

XI. *On the mode of formation of the canal for containing the spinal marrow, and on the form of the fins (if they deserve that name) of the Proteosaurus.* By Sir EVERARD HOME, Bart. V. P. R. S.

Read May 4th, 1820.

THE last communication respecting the bones of the Proteosaurus which I laid before the Royal Society, contained so many important facts connected with the skeleton, that there was no room left to hope, I should ever again call the attention of its members to this subject.

Yet such has been the exertion made by some persons employed by Colonel BIRCH, to explore the cliffs at Lyme, in search of fossil organic remains, from an expectation that they will receive the full reward of their labours, that many new specimens have been lately collected; in one of these which Colonel BIRCH has submitted to my observation, several bones are met with that have not been described, and which give a very important character to the vertebræ, and also form a more complete set of the bones of the fin. Of these I shall give a description, where their appearance is not sufficiently illustrated by the annexed Plate, (Pl. XV.)

Although the bodies of the vertebræ of this animal have been more frequently met with than any other bones, the manner in which the canal for the spinal marrow is formed, has not till now been made out. In this specimen we find

in what manner that is done, and in this as well as in many other particulars, the skeleton differs from that of other animals.

In all the lizard tribe, the vertebræ, like those of other quadrupeds, consist of a body, two transverse, and one spinous process, surrounding a central hole, which forms the spinal canal; the vertebræ of the different tribes of *Proteus* have the same structure, as is shown in a Plate annexed to my former Paper upon that subject. In cartilaginous fishes, the mechanism is very different; the bodies of the vertebræ, properly speaking, form the spinal column; and the canal for the spinal marrow is surrounded by separate cartilages, united to the vertebræ, by projections fitted to corresponding notches in the side of each vertebra. Through the whole length of the tail, a similar canal is formed upon the under edge of the vertebræ, in which are contained and defended from injury, the great artery and vein. In the fossil remains of the shark tribe, the bodies of these vertebræ are very frequently met with, and have hitherto been readily distinguished from all others by these peculiarities.

The structure of the vertebræ of the *Proteosaurus*, is something intermediate between the two kinds which I have described. It is composed of bone, as in the lizard tribe, but consists of a body only, behind which is a canal for the spinal marrow, and the spinous process with two lateral branches which belong to it, quite distinct from the body of the vertebra, and between these there is no bony union, but a species of joint peculiar to themselves; the canal thus formed, defends the spinal marrow from injury, equally as when the whole vertebra is in one piece; it is unusually small. The

bodies of these vertebræ, when met with without the spinous processes, have so close a resemblance to the vertebræ of the shark in a fossil state, that they have till now been mistaken for them ; and I found several of them preserved in the HUNTERIAN Collection, marked as belonging to that fish.

The particular structure which I have endeavoured to describe, will be more readily understood by a reference to the annexed Plate, (Pl. XV.) in which it is very accurately represented.

In the same figure in which the manner of setting on the spinous process to the vertebra is shown, there is (what I have never before met with), one of the feet paddles or fins, (for it is difficult to say which of these names is the most proper), in which the bones are nearly complete ; for although some of the smallest are wanting, there are quite enough to give a tolerably exact figure of the outline ; of this no other specimen has afforded the most distant idea. This outline certainly has more resemblance to that of a fin, than to any of the fore feet of the tribe of lacerta, or the seal, or even the turtle ; and, what is the most remarkable circumstance, there is nothing in any way correspondent to the thumb, or claw for laying hold, which distinguishes the animals that occasionally inhabit the sea, and come ashore for the purpose of laying their eggs, or depositing their young. It certainly has the appearance of a fin ; but if in future it is to be designated under that name, it is always to be understood that this fin, contrary to every thing hitherto known in nature, is made up of bony materials ; and it is from the great number of bones of which it is composed, and the correspondent

number of joints by which these bones are united to each other, that it is enabled to perform the office of any thing resembling the fin of a fish.

In the whale tribe, they are not properly fins, (although they cannot deserve any other name) as they contain the same series of bones as in the seal; and yet no reason can be given why that is the case. In the *Proteosaurus*, which partakes more of the fish than of the whale tribe, there is probably a greater degree of nicety of adjustment of motion wanted than in the whale, and consequently a greater subdivision of parts, to compensate for the unyielding materials of which these parts are composed; and in this instance there are more than two hundred bones, which must greatly exceed the number of cartilages met with in the fins of the shark.

The facts shown in this specimen, it will be admitted, are of considerable importance, in making us more intimately acquainted with the skeleton of this most extraordinary animal. The second figure contained in the same Plate, (Pl. XV.) is of a less interesting nature, because the parts have been repeatedly shown upon former occasions; and although there is sufficient resemblance of parts to give the idea of this figure belonging to the same skull as the other, on which the facts that have been detailed have their dependance, if that is admitted, much intervening substance must have been lost. In this figure, the teeth are better seen than in any other that I have examined; they are distinctly grooved on their surface up to their points, and are firmly fixed in the jaw, so that they are all preserved in their proper place.

The section of the nose, represented in Pl. XVI. shows that the nostrils are continued on to the point of the nose, and

the section of the teeth determine their mode of growth to be the same as in the crocodile.

At the close of this paper, I have much satisfaction in stating, that the bones of the pelvis, the only ones not yet described, have at last been brought under my observation, in a specimen found at Watchet, in Somersetshire, and lately purchased for the Museum of the Royal College of Surgeons in London. The specimen is four feet six inches in length, and in consequence of the bones having been little disturbed, is in all respects more complete than any other specimen that has been met with. The bones of the pelvis are, however, in this specimen too much pressed upon one another to admit of a satisfactory drawing being made of them; but they resemble so closely those of the crocodile, as to make any representation unnecessary.

All the fossil bones of the proteosaurus which I have described, belong to the same species; but I have seen bones of another species, which differs from this in the following particulars—the upper jaw is much longer, narrower, and comes more to a point; the teeth were so loosely fixed in the jaws, that hardly any are met with in their sockets; that part which had been enclosed by the gum was grooved; the other portion is very slender, has a polished surface, and comes to a sharp point.

The long bone belonging to the anterior fin in both species is as large again as that belonging to the posterior, but both these bones are flatter and longer in the new species; and where articulated with the two small bones of the fin, send a short process between them; there is also a deep notch on the outer or lower side of one of these two small bones.

EXPLANATION OF THE PLATES.

PLATE XV.

This Plate consists of two figures, representing portions of the skull, jaw, and other parts, of the natural size.

Fig. 1. A portion of the skull behind the orbit. The two principal objects in this figure are, the mode of articulation of the spinous processes with the bodies of the vertebræ of the back, forming the canal in which the spinal marrow is contained; and the fin of this animal in the most perfect state yet discovered, one hundred and seventy separate bones remaining in their natural situation.

Fig. 2. Shows the anterior portions of both jaws, which appear from their size to have belonged to the same skull as Fig. 1, having been found in the same situation; allowance must however be made, for a considerable intervening portion having been lost.

PLATE XVI.

Represents a transverse section of the nasal bones, of the natural size.

This is the only opportunity that has offered of seeing the cavity of the nostrils.

The teeth and their sockets in both jaws were accidentally divided in making the section of the nose, and their internal structure exposed, from which it appears, that the mode of growth is similar to that of the crocodile; the succeeding tooth filling up the cavity of that which preceded it.

Fig. 2.

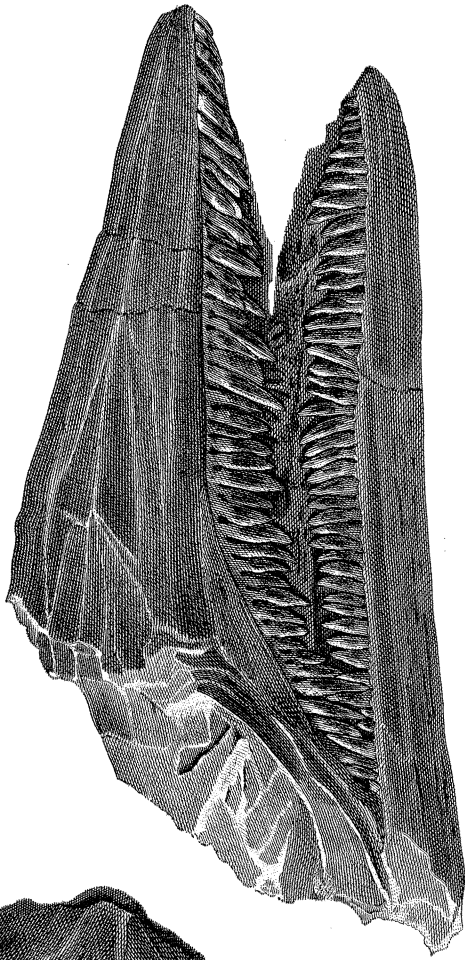


Fig. 1.

