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ORIGINAL ARTICLES.

I.—NOTES ON BRITISH DINOSAURS.¹ PART V: *CRATEROSAURUS*
(SEELEY).

By Dr. Baron FRANCIS NOPCSA.

IN the course of my researches among British Dinosaurs the kindness of Dr. J. E. Marr and Professor T. McKenny Hughes has enabled me to investigate closely the fragmentary bone which Professor Seeley described in 1874 under the new generic name of *Craterosaurus*.² Although the systematic position of the specimen had remained problematical from the day of its discovery, nevertheless the hope was entertained that in consequence of our present more ample knowledge of Dinosaurs and fossil reptiles in general, it might now be possible to determine the exact nature of this apparently most interesting fossil. The result was rather unexpected, for it became clear that what Seeley supposed to be the base of a cranium was nothing else than the neural arch of a dorsal vertebra showing the greatest resemblance to the corresponding element in *Stegosaurus*.

To prove the Stegosaurian affinities of *Craterosaurus* in a striking and convincing manner, two drawings of the fossil are given side by side in Fig. 1, together with corresponding figures of an American Stegosaurian vertebra in the British Museum (Natural History). As shown by the figure (Fig. 2) of the American *Stegosaurus*, Seeley's supposed occipital condyle is a process formed by the two fused post-zygapophyses (*pt.z.*), and the so-called base of the brain-cavity of *Craterosaurus* corresponds exactly with the spoon-like projection that is produced in Stegosaurus by the fusion of the two præ-zygapophyses.

In consequence of the concrescence of the right and left anterior and posterior zygapophyses, the cleft that is usually visible between the zygapophyses of Reptilian vertebræ, but is already very much obliterated in *Omosaurus Lennieri*,³ is practically reduced to nothing in *Craterosaurus*, so that a curious kind of zygosphenal articulation is developed.

Besides the præ- and post-zygapophyses, one can also determine in *Craterosaurus* the position of the parapophysis, the diapophysis, a part of the neurapophysis, and even the position of the neural canal. The parapophysis (*pa.*) is formed in *Craterosaurus* as in *Stegosaurus* by a shallow well-marked depression, and represents the region which

¹ Part I, *Hypsilophodon*, GEOL. MAG., 1905; Part II, *Polacanthus*, loc. cit.; Part III, *Streptospondylus*, loc. cit.; Part IV, GEOL. MAG., 1911.

² H. G. Seeley, "On a Lacertilian Cranium from the Potton Sands": Quart. Journ. Geol. Soc., vol. xl, pp. 690-2, 1874.

³ Nopcsa, "*Omosaurus Lennieri*": Bull. Soc. Géol. Normandie, tom. xxx, p. 11, anné 1910 (1911).

Seeley considered to be the surface of attachment for the alisphenoid. The fractured surface of the diapophysis (*d.*) is situated above and laterally of the parapophysis, where Seeley located the ex-occipital and the periotic; and the neural spine (*n.*) rose from the blunt, compressed, and broken ridge, which is well shown in Fig. 2 of Professor Seeley's drawings, though not specially mentioned.

All the bone of the vertebra of *Craterosaurus* situated below the zygapophyses corresponds to the column-shaped part of the Stegosaurian dorsal vertebræ between these and the neural canal. The more dense nature of the tissue at the bottom of this column-like part that was supposed by Seeley to indicate the vicinity of the pterygoid suture of the basisphenoidal hypapophysis, indicates according to our new interpretation the proximity of the neural canal, for in all Dinosaurs the walls of this canal are characterized by dense bony tissue.

FIG. 1. *Craterosaurus pottonensis*, Seeley; part of neural arch in right side-view (A) and back view (B), one-half nat. size. Lower Greensand: Potton. [Type-specimen in Sedgwick Museum, Cambridge.] For lettering see Fig. 2.

A curious feature worthy of note is that in the middle of the column-like part, where most Stegosaurians show spongy bony matter, our fossil is perfectly hollow. Two irregular openings with fractured margins, the uneven surface of the hollow itself, and the much worn and rolled nature of the whole specimen suggest, however, that a great part of this cavity, if not the whole of it, may be due to post-mortem decomposition. In this case the influence of plant-roots, grass, moss, and water penetrating into small natural cavities of bones lying on the surface of the ground needs specially to be taken into account.

Having decided the anatomical character and general systematic position of the type-specimen of *Craterosaurus*, its generic position has to be considered. The unusually high position of the zygapophyses from the neural canal at once separates our fossil from

Scelidosaurus, from all well-known Acanthopholididæ (viz. *Polacanthus*, *Acanthopholis*, *Struthiosaurus*, and *Stegoceras*), from the Nodosauridæ (like *Ankylosaurus*),¹ and even from the Stegosaurid genus *Omosaurus*. Altogether *Craterosaurus* shows a striking resemblance to the genus *Stegosaurus*, and were it not for the fact that it seems hazardous to determine the exact position of so poor a "medal of creation", and that no *Stegosaurus* has ever been found in so young a deposit as the Potton Sand, *Craterosaurus* might be considered as a synonym of

FIG. 2. *Stegosaurus* sp.; dorsal vertebra in right side-view (A) and back view (B), one-quarter nat. size. Upper Jurassic: Medicine Bend, Wyoming, U.S.A. [British Museum, No. R. 3216.] *d.* diapophysis; *n.* neural spine; *pa.* parapophysis; *pr.z.* præ-zygapophysis; *pt.z.* post-zygapophysis.

Stegosaurus; under the circumstances, however, it seems best to retain provisionally the name given by Seeley.

Great as Professor Seeley's error in the determination of *Craterosaurus* seems to be in the light of our present knowledge, it must be remembered that the fossil was described at a time when one knew

¹ The difference between the Acanthopholididæ and the Nodosauridæ (= Ankylosauridæ) is best seen in the structure of the cranium. Details will be published on some other occasion.

scarcely anything about extinct land reptiles. Nothing shows better how justified Seeley was in 1874 in considering the fragment of *Craterosaurus* to be part of a skull than the fact that since the original description, so far as I am aware, the cranial nature of *Craterosaurus* has never been questioned, at least in print. Had Seeley with the evidence then at his disposal originally described *Craterosaurus* as a neural arch of a dorsal vertebra, probably several of his learned colleagues would have supposed him to be mistaken. As a striking example of the great difficulties that the founders and pioneers of modern palæontology encountered in their early days, *Craterosaurus* thus possesses more than usual interest.

II.—THE UPPERMOST SILURIAN AND OLD RED SANDSTONE OF SOUTH STAFFORDSHIRE.

By W. WICKHAM KING, F.G.S., and W. J. LEWIS, B.Sc.

(Concluded from the October Number, p. 443.)

2. *The Downton Castle or Yellow Sandstones* (see Figs. 2 and 3).—These occur at Lye and Turners Hill, but the best sections are at Saltwells. There the lowest beds are 10 feet of brown yellow and blue soft sandy mudstones (see Fig. 2, E^a), seen resting on the Ludlow Bone-bed, north of the Tram Bridge. Like the same zone at Ludlow, they are practically unfossiliferous.

To the north of this section there are some W.S.W. to E.N.E. faults that have let down some yellow Downton Sandstones which are studied best at "the (canal) Basin section" and Brewin's Tunnel.

The bottom of the Basin section is dolerite. Above it is this sequence:—

		ft.	in.
E ^a	Greenish-yellow gritty hard sandstones: <i>Lingula Lewisii</i> (medium species), very abundant throughout	5	10
	Flaggy green sandstones	2	10
	Rubby green and some yellow sandstones with many <i>L. Lewisii</i> (medium species)	4	9
	Yellow sandstone	1	6
	Rubby light-green shales. <i>L. Lewisii</i> (smaller species) and fragments of fish scales	1	0
E ^b	Very dark-green shale. <i>Platyschisma helices</i> , <i>Modiolopsis complanata</i> , <i>L. minima</i> (rare), <i>L. Lewisii</i> (smaller species) very common	1	0
Above the last there are 15 feet of yellow Downton sandstones with <i>Orbiculoidea rugata</i> and <i>L. minima</i> . On the south side of Brewins Tunnel the <i>Platyschisma</i> shale crops out immediately under the yellow sandstones which dip E.N.E. 31°.			
Here the section continues thus:—			
E ^c	One band of massive yellow sandstone with a fucoid bed at base. <i>L. minima</i> (common)	36	0
E ^d	Fissile light-green shales 8 feet, passing into alternations of light-green shales, and rusty-red marly sandstones. <i>L. minima</i>	16	6
		69	5
Add the lowest part of E ^a at Tram Bridge		10	0
Total of E exposed		79	5