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On the Base of a large Lacertian Cranium from the Potton Sands, presumably Dinosaurian

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Notes

48. *On the* Base *of a large* Lacertian Cranium *from the* Potton Sands, *presumably* Dinosaurian. By Harry Govier Seeley, Esq., F.L.S., F.G.S., Professor of Physical Geography in Bedford College, London. (Read June 24, 1874.)

[Plate XLIV.]

The specimen on which this note is based was found by Mr. Charlesworth in the Potton Sands, near Potton, in Bedfordshire. The bed of phosphatic nodules which there occurs in the brown sands, named by Conybeare and Fitton Woburn sands, is probably of the age of the Purbeck-Wealden formation, though there is also a possibility that it may be as new as the upper part of the Lower Greensand.

The formation has yielded, besides numerous Ichthyosaurs, Plesiosaurs, and Pliosaurs, with which the fossil has nothing in common, some Teleosaurs and several Dinosaurians. The only Dinosaurian genus, however, of which the remains are numerous and varied is *Iguanodon*, represented chiefly by vertebræ, teeth, fragments of jaws, and phalanges. All the vertebrate remains appear to have been sifted on that pebbly shore; and the larger bones were probably deposited on a different horizon. The only other Dinosaurian genus indicated by teeth would seem to be *Megalosaurus*; hence, on ordinary principles of association, we might suspect that any new bone inferentially Dinosaurian probably pertained to one or other of these types.

My fossil presents some remarkable differences from other figured Dinosaurian specimens, and I have thought it worthy of the attention of the Society as indicating that distinct ordinal groups are probably confounded under the name Dinosauria. For if the skull be Dinosaurian which was figured by Mr. Hulke as probably that of *Iguanodon* (and of its Dinosaurian character I entertain no doubt), and the specimen now described be Dinosaurian, in the ordinary sense of the term, as I believe, then no one will doubt the propriety of placing the latter animal, with its indisputable lacertian characteristics, in a distinct ordinal group from the Wealden animal, which has the skull closed anteriorly in a way to which no Lacertilian makes an approximation.

This difference is, indeed, in harmony with lacertian differences in portions of the skeleton in *Ceteosaurus*; so that had there been any reason for suspecting that the Potton fossil belonged to the Ceteosauria, I should have felt no difficulty in regarding it as the base of a Ceteosaurian cranium.

The symmetrical compressed specimen in question I interpret as being the anchylosed basioccipital and basisphenoid bones of an aged individual. They show no trace of the sutural union, as is the case with the similar bones when anchylosed in Lizards.

Seen from behind, the basioccipital portion presents a remarkable

resemblance to that of a Crocodile. The basioccipital condyle projects backward for two inches from the inferior vertical part of the bone, which is divided into two vertical areas for two thirds of its depth by a strong, sharp, elevated ridge, prolonged downward from the middle of the back of the articular portion of the condyloid process (see Pl. XLIV. fig. 1). This condyle is compressed from side to side, V-shaped, tapering below, is an inch and an eighth wide, and about as deep (figs. 1, 3, & 5). It is somewhat worn behind, and probably articulated with the axis, while the exoccipitals may have articulated with the atlas vertebra, as I believe to have been the case with some Dinosaurs from the Weald. What appears to have been the cartilaginous basioccipital articular surface extends backward for an inch and an eighth; behind this the bone is nipped in from side to side below the superior irregular articular surface for the exoccipital bones. The vertical posterior portion of the bone is concave from above downward, and concave from side to side on each portion of the median elevated ridge, and nearly flat from side to side towards the lower end. This posterior surface is margined by sharp angles, both the flattened sides of the specimen being at right angles with it. From side to side the posterior surface measures $1\frac{7}{8}$ inch level with the base of the condyle; below this point the sides approximate, and it measures $1\frac{1}{8}$ inch from side to side level with the termination of the median ridge, and it seems to widen from side to side below this part of the bone; but having been worn, the hypapophysis of the left side is broken away, and that of the right side imperfectly preserved (figs. 1, 2, & 4, *h*). In birds there is often a vertical portion of the basioccipital below the occipital condyle, but it is closely embraced laterally by the exoccipital bones, and in no other way has the bone in birds a resemblance to this fossil. In Crocodiles the resemblance of the posterior aspect of the basioccipital is closer; but in Crocodiles the basioccipital is not anchylosed to the basisphenoid. There is no close resemblance of the occipital aspect to Lizards, because the occipital region in Lizards is never so vertical or deep. In front of the condyle the bone forms an oblique narrow subquadrate mass, most compressed from side to side, longer from front to back, and nearly twice as deep, from above downward, as long. It terminates below in two large slightly diverging hypapophyses, with a deep notch between them, deepest in front (fig. 2). These processes appear to have been directed downward and a little forward, and presumably joined the posterior angles of the pterygoid bones. From back to front at the lower end the bone measures $1\frac{1}{2}$ inch. The sides are flat oblong surfaces, with a hole on each side towards the upper posterior angle (fig. 3, *c*), and a slight bony elevation below this hole. These holes are about $1\frac{1}{4}$ inch long, $\frac{3}{4}$ inch wide. The extreme width of the side at the uppermost end is nearly $2\frac{1}{2}$ inches. Its extreme length, as preserved, is about $2\frac{3}{4}$ inches. The vertical front surface is flattened, slightly concave in length, slightly constricted from side to side in the middle (fig. 4). As preserved, it is about $2\frac{1}{4}$ inches deep, $\frac{5}{8}$ of an inch from side to side in the middle, and $1\frac{1}{4}$ inch from side to side at the upper end. The

angles by which this front surface is separated from the lateral surfaces are rounded, and more marked at the superior than the inferior parts of the bone. Superiorly the bone presents two areas, posteriorly a long subtriangular upper face of the basioccipital (fig. 5), which gave attachment to the exoccipital bones behind, and anteriorly a long deep ovate cup in the basisphenoid (fig. 2, *d*), which I interpret as being the base and anterior portion of the brain-case. This cup is $2\frac{1}{4}$ inches long, more than 1 inch wide, and wider towards the front than behind; anteriorly it is $1\frac{1}{4}$ inch deep.

Something analogous to this singular structure may be seen in the skull of *Hatteria*, where the pterygoid processes of the basisphenoid occupy a similar position, and, in aged specimens, a fibrocartilaginous extension in front of the bone becomes ossified, so as to present a similar flat anterior surface to that seen in the fossil; only in the fossil the anterior part of the bone is thick and strong, and owes its existence to no condition of growth but to the plan of structure in the animal. Viewed in this light, the brain-case offers a general resemblance to the brain-case attributed to *Iguanodon* by Mr. Hulke, though the resemblance is as close or closer to *Hatteria*.

Superiorly the basioccipital has a median ridge, with a pit on each side (figs. 1, 3, & 5, *a*) behind the middle of the bone. To these surfaces I suppose the exoccipital bones to have been attached, and I imagine that the medulla oblongata rested on them. Anteriorly to these and laterally, just behind the excavation for the brain in the basisphenoid, are two badly preserved surfaces (figs. 3 & 5, *b*), which appear to have given attachment to the periotic bones. They are $\frac{1}{2}$ inch deep and $\frac{3}{4}$ inch long.

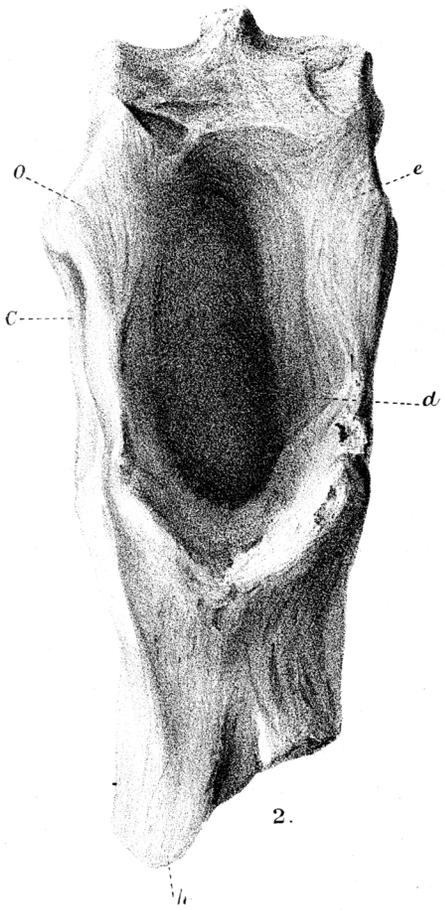
In front of these, at the sides of the hinder part of the brain-case, are the larger excavations already described, from which the alisphenoid bones appear to have been given off (fig. 3, *c*). Between and above these lateral articular surfaces the cerebral cup is produced outward, indicative, I think, of the large size and lateral position of the optic lobes of the brain.

On the whole I regard the bone as indicating that in at least one Order of the Subclass Dinosauria the bones of the base of the cranium were Rhynchocephalian rather than Avian. For the present, the fossil may be named *Craterosaurus pottonensis*.

EXPLANATION OF PLATE XLIV.

The letters attached to the figures have the following significance:—*a*, attachment for exoccipital bone; *b*, attachment for periotic bones; *c*, attachment for alisphenoid; *d*, cavity for base and front of cerebrum; *e*, surface for optic lobe (?); *h*, hypapophysis of basisphenoid for attachment of pterygoid bone; *o*, basioccipital element of occipital condyle. All the figures are of the natural size.

Fig. 1. Occipital aspect of base of skull of *Craterosaurus pottonensis*.
2. Front aspect, showing cerebral cavity.
3. Right lateral aspect.
4. Front view of basisphenoidal portion, with the outline of the posterior part of the bone.
5. View of the occipital region from above.



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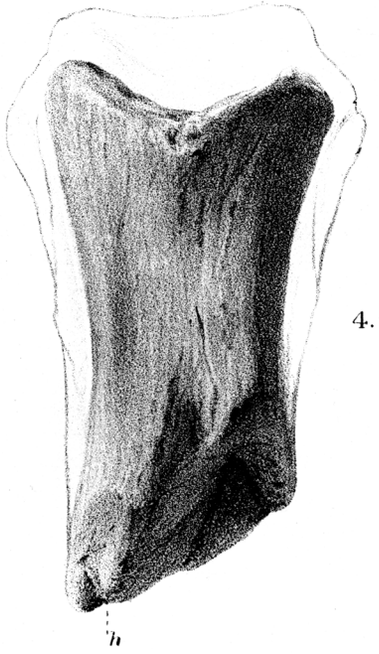

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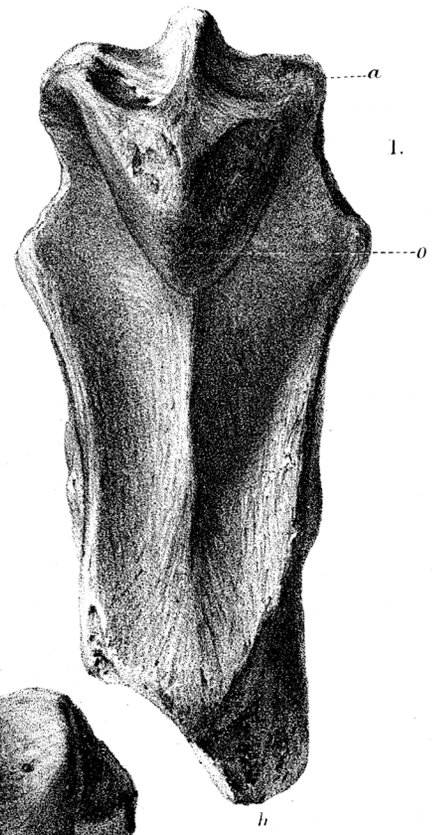

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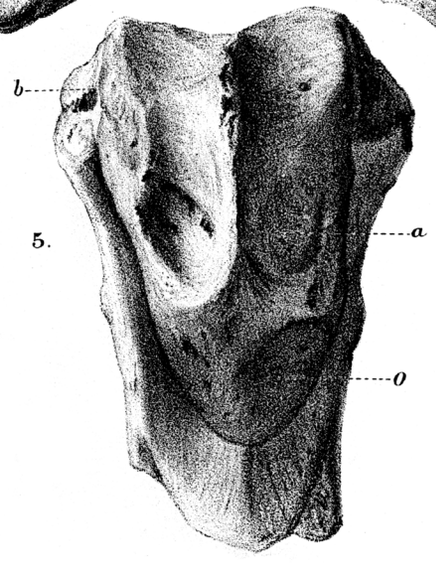

5.

C. L. Griesbach.

Mintern Bros. imp.

CRATEROSAURUS POTTONENSIS.