaria. Plate lxxiv. fig. 20. Conical, smooth, cream-yellow, volutions deeply divided;

spire detached, with a deep umbilicus; volutions connected by longitudinal ribs; body extremely ventricose. One inch and a half long. Inhabits the Indian ocean.

47. *Vermetus lumbricalis*.—The Worm-like Vermetus. Plate lxxiv. fig. 24. Variously twisted; reddish-brown, sometimes clouded with darker brown. Two to four inches long. Inhabits the African seas.

48. *Pyramidella terebellum*.—The Wimble Pyramidella. Plate lxxiv. fig. 26. Smooth, glossy, white, with reddish-brown fasciæ; columella recurved; inside of the lip smooth. One inch and one-fourth long. Inhabits the American seas.

49. *Tornatella fasciata*.—The Banded Tornatella. Plate lxxiv. fig. 27. Covered with fine transverse striæ; produced, apex acute; aperture straitened, columella with one plait; purplish-red, with two white transverse fasciæ. Inhabits the coast of Britain.

50. *Haliotis asinina*.—The Assinine Haliotis. Plate lxxiv. fig. 28. Internal margin very broad, inside pearly, smooth, shining, iridescent, reflecting green, pink, and orange; back clouded with brown and green, and striated longitudinally, oblique; spire very short. Two and a half inches long. Inhabits the sea at Molucca.

51. *Stomatia phymotis*.—The Tumoured Stomatia. Plate lxxiv. fig. 29. Ovate-oblong, back convex, striated, nodulous, and white; spire small, conorted; lip thin and acute. Three and a fourth inches long. Inhabits the Indian Ocean.

52. *Stomatella imbricata*.—The Imbricated Stomatella. Plate lxxiv. fig. 30. Suborbicular, convex, somewhat depressed, rough, having thick-set transverse ribs, covered with imbricated scales grayish-brown. One inch and a half long. Inhabits the Indian Ocean.

53. *Sigaretus concavus*.—The Concave Sigaretus. Plate lxxiv. fig. 25. Ovate, back convex, covered with transverse undulated striæ; reddish-yellow, spire white, somewhat prominent; aperture expanded, concave; umbilicus deepish. Inhabits the Indian Ocean.

54. *Ianthina communis*.—The Common Ianthina. Plate lxxiv. fig. 19. Extremely fragile, of a beautiful violet hue; aperture triangular, with a small notch on the margin of the outer lips. One inch long. Inhabits the Atlantic and Mediterranean.

55. *Natica canrena*.—The Canrena Natica. Plate lxxiv. fig. 15. Subglo-bular, smooth; fawn-coloured, with bands and interrupted rays of reddish-brown, and zigzag lines and streaks; base of body and inner lip white, deeply umbilicated; spire a little prominent. One inch and three-fourths long. Inhabits the West Indian Ocean.

56. *Nerita pelcronta*.—The Monstrous Nerita. Plate lxxiv. fig. 13. Thick, transversely sulcated; ash-coloured, or reddish-yellow, with variously coloured bands; inner lip with two crenulations, outer lip with two deep notches near its internal upper edge, and a bloody mark at the base of the inner teeth. One inch long. Inhabits the seas of South America.

57. *Neritoides littoralis*.—The Shore Neritoides. Plate lxxv. fig. 24. Smooth, covered with an olive-green, yellow, brown, or other coloured epidermis, sometimes beautifully banded or chequered beneath it; inside generally purplish-brown; body very large; spire very short and depressed. Five-eighths of an inch long. Inhabits the shores of Northern Europe.

58. *Neritina fluviatilis*.—The Fresh-Water Neritina. Plate lxxiv. fig. 14.



Shell small, oval; back convex, smooth, white, variously speckled with black, or dark brown; spire inclined, lateral; lip slightly denticulate. One third of an inch long. Inhabits the rivers and streams of Europe.

59. *Navicella elliptica*.—The Oval Navicella. Plate lxxv. fig. 1. Smooth, shining, spotted and streaked with purple, blue, or brown; covered with an olivaceous epidermis; spire curved, prominent, extending beyond the margin. One inch long. Inhabits rivers in the Isle of France.

60. *Ampullaria Guyanensis*.—The Guiana Ampullaria. Plate lxxv. fig. 2. Globular, thick, with unequal longitudinal striæ; covered with a fuscous-brown epidermis; inside golden-yellow. Three inches in diameter. Inhabits the rivers of Guiana.

61. *Paludina vivipara*.—The Viviparous Paludina. Plate lxxv. fig. 3. Thin, ovate, ventricose, wrinkled longitudinally; body with three brown bands; covered with an olivaceous epidermis. One inch and a half long. Inhabits the rivers of Europe.

62. *Valvata piscinalis*.—The Pond Valvata. Plate lxxv. fig. 4. Globular, conoid, somewhat trochus-shaped, deeply umbilicated; apex obtuse; longitudinally wrinkled; covered with a greenish-yellow epidermis. One-fourth of an inch long. Inhabits the rivers and lakes of Europe.

63. *Pirena terebralis*.—The Dark Pirena. Plate lxxv. fig. 7. Subulate, longitudinally striated; outer lip expanded; covered with a deep black-brown epidermis; aperture white. Three inches long. Inhabits the rivers of India.

64. *Melanopsis lævigata*.—The Polished Melanopsis. Plate lxxv. fig. 28. Ovate, conical, smooth, of a chestnut-colour. Three-fourths of an inch long. Inhabits the rivers of the Archipelago.

65. *Melania amarula*.—The Crowned Melania. Plate lxxv. fig. 8. Ovate-oblong, thick; longitudinally wrinkled; transversely striated at the base of the body; upper margin of the volutions crowned with triangular tubercles, from which emanate ciliated spines; colour deep chestnut, covered with a black epidermis. One inch and a half long. Inhabits the rivers of India.

66. *Lymnæa stagnalis*.—The Pond Lymnæa. Plate lxxv. fig. 9. Ob-long, body ventricose; spire very acute and subulate; aperture large and ovate; horn-coloured. Two inches long. Inhabits the ditches and ponds of Europe.

67. *Physa fontinalis*.—The Fountain Physa. Plate lxxv. fig. 6. Volutions reversed, oval, diaphanous, glossy, horn-coloured; spire short and acute. Half an inch long. Inhabits the ditches and streams of Europe.

68. *Lutea lacuna*.—The Ditch Lutea. Plate lxxv. fig. 10. Very diaphanous, slightly wrinkled, and of a greenish horn-colour. Half an inch long. Inhabits the ditches in Britain.

69. *Planorbis carinatus*.—The Keeled Planorbis. Plate lxxv. fig. 11. Depressed; upper side concave, with a keel round the middle of the body. Three-fourths of an inch in diameter. Inhabits the ditches and lakes of Europe.

70. *Planaria albo*.—The White Planaria. Plate lxxv. fig. 17. White, slightly wrinkled transversely; outer lip with a narrow margin behind. One fourth of an inch in diameter. Inhabits the coast of Dunbar,—Scotland.

71. *Cyclostoma elegans*.—The Elegant Cyclostoma. Plate lxxv. fig. 12.

Ovate, conical, umbilicated; with fine transverse striæ; volutions very convex; ash-coloured with three bands of brown spots. Half an inch long. Inhabits Europe.

72. *Auricula Judæ*.—Judas Auricula. Plate lxxv. fig. 13. Oblong, conical, cylindrical, thick, with minute decussated striæ and granulations; whitish-brown; columella with three plaits. Two and a fourth inches long. Inhabits the East Indies.

73. *Succinea amphibia*.—The Amphibia Succinea. Plate lxxv. fig. 14. Amber-coloured; excessively thin and pellucid; spire short; aperture expanding. Three-fourths of an inch long. Inhabits the sides of ditches and lakes in Europe.

74. *Achatina Virginia*.—The Virginian Achatina. Plate lxxv. fig. 15. Smooth, grayish-white, with red and black transverse bands; the columella with one plait, rose-coloured; volutions ventricose; inside of the lip bluish. One inch and a half long. Inhabits South America.

75. *Bulimus montanus*.—The Mountain Bulimus. Plate lxxv. fig. 16. Ovate-oblong, umbilicated, slightly striated longitudinally; brownish horn-coloured; with seven convex volutions; aperture semioval; outer lip white and reflected. Five-eighths of an inch long. Inhabits mountainous situations in Europe.

76. *Clausilia papillaris*.—The Pimpled Clausilia. Plate lxxv. fig. 18. Pellucid, finely striated longitudinally, horn-coloured brown; the margins of the volutions papillose; aperture with two plaits. Three-fourths of an inch long. Inhabits dry situations in Europe.

77. *Pupa muscorum*.—The Moss Pupa. Plate lxxv. fig. 21. Very small, cylindrical, obtuse, and smooth, brownish horn-coloured; volutions convex; sutures much sunk; aperture with one tooth; outer lip white and reflected. One-eighth of an inch long. Inhabits moss, generally in shaded places of Europe.

78. *Helicina major*.—The Great Helicina. Plate lxxv. fig. 22. Citron-coloured, inside pink; pillar and outer lip white; the former broadly reflected on the columella.

79. *Anostoma globulosa*.—The Globular Anostoma. Plate lxxv. fig. 25. Suborbicular, absolutely carinated, smooth, and white; aperture with six teeth; reddish-brown.

80. *Carocolla lapicida*.—The Stone Carocolla. Plate lxxv. fig. 26. Depressed above, and convex beneath, broadly umbilicated, and transversely striated; reddish horn-coloured; body carinated. Seven-eighths of an inch in breadth. Inhabits dry situations in Europe.

81. *Helix arbustorum*.—The Grove Helix. Plate lxxv. fig. 27. Subglobular, subumbilicated, finely striated longitudinally; greenish-yellow, beautifully mottled, and streaked with reddish-brown, and a broad brown band running throughout the middle of the volutions. One inch in diameter. Inhabits the groves and woods of Europe.

#### ORDER IV.—GASTEROPODA.

Animals with straight bodies, and never spiral, nor enveloped entirely in a shell; having a foot or muscular disc under the abdomen, and attached to

the body nearly its whole length, and serving for progressive motion.—This order contains thirty-three genera :

1. *Vitrina*; 2. *Testacella*; 3. *Limax*; 4. *Parmacella*; 5. *Ochidium*; 6. *Dolabella*; 7. *Laplysia*; 8. *Bulla*; 9. *Retusa*; 10. *Akera*; 11. *Diaphana*; 12. *Bullæa*; 13. *Acera*; 14. *Ancylus*; 15. *Crepidula*; 16. *Calyptrea*; 17. *Pileopsis*; 18. *Fissurella*; 19. *Sipho*; 20. *Emarginula*; 21. *Parmophorus*; 22. *Umbrella*; 23. *Pleurobranchus*; 24. *Patella*; 25. *Chiton*; 26. *Chitonellus*; 27. *Phyllidia*; 28. *Doris*; 29. *Tethys*; 30. *Seyllæa*; 31. *Tritonia*; 32. *Eolis*; 33. *Glaucus*.—Of which we have figured the following species :

*Vitrina pellucida*.—The Pellucid *Vitrina*. Plate lxxv. fig. 5. Extremely thin, pellucid, and glossy; depressed, with the spire very short; of a pale yellowish-green; aperture large and oval. Fourteen inches long. Inhabits dry places of Europe.

*Testacella Haliotiden*.—The Haliotis-Shaped Testacella. Plate lxxv. fig. 23. Shell oblong-ovate, auriform; left margin slightly reflected; exceedingly thin, transparent, and yellowish. Inhabits the middle provinces of France.

*Limax Rufus*.—The Red *Limax*. Plate lxxv. fig. 29. Shell ovate-oblong both margins reflected; very thin, diaphanous, slightly wrinkled, and of a pale straw-yellow colour. Inhabits gardens in Britain and France.

*Parmacella calycutula*.—The Cup-Shaped *Parmacella*. Plate lxxv. fig. 31. Ovate; left margin broad and reflected, right margin reflected at top and acute beneath; exceedingly thin, transparent, and of a pale yellowish-brown.

*Dolabella Rumphii*.—Rumphius's *Dolabella*. Plate lxxv. fig. 30. Base thick, callous, and subspiral; dilated above, thin, and wedge-shaped. Inhabits the Indian ocean, at the Isle of France.

*Laplysia radiata*.—The Radiated *Laplysia*. Plate lxxvi. fig. 25. Nearly round, left margin somewhat reflected; outer lip acute; yellowish horn-coloured, with brown radiations; and two concentric bands.

*Bulla lignaria*.—The Wood-like *Bulla*. Plate lxxvi. fig. 25. Narrowed towards the top, where it is slightly umbilicated; yellowish-brown, with numerous transverse pale striae. Two inches long. Inhabits the British seas.

*Retusa plicata*.—The Plaited *Retusa*. Plate lxxvi. fig. 27. White, opaque, subcylindrical; spire produced; aperture elongated, straitened at top; two transverse plaits, and several oblique ones, at the base of the columella; outer lip thin, slightly inflected. One-third of an inch long. Inhabits the sea at Dunbar.

*Akera flexilis*.—The Flexible *Akera*. Plate lxxvi. fig. 29. Oval, membranaceous, flexible; horn-coloured, with a convolute truncated channelled spire. Three-fourths of an inch long. Inhabits the British seas.

*Diaphana candida*.—The White *Diaphana*. Plate lxxvi. fig. 30. Pure white, ventricose; aperture whole length of the shell, narrowed at top; spire short; subumbilicated. One-sixth of an inch long. Inhabits the Frith of Forth.

*Bullæa aperta*.—The Open *Bullæa*. Plate lxxvi. fig. 23. Suborbicular, pellucid, white, faintly striated, and slightly wrinkled; almost entirely open. Half an inch long. Inhabits the British seas.

*Ancylus oblonga*.—The Oblong *Ancylus*. Plate lxxvi. fig. 18. Aperture elongated, vertex turned to one side; with fine concentric striae; pale horn-

colour above, inside bluish. One-third of an inch long. Inhabits the fresh waters of Europe.

*Crepidula aculeata*.—The Prickly Crepidula. Plate lxxvi. fig. 16. Oval, brown, with acute rough striæ; vertex recurved; inside with a chamber, and bluish or purple. One inch long. Inhabits the American seas.

*Calyptæa Sinense*.—The Chinese Calyptæa. Plate lxxvi. fig. 19. Orbicular, subconic; vertex ending in a small volution; smooth, margin entire; cream-yellow; very glossy within, and provided with a laminar plate. Three-fourths of an inch in diameter. Inhabits the Chinese seas.

*Pileopsis Ungarica*.—The Hungarian Pileopsis. Plate lxxvi. fig. 31. Conical, vertex slightly spiral; longitudinally striated, and transversely wrinkled; covered with a fawn-coloured pilous epidermis; inside smooth, glossy, white, or rose-colour. Two inches in diameter. Inhabits the seas of Europe.

*Fissurella Græca*.—The Greek Fissurella. Plate lxxvi. fig. 20. Ovate-oblong, convex; the vertex with an ovate perforation; with elevated cancellated striæ, and the sections tuberculated; opening oblong-ovate, white or bluish; outside yellowish-brown, sometimes clouded. Half an inch long. Inhabits the European seas.

*Sipho radiatus*.—The Rayed Sipho. Plate lxxvi. fig. 21. Subconic, vertex slightly recurved; side with a square fissure near the top, from which radiate strong striæ; with several concentric distant striæ; inside white; with a rhombic siphon, corresponding with the fissure, margin slightly crenulated. One-fourth of an inch long. Inhabits the British seas.

*Emarginula fissura*.—The Slit Emarginula. Plate lxxvi. fig. 17. Oval, with reticulated striæ, and ribs radiating from the vertex, which is obtuse and slightly recurved; one margin with a fissure, which extends nearly half way to the vertex; inside glossy, white. Three-eighths of an inch long. Inhabits the British seas.

*Parmophorus Australis*.—The Australian Parmophorus. Plate lxxvi. fig. 22. Shell oblong, depressed; vertex slightly recurved; concentrically striated; the posterior margin rounded, and the anterior truncated. Two inches long. Inhabits the Australian coasts.

*Umbrella Indica*.—The Indian Umbrella. Plate lxxvi. fig. 24. Ovate, slightly convex above; the vertex towards the centre; whitish, summit yellow, longitudinally striated, and concentrically wrinkled; inside with radiating striæ. Four inches in diameter. Inhabits the Indian seas.

*Pleurobranchus plumula*.—The Plumed Pleurobranchus. Plate lxxvi. fig. 14. Ovate-oblong, depressed, pellucid, yellowish-white, concentrically wrinkled, almost entirely open, rounded, and convoluted; the vertex with a single turn. Half an inch long. Inhabits the Devonshire coast.

*Patella vulgata*.—The Common Patella, or Limpet. Plate lxxvi. fig. 15. Oval, conic, or a little depressed; outside green or brown, sometimes radiated with various colours; with divergent striæ, and concentric wrinkles; inside glossy, iridescent, having yellow, or fawn-coloured, and purple, blue, or brown radiations. Two inches long. Inhabits the coasts of Europe.

*Chiton fascicularis*.—The Fasciculated Chiton. Plate lxxvi. fig. 13. Eight imbricated valves, nearly smooth, slightly carinated, and rounded at the margins, with a thick tuft of hair between the junction of the valves, having five on the top of the upper valve, and three on the base of the lower one. Three-fourths of an inch long. Inhabits the British coasts.

*Chitonellus striatus*.—The Striated Chitonellus. Plate lxxvi. fig. 10. Each valve with striæ radiating from its apex; the margins serrated; the base of the last valve obtuse.

## ORDER V.—PTEROPODA.

Animals destitute of any foot for locomotion, and of arms for seizing their prey; provided with two opposite and similar fins fitting them for swimming; body free and floating. This order contains six genera, namely,—1. Pneumodermon; 2. Cymbulia; 3. Limacina; 4. Cleodora; 5. Clio; 6. Hyalæa.—Of which we have given the following representations.

*Cymbulia Peronii*.—Peron's Cymbulia. Plate lxxvi. fig. 6. Somewhat gelatinous, or cartilaginous; very transparent crystalline; oblong, pointed at the vertex, truncated at the base; general shape like a Turkish slipper. Two inches long. Inhabits the Mediterranean.

*Limacina helicalis*.—The Helix-like Limacina. Plate lxxvi. fig. 11. Thin, fragile, spiral; the volutions united in a discoid form. Half an inch in diameter. Inhabits the North seas.

*Cleodora pyramidata*.—The Pyramidal Cleodora. Plate lxxvi. fig. 9. Pyramidal, triangular; of a gelatinous or cartilaginous substance, very thin and transparent; aperture obliquely truncated. Inhabits the American seas.

*Hyalæa tridentata*.—The Three-Toothed Hyalæa. Plate lxxvi. fig. 12. Transparent, horn-coloured, globular; posteriorly tridentate; summit and two posterior sides open; very finely striated transversely. Three-fourths of an inch long. Inhabits the Mediterranean.

## CLASS II.—CONCHIFERA.

Animals soft with articulations, destitute of head or organs of vision, and always fixed within a bivalve shell; having external branchiæ; a simple circulation, and a unilocular heart.

Lamarck divides this class into the two following orders;—I. MONOMYARIA, with one muscle of attachment; shell exhibiting interiorly but one subcentral muscular impression. II. DIMYARIA, having at least two muscles of attachment; the shell exhibiting interiorly, two separate, lateral, muscular impressions.

### ORDER I.—MONOMYARIA.

Contains Thirty-one Genera.

1. Lingula; 2. Terebratula; 3. Orbicula; 4. Crania; 5. Discina; 6. Birostrates; 7. Calcola; 8. Radiolites; 9. Sphæralites; 10. Anomia; 11. Placina; 12. Vulsella; 13. Ostrea; 14. Gryphæa; 15. Podopsis; 16. Spondylus; 17. Plectula; 18. Pecten; 19. Plagiostoma; 20. Lima; 21. Pedum; 22. Molegrina; 23. Avicula; 24. Malleus; 25. Perna; 26. Crenatula; 27. Pinna; 28. Mytilus; 29. Modiola; 30. Hippopus; 31. Tridacna.—Of which we have figured the following species:—

*Lingula anatina*.—The Duck Lingula. Plate lxxvi. fig. 7. Green, shaped like a duck's bill; and having a cylindrical pedicle. Four inches long. Inhabits the Indian ocean.

*Terebratula cranium*.—The Skull Terebratula. Plate lxxvi. fig. 1. Slightly ovate, ventricose; summit of the convex valve produced and blunt; with divergent striæ, and the margins crenulated. Half an inch long. Inhabits the sea at the Zetland Islands.

*Crania personata*.—The Masked Crania. Plate lxxvi. fig. 5. Orbicular; the upper valve gibbous and conical; lower valve flat, with three perforations. Inhabits the Indian ocean.

*Anomia undulata*.—The Waved Anomia. Plate lxxvi. fig. 2. Sub-orbicular, pellucid, with strong, irregular, undulated, longitudinal striæ, and some transverse concentric striæ; outside yellowish dirty green; inside fine green; the ligament perforation large and ovate. Two inches broad. Inhabits the British coasts.

*Placuna placenta*.—The Placenta Placuna. Plate lxxvi. fig. 3. Sub-orbicular, flat, white, and pellucid, with fine longitudinal striæ, slightly decussated. Four inches long. Inhabits the coasts of China.

*Vulsella lingulata*.—The Latchet Vulsella. Plate lxxvi. fig. 4. Elongated, depressed, transversely striated; pale yellowish brown, with longitudinal darker stripes. Four inches long. Inhabits the Indian ocean.

*Ostrea edulis*.—The Edible Oyster. Plate lxxvii. fig. 3. Sub-orbicular, rugged, with undulated, imbricated scales, and transversely striated; one valve flat, and the other convex; outside brownish-green; inside pearly-white; exceedingly variable in size. Inhabits the coasts of Europe.

*Gryphæa angulata*.—The Angulated Gryphæa. Plate lxxvii. fig. 1. Oblong-ovate, with three longitudinal, carinated ribs below; beak large, somewhat oblique. Four inches long. Habitation unknown.

*Spondylus longispina*.—The Long-Spined Spondylus. Plate lxxvii. fig. 2. Longitudinally sulcated and ribbed, thickly spined; of a reddish colour; alternate spines, arcuated and tongue-shaped; umbones orange. Four inches long. Inhabits the Indian ocean.

*Plicatula ramosa*.—The Branched Plicatula. Plate lxxvii. fig. 4. Oblong, trigonal, very thick; with strong longitudinal plaits; brown, or yellowish-brown, with rust-coloured, arrow-shaped markings; inside white. One inch and a half long. Inhabits the American seas.

*Pecten varia*.—The Speckled Pecten. Plate lxxvii. fig. 5. Ears very unequal; with about twelve ribs, covered with transverse, prickly scales, variously clouded and speckled with a variety of colours. Two inches and a quarter long. Inhabits the European seas.

*Plagiostoma spinosum*.—The Thorny Plagiostoma. Plate lxxvii. fig. 6. Sub-arcuated, with the umbo of one shell higher than that of the other, with longitudinal ribs, and remote concentric rings. Fossil. Britain.

*Lima vitrina*.—The Glassy Lima. Plate lxxvii. fig. 7. Ovate-oblong; extremely pellucid, and pure snowy-white, with longitudinal distinct striæ. One half inch long. Inhabits the British seas.

*Pedum Spondyloideum*.—The Spondylus-Shaped Pedum. Plate lxxvii. fig. 9. Ovate, wedge-shaped, flat; the superior valve with longitudinal striæ, white, rough, and granulated, slightly tinged with purple near the beak. Two inches and a half long. Inhabits the Indian ocean.

*Meleagrina Margaritifera*.—The Pearl-Bearing Meleagrina. Plate

lxxvii. fig. 10. Somewhat square, compressed; undulated, and transversely striated; and with a series of lamellated longitudinal scales; greenish on the outside and pearly within. Ten or twelve inches long. Inhabits the Indian ocean.

*Aricula Anglica*.—The English Avicula. Plate lxxvii. fig. 11. Wing moderate, obliquely curved; yellowish fawn-coloured, with dark reddish-brown blotches; inside pearly. One inch and a fourth long. Inhabits the Devonshire coast.

*Malleus alba*.—The White Malleus. Plate lxxvii. fig. 12. Trilobate; oase of the lateral lobe prolonged, without a sinus, the base and the pit for the ligament not distinct; white, with transverse undulations. Four inches long. Inhabits the Australian seas.

*Perna Ephippium*.—The Saddle Perna. Plate lxxvii. fig. 13. Compressed, suborbicular; left valve produced, the margins acute; purplish-brown on the outside, and pearly within. Four inches long. Inhabits the Indian seas.

*Crenatula Mytiloides*.—The Muscle-Shaped Crenatula. Plate lxxvii. fig. 14. Oblong-ovate, oblique; the base acute; violet coloured, with obscure radiations. Inhabits the Red sea.

*Pinna Ingens*.—The Huge Pinna. Plate lxxvii. fig. 15. Nearly triangular, horn-coloured, smooth, with distant foliations; striated on one side, with rough scaly wrinkles on the broader end. Twelve inches long. Inhabits the coast of Britain.

*Mytilus edulis*.—The Edible Mussel. Plate lxxvii. fig. 16. Oblong-oval, nearly smooth, pointed and slightly carinated at the beak, truncated on one side, and dilated on the other; covered with an olivaceous epidermis; beneath which it is radiated with blue or purple; internal margin blue, the concave part white. Two to three inches long. Inhabits the British seas.

*Modiola discors*.—The Discordant Modiola. Plate lxxvii. fig. 17. Oblong-oval, very convex, produced and narrower at the anterior end; longitudinally striated on both sides, and transversely in the middle; outside green; inside white or pale pink; margin crenulated at the base; the beak oblique. One half inch long. Inhabits the British seas.

*Hippopus Maculatus*.—The Spotted Hippopus. Plate lxxvii. fig. 18. Transversely ovate, ventricose, with scaly ribs, and reddish purple spots; lunule cordated, heart shaped, and oblique; the margins very deeply crenulated. Eight inches broad. Inhabits the Indian seas.

*Tridacna gigas*.—The Giant Tridacna. Plate lxxvii. fig. 21. Large, white, transversely ovate; with broad ribs, provided with vaulted scales; the posterior slope heart-shaped and gaping. Two feet six inches long, and four feet six inches broad, the largest of all known shells; sometimes weighing above five hundred pounds. Inhabits the Indian ocean.

## ORDER II.—DIMYAIRA.

Contains Seventy-one Genera.

1. Etheria; 2. Chama; 3. Dicerus; 4. Iridium; 5. Anadonta; 6. Hyria; 7. Unio; 8. Castalia; 9. Trigonis; 10. Nucula; 11. Pectuncula; 12. Arca;

13. Cucullæa; 14. Isocardia; 15. Hiattella; 16. Cypricardia; 17. Cardita; 18. Cardium; 19. Venericardia; 20. Ostygia; 22. Venus; 23. Cytherea; 24. Exolita; 25. Cyprina; 26. Lasæa; 27. Galathea; 28. Cyrena; 29. Cyclas; 30. Crassina; 31. Capsa; 32. Donax; 33. Lucina; 34. Mysia; 35. Corbis; 36. Arcopagia; 37. Tellinides; 38. Tellinæ; 39. Psammotæa; 40. Psammobia; 41. Tellimya; 42. Sanguinolaria; 43. Venerupis; 44. Petricola; 45. Saxicava; 46. Pandora; 47. Corbula; 48. Amphidesma; 49. Solemya; 50. Ungulina; 51. Erycina; 52. Crassatella; 53. Mactra; 54. Lutraria; 55. Anatina; 56. Mya; 57. Ligna; 58. Gallioma; 59. Magdala; 60. Spinea; 61. Glycimeris; 62. Panopea; 63. Solen; 64. Gastrochoena; 65. Pholas; 66. Tereido; 67. Teredina; 68. Septaria; 69. Fistulana; 70. Clavagella; 71. Aspergillum. Of which we have represented the following species:—

*Etheria elliptica*.—The Oval Etheria. Plate lxxvii. fig. 19. Oval, flattened, dilated towards the umbones; the apices remote. Inhabits the Indian ocean.

*Chama Lazarus*.—Lazarus's Chama. Plate lxxvii. fig. 20. With imbricated, dilated, waved foliations, and obsolete striated; of a white, orange, red, or yellow colour; white within. Two inches in diameter. Inhabits the American seas.

*Disceras arietina*.—The Ram-Horned Disceras. Plate lxxviii. fig. 7. Somewhat heart-shaped, with divergent beaks. Fossil.

*Iridina Nilotica*.—The Nile Iridina. Plate lxxvii. fig. 22. Shell transversely, oblong; dark olivaceous green on the outside, somewhat wrinkled, concentrically; inside, fine pearly, with iridescent reflections. Five inches long. Inhabits the Nile.

*Anadonta Cygnea*.—The Swan Anadonta. Plate lxxviii. fig. 1. Ovate, thin, convex, somewhat compressed on the anterior side; with concentric wrinkles; covered with a green epidermis, frequently brown towards the umbo; inside pearly white; beak small and ventricose. Three inches long and seven broad. Inhabits fresh water lakes in Europe.

*Hyria avicularis*.—The Little-Bird Hyria. Plate lxxviii. fig. 2. Umbones smooth and produced; ears large, with pointed terminations; a greenish-brown epidermis, and finely striated; inside pearly, and of a fine reddish golden-yellow. Three inches broad. Inhabits the rivers of America.

*Unio pictorum*.—The Painter's Unio. Plate lxxviii. fig. 3. Oblong-ovate, strong, anterior side rhomboid and attenuated; the opposite side obtusely acute; the umbones, somewhat warted; with a dusky-green epidermis, and concentrically wrinkled. Nearly three inches broad. Inhabits the rivers of Europe.

*Castalia ambigua*.—The Ambiguous Castalia. Plate lxxviii. fig. 4. Ovate, oblique, the umbones truncated; longitudinally ribbed, with distant transverse striæ; epidermis pale chestnut-brown; inside pearly.

*Trigonia pectinata*.—The Toothed Trigonia. Plate lxxviii. fig. 5. Sub-orbicular, with radiated or divergent, prominent, and somewhat scaly ribs; inside pearly; margin crenulated. One inch and three fourths broad. Inhabits Australian seas.

*Nucula margaritacea*.—The Pearly Nucula. Plate lxxxvii. fig. 6. Obliquely ovate, trigonal striæ, and almost obsolete minute; covered with a greenish epidermis; inside silvery-pearlaceous; margin crenulated; and having regularly pectinated teeth. One half inch long. Inhabits the British seas.



*Pectunculus glycimeris*.—The Delicious Pectunculus. Plate lxxviii. fig. 8. Suborbicular, umbones produced; finely striated, transversely and longitudinally; covered with a villous skin, under which, it is marked with reddish chestnut spots or bands; inside white, and the margin crenulated. From two to three inches long. Inhabits the British and Mediterranean seas.

*Arca Noæ*.—Noah's Ark. Plate lxxviii. fig. 9. Oblong, striated transversely, and longitudinally ribbed; umbones remote, and incurved; margin entire and gaping; cream-white with divergent and zigzag chestnut stripes; inside white. Two inches broad. Inhabits the American and British seas.

*Cucullæa auriculifera*.—The Eared Cucullæa. Plate lxxviii. fig. 10. Obliquely heart-shaped, ventricose, with decussated striæ; reddish-brown; hinge with two parallel ribs at each end; white within and slightly tinged with violet. Two and a half inches broad. Inhabits the Indian ocean.

*Isocardi Cor*.—The Heart Isocardia. Plate lxxviii. fig. 11. Globular, and heart-shaped, slightly wrinkled longitudinally; reddish chestnut, the umbones paler and prominent; inside white. Four inches long. Inhabits the Mediterranean and British seas.

*Hiatella arctica*.—The Arctic Hiatella. Plate lxxviii. 12. Transversely oblong; the apices truncated, with two divergent spiny ridges; yellowish-white with decussated striæ; inside pearlaceous. One half inch long, and one inch broad. Inhabits the British seas.

*Cypricardia Guineaica*.—The Guinea Cypricardia. Plate lxxviii. fig. 13. Transversely oblong, oblique and angulated, white, and covered with decussated striæ; compressed before and the apex rounded; yellowish-white. Two inches long. Inhabits the coast of Guinea.

*Cardita sulcata*.—The Furrowed Cardita. Plate lxxviii. fig. 15. Subcordate, white, tessellated with brown; having longitudinal, convex transversely striated ribs; posterior depression heart-shaped. One inch long. Inhabits the Mediterranean.

*Cardium edule*.—The Edible Cardium. Plate lxxviii. fig. 14. With about twenty-six depressed ribs, and transverse obsolete scales; outside yellowish white, and inside white; beaks protuberant. One to one and a half inches long. Inhabits the European seas.

*Venericardia imbricata*.—The Imbricated Venericardia. Plate lxxviii. fig. 17. Suborbicular, having convex longitudinal ribs, covered with imbricated, rough scales. One and a half inch long. Fossil at Grignon.

*Ortygia gallina*.—The Hen Ortygia. Plate lxxviii. fig. 19. Somewhat heart-shaped with obtuse recurved concentric striæ, and three or four radiated bands proceeding from the umbo to the margin, frequently with zigzag markings throughout; inside white. One inch long. Inhabits the British seas.

*Venus Casina*.—The Monticassina Venus. Plate lxxviii. fig. 18. Suborbicular, with transversely, acute recurved ridges, crenulated on the hind margin; slightly channelled behind the depression. Two inches long. Inhabits the British seas.

*Cytherea Chione*.—The Chione Cytherea. Plate lxxviii. fig. 21. Somewhat heart-shaped, strong; covered with a chestnut glossy epidermis, faintly wrinkled, transversely, longitudinally rayed; with a cordiform depres-

pression under the beak. Two and a half inches long. Inhabits the British and Mediterranean seas.

*Cyprina Islandica*.—The Islandic Cyprina.—Plate lxxviii. fig. 22. Suborbicular, convex, strong, irregularly striated; covered with a deep black-brown epidermis; white within. Three and three-fourth inches long. Inhabits the Atlantic ocean and British seas.

*Exoleta Orbiculata*.—The Orbicular Exoleta. Plate lxxviii. fig. 23. Orbicular, strong, with regular coarse, close set transverse striæ; generally white, or pale brown, with sometimes three or four brown radiations emanating from the umbo, and terminating in the margin; inside white. Two inches long. Inhabits the European seas.

*Lasæa rubra*.—The Red Lasæa. Plate lxxviii. fig. 16. Convex, smooth, glossy, pellucid, reddish-pink. Fourth of an inch long. Inhabits the British seas.

*Galathea radiata*.—The Rayed Galathea. Plate lxxviii. fig. 20. Somewhat trigonal, gibbous towards the base; covered with a yellowish-green thin epidermis, beneath which it is radiated with pale chestnut. Three and a half inches long. Inhabits the rivers of Ceylon.

*Cyrena fluminea*.—The River Cyrena. Plate lxxix. fig. 1. Heart-shaped, gibbous, greenish-brown; transversely sulcated; variegated with white and violet in the inside. One inch long. Inhabits the rivers of China.

*Cyclas cornea*.—The Horny Cyclas. Plate lxxix. fig. 2. Suborbicular, convex, thin, pellucid, with fine concentric striæ; covered with a horn-coloured epidermis; bluish-white within. Three-fourths of an inch long. Inhabits rivers of Europe.

*Crassina Scotica*.—The Scottish Crassina. Plate lxxix. fig. 3. Somewhat heart-shaped, a little compressed, with regular parallel grooves and ribs; impressions under the beak lanceolate; covered with a yellow-brown epidermis; inside pure white; margin broad and plain. One inch long. Inhabits the Scottish and Devonshire coasts.

*Capsa lævigata*.—The Polished Capsa. Plate lxxix. fig. 4. Triangular, sub-equilateral, obsolete striated transversely; covered with a greenish-yellow epidermis; inside violet towards the umbones. Two inches long. Inhabits the Indian ocean.

*Donax trunculus*.—The Truncated Donax. Plate lxxix. fig. 5. Oblong, glossy, finely striated and radiated longitudinally; transversely banded with purple; white and clouded with purple within; margin crenulated. One inch and a quarter broad. Inhabits the seas of Europe.

*Lucina undata*.—The Waved Lucina. Plate lxxix. fig. 7. Orbicular, thin, convex, undulated, with fine irregular striæ; pale straw-coloured yellow, and white in the inside; margin glossy and plain.

*Mysia rotundata*.—The Rounded Mysia. Plate lxxix. fig. 6. Orbicular, somewhat convex, thin, sub-pellucid, and obscurely striated; umbones small and oblique. Three quarters of an inch long. Inhabits the British seas.

*Corbis fimbriata*.—The Fringed Corbis. Plate lxxix. fig. 8. Very thick, white, transversely oval, gibbous, longitudinally striated, with transverse, undulated furrows; the margins crenulated; with depressions somewhat lanceolate. Two inches and a half broad. Inhabits the Indian ocean.

*Arcopagia crassa*.—The Thick Arcopagia. Plate lxxix. fig. 9. Suborbicular, strong, thick; upper valve flat; with coarse, thick-set, transverse

striæ; pale yellow, radiated longitudinally; inside white, with a large patch of yellow or pink; muscular impressions very deep. One inch and a half long. Inhabits the British seas.

*Tellinides rosea*.—The Roseate Tellinides. Plate lxxix. fig. 10. Ovate, oblique, polished, thin, and of a beautiful rosy hue; slightly wrinkled transversely. One-half inch broad. Inhabits the Bay of Naples.

*Tellina depressa*.—The Depressed Tellina. Plate lxxix. fig. 11. Oval, flat, pointed at the smaller end, and slightly reflected; pale yellowish, faintly striated concentrically; covered with a pale brown transparent epidermis. One inch and three quarters broad. Inhabits the Mediterranean sea.

*Psammotæa violacea*.—The Variegated Psammotæa. Plate lxxix. fig. 13. Transversely ovate-oblong, sub-ventricose; radiated with purple; transversely striated. Two inches broad. Inhabits the Australian seas.

*Psammobia Ferroensis*.—The Feroe Psammobia. Plate lxxix. fig. 12. Oblong-oval; white, radiated with crimson; finely striated transversely; valves obliquely truncate. One inch and a half broad. Inhabits the European seas.

*Tellimya tenuis*.—The Thin Tellimya. Plate lxxix. fig. 14. Nearly orbicular, white, thin, ventricose, and shining; one valve, with two teeth locking into a triangular void in the opposite one, with transverse lamina on each side. One-third of an inch long. Inhabits the British seas.

*Sanguinolaria rosea*.—The Roseate Sanguinolaria. Plate lxxix. fig. 15. Semi-orbicular, smooth, shining, and convex; of a beautiful rose-colour towards the umbones, which becomes gradually paler as it descends; with acute transverse striæ. One inch and a half broad. Inhabits the sea at Jamaica.

*Venerupis perforans*.—The Perforating Venerupis. Plate lxxix. fig. 16. Sub-rhombic, transversely striated, wrinkled on the anterior side; brown, with a white inside, sometimes with a tinge of purple. Three quarters of an inch broad. Inhabits the British seas.

*Petricola pholadiformis*.—The Pholas-Shaped Petricola. Plate lxxix. fig. 17. Transversely elongated; umbones very small; with transverse, rough, prickly striæ; posterior side extremely short. Three inches long. Inhabits the Australian seas.

*Saxicava præcisa*.—The Abbreviated Saxicava. Plate lxxix. fig. 18. Oblong, wrinkled, one valve larger than the other, truncated at the posterior end; of a pale horn colour. Three quarters of an inch broad. Inhabits the British seas.

*Pandora rostrata*.—The Beaked Pandora. Plate lxxix. fig. 19. White, oblong, much produced towards the beak; one valve nearly flat, the other convex; rounded at the anterior end. One inch broad. Inhabits the Mediterranean and British seas.

*Corbula nucleus*.—The Kernel Corbula. Plate lxxix. fig. 20. Somewhat triangular, strong, with the under valve much larger than the upper one; transversely striated; covered with a thick, brown epidermis. Half an inch long. Inhabits the British seas.

*Amphidesma reticulata*.—The Reticulated Amphidesma. Plate lxxix. fig. 24. Sub-orbicular, sub-diaphanous, compressed, finely reticulated; yellowish-white. One inch and a quarter long. Inhabits the West Indian seas.

*Solemya Mediterranea*.—The Mediterranean Solemya. Plate lxxix. fig.

23. Transversely oblong; blackish-brown; longitudinally ribbed, with imbricated, projecting foliations; inside white. Inhabits the Mediterranean sea.

*Ungulina transversa*.—The Transverse Ungulina. Plate lxxix. fig. 22. Transversely round; rugose, of a yellowish-brown colour.

*Erycina striata*.—The Striated Erycina. Plate lxxix. fig. 21. Yellowish-green, with strong transverse striæ. One inch long. Inhabits the Indian ocean.

*Crassatella Kingicola*.—The King's Island Crassatella. Plate lxxx. fig. 1. Ovate, orbicular; yellowish-white; with obsolete rays; very minutely striated transversely; the umbones somewhat plicated. Two inches long. Inhabits the sea at King's Island, New Holland.

*Ligula prætenuis*.—The Very Thin Ligula. Plate lxxx. fig. 2. Oval, flat, thin, brittle; a little gaping; valves with a single, spoon-like tooth in each, projecting horizontally inwards; white, with a few concentric striæ. One inch broad. Inhabits the British seas.

*Maetra truncata*.—The Truncated Maetra. Plate lxxx. fig. 3. Strong, opaque, white; truncated on both sides; with a few concentric wrinkles. One inch and a half long. Inhabits the British coasts.

*Lutraria elliptica*.—The Oval Lutraria. Plate lxxx. fig. 4. Oblong-oval, nearly smooth, having a few concentric, nearly obsolete wrinkles; and some diagonal striæ at the ends of the valves; of a fine yellow, or greenish-brown; inside white. Five inches broad. Inhabits the seas of Europe.

*Anatina declivis*.—The Sloping Anatina. Plate lxxx. fig. 5. Oval, thin, brittle, a little gaping near the end, where it is truncated, slightly wrinkled concentrically; yellow sand-colour. Two inches broad. Inhabits the British seas.

*Mya truncata*.—The Truncated Mya. Plate lxxx. fig. 6. Suboval, truncated, and gaping greatly at the smaller end; much rounded at the other; covered with a yellowish-brown epidermis; wrinkled transversely; inside white. Three inches broad. Inhabits the British coasts.

*Glycimeris siliqua*.—The Pod Glycimeris. Plate lxxx. fig. 7. Transversely oblong; covered with a black epidermis; umbones decorticated; internal disc of the valves white, callous, and thick. Two inches and a half broad. Inhabits the North seas.

*Galeomma Turtoni*.—Turton's Galeomma. Plate lxxvii. fig. 8. Tumid in the middle, and gradually sloping to the sides; dull milk-white, covered with short interrupted opaque lines; beaks prominent and central. Breadth nearly half an inch. Inhabits the English Channel.

*Magdala striata*.—The Striated Magdala. Plate lxxx. fig. 12. Ovate-oblong, white, with longitudinal striæ and concentric wrinkles; inside pearl-aceous. One inch broad. Inhabits the British seas.

*Crenella elliptica*.—The Oval Crenella. Plate lxxx. fig. 13. Ovate, ventricose; with decussated striæ; greenish-yellow, and the margins crenulated. One-eighth of an inch long. Inhabits the coasts of Zetland and Argyll.

*Spenia Binghami*.—Bingham's Spenia. Plate lxxx. fig. 14. Upper valve flat, much smaller than the under, which is convex, and incurved at the extremity, and envelopes the smaller valve; covered with a reddish-brown epidermis; inside bluish-white. Half an inch broad. Inhabits the Devonshire coast.

*Panopea Aldrovandi*.—Aldrovandus's Panopea. Plate lxxx. fig. 8 and 9. Transversely elongated, nodulated; concentrically wrinkled; of a yellow fawn-colour. Inhabits the Mediterranean.

*Solen ensis*.—The Sabre Solen. Plate lxxx. fig. 11. Linear, sabre-shaped, somewhat reflected at the end next the hinge; in each valve a single compressed tooth without laminae; olive-brown towards the base of the shell, and next the apex brownish-purple. From five to seven inches broad. Inhabits the seas of Europe.

*Gastrochæna modiolina*.—The Modiolaform Gastrochæna. Plate lxxx. fig. 16. Oval, thin, brittle, gaping at the side; of a light reddish-brown; inside bluish-white. Three-fourths of an inch long. Inhabits the British coasts.

*Pholus crispatus*.—The Curled Pholas. Plate lxxx. fig. 17. Somewhat oval; reticulated on the anterior half, and separated from the plain wrinkled half by a broad furrow down the middle. Two inches long and three broad. Inhabits the British coasts.

*Teredo navalis*.—The Ship Teredo, or Ship Worm. Plate lxxx. figs. 18 to 22. Cylindrical, taper, smooth, white, somewhat flexuous, finely striated longitudinally. Inhabits the European seas, in timber.

*Teredina personata*.—The Masqued Teredina. Plate lxxx. fig. 22. Shell consisting of a straight tube, like the stump of a tree, with a club-shaped termination, the club consisting of several similar shaped lobes. Fossil from Courtagnon.

*Septaria arenaria*.—The Sand Septaria. Plate lxxx. fig. 23. Tubular, tapering, terminating in a slender undivided tube. Found in sand on the shores of the Indian sea.

*Fistulana gregata*.—The Gregarious Fictulana. Plate lxxx. figs. 24 to 26. Sheath doubly club-shaped, congregating; the shells angularly arcuated, with double, angulated, serrated wings. Minute.

*Clavagella aperta*.—The Open Clavagella. Plate lxxx. fig. 27 and 28. An erect tube, adhering to another body; with a funnel-shaped, expanding, entire, and waved aperture; provided with an ovate face-valve.

*Aspergillum Javanum*.—The Java Aspergillum. Plate lxxx. fig. 29. Smooth, club-shaped, the apex surrounded by fimbriated rays. Five inches long. Inhabits the sea at Java.

### CLASS III.—CIRRIPEDA.

The animals are soft, destitute of head or eyes, covered with a shell, which is fixed to other substances, and incapable of locomotion. The body is inarticulated, provided with a mantle, having tautacular, cirrous, or many-pointed arms or feelers above.

The class Cirripeda is divided by Lamarek into two orders.—I. PEDUNCULATA. The body supported by a tubular moveable peduncle, the base of which is attached to extraneous substances in the ocean, such as stones, wood, &c.; the mouth is usually placed below.—II. SESSILIA. The body without a peduncle, and attached upon extraneous substances; the mouth usually at the top.

## ORDER I.—PEDUNCULATA,

Consists of five genera:—1. *Otione*; 2. *Cineras*; 3. *Pollicipes*; 4. *Scalpellum*; 5. *Anatifa*.—Of which we have represented the following.

*Otione Blainvillii*.—Blainville's *Otione*. Plate lxxxix. fig. 1. Ash-coloured, the body and horns spotted with black. Inhabits the North seas.

*Cineras auratus*.—The Eared *Cineras*. Plate lxxxix. fig. 2. Greenish ash-colour, clouded and streaked with black; wrinkled towards the base. Inhabits the coasts of England.

*Pollicipes cornucopia*.—The *Cornucopia Pollicipes*. Plate lxxxix. fig. 3. Peduncle covered with imbricated scales, the base of the scales towards the bottom of the peduncle rounded, and pointing upwards. Inhabits the European seas.

*Scalpellum vulgare*.—The Common *Scalpellum*. Plate lxxxix. fig. 4. Valves rough, the dorsal one compressed; covered with short hairs; peduncles short, annulated, and hairy. Inhabits the British seas.

*Anatifa levis*.—The Smooth *Anatifa*. Plate lxxxix. fig. 5. With five smooth valves; the dorsal valve rounded at the sides, and slightly carinated; peduncle very long, of a scarlet colour. Inhabits the British seas.

## ORDER II.—SESSILIA,

Contains six genera:—1. *Pyrgoma*; 2. *Creusia*; 3. *Acasta*; 4. *Balanus*; 5. *Coronula*; 6. *Tubicinella*.

*Pyrgoma crenata*.—The Crenated *Pyrgoma*. Plate lxxxix. fig. 6. With radiated ribs, and crenated round the margin; of a pale violet colour.

*Creusia verruca*.—The Warty *Creusia*. Plate lxxxix. fig. 7. White; slightly depressed, with interwoven obliquely striated valves; the margin at the base irregularly serrated. One-fourth of an inch broad. Inhabits the British seas.

*Acasta Montagu*.—Montagu's *Acasta*. Plate lxxxix. fig. 8. Valves erect, triangular, acute, with mucronated ascending spines. Inhabits the British seas.

*Balanus candidus*.—The White *Balanus*. Plate lxxxix. fig. 10 and 11. White; valves nearly smooth; operculum strongly ridged transversely with longitudinal, nearly obsolete striae. Two inches broad at the base. Inhabits the Frith of Forth.

*Coronula diadema*.—The Crown *Coronula*. Plate lxxxix. fig. 12. Somewhat compressed, with six prominent longitudinally ribbed valves; alternating with as many depressed transversely striated ones. Found attached to the skin of whales in the North seas.

*Tubicinella Balænarum*.—The Whale *Tubicinella*. Plate lxxxix. fig. 13. Tubular, with transverse ribs, and a ring-shaped margin; operculum bottle-shaped. Found adhering to the skin of whales in the South American seas.

## DIVISION III.—ARTICULATA.

## CLASS V.—ANNELIDES.

The bodies are soft, usually elongated, naked, or inclosed into a tube, and divided into many segments; with red blood.

Lamarek divides this class into three orders.

ORDER I.—SEDENTARIÆ,

Which contains the following genera :—1. Magilus ; 2. Galeolaria ; 3. Vermilia ; 4. Serpula ; 5. Spirorbis ; 6. Amphitrite ; 7. Terebella ; 8. Sabellaria ; 9. Pectinaria ; 10. Dentalium ; 11. Clymene ; 12. Siliquaria ; 13. Arenicola.—Of which we have figured the following,

*Magilus antiquus*.—The Antiquated Magilus. Plate lxxxix. fig. 17. Tubular, distorted, transversely wrinkled ; of a pale yellowish-brown. Inhabits the sea at the Isle of France.

*Galeolaria recumbens*.—The Recumbent Galeolaria. Plate lxxxix. fig. 16. White, and existing in reclining congregated masses.

*Vermilia triquetra*.—The Triangular Vermilia. Plate lxxxix. fig. 18. White or reddish, rugged, variously twisted, and triangular ; carinated along the back. Inhabits the coasts of Britain.

*Serpula vermicularis*.—The Vermicular Serpula. Plate lxxxix. fig. 14. White, cylindrical, tapering, rugged, variously curved and twisted. Inhabits the coasts of Britain.

*Spirorbis Nautiloides*.—The Nautilus-Shaped Spirorbis. Plate lxxxix. fig. 15. White, nautilus-shaped, transversely wrinkled. One-eighth of an inch in diameter. Inhabits the British coasts, on Algae, &c.

*Amphitrite ventilabrum*.—The Fan Amphitrite. Plate lxxxix. fig. 19. Tube tapering, incurved, and smooth ; of a cream-yellow colour. Inhabits the Mediterranean sea.

*Terebella conchilega*.—The Shelly Terebella. Plate lxxxix. fig. 21. Tube covered with numerous fragments of broken shells agglutinated together ; with three branchiæ on each side. Inhabits the coasts of Holland.

*Sabellaria crassissima*.—The Thickest Sabellaria. Plate lxxxix. fig. 22. Tubes long, thick, somewhat parallel, and contiguous ; the openings nearly obsolete.

*Pectinaria Belgica*.—The Belgic Pectinaria. Plate lxxxix. fig. 23. Tube inversely conical, membranaceous and covered with particles of sand. Inhabits the European seas.

*Dentalium entalis*.—The Tooth Dentalium. Plate lxxxix. fig. 26. White or yellowish, slightly curved, smooth and tapering to a fine point. One and a half inch long. Inhabits the British seas.

*Dentalium elephantinum*.—The Elephantine Dentalium. Plate lxxxix. fig. 27. Green, slightly bent, with ten longitudinal ribs. Three to four inches long. Inhabits the Indian and European seas.

*Brochus trachiformis*.—The Trachiform Brochus. Plate lxxxix. fig. 25. Brown, regularly furrowed transversely. Fourth of an inch long. Inhabits the British seas.

*Siliquaria Anguina*.—The Snake-like Siliquaria. Plate lxxxix. fig. 24. Shell taper, undulating, with a longitudinal fissure ; spiral at the extremity. Inhabits the Indian seas.

ORDER II.—ANTENNATÆ.

The head is antenniform, and provided with eyes ; and having a projectile proboscis frequently furnished with jaws ; and setaceous papillæ, which are pediform and retractile ; the branchiæ are longitudinally disposed. This

Order contains seventeen genera ; of which we have given representations of the following :

*Leodice Sanguinea*.—The Bloody Leodice. Plate lxxxii. fig. 1. With pectinated branchiæ ; most lengthened towards the centre of the body ; tail with a double cetaceous termination. Inhabits the Indian ocean.

*Spio quadricornis*.—The Four Horned Spio.—Plate lxxxii. fig. 7. With four tentacula, the external ones filiform, and the intermediate thick and short. Inhabits the British coasts.

*Halithea aculeata*.—The Spined Halithea. Plate lxxxii. fig. 2. Oblong, with shining spines and hairs ; dorsal scales dotted with brown. Inhabits the British coasts.

#### ORDER III.—APODES.

Without feet ; branchiæ, when they exist, disposed interiorly along the body. It consists of ten Genera.

*Pontobdella spinulosa*.—The Spined Pontobdella. Plate lxxxii. fig. 3. Body with remote spines, and annulated. Inhabits the British seas, adhering to the skate.

### CLASS VI.—CRUSTACEA.

Animals without vertebral column, having generally a crustaceous covering, more or less solid ; the members of the body articulated, provided with distinct organs of circulation, and respiring by means of branchiæ.—For the Physiology of Crustaceous animals, see vol. iv. page 2. This class consists of nine orders.

#### ORDER I.—DECAPODA.

With the branchiæ of a pyramidal shape in the form of leaflets, situated near the last four feet-jaws, and of the feet, concealed under the sides of the shell ; head not distinct from the trunk of the body. This order contains seventy-six genera, of which we have given representations of the following.

*Pinnotheres pisum*.—The Fishing Pinnotheres or Pea Crab. Plate lxxxii. fig. 4. Described, vol. iv. page 11.

*Gonoplax bispinosa*.—The Two-Spined Gonoplax. Plate lxxxii. fig. 5. Shell armed with two spines on each side ; wrists, and arms above with one internal spine. Inhabits the coast of England.

*Pilumnus hirtellus*.—The Hairy Pilumnus. Plate lxxxii. fig. 6. Shell with five teeth on each side ; body and legs thickly furnished with bristles ; claws mucronated on the outside. Inhabits the Devonshire coast.

*Cancer pagurus*.—The Pagurus or Common Crab. Plate lxxxii. fig. 8. Described, vol. iv. page 12.

*Pirimela denticulata*.—The Toothed Pirimela. Plate lxxxii. fig. 9. Shell tubercular, each of the anterior sides provided with five teeth ; three teeth in front, the centre ones largest. Inhabits the British coasts.

*Portunus corrugatus*.—The Wrinkled Portunus. Plate lxxxii. fig. 10. Wrinkled and granulated transversely, with five teeth before on each side ; first and second joints of the claws with a spine on each ; forceps serrated ;



hind legs with an ovate pointed termination. Inhabits the European seas.

*Portunus variegatus*.—The Variegated Portunus. Plate lxxxii. fig. 11. With obscure granulations and five teeth on either side, the second and third rather obsolete; three teeth in front, and the wrists with one internal tooth. Inhabits the British seas.

*Corystes dentata*.—The Toothed Corystes. Plate lxxxii. fig. 12. Granulated and crenated behind; with a bifid front, and the sides with three teeth. Inhabits the coasts of Britain.

*Eurynome aspera*.—The Rough Eurynome. Plate lxxxiii. fig. 1. Back with eight tubercles more prominent than the rest, with hairy margins; and the sides with four lamellæ; anterior legs and thighs with tubercles. Inhabits the British seas.

*Hyas araneus*.—The Sand Hyas. Plate lxxxiii. fig. 2. Pointed in front, widening towards the posterior parts, covered with small tubercles; legs very long, the forcep claws thicker and shorter than the others. Inhabits the coasts of Britain.

*Remipes testudinarius*.—The Tortoise Remipes. Plate lxxxiii. fig. 5. Oblong-ovate; provided with a long tail; with scaly wrinkles, and the whole members finely crenated; five teeth before, of which the intermediate three are shorter than the lateral ones. Inhabits the coasts of New Holland.

*Pagurus Bernhardus*.—The Bernhardine Pagurus. Plate lxxxiii. fig. 4. With mucated and shagreened forceps, the right one longer and larger than the left; second and third pairs of feet spinous at the extremity. A native of the coasts of Britain, inhabiting various species of Bivalve shells, such as turbos, trochi, &c.

*Nephrops Norvegicus*.—The Norwegian Nephrops. Plate lxxxiii. fig. 3. Described, vol. iv. p. 8.

*Astacus fluviatilis*.—The Freshwater Astacus, or Craw-Fish. Plate lxxxiii. fig. 8. Described, vol. iv. p. 9.

*Crangon vulgaris*.—The Common Crangon, or Shrimp. Plate lxxxiii. fig. 10. Described, vol. iv. p. 8.

*Nebalia Herbstii*.—Herbst's Nebalia. Plate lxxxiv. fig. 2. Ash-coloured, with black eyes. One inch long. Inhabits the European seas.

#### ORDER II.—STOMAPODA.

The head is large, and distinct from the trunk, and consists of two parts; the branchiæ are in the form of plumes or tufts, adhering to the lower appendages of the post-abdomen; intermediate antennæ with a filamentous termination; shell membranaceous; six posterior feet filiform; extremity of the body provided with a foliaceous fin.

This order contains four genera.

#### ORDER III.—LÆMODIPODA.

Head, and first segment of the trunk not distinctly divided; with four setaceous antennæ, having many articulations; second and third segment provided below with vesicular bodies, supposed to be the organs of respiration.

It contains four genera.

## ORDER IV.—AMPHIPODA.

Head separated from the segment which supports the second feet jaws; the post-abdomen provided with branchial and narrow elongated swimming appendages below, which are striated transversely, and with many articulations, or branchiæ; mandibles having palpi.

This order contains twenty-one genera.

## ORDER V.—ISOPODA.

Head distinct; mandibles without palpi; three pairs of jaws, the lower one like two small feet, united at their base; or having a lip with palpi; body depressed, and divided into from three to seven segments; from ten to fourteen feet; tail with seven segments, or upwards; having branchiæ; frequently covered with laminæ; destitute of shell; with four antennæ and granulated eyes.

This order contains twenty-five genera; of which we have figured the following examples:—

*Anthura gracilis*.—The Slender Anthura. Plate lxxxiii. fig. 9. Antennæ short, somewhat equal, the intermediate a little longer than the lateral ones; body linear; anterior feet with moveable claws; tail foliaceous and obliquely truncate.

*Idotea entomon*.—The Entomon Idotea. Plate lxxxiv. fig. 1. Drab-coloured above, whitish-gray below; antennæ nearly of equal length. One inch and a half long. Inhabits the Northern coasts.

*Armadillo vulgaris*.—The Common Armadillo. Plate lxxxiii. fig. 6. Ash-coloured, with the margin of the segments paler. Inhabits Europe, under stones.

## ORDER VI.—LAPHYROPODA.

Head not distinct from the trunk; eyes compound and sessile; shell of one or two pieces, and varying in size; jaws unprovided with branchiæ, and the mandibles without palpi; feet variable in number, simple, branched, or formed of hairy laminæ, fitted for swimming; these are considered the organs of respiration.

## ORDER VII.—PHYLLOPODA

Head not distinct from the trunk; eyes approximate, smooth, and sessile; antennæ very short; a crustaceous shield, free posteriorly; having two corneous mandibles without palpi; feet of the first pair oar-shaped, the others fitted for swimming, and consisting of sixty pairs.

## ORDER VIII.—XYPHOSURA.

Body subdivided, without a syphon; base of the feet, except the last two, spiny, and acting as jaws; shell covering the whole body, hard, in two compartments, longitudinally furrowed above; body terminated by a hard sabre-shaped process.

## ORDER IX.—SIPHONOSTOMA.

With a syphon or proboscis, but is sometimes invisible, and provided with palpi for suction; with more than six or seven pairs of feet; shell of one piece, soft, membranous, and not entirely covering the body.

## CLASS VII.—ARACHNIDES.

For the characters of this class, see vol. iv. page 203. Lamarck divides it into three orders.

## ORDER I.—PULMONARIE.

Provided with a heart, or organ of circulation; branchial sacs placed on each side of the abdomen below; the sexual organs are double; with from six to eight smooth eyes; they are furnished with two pedipalpi, with one or two toes at their termination, one of which is always moveable; two jaws, and palpi, and four pairs of feet. This order contains thirty-one genera.

*Scorpio Europæus*.—The European Scorpion. Plate lxvi. fig. 1. Described, vol. iv. page 233.

*Thelyphonus proscorpio*.—The Tarantula. Plate lxvi. fig. 2. Described, vol. iv. page 217.

*Mygale avicularia*.—The Bird-Catching Mygale. Plate lxvi. fig. 3. Described, vol. iv. page 216.

*Argyroneta aquatica*.—The Aquatic Spider. Plate lxvi. fig. 4. Described, vol. iv. page 207.

*Scytodes thoracica*.—The Thoratic Scytodes. Plate lxvi. fig. 5. Skin coloured, spotted with black; with a large orbicular thorax, produced and rounded behind; abdomen nearly white and subglobose. Inhabits houses at Paris.

*Epeira diadema*.—The Crown Epeira. Plate lxvi. fig. 6. Abdomen nearly ovate and globose, with an elevated ridge on each side of its base; of a reddish chestnut-brown colour, and spotted with yellowish-white. Inhabits Europe, in woods and gardens.

*Lycosa tarentula*.—The Tarentula Lycosa. Plate lxvi. fig. 7. Brown; back of the abdomen with a row of trigonal black spots, white on the edges; legs having black and white bars. Inhabits Southern Europe.

*Salticus scenicus*.—The Scenicus Salticus. Plate lxvi. fig. 8. Black; margins of the chest covered with white down. Inhabits old walls of Europe.

## ORDER II.—TRACHEARIE.

Instead of a heart provided with a single dorsal vessel, they respire by radiated tracheæ, and receive the air by spiracles placed in the abdomen or thorax; sexual organs single; eyes usually two, but never exceeding four, and some species are devoid of them; most species have a syphon-shaped mouth. The order embraces twenty-seven genera.

*Phoxichilus hirsutus*.—The Hairy Phoxichilus. Plate lxvi. fig. 9. The articulations of all the joints of the limbs provided with hairs.

*Obisium Trombidoides*.—The Tromboidal Obisium. Plate lxvi. fig. 10. The second joint of the arms considerably elongated; fingers long and straight; dark brown, and covered with ciliated hairs. Inhabits England and France, under stones.

*Phalangium cornutum*.—The Horned Phalangium. Plate lxvi. fig. 11. Reddish ash-coloured above; the mandibles and antennæ whitish. Inhabits Europe, in walls, &c.

*Acarus domesticus*.—The Cheese Mite. Plate lxvii. fig. 1. Body ovate,

yellowish-white, beset with long remote hairs. Inhabits cheese and old flour, in England.

*Hydrachna geographica*.—The Geographical Hydrachna. Plate xvii. fig. 2. Body globular, black, with scarlet spots and dots. Inhabits slow-running streams of Europe.

## CLASS VIII.—MYRIAPODA.

Head distinct and provided with two antennæ; body divided into segments; mandibles simple, incisive, most of which are provided with feet. It contains two orders.

### ORDER I.—CHILOGNATHA.

Antennæ seven-jointed and filiform; mouth composed of two mandibles and a lip divided by sutures; with two or four anterior feet united at their base, resembling pedipalpi; and having distinct spiracles. This order contains five genera.

*Julus subulosus*.—The Subular Julus or Gally Worm. Plate lxxvii. fig. 3. Described, vol. iv. page 240.

*Polyxenus electrica*.—The Electric Polyxenus. Plate lxxvii. fig. 4. Dusky-brown, with yellowish legs, these are about seventy on each side. Inhabits damp situations in Europe.

### ORDER II.—CHILOPODA.

Antennæ setaceous, many-jointed; mouth consisting of two mandibles and a small palpiform appendage; labium with many clefts, and two large palpi; two hook-formed feet, pierced at the tips for the emission of a poisonous fluid; body with a coriaceous or membranous covering; and each segment with two feet; having distinct spiracles. This order contains five genera.

*Scolopendra morsitans*.—The Deadly Scolopendra. Plate lxxvii. fig. 5. Body brown; provided with forty-two feet, the last two with a spinous first joint. Inhabits India.

## CLASS IX.—INSECTS.

Articulated animals with six legs, and respiring by means of tracheæ; head distinct from the thorax, and provided with two antennæ.

For a general account of this class, see vol. iv. page 192.

Latreille divides insects into eleven orders.

### ORDER I.—THYSANOURA.

Apterous insects with six feet, and not undergoing any transformation; head distinct; two antennæ, which are longer than the head; abdomen terminated by filaments on a forked tail. This order contains four genera.

*Lapisma saccharina*.—The Saccharine Lapisma, or Wood Fish. Silvery-gray; body gradually tapering to the tail, which terminates in three long serrated bristles. Inhabits Europe and Jamaica, and destroys books.

*Smynturus atra*.—The Black Smynturus. Plate lxvii. fig. 7 Short, sub-globular, with elongated antennæ; glossy black. Inhabits the bark of trees in Britain.

## ORDER II.—PARASITA.

Destitute of wings, and provided with six feet; abdomen without articulated and moveable appendages; having two or four small eyes; the mouth of many species placed interiorly, with an external proboscis or nipple, acting as a sheath to a retractile sucker, or having two membranous lips provided with two hooked mandibles.

*Ricinus corvicoracis*.—The Crow Louse. Plate lxvii. fig. 8. Back with oblique brown bands along its margins. Infests the crow.

*Pediculus coturnixi*.—The Quail Louse. Plate lxvii. fig. 9. White; every segment furnished with three hairs on each side; legs hairy. Infests the quail.

## ORDER III.—SYPHONAPTERA.

Body compressed; mouth provided with a sucker of two pieces, inclosed between articulated laminae, forming a cylindrical or conical rostrum by their union, the base of which is covered with scales. This order consists of but one genus.

*Pulex irritans*.—The Flea. Plate lxvii. fig. 10. Described, vol. iv. page 219.

## ORDER IV.—COLEOPTERA.

Having four wings, the upper ones in the form of cases: provided with mandibles and jaws for mastication; under wings folded across; elytra crustaceous, with a straight suture.

*Cicindella hybrida*.—The Hybrid Cicindella. Plate lxvii. fig. 11. Body shining, verdigris-green; and spotted with white on each wing case; suture of a coppery tinge. Inhabits wood in Europe.

*Carabus morbillosus*.—The Morbillous Carabus. Plate lxvii. fig. 12. Copper-green above, and black beneath; abdomen oblong-oval. Inhabits Europe, under stones in moist places.

*Dytiscus marginalis*.—The Marginated Dytiscus. Plate lxvii. fig. 13. Elytra with a yellow border and not dilated; thorax with a yellow margin; body blackish-green above, and fawn-coloured below. Inhabits Europe.

*Gyrinus natator*.—The Swimming Gyrious. Plate lxvii. fig. 14. Iridescent blackish-bronze; feet rust-coloured, the four posterior ones short and compressed; the anterior feet elongated; antennæ black. Inhabits Europe.

*Staphylinus maxillosus*.—The Maxillary Staphylinus. Plate lxvii. fig. 15. Black, iridescent; head considerably broader than the thorax; elytra gray, with black spots and points. Inhabits Europe, found in old dung-hills.

*Buprestis viridis*.—The Green Buprestis. Plate lxvii. fig. 16. Body bright bronze-green; elytra entire and dotted. Inhabits Europe, in the bark of trees.

*Lampyris noctiluca*.—The Glow-Worm. Plate lxviii. fig. 17. Described, vol. iv. p. 383.

*Ptinus futidicus*.—The Death-Watch Ptinus. Plate lxvii. fig. 17. Described, vol. iv. p. 392.

*Hololepta unicolor*.—The One-Coloured Hololepta. Plate lxviii. fig. 16. Of a deep glossy coal-black. Inhabits gardens and sandy fields, in Britain.

*Spercheus emarginatus*.—The Emarginated Spercheus. Plate lxviii. fig. 6. Head and throat black; back dark brown, elytra dull red. Inhabits Europe, at the roots of water plants.

*Oryctes nasicornis*.—The Nose-Horned Oryctes. Plate lxviii. fig. 3. Chestnut-brown above, pale chestnut below; male with a simple elevated recurved horn on its nose. Inhabits Europe, in gardens, &c.

*Scarabæus Hercules*.—The Hercules Beetle. Plate lxviii. fig. 1. Head of a deep shining black; the male provided with a long incurved horn; thorax black, with a projecting retrousse horn, somewhat notched above; elytra brown, with black spots. Inhabits the Antilles.

*Melolontha vulgaris*.—The Cock-Chaffer. Plate lxviii. fig. 2. Described, vol. iv. p. 378.

*Tenebrio molitor*.—The Meal Beetle. Plate lxviii. fig. 7. Described, vol. iv. p. 379, note.

*Diaperis boleti*.—The Mushroom Diaperis. Plate lxviii. fig. 5. Black, with three yellow bands across the elytra. Inhabits England, and is found on the boleti and other fungi.

*Helops violaceus*.—The Violet Helops. Plate lxviii. fig. 10. Head, thorax, and elytra, violet-coloured; legs and antennæ gray. Inhabits Britain, on the bark of trees in sandy situations.

*Mordella aculeata*.—The Aculeated Mordella. Plate lxviii. fig. 15. Dusky-black and shining, spotless, invested with silky down; antennæ serrated; the female with the last abdominal segment prolonged into a point; ovipositor the same length as thorax. Inhabits gardens in Britain.

*Attelabus coryli*.—The Coryli Attelabus. Plate lxviii. fig. 12. Black, the elytra red and reticulated. Inhabits Europe, and is found on the hazel.

*Paussus microcephalus*.—The Minute-Headed Paussus. Plate lxviii. fig. 14. The head excessively small; blackish-brown. Inhabits Sierra Leone.

*Prionus coriarius*.—The Coriarius Prionus. Plate lxviii. fig. 8. Antennæ thick and serrated; thorax armed on each side with three sharp spines; the whole insect of a deep chocolate brown. Inhabits the hollows of decayed trees in Britain.

*Megalopus nigricornis*.—The Black-Horned Megalopus. Plate lxviii. fig. 13. Body fawn-coloured yellow; antennæ, legs, and feet, black; a black spot on the thorax; elytra greenish drab-colour and downy, with distant dots: the external margin and suture black. Inhabits South America.

*Cassida viridis*.—The Green Cassida. Plate lxviii. fig. 9. Rich green above, and black below; elytra with some faint dotted striæ; feet red, and the lower half of the thigh black. Infests the artichokes and thistles of Britain.

*Erotylus giganteus*.—The Gigantic Erotylus. Plate lxviii. fig. 4. Black, and the elytra spotted with deep orange-red. Inhabits India.

*Cocinella 14 gallata*.—The Fourteen-Spot Cocinella. Plate lxviii. fig. 18. Orange, with fourteen white spots. Inhabits Britain.

*Eumorphus Kerbyanus*.—Kerby's Eumorphus. Plate lxviii. fig. 16. Black, shining, the elytra with two fulvous spots on each. Inhabits India.

*Pselaphus Herbstii*.—Herbst's Pselaphus. Plate lxix. fig. 10. Body and elytra dark chestnut-brown; antennæ and legs yellow.

## ORDER V.—ORTHOPTERA.

With coriaceous elytra, the margin of the one resting on that of the other; mouth provided with mandibles; the wings folded longitudinally and sometimes also transversely; subject to a half complete transformation only.

*Forficula auricularia*.—The Earwig. Plate lxix. fig. 4. Described, vol. iv. page 274.

*Blatta livida*.—The Bluish Blatta. Plate lxix. fig. 3. Body and head brown, wings fuscous, transparent, antennæ and legs yellow. Inhabits Britain.

*Mantis precaria*.—The Praying Mantis. Plate lxix. fig. 5. Of a fine green-colour, the thorax spined on each side, and the upper wings each marked in the middle by a semi-transparent spot. Inhabits Africa. Held in great veneration by the Hottentots.

*Phyllium siccifolia*. The Dried Leaf Phyllium. Plate lxix. fig. 6. Body greatly depressed, of a pale-green or reddish-yellow colour. Inhabits India.

*Gryllo-Talpa vulgaris*.—The Mole Cricket. Plate lxix. fig. 8. Described, vol. iv. page 272.

*Locusta flavipes*.—The Yellow-Legged Locust, Plate lxix. fig. 9.

*Acridium migratorium*.—The Migratory Acridium. Plate lxix. fig. 7. Described, vol. iv. page 264.

## ORDER VI.—HEMIPTERA.

Having two wings, covered by elytra; mouth formed for suction, the rostrum consisting of an articulated tubular sheath, which includes four scaly setæ, instead of mandibles and jaws; some species have crustaceous elytra, with membranous posterior extremities; in others they are similar to wings, but more extended, thicker and coloured.

*Cimex pracinus*.—The Leek-Green Bug. Plate lxix. fig. 2. Described, vol. iv. page 228, note.

*Nepa cinerea*.—The Ash-Coloured Nipa. Plate lxix. fig. 1. Deep ash-coloured, abdomen broad, ovate, depressed, and red above; scutellum large and triangular; anterior feet directed forwards. Inhabits stagnant waters of Europe.

*Fulgora lanternaria*.—The Lantern Fly. Plate lxx. fig. 10. Described, vol. iv. page 273, note.

*Thrips physapus*.—The Physapus Thrips. Plate lxx. fig. 11. Black, with white transparent wings, and a hairy marginal fringe. Inhabits Europe, on various flowers.

*Coccus cacti*.—The Cochineal Coccus. Plate lxx. fig. 1. Described, vol. iv. page 390.

## ORDER VII.—NEUROPTERA.

With four naked, transparent, reticulated wings; mouth formed for mastication; jaws and lips straight and extended; joints of the tarsi variable, but generally entire.

*Libellula 4 Maculata*.—The Four-Spotted Dragon Fly or Libellula. Plate lxx. fig. 7. Described, vol. iv. page 247.

*Ephemera vulgaris*.—The Common Day Fly. Plate lxx. fig. 8. Described, vol. iv. page 277.

*Panorpa communis*.—The Common Panorpa. Plate lxx. fig. 2. Body rather long, wings transparent, elegantly variegated with deep brown spots; tail of the male furnished with forceps, like a lobster's claw. Inhabits Europe in meadows.

## ORDER VIII.—HYMENOPTERA.

With four naked veined wings, unequal in size; mouth composed of jaws, mandibles, and two lips; the lip tubular at its base, terminated by a labium, which is either double or folded in, and forming a sort of sucker; females provided with a compound ovipositor near the vent.

*Tenthredo scrophulariæ*.—The Scrophulariæ Tenthredo. Plate lxx. fig. 6. Head, thorax and abdomen black, with transverse bands of yellow; wings reddish brown and transparent. Inhabits England on the water betony.

*Ichneumon manifestator*.—The Notorious Ichneumon. Plate lxx. fig. 12. Described, vol. iv. page 356.

*Formica Herculeana*.—The Herculean Formica. Plate lxx. fig. 9. The antennæ of the neuters are black; the head large, black, and shining, slightly covered with hairs; thorax blood-red. Inhabits Europe in dead trees.

*Ammophila viatica*.—The Wayside Ammophila. Plate lxx. fig. 5. Black, beset with hairs; second and third segment of the abdomen reddish brown; upper wings brown. Inhabits England.

*Vespa crabo*.—The Hornet. Plate lxx. fig. 3. Described, vol. iv. page 355.

*Apis retusa*.—The Retuse Bee. Plate lxx. fig. 4. Body pale brown, legs hairy, wings transparent, with an elongated cleft proboscis, and three bristles betwixt them. Inhabits Britain.

## ORDER IX.—LEPIDOPTERA.

With four membranaceous wings, covered with a scaly farina; and provided with a trunk which is spirally rolled up at the mouth.

*Papilio Apollo*.—The Apollo Butterfly. Plate lxxi. fig. 2. Thorax deep brown, wings pale yellow, slightly indented on their margins; superior wings with black spots, inferior wings with four scarlet eye-like spots, white in the centre, and surrounded by a ring of black. Inhabits Europe.

*Sphinx Atropos*.—The Death's Head Sphinx. Plate lxxi. fig. 5. Upper wings dark grey, with zigzag marking of black, orange and white; body orange-coloured, barred with black; on the top of the thorax is a large pale ochre yellow mark, exactly resembling a human skull. Inhabits Britain.

*Bambyx pavonia major*.—The Peacock Moth. Plate lxxi. fig. 9. Wings round, variegated with deep and pale gray, black brown, and purplish brown; with a deep edging of pale brown; web of the wings with an eye-like spot. Inhabits the south of Europe.

## ORDER X.—STREPSIPTERA.

With two naked membranous wings, accompanied by two balancers, which are longitudinally folded, forming nearly the quadrant of a circle; anal opening styloferous; transformation incomplete.

*Xenos Peckii*.—Peck's Xenos. Plate lxx. fig. 11. Blackish-brown; antennæ dotted with white. Inhabits America.

## ORDER XI.—DIPTERA.

Provided with six feet; two membranaceous extended wings, under each



a balancer, in most species; mouth composed of a sucker, consisting of a variable number of scaly setaceous pieces, either inclosed in the upper furrow of a sheath, or inarticulated proboscis, and terminated by two lips, or cased in one or two plates.

*Culex pipiens*.—The Gnat. Plate lxxi. fig. 4. Described, vol. iv. page 395.

*Tipula oleracea*.—The Common Tipula. Plate lxxi. fig. 1. Described, vol. iv. page 394.

*Tabanus tropicus*.—The Tropical Tabanus. Plate lxxi. fig. 7. Mouth with a membranaceous proboscis; two equal lips; haustellum projecting and received into a groove; antennæ short, approximate and cylindrical with seven articulations; of a dull brown and yellow colour. Inhabits Britain.

*Stratiomys chamæleon*.—The Chameleon Fly. Plate lxxi. fig. 8. Head yellow, with brown eyes, and black antennæ, thorax brown, covered with yellow fawn coloured down; abdomen blackish or dusky above, with three spots of yellow on each side, and one at the tail. Inhabits Europe on flowers.

*Conops macrocephala*.—The Lean-Headed Conops. Plate lxxi. fig. 10. Mouth with a porrected, geniculated, rostrum; antennæ clavated; the clava acuminate. Inhabits Europe.

*Æstrus bovis*.—The Ox Gad-Fly. Plate lxxi. fig. 6. Described, vol. iv. p. 400.

*Hippobosca equina*.—The Horse Hippobosca, or Horse Gad-Fly. Plate lxxi. fig. 3. Described, vol. iv. p. 400.

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## DIVISION IV.—RADIATA.

This division is divided into six classes.

### CLASS X.—ECHINODERMATA.

With a suborbicular body, having a crustaceous covering, radiated, devoid of a head, eyes, and articulated feet; mouth placed below, simple, or multiform; having compound digestive organs; with exterior tubes or pores for respiration.

*Echinus esculentus*.—The Edible Sea Urchin. Plate lxxxiv. fig. 7. Described, vol. iv. p. 80.

*Spatangus purpureus*.—The Purple Spatangus. Plate lxxxiv. fig. 6. Heart-shaped, with four lanceolate compartments, which are placed, with the larger tubercles, in a zigzag form. Inhabits the European seas.

*Asterias rubens*.—The Red Star-Fish. Plate lxxxiv. fig. 9. With five lanceolate, papillous, and spinous rays; papillæ of the back scattered, and set nearly in rows. Inhabits the European seas.

### CLASS XI.—TUNICATA.

Gelatinous or coriaceous biferous animals; with double coats, isolated placed in groups, or adhering together in a common mass.

## ORDER I.—ASCIDIARIA.

Animals disunited, either isolated or placed in groups, without any internal communication; and not connected in a common mass.

## ORDER II.—BOTRYLLARIA.

Agglomerated animals, always united, and combined in a common mass.

## CLASS XII.—ENTOZOA.

Body soft, naked, and elongated; destitute of a distinct head, eyes, or feet; mouth formed of one or many suckers; no tentacula or organs of respiration; intestinal canal scarcely perceptible in some species.

## ORDER I.—ELMINTHOZOA.

Worms which usually live on the exterior of aquatic animals, or in the interior parts of others, with a mouth and a vent, and the sexual organs separate; nervous filaments in some, emerging from near the opening of the oesophagus.

*Filaria medinensis*.—The Guinea Worm. Plate lxxxv. fig. 8. Described, vol. iv. page 409.

*Humularia sub-compressa*.—The Sub-compressed Humularia. Plate lxxxv. fig. 9. Fig. 10, head of do. magnified. Oblong, round, compressed on both sides; dark-brown, and studded with black spots, tapering towards the anterior extremity; head obtuse, and furnished with two hooks. Found in the human body.

*Trichocephalus dispar*.—The Long Thread Worm. Plate lxxxv. fig. 13. male. Plate lxxxvi. fig. 1. female. Anterior part small and capillary, terminating in an acute point, in which the mouth is situated; the posterior part swells out to a considerable size, and in the male is spiral and provided with a funnel-shaped tube. Inhabits the human body.

*Oxyurus vermicularis*.—The Maw or Thread Worm. Plate lxxxv. fig. 4. male, natural size; fig. 3. magnified; fig. 2. female, natural size; fig. 1. magnified. Head obtuse, and the body gradually thickening towards the tail; the female is subulate towards the tail. Inhabits the human body.

*Oxyurus angulata*.—The Angulated Maw-Worm. Plate lxxxv. fig. 6. Male; fig. 5. the female; both the size of nature. Head obtuse, body thick, tapering from about the middle to the tail; pale horn-colour. Inhabits the human body.

*Ascaris lumbricoides*.—The Long Round Worm. Plate lxxxv. fig. 7. Male. Cylindrical tapering to the two extremities, and annulated; flesh-coloured. From 10 to 15 inches long. Inhabits the human body.

*Strongylus gigas*.—The Great Strongylus. Plate lxxxv. fig. 12. Natural size, 11 magnified. Head obtuse tapering towards both extremities; body composed of annular rings. Inhabits the human body. Strongylus found in human urine, Plate lxxxv. 14 and 15.

## ORDER II.—ELMINTHAPROCTA.

Worms which inhabit the interior of the bodies of other animals; with

the sexual organs united in each individual; having no floating alimentary sac, a simple cavity in the anterior, and almost or totally destitute of nerves.

*Bothricephalus latus*.—The Broad Tape Worm. Plate lxxxvi. fig. 3. Articulations of the body broader than long, minutely papillose, with an osculum in the middle of each articulation; the head is small and the tail frequently bifurcated. From 15 to 20 feet long. Inhabits the human body.

*Tænia solium*.—The common Tape Worm. Plate lxxxvi. fig. 2. Described, vol. iv. page 410.

### CLASS XIII.—ACALEPHA.

Having a gelatinous body, circular and radiated, with a soft and transparent skin; susceptible of considerable contraction and dilation.

*Actinia verrucosa*.—The Great Actinia. Plate lxxxiv. fig. 6. Cylindrical, glandular, red; mouth appendiculated, with projecting tentaculæ. Inhabits the coasts of Britain.

### CLASS XIV.—POLYPI.

The animals are gelatinous, with elongated contractile bodies; and provided with an alimentary sac, which has one opening; mouth terminal, surrounded by radiated tentaculæ; the greater number of the species congregated and adherent, and forming compound animals. See vol. iv. page 414. It consists of five orders.

#### ORDER I.—POLYPI NATANTES.

The animals united in a common body, free, elongated, fleshy, enveloping an inorganic axis, which is either cartilaginous, osseous, or stony; and provided with radiated tentacula around the aperture of each polypus.

*Umbellularia Greenlandica*.—The Greenland Umbellularia. Plate lxxxvii. fig. 1. Stem long, attenuated above, the polypi congregated in an umbel at the apex. Inhabits the Northern ocean.

*Pennatula Phosphorea*.—The Phosphoric Pennatula. Plate lxxxvii. fig. 9. Described, vol. iv. page 425.

#### ORDER II.—POLYPI TUBIFERI.

The animals united in a common fleshy body, either simple, lobed, or with ramifications, and constantly fixed by their base; without any solid internal axis; surface entirely or partly covered with tubiform cylinders, rarely retractile; mouth terminal, with eight pectinated tentacula.

*Lobularia digitata*.—The Fingered Lobularia. Plate lxxxvii. fig. 2. Sessile, pale rusty, gelatinous and fleshy; the lobe from two to five inches thick and obtuse. Inhabits the European seas.

#### ORDER III.—POLYPI VAGINATI.

Each individual polypi, provided with tentacula, constantly fixed in an

inorganic body, which invests them, and forming a general compound of animals.

*Spongia palmata*.—The Palmated Sponge. Plate lxxxvii. fig. 4. Erect, compressed and very porous, with palmated digitiform branches; and a subacute furcated apex. Inhabits the European seas.

*Flabellaria pavonia*.—The Peacock Flabellaria. Plate lxxxvii. fig. 3. With a simple incrustated stem and agglutinated branches; surmounted by a flabelliform calcareous, undulated, sublobed leaf. Inhabits the American seas.

*Corallina officinalis*.—The Shop Corallina. Plate lxxxvii. fig. 5. Branches pinnated; joints of the stem and branches cuneiform and compressed. Inhabits the coasts of Europe.

*Corallina squamata*.—The Scaly Corallina. Plate lxxxvii. fig. 6. Natural size; fig. 7. a branch magnified. Inhabits the coasts of England.

*Corallina cylindrica*.—The Cylindrical Corallina. Plate lxxxvii. fig. 8. Inhabits the American coasts.

*Gorgonia verriculata*.—The Warted Gorgonia. Plate lxxxvii. fig. 11. Very large, branched, and fan-shaped; ramuli divaricate, and joined at the reticulation; crust white, with scattered warty pores. Inhabits the Indian seas.

*Gorgonia lepadifera*.—The Stony Gorgonia. Plate lxxxvii. fig. 12. Branched and squamose. Inhabits the North seas.

*Antipathes spiralis*.—The Spiral Antipathes. Plate lxxxvii. fig. 10. Subspiral, simple, and scabrous. Inhabits the Indian ocean.

*Isis hippurus*.—The Horse-tail Isis. Plate lxxxvii. fig. 13. Somewhat branched, with a smooth, thick, many-osculated crust; joints of the axis stony, sulcated, irregular, and the last compressed; intervals horny. Inhabits the Indian ocean.

*Corallium rubrum*.—The Red Corallium. Plate lxxxvii. fig. 14. Bright carnation red. Inhabits the Mediterranean and Indian seas.

*Oculina virginea*.—The Virgin Oculina. Plate lxxxvii. fig. 15. Greatly branched, and tortuous; stars scattered, immersed or prominent, and formed by lamellæ. Inhabits the Indian seas.

*Seriatopora subulata*.—The Subulate Seriatopora. Plate lxxxvii. fig. 18. Diffuse, with many slender branches; stars in a longitudinal series.

*Madripora simplicis*.—The Simple Madripore. Plate lxxxvii. fig. 21. Greatly depressed, and mushroom-shaped. Inhabits the Indian ocean.

*Porites clavaria*.—The Club-Shaped Porites. Plate lxxxvii. fig. 22. Subclavate, and obtusely compressed; stellæ broad, flat, and contiguous. Inhabits the American seas.

*Astrea radiata*.—The Rayed Astrea. Plate lxxxvii. fig. 16. Stars orbicular; interstices sulcated. Inhabits the American seas.

*Astrea denticulata*.—The Toothed Astrea. Plate lxxxvii. fig. 17. Stars unequal, cells contiguous. Inhabits the Indian ocean.

*Explanaria rosularia*.—The Rosularia Explanaria. Plate lxxxviii. fig. 3. Depressed, foliaceous, and suborbicular. Inhabits the Australian seas.

*Meandrina labyrinthica*.—The Labyrinth Madripore. Plate lxxxvii. fig. 19. Hemispherical; undulations long and tortuous; base dilated; emenures simple, and subacute. Inhabits the American seas.

*Agaricia ampliata*.—The Increasing Agaricia. Plate lxxxvii. fig. 23. Fan-shaped and foliaceous; longitudinally rugose; stars few and imperfect.

*Pavonia agaricites*.—The Mushroom Pavonia. Plate lxxxvii. fig. 20. Undulations stelliferous, transversely flexous and acute. Inhabits the American seas.

*Fungia agariciformis*.—The Mushroom-Shaped Fungia. Plate lxxxviii. fig. 2. Described, vol. ii. p. 424.

*Caryophyllia cyathus*.—The Measure Caryophylla. Plate lxxxviii. fig. 5. Turbinate club-shaped, or a solitary stem; star concave, with a papillose centre.

*Tubipora musica*.—The Music Tubipora. Plate lxxxviii. fig. 10. Having distinct cylindrical tubes, and distant partitions; of a bright scarlet. Inhabits the Indian ocean.

*Millepora informis*.—The Shapeless Millepora. Plate lxxxviii. fig. 11. Irregular and solid; branches thick and nodose.

*Retepora cellulosa*.—The Cellular Retepora. Plate lxxxviii. fig. 1. Flattened, thin, greatly undulated, with elliptic cells. Inhabits the Indian ocean.

*Eschara foliacea*.—The Foliated Eschara. Plate lxxxviii. fig. 4. With numerous, flexous, coalescing laminæ; pores small, round, and separate. Inhabits the European seas.

*Tubulipora transversa*.—The Transverse Tubulipora. Plate lxxxviii. fig. 25. White within; tubular cells disposed in transverse rows, united at their base. Inhabits the Mediterranean sea.

*Flustra carbacea*.—The Coaly Flustra. Plate lxxxviii. fig. 22. Foliaceous, with wedge-shaped, linear, obtuse lobes. Inhabits the Frith of Forth.

*Dichotomaria obtusata*.—The Obtuse Dichotoma. Plate lxxxviii. fig. 24. Branching, with oblong-ovate joints, and compressed in a dry state. Inhabits the Bahama Islands.

*Anguinaria spatulata*.—The Spoon-Shaped Anguinaria. Plate lxxxviii. fig. 23. With spatuliform cells, placed on an upright stem. Inhabits the European seas.

*Cellaria salicornia*.—The Salicorn Cellaria. Plate lxxxviii. fig. 20. natural size; 21 magnified. Joints cylindrical; cells rhomboidal. Inhabits the seas of Europe.

*Liriozoa Caribæa*.—The Caribæan Liriozoa. Plate lxxxviii. fig. 18. size of nature; 19 magnified. Cells in opposite clusters, terminal. Inhabits the West Indian seas.

*Serialaria lendigera*.—The Lendigera Serialaria. Plate lxxxviii. fig. 8. size of nature; 9 magnified. With filiform, jointed branches; and the cells in distinct rows. Inhabits the seas of Europe.

*Plumularia cristata*.—The Crested Plumularia. Plate lxxxviii. fig. 6. size of nature; 7 magnified. Loosely branched; cells companulate and sessile; with crested vesicles. Inhabits the seas of Europe.

*Sertularia Cupressina*.—The Cypress Sertularia. Plate lxxxviii. fig. 14. size of nature; 15 magnified. Compound and elongated branches; cells cylindrical and obliquely truncated; vesicles sub-ovate, with a sub-tubular orifice. Inhabits the seas of Europe.

*Campanularia dichotoma*.—The Dichotomous Campanularia. Plate lxxxviii. fig. 16. size of nature; 17 magnified. Stem filiform; cells bell-shaped and terminal. Inhabits the seas of Europe.

*Tubularia ramosa*.—The Branched Tubularia. Plate lxxxviii. fig. 12. size

of nature; 13 magnified. Tubular, branched, with the axillæ of the branches twisted. Inhabits the British seas.

ORDER IV.—POLYPI DENUDATI.

Polypi provided with tentaculi, and not congregated in a polypiferous mass; greatly diversified in form, as well as in the number and situation of their tentacula; and either constantly or spontaneously fixed.

ORDER V.—POLYPI CILIATI.

Mouth provided with ciliated and gyratory organs, which agitate the water, but not fitted for seizing their food.

CLASS XV.—INFUSORIA.

Micostopic, gelatinous, transparent, polymorphous, and contractile animals; without any distinct mouth, or constant, determinable, interior organ; generation supposed fissiparous or gemmiparous.

ORDER I.—INFUSORIA APPENDICULATA.

With projections at the exterior of the body, such as hairs; a sort of horns or a tail.

ORDER II.—INFUSORIA NUDA.

Body extremely simple, devoid of organs or exterior appendages; and appearing homogeneous.

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TO THE

## NATURAL HISTORY AND NOTES.

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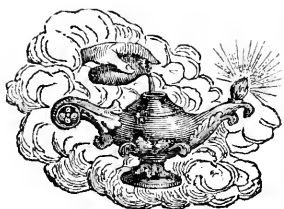
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