

Fig. 2.

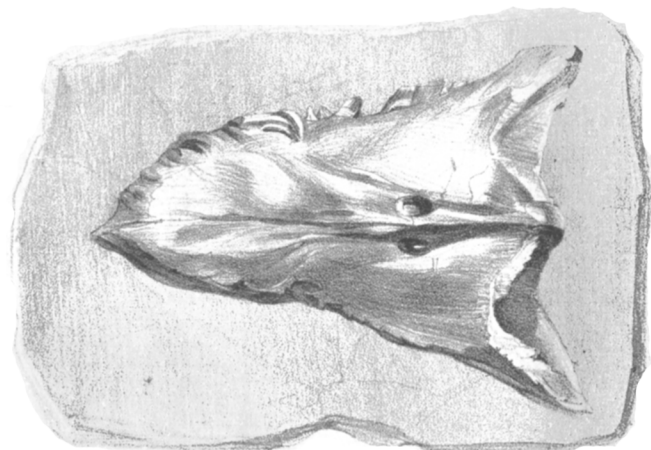


Fig. 4.



Fig. 3.



Fig. 1.



MAY 20, 1846.

The Rev. J. G. Cumming, M.A., Vice-Principal of King William's College, Isle of Man, and C. H. L. Woodd, Esq., were elected Fellows of the Society.

The following communications were read:—

1. *Description of a New Species of PLESIOSAURUS, in the Museum of the Bristol Institution.* By SAMUEL STUTCHBURY, Esq., F.G.S. &c.

PLATE XVIII.

THE animal about to be described in the following pages was discovered in the grey lias, which is largely quarried throughout Somersetshire for building-stone and other economic purposes.

The remains of Enaliosaurians are distributed through the whole Liassic period, and it has been observed in the majority of cases as relates to the two genera Plesiosaurus and Ichthyosaurus, that specimens of the first-named genus are mostly found lying upon their backs, while the Ichthyosauri are generally lying upon their sides; but in a few instances the parts of the skeletons of both have become dislocated and detached from one another, not even retaining in any manner their relative position.

In the first of these cases I imagine, that after the death of the animal, gases, evolved principally among the abdominal viscera, have been retained by means of the tough dermal covering, aided by the support of the sterno-costal arcs, and the body becoming gradually water-logged, was quietly deposited on the muddy bottom and afterwards silted up*.

The fact of the Ichthyosauri possessing a more fish-like form, the depth in their supero-inferior diameter being greater than their lateral width, accounts for their being so constantly found lying upon their sides; and the occasional dislocated condition to which I have alluded results from their tough integuments having held together until the interior of the body was so much macerated as to disunite the whole skeleton, which would then be similar to a number of loose bones held in a bag or sack.

But as these animals generally appear to have been quietly deposited, it would seem that they must have been protected in some manner from the attacks of their own predaceous race, as well as from those of the fishes, of which numerous remains attest the existence during that period; and these saurian remains appear also to have belonged to individuals of all ages. Hence the opinion has arisen, as noticed by Dr. Buckland, that these creatures experienced a violent death.

* Since this paper was read, the author's attention has been directed to a notice in the Geol. Trans., 2nd series, vol. v. p. 513, by Professor Owen, and he finds that he has used arguments very similar, respecting consequences after death, to those used by that author.

If we suppose some sudden diffusion of mephitic gas through the waters, produced by submarine volcanic action, this would be a cause sufficient for the immediate destruction of all animals within its influence, and during its continuance would also prevent other animals entering within its poisonous precincts, thus allowing time for the dead bodies to be quietly deposited in the manner before suggested.

To these or some such causes and effects we are indebted for the means of examining the remains of the Enaliosaurians in the very perfect condition in which they are generally found.

In the descriptive detail which the admirable state of preservation of the specimen before us enables me to give, I shall adopt the nomenclature of Professor Owen *, as being most applicable to this particular order.

PLESIOSAURUS MEGACEPHALUS.

Animal with spinal column consisting of ninety-four vertebræ in the following divisions:—cervical twenty-nine, dorsal and lumbar? thirty-four, sacral and caudal thirty-one. Total ninety-four.

Head large, in length equal to two-thirds that of the neck, and one-sixth of the whole length of the body.

The whole length of the animal from the anterior portion of the muzzle to the posterior extremity of the tail, measured along its curvatures, is sixteen feet three inches.

The superior portion of the head, posterior to the orbits, is so much crushed as to prevent any examination.

The teeth, of which more than sixty can be counted in the two jaws anterior to the line of the orbits, are finely striated towards their apex in the young state, but perfectly smooth in the matured teeth.

The sixth tooth from the front in the lower jaw outside the socket is in length 1 inch $\frac{8}{10}$ ths, and the diameter at the base $\frac{6}{16}$ ths inch.

In this specimen there is an inner row of small mucronate teeth situated parallel to the principal or external teeth †.

The *columellar bone* is in this specimen clearly displayed, and is separated at its superior extremity, and slightly shifted at its inferior, now lying on the same plane as the whole inferior surface.

* *Vide* Report on the 'British Fossil Reptiles,' laid before the British Association in 1839.

† Professor Owen regards these as the young teeth in progress of growth, and describes them as follows:—"The germs of the successional teeth are developed at the inner side of the bases of the old teeth, but do not penetrate these teeth; the apices of the new teeth make their appearance through foramina situated at the inner side, and generally at the interspace of the sockets of the old teeth. Here, therefore, the growing teeth may be included in closed recesses of the osseous substance of the jaw, and emerge through tracts distinct from the sockets of their predecessors."—*Odontography*, p. 285.

And again,—“The dentition of the Plesiosaurus differs from that of the Crocodile, inasmuch as the new tooth, instead of emerging from the pulp-cavity of the old tooth, or even from the same socket, protrudes its apex through a distinct foramen at the inner side of the alveolus of its predecessor.”—*Ibid.* p. 282.

The *Pterygoid*, as seen from the inferior surface, remains nearly in place, its posterior extremity being in contact with the articular bone of the lower jaw.

	ft.	in.	10ths.
Length of the lower jaw from the anterior part of the muzzle to the end of the articular bones	2	8	0
Inferior surface of the head from the muzzle to the basi-occipital... ..	2	0	5
Ditto ditto to the anterior wall of the nasal openings.....	1	6	0
Length of the symphysis of the lower jaw	5	6	
Breadth of the widest part of the muzzle	5	2	
Widest part across the occipital region.....	1	3	5
Superior surface of the head; from the muzzle to anterior part of the nasal openings	9	6	
Antero-posterior length of the nasal opening	1	1	
Width of the nasal openings		5	
Distance between the nasal openings	1	1	
From the anterior part of the muzzle to the anterior wall of the orbit	11	5	
Columellar bone, length	5	7	
Ditto, diameter		6	

Cervical vertebræ.—Twenty-nine in number.

Nos. 1 and 2 appear to be anchylosed.

No. 3, antero-posterior diameter	1	2
Distance between the inferior point of the neurapophysis to the superior margin of the articular facet for the reception of the cervical rib.....		5
Vertical diameter of the articulating facet		7
Nos. 4, 5, 6. Antero-posterior diameter	1	2
Height or length of neurapophysis	2	2
Nos. 7, 8. Antero-posterior diameter	1	2
Nos. 9 to 13. Ditto ditto	1	4
Nos. 14, 15. Ditto ditto	1	5
No. 16. Ditto ditto	1	7
Distance between the inferior point of the neurapophysis to the superior margin of the articular facet for the reception of the cervical rib		6
Nos. 17, 18. Antero-posterior diameter	1	7
Height or length of neurapophysis	2	6
Height or length of spinous process above the neurapophysis... ..	1	8
No. 19. Antero-posterior diameter	1	9
Distance between the orifices of the vascular canals		8
Nos. 20 to 26. Antero-posterior diameter	1	9
Articulating facet distinctly separate into two, superior and inferior.		
Nos. 27 to 29. Antero-posterior diameter	2	0
Vertical diameter of the centrum of the vertebra	3	2

The inferior surface of the neurapophysis of the twenty-ninth vertebra is extended outwards, forming a transverse process, carrying part of the articulating facet.

The inferior surface of the centrum of the cervical vertebræ is subcarinated along the median line.

The cervical rib or hatchet-shaped bone is most strongly characterized at about the twentieth vertebra.

The articulating facet for the attachment of the cervical rib is

nearly circular, very rough, with a deep and broad groove about one-third above its inferior margin.

	in. 10ths.
Diameter of articulating surface	1 2
Length of pedicle.....	9
Length of whole rib.....	1 7
Lateral expansions	2 1

Of the lateral expansions one-third part is anterior and two-thirds posterior.

Dorsal and Lumbar? vertebræ.—Thirty-four in number; the majority of them are now concealed by the sternal bones, which, together with the sterno-costal arcs, were removed for the purpose of examining the number of vertebræ, &c.: the sterno-costal arcs are not restored to their natural position, but kept separate.

The dorsal vertebræ are not carinated upon the inferior plane of the centrum, as are the cervical and caudal. The surface is smooth; they are deeply concave on their inferior line; thus in the thirteenth vertebra, the antero-posterior diameter being $2\frac{5}{10}$ inches, the concavity is half an inch.

Sacral and Caudal vertebræ.—Thirty-one in number.

It has been stated that the cervical vertebræ are carinated on their inferior plane and that the ridge or carina does not exist on the dorsal vertebræ. In the caudal vertebræ there are two strongly-marked angulations or ridges, giving these vertebræ a remarkably distinct character from those of the anterior portion of the spinal column.

The hæmapophyses partake of the general robust character of the whole skeleton.

The true ribs are large, several of them two feet in length, with a diameter of $1\frac{4}{10}$ inch; their exact measurements cannot be obtained in consequence of the overlying of the shoulder and sternal bones.

Entosternum.—This bone is large, but much mutilated; its lateral length in a line with its anterior concavity was 16 inches; its antero-posterior length, taken at the widest part across its lateral expansion, is $7\frac{2}{10}$ inches; its anterior concavity $2\frac{2}{10}$ inches in depth.

Sterno-costal arcs.—These have been removed *en masse* for the purpose of exposing the dorsal vertebræ and ribs; they are now placed separately in the same case (Plate XVIII. fig. 4).

	in. 10ths.
Length of the median piece	13 0
Diameter in centre	1 0

Coracoids.

Antero-posterior dimensions	17 0
Breadth from median line to the glenoid cavity	8 8

Scapula and Clavicle.—These bones being anchylosed, form one large triradiate bone.

Its anterior expansion	7 0
Its lateral expansion	6 0

Humerus.

in. 10ths.

Length from the extreme convexities of the proximal and distal extremities	13	7
Diameter across the head	3	3
Ditto ditto great tuberosity	3	7
Ditto at half its length	3	3
Ditto at its distal extremity	7	0
Anterior edge nearly straight, posterior edge deeply concave; depth of the concavity	1	8

Radius.

Length from proximal to distal terminations	4	6
Breadth across proximal extremity	3	5
Diameter at half its length	2	0
Diameter at distal extremity	2	7

Ulna.

Greatest length of its posterior or convex edge	4	3
Length of its anterior or concave edge	3	3
Breadth at half its length, being from the deepest part of the anterior concavity to the posterior convexity	3	3
Depth of anterior concavity or versed sine		5

Carpal bones.—Six in number.

Diameter of the largest	2	3
Ditto smallest	1	0

The *Metacarpal* and *Digital Phalanges* are expanded at their extremities, the diameter of their centres being as two to three to that of the extremities.

The paddles not being quite complete, the number of the digital phalanges cannot be stated.

Pelvis.

Antero-posterior dimensions of the <i>Pubic</i> bones along the median line or symphysis	8	6
Diameter of the <i>Ischium</i> taken in the same direction	11	0
Length of the <i>Ilium</i> (both of which are remarkably well preserved)	8	5
Diameter across the extremity which forms part of the acetabulum	3	4
Diameter across the sacral extremity	2	1
Ditto at half its length	1	4

Femur.—The head of each femur is broken off, but judging from appearances, I take it to have been about the same length as the humerus.

Length from the trochanter to its distal extremity	9	0
Diameter at half its length?	3	2
Ditto across distal end	6	4

The anterior edge is slightly concave, as also the posterior edge, but not so concave as the posterior edge of the humerus.

Tibia.

Length	4	5
Diameter at femoral extremity	3	9
Ditto at tarsal	3	10
Ditto at half its length	2	7

Fibula.

	in. 10ths.	
Greatest length of its posterior or convex edge	4	5
Length of the anterior or concave edge	2	7
Diameter at half its length, from the depth of its anterior concavity to the posterior convex edge.....	3	7

Tarsal bones.—Four in number; the three posterior bones being large.

Diameter of the largest of the three.....	2	3
Ditto of the smallest	2	1
The anterior tarsal bone is small, its diameter		6

The metatarsal and digital phalanges consist of five ranges, larger and broader than in the anterior paddles, but not being complete, the number of digital phalanges cannot be enumerated.

Proportions.—The whole length of the animal, as before stated, is 16 feet 3 inches; for the sake of comparison I shall call it 1000. We shall then have:—

Length of lower jaw	160
Length of neck	245
Width across lower jaw	78
Length of humerus	67
Width of distal extremity of humerus.....	35
Antero-posterior length of coracoid	98
Width of coracoid	47

The length of the head is two-thirds the length of the neck; it bears the same proportion with regard to the thirty-four vertebræ comprising the tail.

P. megacephalus differs from the undernamed species in the following particulars:—

P. Hawkinsii, Ow.

The neck is three times the length of the head.

The tail is two and a half lengths of the head.

The cervical vertebræ are thirty-one in number.

The cervical vertebræ are smooth on their external surface.

The length of the largest of four or five adult specimens does not exceed seven feet six inches.

P. dolichodeirus, Con.

The neck is as four to one of the head.

The head is as one to thirteen of the whole length of the animal.

P. megacephalus.

The neck is only one-third longer than the head.

The tail is but one-third longer than the head.

The cervical vertebræ are twenty-nine in number.

The cervical vertebræ are slightly rugose.

The whole length is sixteen feet three inches.

The neck is as three to two of the head.

The head is as one to six of the whole length of the animal.

P. macrocephalus, Ow.

The neck is as four to two of the head.

P. megacephalus.

The neck is as three to two of the head.

P. brachycephalus, Ow.*

The head is equal in length to fourteen of its anterior cervical vertebræ.

The head is equal in length to twenty of its anterior cervical vertebræ.

P. macrourus, Ow.

The anterior paddles are the largest, as in *Ichthyosaurus*.

The anterior paddles are smallest, as in most of the *Plesiosauroi*.

P. arcuatus, Ow.

The vertical height of the cervical vertebra is seven inches.

The vertical height of the cervical vertebra is seven inches eight tenths.

The length of the humerus is fourteen inches.

The length of the humerus is thirteen inches seven tenths.

Diameter of the expanded symphysis of the lower jaw is four inches.

Diameter of the expanded symphysis of the lower jaw is five inches two tenths.

Upon comparison with descriptions of the remaining species, there are essential and especial differences which at once distinguish from all those the known species hitherto discovered.

DESCRIPTION OF PLATE XVIII.

Fig. 1. *Plesiosaurus megacephalus*. Scale one inch = 1 foot.

2. Ditto. View of the upper part of the anterior portion of the head.

3. Ditto. Side view of the anterior portion of the head. Scale 2 inches = 1 foot.

4. Ditto sterno-costal arcs removed to show the dorsal vertebræ.

2. On FOOT-MARKS *discovered in the COAL-MEASURES of PENNSYLVANIA.* By CHARLES LYELL, Esq., F.G.S.

I INTENDED to draw up a paper on what I have learned and observed respecting the proofs alleged to have been found of the existence of mammalia, birds and reptiles in the Pennsylvania coal-field; but I cannot do this until I receive my specimens, and have had more time to make sections and maps, in order to do the subject justice. I must therefore content myself with this brief notice. The discoveries of the impressions to which I shall refer were made by Dr. King, a physician of this place, whom I have seen, and who has been most anxious to facilitate my investigations, and to give me every help in arriving at the truth, which was his only thought,

* The skull is mutilated in the specimen on which this species was founded.