

fect, of its enormous elk, one of the most celebrated of all the fossil ruminating animals. The Mediterranean coast, Russia, and both Americas have amply contributed to the collection. But it is to the limestone quarries of Aningen and Geylenreuth, and the alternating quarries of Paris, that it is chiefly indebted for its very interesting supply of the animal remains of a former world.

We have not time to travel even over an outline of this wonderful repository. Those who have no opportunity of examining it on the spot, may be abundantly gratified by a perusal of M. Cuvier's valuable and extensive work on the fossil remains of quadrupeds:* which, though chiefly devoted to this particular class, is nevertheless rich in its history of extinct kinds and species of birds, amphibians, and fishes. We can only glance at a few of the more striking of the whole collection.

These are to be found chiefly in the class of mammals, and especially among the largest kinds. The gypsum-formation of Paris, supposed to be a fresh water deposit, has furnished M. Cuvier with two entirely original genera, and each genus with several species, the whole of which appear to be utterly extinct.

To these he has given the name of palæotherium and anoplotherium, or OLDEN BEAST, in allusion to its existence in the olden times; and DEFENCELESS BEAST, in allusion to the want of canine teeth in the genus it designates. Both genera belong to the Linnæan order of BELLŪE OF WARRIOR-BEASTS, and the Cuvierian order of PACHYDERMATA, or thick-skinned.

The station of the first is allotted in this order after the tapir, and before the rhinoceros and the horse, which gives us the best idea of its general character. It is generically distinguished by having forty-four teeth; in each jaw six fore-teeth, two incisors, fourteen molars; snout extended, flexible; fore and hind feet quadrifid.

The gypsum quarries alone have furnished five distinct species of this very singular animal, in a more or less perfect state of its skeleton. 1. Palæotherium magnum, of the size of the horse. 2. P. medium; and, 3. P. crassum, each of the size of a hog. 4. P. curtum, with decurtate, patulous feet. 5. P. minus, of the size of a sheep. Besides which, five other species have been discovered in other parts of France, imbedded in fresh-water limestone, or in alluvial soil; one of them, P. giganteum, as large as the rhinoceros; and another, P. tapiroides, of the size of an ox.

The second species, or ANOPLOTHERIUM, is somewhat smaller, and has its station assigned between the rhinoceros or the horse on the one hand, and the hippopotamus, hog, and camel on the other. It has forty-four teeth in a continuous series; being in each jaw six fore-teeth; two incisors, not longer than the fore-teeth; fourteen molars; fore and hind feet bifid, with distinct metacarpal and metatarsal bones; and accessory digits in a few. This genus also offers four species, varying from the size of the horse or ass to that of the leopard or elegant gazelle.

There is also another genus of entirely extinct quadrupeds, belonging to the same order, and of still larger magnitude, which M. Cuvier has been able to constitute from remains found in different parts of the world, to which he has given the name of MASTODON. It makes a near approach to the elephant, and in one or two of its species vies with it in size. The ascertained species are five; the largest of which, called the great mastodon, has been found in considerable abundance near the river Ohio; and specimens of whose skeletons have been brought to our own country, and exhibited under the name of MAMMOTH, which, however, is an error; as mammoth is a Russian term, applied to a fossil species of genuine elephant, which we shall notice presently. But the mastodon has in America been confounded with the mammoth. Both have been dug up in the alluvial soil of Siberia. Of the other species, two have been discovered by M. Humboldt in America alone; one both in America and at Simorre in Europe; and one both in Saxony and Monta-

* See also Mr. Kerr's translation of M. Cuvier's Essay on the Theory of the Earth, with Professor Jameson's Notes. Eyo.—Edin.

busard. They are all of less magnitude than the great mastodon; and, from the character of the teeth, there is no doubt that all the species were grazing animals.

The fossil elephant, to which I have just referred, the proper mammoth of natural history, makes a nearer approach to the Asiatic than to the African living species; but it nevertheless differs so much from both, as to leave no question of its being an entirely extinct animal. Various relics of it, as bones and teeth, have been found scattered over almost every part of Europe, as well as in Asia and both Americas; occasionally in our own island, in the Isle of Sheppey, and in Ireland. But they are more common, and in a far more perfect state, in Sweden, Norway, Poland, and especially in Asiatic Russia; and M. Cuvier inclines to a belief that the bones of Archbishop Pontoppidan's giants of the north are nothing more than remains of this animal. The most perfect specimen of this kind that has ever been met with, was discovered, in the year 1799, by a Tungusian fisherman. It appeared at this time like a shapeless mass, projecting from an ice-bank near the mouth of a river in the north of Siberia. Year after year a larger and a larger portion of the animal was rendered visible by the melting of the ice in which it was imbedded; but it was not till five years after the first detection that its enormous carcass became entirely disengaged, and fell down from an ice-crag upon a sand-bank, on the coast of the Arctic Ocean. The greater part of its flesh was soon afterward devoured by the white bear, or cut away by the Juhuts of the neighbourhood, as food for their dogs; yet when, in 1806, Mr. Adams examined it on the spot, and carefully collected all its remaining parts, more than thirty pounds weight of its hair and bristles were gathered from the wet sand-bank into which they had been trampled; and the mass of extremely thick and heavy skin, which was still left, demanded the utmost exertions of ten men for its removal.

The other extinct animals of the same class and order, collected or described by M. Cuvier, are a fossil rhinoceros, sufficiently distinguished from the only two species at present known; two unknown species of the hippopotamus; and two of the tapir.

Of the fossil rhinoceros, the earliest specimens noticed were those described by Grew, and consist of bones dug out of alluvial soil near Canterbury. Since which period, other relics have been traced in various parts of Germany, France, and Italy; while, in Siberia, an entire animal has been discovered, with its flesh and skin little injured. Of the two developed species of fossil hippopotamus, there is a doubt whether the largest, found in the alluvial soil of France and Italy, may not belong to an extant species; but the other, which is not larger than a hog, is strongly characterized, and widely different from either of the two living species of the present day. The two discovered species of fossil tapir evince a like difference of size, the one being small, the other gigantic; while both are found in different parties of France, Germany, and Italy.

All these belong to the pachydermatous or warrior-order of the mammal class, which may, perhaps, be regarded as the richest of all the divisions of fossil animals. But there is no class or order without like examples: and the caves of Gaylenreuth, on the frontiers of Bayreuth, as examined by Esper, have furnished quite as extensive a variety as the quarries around Paris. He has hence derived two entirely extinct species of bear, one of the size of the horse; several species of the dog; one of the cat; and two of the weasel: all of which are possibly extinct, though there is a doubt respecting one or two of them. In these caves alone, indeed, according to M. Esper, the enormous mass of animal earth, the prodigious number of teeth, jaws, and other bones, and the heavy grouping of the stalactites, render the place a fit temple for the God of Death. Hundreds of cart-loads of bony remains might be removed, and numerous bags be loaded with fossil teeth, almost without being missed.

The fossil deer and elk tribe form also a very numerous collection. Among these the celebrated elk of Ireland, dug out of a marl-pit near Drog-

heda, with its antlers of nearly eleven feet from tip to tip,* figures as chief. The finest fallow-deer, red-deer, roes, and stags, belonging to the fossil kingdom, have been found in Scania, Sommes, Etampes, Orleans, or scattered over Europe, in limestone, peat-bogs, or sand pits. M. Cuvier has described seven distinct species, all of which, with the exception of one, are extinct or unknown species. Of the fossil ox, buffalo, and antelope genus, he has given four distinct species, all apparently unknown.

He has also collected fossil remains of the horse and hog genera, without being able to ascertain to what species they belong: and various animals of the order glires or gnawers, as beavers, guinea-pigs, and rabbits, and two decidedly unknown species of the sloth tribe, which he has distinguished by the names of *Megalonix* and *Megatherium*, the first as large as an ox, earliest discovered in limestone caves in Virginia in 1796; and the second of the size of the rhinoceros, hitherto found only in South America. Specimens of the ox-sized have since been found in Buenos Ayres, in Lima, and in Paraguay; and of these three the first, a perfect skeleton, was sent as a present to M. Cuvier by the Marquis Loretto in 1789.

Relics of fossil seals and lamantins, though less perfect than most of the preceding, enter also into this extraordinary collection.

In the other classes M. Cuvier has hitherto made less progress; though his collection of fossil, and apparently unknown amphibials, especially of the crocodile and tortoise tribes, is considerable, and highly interesting, and should his life be spared for ten or twelve years longer, we may have reason to expect these classes to be filled up as numerously as that of mammals.

Among the most extraordinary of the fossil amphibials he has enumerated, is, the gigantic monster first discovered as early as the year 1766, in the limestone quarries at Maestricht, and which was at that time regarded by some naturalists as a whale, by others as a crocodile, and by a third set as an enormous unknown fish. M. Cuvier has sufficiently ascertained that it must have formed an intermediate genus between those animals of the lizard tribe which possess a long and forked tongue, and those with a short tongue and a palate armed with teeth; and it is hence generally regarded in the present day as a monitor, making an approach towards the crocodile. The length of the skeleton seems to have been about twenty-four feet: the head is the sixth part of the whole length of the animal, which is nearly the proportion it bears in the crocodile. The tail must have been very strong, and its width at the extremity have rendered it a most powerful oar, capable indeed of opposing any violence of the waters; and it is hence chiefly that M. Cuvier regards it as having been an inhabitant of the ocean: though we are hereby put into possession of a kind or species far surpassing in size and power any of those which it most nearly resembles, and at least rivalling the magnitude of the crocodile.†

The circumstances under which most of the preceding large and fossil animals have been found, and especially those traced in Siberia, afford sufficient proof that the catastrophe which arrested them must have overtaken them suddenly while in their native regions; and that they could not have been brought into their present situations from a remote distance. And we have

* See Sir Thomas Molyneux's account of this animal in *Phil. Trans.* 1726.

This is the cervus *Eurycerus* of Dr. Hibbert: a name he has applied to it from *Aldrovandus*, who appears to have been acquainted with this species of fossil elk, and has referred to it as common at that time in various soils in the British isles. Specimens, indeed, are still often to be met with in this quarter: and Dr. Hibbert, in the essay now referred to, quotes part of a letter from Dr. Milligan, of Edinburgh, in which he adverts to the skeletons of three great elks that were lately dug up in Ireland, one of which measures eleven feet between the tips of the horns. And he adds, what would seem to show that this species had not been many ages extinct, that near them, in a three feet stratum of marl, were also found the skeletons of three dogs; and, at a little distance, several human skeletons. *Edin. Journ. of Science*, No. V. p. 134. 1825.

† The fossil animals of this class have been since considerably enlarged by other discoveries; among the most curious of which, perhaps, are the *Plesiosaurus* of the late Mr. Conybeare, and the *Megalosaurus* of Professor Buckland. The remains of the last are the most imperfect; though from a large portion of the lower jaw dug up from the soil at Stonesfield, near Oxford, and a thigh-bone found at Cuckfield, in Sussex, Mr. Buckland has been able to ascertain its mode of dentition, as also to estimate that its face must have terminated in a flat, straight, and very narrow snout. Its length seems to have been upwards of sixty feet, and its bulk to have equalled that of an elephant seven feet high. *Geol. Trans. series ii. vol. i. part ii.* The structure of this genus makes an approach to that of fishes, but it has a length and flexibility of

hence facts to show, as we had occasion to observe formerly, that various quadrupeds of the largest size, as the elephant, mammoth, rhinoceros, and hippopotamus, which are now traced in a living state in the hot parts of Asia, Africa, or America alone, formerly existed, as to certain species that have been long extinct, in the highest northern latitudes: and that, consequently, such species must have had such a discrepancy of habit and organization, like the dog and the ox tribes of our own day, as enabled them to endure the difference.

Such, then, is a brief sketch, I will not say of the animal kingdom, but of the most popular arrangements which have hitherto been attempted concerning it. It would have been much easier, and might have been much more interesting, to have extended the survey: but the thread of connexion would then, probably, have escaped from us, and we should have lost the system in the fulness of the description.

Enough, however, and more than enough, has, I trust, been offered to prove that the study of zoology is of a most interesting and inviting character, equally calculated to win the heart, and to inform the head. I have dwelt somewhat more at large upon the three lowest classes of worms, insects, and fishes, for the very reason that these classes have too often been passed over by naturalists, as little worthy of their attention; and because I wished to impress upon your minds, by the incontrovertible fact of living examples, that nothing is low, nothing little, nothing in itself unworthy, in the view of the great Creator and common Parent of the universe; that nothing lies beyond the reach of his benevolence, or the shadow of his protection. God alike supplies the wants and ministers to the enjoyments of every living creature: he alike finds them food in rocks and in wildernesses, in the bowels of the earth, and in the depths of the ocean. His is the wisdom that, to different kinds and in different ways, has adapted different habits and modes of being; and has powerfully endowed with instinct where he has strikingly restrained intelligence. It is he that has given cunning where cunning is found necessary, and wariness where caution is demanded; that has furnished with rapidity of foot, or fin, or wing, where such qualities appear expedient; and where might is of moment, has afforded proofs of a might the most terrible and irresistible.

At the head of the whole stands man, the noblest monument of creative power "in this diurnal scene," and in a state of purity and innocence, a faint image of the Creator himself; connected with the various classes of animals by his corporeal organization, but infinitely removed from them by the possession of an intelligent and immortal spirit; his chief distinction, to the external eye, consisting in the faculty of language, and the means of communicating and interchanging ideas:—a subject full of interest and of importance, and towards which, therefore, I shall beg leave to direct your attention after we have examined this lord of the universe in the different varieties he exhibits in different parts of the world, under the influence of climate, manner of life, and incidental circumstances.

Thus nature varies: man, and brutal beast,
And herbage gay, and scaly fishes mute,
And all the tribes of heaven, o'er many a sea,
Through many a grove that wing, or urge their song
Near many a bank or fountain, lake or rill:
Search where thou wilt, each differs in his kind,
In form, in figure, differs.*

neck like that of the larger birds; and from the form of its paddles, it is probable that, like the crocodile, it swam on the surface of the ocean; an idea which is confirmed by various specimens found on the Dorsetshire coast, where the present writer has seen one or two nearly entire specimens.

* *Præterea genus humanum, mutæque natantes
Squamiferum pecudes, et læta armenta, fæaque,
Et variæ volucres, lætantiæque loca aquarum
Concelebrant, circum ripas fontisque, lacûsque;
Et quæ pervolant nemora avia pervolantes;
Quorum unum quod vis generatim sumere perge,
Invenies tamen inter se differre figuras.*

De Nat. Rer. ii. 342.