CLASSICS TO GO

PETER PARLEY'S WONDERS OF THE EARTH, SEA, AND SKY

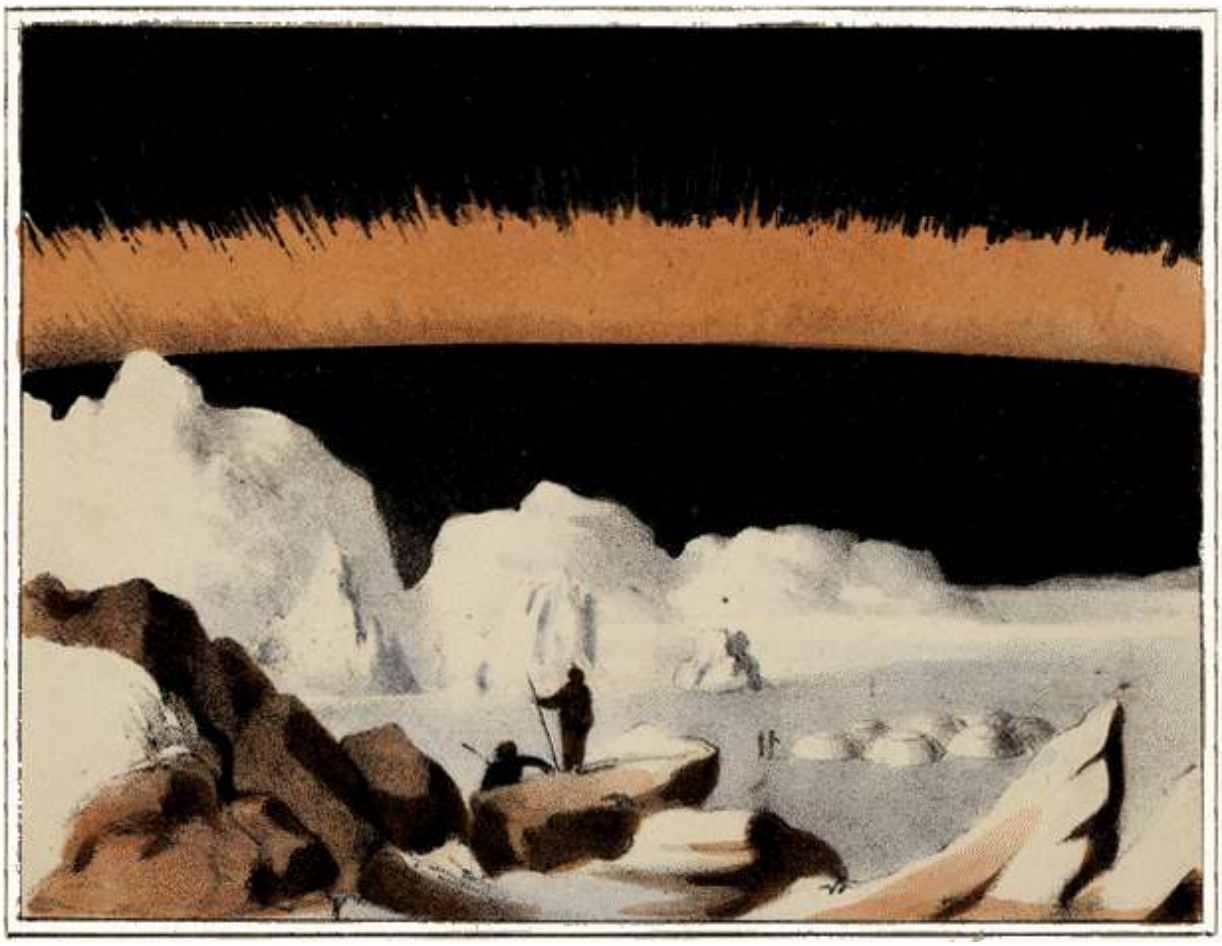
SAMUEL G. GOODRICH

Peter Parley's

Wonders of the Earth, Sea, and Sky

Samuel G. Goodrich

PLATE XVII



AURORA BOREALIS

PREFACE.

It seems to me that there is something very unreasonable in the plan of a great many of the books intended to introduce young people to the various branches of Natural History, which have been recently published. The chief aim of their authors seems to have been to combine brevity with comprehensiveness. Brevity is, without doubt, a great advantage, inasmuch as the proverb is true, that a great book is a great evil; but in my opinion comprehensiveness ought not to be attempted in books intended for children. If it were desirable, I might indeed confidently say, that it can never be obtained within the necessary limits; and the attempt to effect it, will very often reduce the work to a mere dry table of classification. However neat and systematic tables of genera and species, and lists of names may look, they can never convey to the young the elements of sound scientific method; and will seldom fail in being useless or disgusting to the mind, at an age when it is seeking for that sort of knowledge which will exercise the understanding, without burdening the memory. This healthy appetite ought to be carefully cultivated; and I am satisfied that if it were so, from the earliest stage of education, we should have but few complaints of bad memories. The memory is apt to vanish from those who would make an idol of it; and I am disposed to think that its cultivation may very safely be omitted, as a direct object of education, if due care is taken to keep the understanding active, and to present the matter on which it is to be engaged in the most entertaining form possible. In fact, what is often termed "a good memory," that is, a ready recollection independent of

the connections which are made solely by the understanding, is, as we may see by its fruits in many persons of feeble intellect, by no means desirable. An apt example of such a memory is afforded, in what Dame Quickly says to Sir John Falstaff, when she reminds him of a mixed multitude of unimportant circumstances, with no other principle of arrangement or connection, than what was supplied by proximity of time and place.

I would not, however, willingly be supposed to recommend books, in which systematic arrangement, or the most scrupulous regard to accurate statement, is overlooked. I had particularly in view that numerous class of little books, which under various names come out in series, each volume professing in a manner to comprise *the whole* of the branch of Natural History which may be the subject of it, by its containing a mere arrangement of the names of the phenomena which the branch includes. There is another and widely different class of books, in which stories from travellers and other idle gossip of the like kind, are compiled in an undigested mass, without regard to the different names by which the same thing may be called, and not unfrequently to a common respect for truth, which is not much less to be deprecated.

And yet to books of this latter description, often of a very unworthy character, it is that many of us owe the first calling into consciousness of that taste which may have made us travellers or naturalists, or lovers of knowledge. I wish that, without copying the example of their authors, we should learn a lesson from them, and put it in practice, by striving to form a taste to enjoy knowledge in them we have to teach, before we attempt any mode of systematic instruction.

The following little book has been written under the impressions which I have here stated. I have selected a few

of such phenomena of the Kingdoms of Nature, as seemed to me to have in them most to excite wonder and admiration; and I have sought to convey distinct notions with the least possible use of technical language; neither forgetting the connection of things, nor overloading the statements with matters that are merely expletive of an arbitrary system. How far I may have succeeded, is for my little friends, and their instructors, who have approved of my other books, to decide. Wishing the former as much pleasure in the reading, as I have had, for their sakes, in the writing, I take my leave of them.

P. P.

List of Plates.

PART I.

WONDERS OF THE EARTH.

CHAPTER I.

PARLEY EXPLAINS HOW THE STRATA OF THE EARTH ARE PLACED.

I am now going to tell you, my young friends, about some of the wonderful things in the earth, sea, and sky. A great number of them I have seen myself in my travels through various countries, and others I have only read of; but I shall tell you nothing that is not strictly true, for I do not wish so much to astonish you as to make you take pleasure in contemplating the works of God, and to increase your knowledge of His goodness, wisdom, and power.

I shall begin with some of the wonders of the earth which, as I suppose you know, belong to the branch of natural history which is called geology; and to enable you to understand what follows, I must first explain how the materials which compose the ground you tread upon are arranged.

If you hastily travel over any extensive tract of country, such as that between New York and Philadelphia, or between London and Bristol, you might think that all the different substances, clay, chalk, limestone, and granite, were irregularly mixed together. This is, however, not the case, when taken on a great scale; for if you more carefully examine, you will find that the various sorts of earth are disposed in layers, or *strata*, and that a uniform order of arrangement is nearly preserved.

If these layers were perfectly horizontal, laid one over another like the coats of an onion, we should have to dig through one before we could get to the second, and our knowledge of what the globe consists, would be much more

limited than it is; for the greatest depth to which men have descended in the deepest mines, is not much greater than the thickness of one of the strata.

But, instead of this, the surface is broken up by some force from beneath elevating portions, so as to form mountains and hills; and in consequence of this the edges of the strata appear on the surface one after another; just as you would see the edges of a row of bricks that had been set up on their ends, and then the last one thrown down so as to push down all the others.

This is the way in which the strata are placed in the neighbourhood of Weymouth.

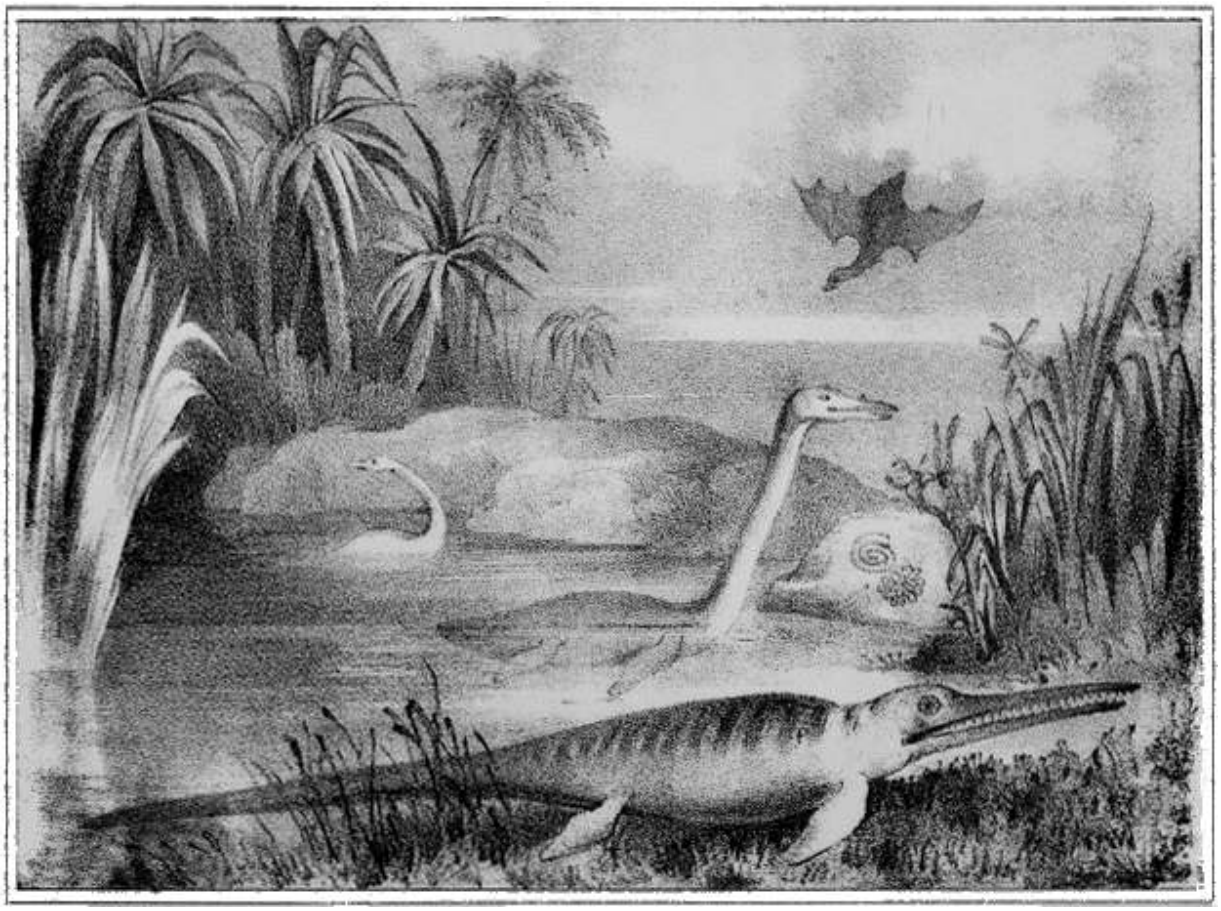
The chief reason why I wished you to understand this is, that you may see how it is known that one stratum is older than another. It is evident that the substance marked *a*, in the section, which is limestone, must have been deposited before *b*, while *b* must certainly be older than *c*.

Now in most of the strata above the granite, which is nearly always in the position of the oldest formation, there are found various shells, plants, and bones of animals; and where certain remains of different animals or vegetables are found in one stratum, it is concluded that they must have been living about the same time.

Most of the animals of the older strata were different in form from any at present known to exist; and some of them

are very remarkable, and if they were alive now, would seem to us very strange and awkward.

PLATE I. *p. 5*



EXTINCT ANIMALS.

CHAPTER II.

WHAT CREATURES ONCE LIVED WHERE DORSETSHIRE NOW IS.

I will show you a picture of what creatures were once living where the town of Lyme Regis, in Dorsetshire, now stands, and tell you something about their structure and their habits. You may perhaps be ready to think that a great deal of what we profess to know concerning them, is the work of fancy, but I can assure you it is not, and by and by I will endeavour to convince you that there is reason enough for you to believe what I tell you.

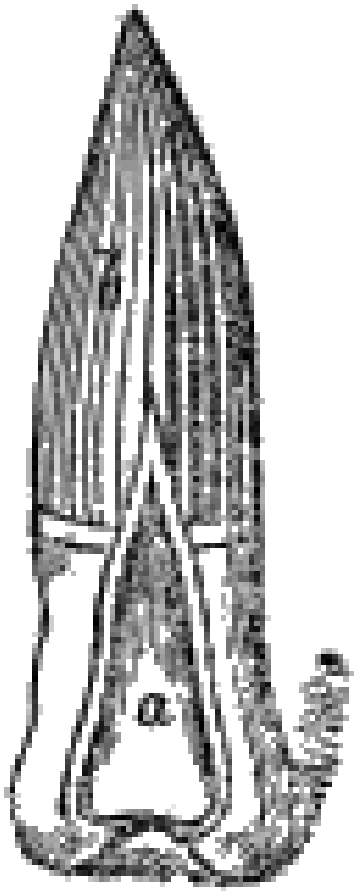
THE ICHTHYOSAURUS.

That large animal lying on the ground, is called the *Icthyosaurus*, from two Greek words signifying *Fish-Lizard*, in consequence of his possessing some of the peculiarities of both fishes and lizards.

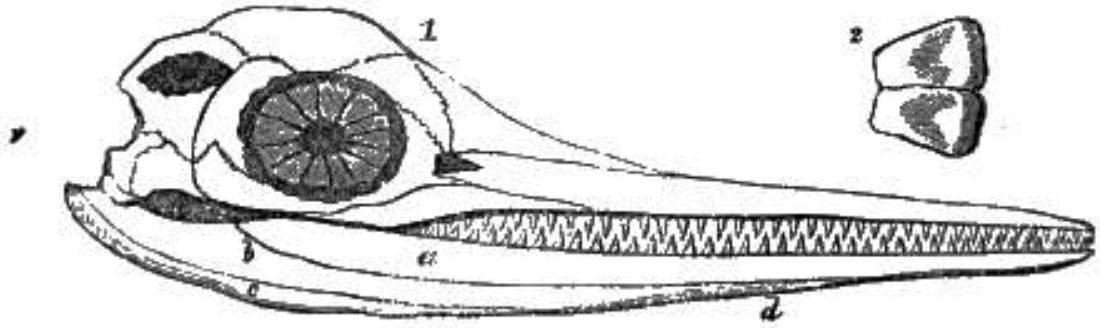
The usual length of this creature was from twenty to thirty feet. It possessed a most surprising combination of the powers and qualities of different animals which are now in existence. In its general form and character it must have been something like the modern porpoise; but it had the teeth of a crocodile, the head of a lizard, the back-bone of a fish, and the fins or *paddles*, of a whale.

I shall spend some little time in explaining to you each of these particulars, that you may see how wisely all the parts of living things are framed to supply their wants, and adapt them to the circumstances in which they are placed.

The head was not very different from that of a crocodile, or lizard, in its general shape. The teeth were precisely like those of a crocodile, and grew up in the same manner. Creatures of this sort lead a ruffian sort of life, always biting something or other, and as they live very much in the dark at the bottom of the water, perhaps now and then snap at a stone or a piece of hard wood by mistake, and often break their teeth; and in order therefore to keep them in constant repair, they have a fresh set once a year, or at very short intervals, so that they are always growing. The young tooth *a*, springs up inside the old one *b*, till it becomes so large that it splits its predecessor, and the pieces fall off, just as the covering of some sorts of buds falls off as the flower expands, as you will see in this cut, representing one of the fossil teeth.



You must have noticed in the picture the great length of his snout. In a jaw-bone of such amazing length which was to be applied to such violent purposes, it was necessary there should be great strength. There were two ways of obtaining this: one would have been by having the bones very hard and stout; but this would not do, because they would then have been so heavy that the animal would have found difficulty in raising his head to the surface of the water for the purpose of breathing, since it would have overbalanced the other part of his body. The other contrivance, which was the one adopted by the wisdom of the Creator, was to make the jaws consist of several thin bones, *a*, *b*, *c*, *d*, strongly bound together, and terminating in succession like the plates of steel of which a carriage spring is made. There are accordingly six of these bones thus disposed.



But this was not all, the principal middle bone marked *b*, instead of having its fibres run straight, parallel with the others, had them placed in a slanting position, and thus there was additional firmness given to the jaw by what ship-builders would call *diagonal bracing*, a contrivance that you may often see used in the construction of houses and ships.

If you have ever seen a crocodile open its mouth, and then snap together its long thin jaws, so as to make you start with the noise, you will see how necessary all these contrivances must be for him and the Icthyosaurus, whose

jaws were still thinner, to prevent them from breaking their bones.

This however is not at all more wonderful than the eye, which in the old-fashioned animal I have been describing, was much larger than that of the crocodile, and not unfrequently bigger than a man's head. From the very great quantity of light which such a large surface would receive, the creature's power of seeing must have been very great. And besides this advantage, it had the same faculty as is possessed by the golden eagle, the turtle, the tortoise, and the lizard, of pressing the eye forward to render it more convex. In man and most animals, the eye is placed in a fixed cavity of thin bone, something like an egg-cup, but in the Icthyosaurus, the cavity was formed by several bones not quite touching each other; (as you may see in the last cut, and in figure 2, you have two of the bones by themselves, taken out of the socket of the eye;) and there were muscles to draw these bones closer together; so that by making the cup less deep, the eye was thrust forward and made to swell out in the middle. This is illustrated in the ball *b*, which is pressed outwards, by drawing the plates of bone *cc*, together at *o*, close than those which have the ball *a* between them.

You must have seen that the more convex magnifying glasses are, the more they magnify, and the nearer you must hold them to the object you are looking at. By this contrivance, the eye of the Icthyosaurus could be made at pleasure into a microscope, so as to see with wonderful quickness things which were quite close to it, by pushing it forward and rendering it more convex; or it could be made

into a telescope like the eyes of some persons who are long-sighted, for seeing what is at a greater distance, by drawing it back.

In all these particulars you may see how the skill of man leads him to adopt the same plans to produce the same ends in the works of art, as God has adopted before him in the works of nature, without his being conscious of copying them; and this should remind you that man was created in the image of his Maker. If man had never made a carriage-spring, or a diagonal bracing, he would not have understood the structure of the jaw of the Icthyosaurus; and if he had never invented the telescope, he would not have been able to explain the construction of the eye.

You have now seen the points in which the Icthyo-saurus chiefly resembled a crocodile or lizard; from which the latter half of its name is derived, *saurus*, *a lizard*. I must now tell you something of those parts in which it is like a fish, from which it takes the other part of its name, *icthy*, for *icthus*, a fish.

You know that crocodiles live a good part of their time on land, and they therefore have feet and a back-bone like land animals, which enable them to walk better, but do not allow them to swim so well as fish. The back-bone is heavy and firm, and each of the bones composing it has one side slightly hollow, and the other side swelling out to fit into the hollow in the one that comes next to it. But in fish both sides of the bones are hollow, and they are joined together by gristle, as you can easily see in the fish that are commonly eaten; this renders the back-bone much more flexible and lighter, and therefore better adapted for an animal always swimming. That of the Icthyosaurus was formed in the same manner, and we therefore judge that he spent his whole life in the water; for a back-bone so formed,

would not have been able to support such a great heavy body when walking on the land.

The fins, or paddles, were very curious, and much like those of the whale; they consisted of above a hundred small bones strongly united together, in a sort of pavement enclosed in a strong skin, and not divided into toes, as you may observe in this representation of the entire skeleton.

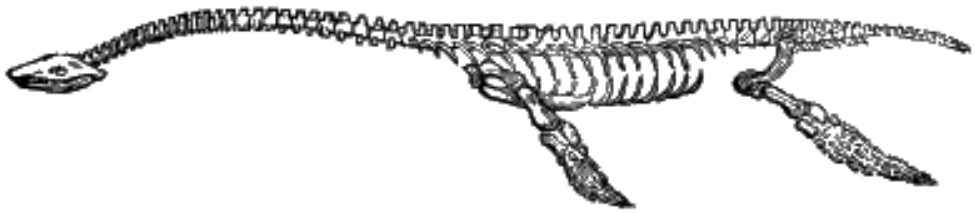
You may see many specimens of the skeleton itself in the British Museum.

The Icthyosaurus was a great tyrant, and used to prey on every creature that came within his reach; this is known by the fossil remains found in the inside of his body. He used at times even to act the cannibal, and eat his own relations, for a large one has been dug out of the cliff at Lyme Regis, with part of a small one in his stomach undigested; he must have been altogether a very unamiable character. But as his family has been so long extinct, and we are told that we ought to say nothing but what is good concerning the dead, I shall not say any more about him, leaving you to form your own conclusions from what I have related to you.

THE PLESIOSAURUS.

Those still more strange looking animals with very long necks, which are represented swimming in the water, have been named *Plesiosauri*, a word signifying, *related to*, or *closely resembling*, a lizard. There are some nearly perfect specimens in the British Museum, and this is a

representation made up by taking the uninjured parts of several, so as to make up a perfect whole.



Taking it altogether, there is not one of the fossil animals so much unlike anything at present known to exist. Its usual length was from 9 to 15 feet, but it was at times very much larger.

The head was much shorter in proportion than that of the Icthyosaurus, being more like that of the guana, the lizard which people eat in the West Indies. The neck must have been longer than that of any living animal, not even excepting the swan; it contained thirty-three bones, or *vertebræ*, while the whole of the rest of the back-bone in the body and tail, contained only fifty-seven.

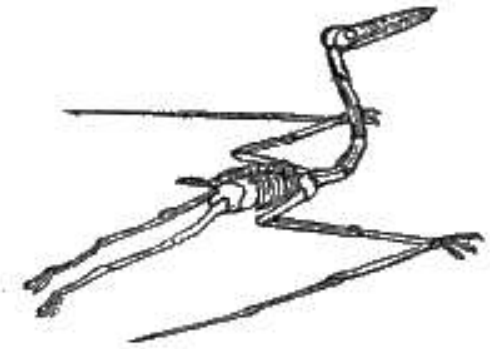
The faces of these vertebræ were nearly flat, and not hollow like those of the Icthyosaurus, which would better enable the animal to exist on land, and it appears to have moved about in the same manner as seals do. From some very ingenious observations on certain parts of its anatomy, (which if I were to endeavour to explain to you, you would not understand, unless you possessed a great deal of anatomical knowledge,) naturalists have supposed that it used to change the colour of its skin like the chameleon. Its paddles were almost exactly like those of the turtle, and its body was something of the same shape, but not quite so wide.

From its long neck, which, although it was strengthened by the solid joints and peculiar shapes of the bones, was not very strong, and its small head and jaws, the Plesiosaurus

could not have been near a match for its neighbour, the Icthyosaurus, in combat, even when the individuals were of the same size; neither would its form adapt it for cutting through the water so quickly. It must, therefore, no doubt, have often fallen a prey to that voracious monster. Perhaps, however, it often played him a trick when he was pursuing it by running on shore out of his reach; or it might mostly have kept out of his way in very shallow water amongst the rushes and reeds, where it could every now and then dart its long neck like a swan, down at the little fish that came near it; or else suddenly reaching aloft into the air, it may have seized upon some unlucky insect, or Pterodactyle, (a sort of bat of which I shall presently speak) and then laid down as quiet under the rushes as if nothing had happened, waiting for its next mouthful.

THE PTERODACTYLE.

That odd-looking creature which is flying in the air over the heads of the Plesiosauri, has been called the Pterodactyle, which signifies *wing-fingered*. There were several varieties, of different sizes and figures, from that of a snipe to that of a raven. The most remarkable of them was indeed a curious creature, and so you will say if you look at the picture of his skeleton.



He was more like a bat in his general shape and habits, than anything else we know of, but was very different in a

great many respects.

He had a head like a lizard, with a long snout and sharp teeth; his ribs were round and thread-like, not flat like those of birds and bats; his eyes were large; and his wings like a bat's, being a membrane or skin, stretched out by one very long toe on each of his fore-feet. In order to support his long head, there were strong cords running down each side of the vertebræ of his neck, such as are found in some modern birds, as is known by the forms of the bones to which the ends of them were attached. His toes ended in sharp claws, and he had also claws at his two principal joints, so that he could catch hold of the branches of trees with them, as bats do. These creatures used principally to feed upon large dragon flies, beetles, and the other insects, of which the remains are found, and some of which are represented in the picture.

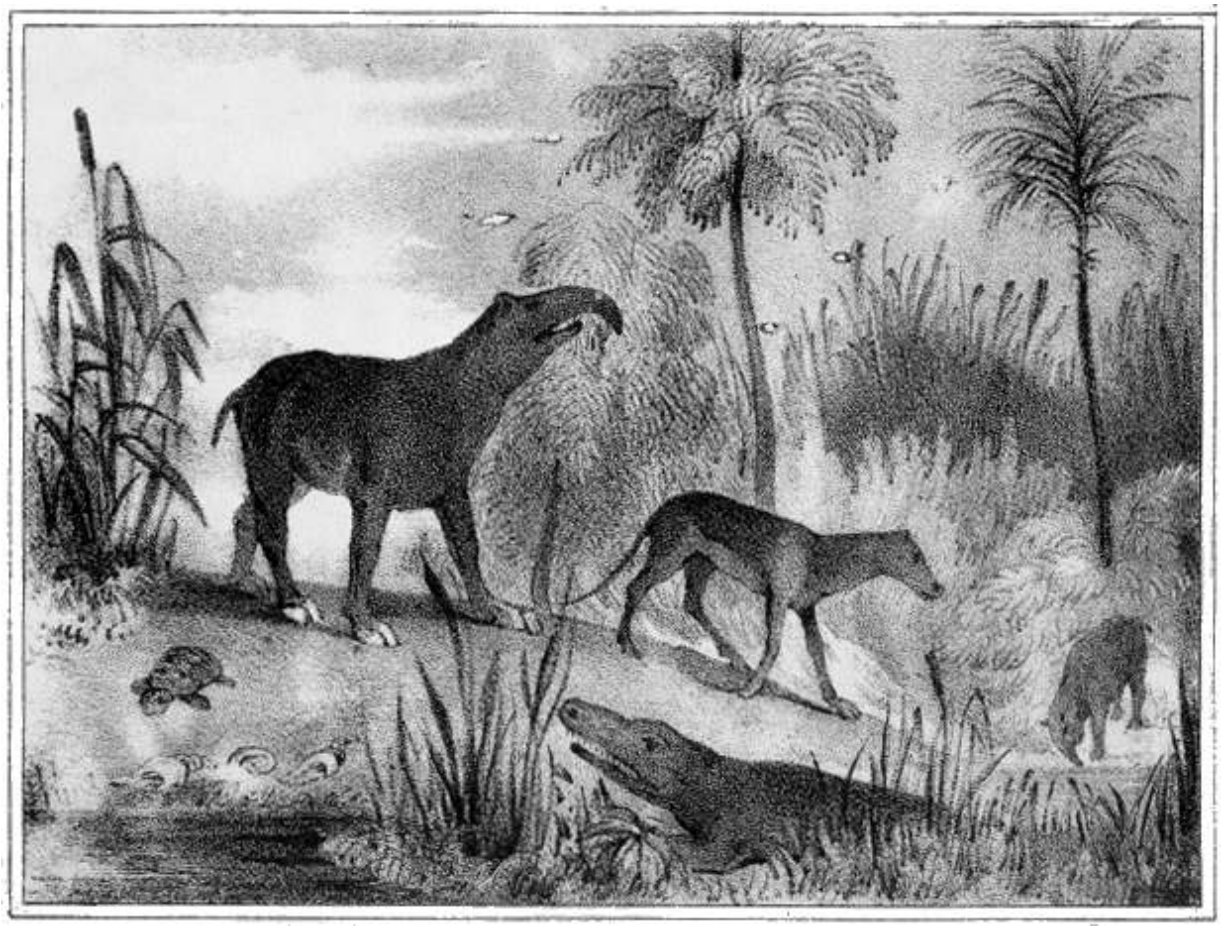
There were also living at the same time with these creatures, several kinds of tortoises, and fish in immense varieties. The whole district where the south coast of England now is, seems to have then been a marsh with no vegetation but sea-weeds, reeds, and the like; and its only inhabitants were, fish, reptiles, and insects.

After the races of animals which we have mentioned, became extinct, a period followed in which they were succeeded by some monstrous creatures, like lizards in all respects, except that they were fitted to live in the water by the construction of their back-bone, their having lungs of the same kind as those of fishes, and the possession of fins. One of these, called the Iguanodon, was sometimes seventy feet long. It had a little horn near the end of its snout, placed something like the horn of a rhinoceros, and must have borne considerable resemblance in its general form to the guana, which I mentioned before. Their bones and teeth, are found at Lewes, in Sussex, and in the Isle of Wight,

where you may pick them up on the shore, as you can the bones of Icthyosauri and Plesiosauri, at Lyme Regis, though not in such great numbers.

We are indebted for a great deal of what I have told you about the animals that once lived where Dorsetshire is now, to a lady, Miss Anning, who spends nearly her whole time in collecting fossils out of the cliffs. No one ought to go near Lyme Regis without visiting her collection.

PLATE II. *p. 21*



EXTINCT ANIMALS.

CHAPTER III.

WHAT SORT OF A PLACE ONCE EXISTED WHERE THE NEIGHBOURHOOD OF PARIS IS NOW.

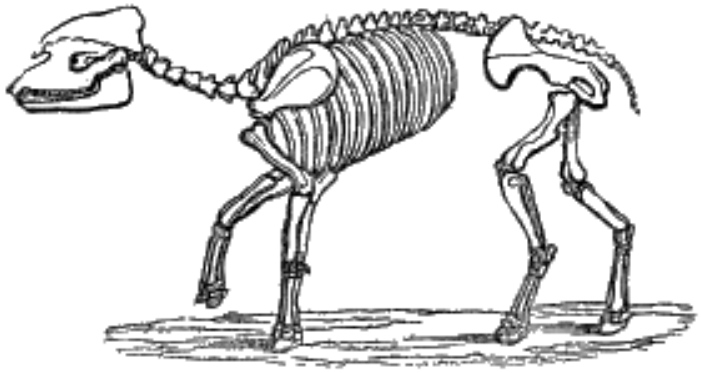
I shall show you a picture representing a state of things much more like the present, than the one we looked at before. It existed at a later period, though still a great many years ago; and if you wish to know why we conclude it to be later, since it is the other side of the water and we are therefore prevented from distinctly tracing the succession of the strata, I will tell you.

After leaving the formations of Dorsetshire, in which the great *saurian* or lizard-like reptiles are found, we come to chalk in Hampshire and the Isle of Wight; and after the chalk, to some beds of clay, and then some beds of limestone. The formations above the chalk, are those called *tertiary*; those from the chalk down to the lowest containing animal and vegetable remains, are the *secondary*; and all below that, consisting mainly of various sorts of granite, are the *primary*.

Now all this occurs in the same order in France, and the neighbourhood of Paris consisting of tertiary formations, just corresponds with the tertiary strata of the Isle of Wight, and them we know to be more recent than the secondary formations of Dorsetshire. Of course, therefore, the animals found at Paris, must be more recent than those found at Lyme Regis.

The largest of the animals represented in the plate, is called the Palæotherium.

The following is a picture of his skeleton, as it has been made out, bone by bone. A single tooth was first discovered, and the French naturalist, Cuvier, was able to determine from this alone, a great many particulars which have now been proved by the subsequent discovery of the bones; such was the knowledge he had acquired by comparing the bones of different animals. He thus discovered that a certain shape of tooth always accompanied a certain shape of foot, as well as indicated what kind of food the animal lived upon. From this might be judged a great deal about the organs of digestion, and the internal structure, and something of its habits and disposition. In all these points and several others, Cuvier predicted from a single bone of the Palæotherium, what has been exactly confirmed by the entire skeleton.



It was about the size of a small horse, and must have possessed a little trunk, or proboscis, like the modern Tapir, to which indeed it must have borne a great resemblance.