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ON *PATRICOSAURUS MEROCRATUS* FROM THE CAMBRIDGE GREENSAND.

On Patricosaurus merocratus, *Seeley, a* Lizard *from the* Cambridge Greensand, *preserved in the* Woodwardian Museum *of the* University *of* Cambridge. By H. G. Seeley, F.R.S., F.G.S., Professor of Geography in King's College, London.

[Plate XII.]

No lacertilian has hitherto been recorded from the Cambridge Greensand. The comparative rarity of this group of animals in the deposit is evidenced by the fact that only two fragments of lizard-bones are known to me to have been found during the whole period in which its fossils have been collected. One of these is a sacral vertebra with the transverse processes broken away, which was, I believe, collected by the Rev. H. G. Day prior to 1859. The other is the proximal end of a femur obtained recently by Mr. A. F. Griffith. Slight as is the material, it is worth recording as evidence of a terrestrial animal of a relatively large size, and more nearly allied to existing lizards than are the other Cretaceous representatives of this order of animals.

Right Femur (Pl. XII. figs. 9, 10).

The proximal end of the right femur now described is larger than the corresponding bone in the largest existing Monitor. It was unfortunately fractured, subsequently to being mineralized, at a point below the articular head, just where the shaft becomes triangular, so that the length of the bone and its distal characters are entirely conjectural. The shaft consists of dense bony tissue, as in existing lizards, with a small medullary cavity. The fragment is about 3 centim. long. It has the characteristic vertical compression and forward curvature of the convex articular head, and the usual front-to-back compression of the inferior trochanter, which, however, extends further proximally than in existing lizards. The fragment has experienced a little attrition, and a thin external epiphysial layer of bone is partly removed from the proximal articular surface—a character of some interest as repeating the epiphysial growth which is often seen in existing lizards, but in a form no thicker than in the limb-bones of some breeds of domestic fowls, like Bramahs, when a week or two old.

The proximal articular surface is semicircular from front to back; it is 2 centim. wide. Its superior outline, viewed from the proximal end, is comma-shaped, being a centimetre wide in front, and becoming narrower as it extends backward. From above downward the articulation is convex, about 12 millim. thick in the middle, and narrowing away behind. The convexity of the anterior part of the smooth rounded articular head is suggestive of the limb having been carried in a position well raised from the ground. The axis of the articular head of the bone is directed inward and very slightly

upward. The superior aspect of the shaft, which the articulation terminates, is concave; and the concavity runs into the middle of the articulation to give it its crescentic or comma-shaped form (fig. 9). In the Nilotic Monitor this depression receives a talon-like spur from the proximal epiphysis. The anterior margin of the bone below the articular head is concave as it extends distally, but the posterior margin of the superior aspect of the shaft was thicker, trochanteroid, and probably convex in length; though, being a little abraded, it can only be seen to widen and inflate the bone below and behind the articulation. As already remarked, the shaft is triangular; and I am disposed to term the other two sides of the bone anterior and posterior, as they lie in front of or behind the inferior or great trochanter. At its fracture the shaft measures one centim. from above downwards, and 9 millim. from side to side; the outline is flat above and behind, more convex and wider at the inferior trochanteric margin than at the other angles.

The great trochanteric ridge extends longitudinally on the middle of the underside (fig. 10), converging rapidly downward to the shaft, and is vertical to the superior aspect of the shaft, like the stem of a capital T: the thickness through the bone at its proximal termination is about 17 millim., though the superior proximal expansion of the articular surface increases the thickness of the bone to about 22 millim. This characteristic lacertilian trochanteric process extends to within nearly a centimetre of the proximal extremity of the bone; it is concave in length, curving forward proximally, is about 6 millim. thick, and somewhat flattened below, with the anterior margin rounded.

The anterior aspect of the bone is concave, so that the constriction of this side, combined with the concavity of the superior surface, gives a well-defined character to the articular head, almost like a neck, if it were not that these sides converge anteriorly to form a sharp ridge which unites them, and becomes flattened as it extends down the shaft. There is a mark of strong muscular attachment, of which a centimetre is preserved, which commences one centimetre below the trochanteroid ridge, on the inferior border of its anterior aspect.

The posterior aspect of the bone can only be described as saddle-shaped, being convex in length and channelled with a wide, smooth, concave depression, which lies between the inferior and superior trochanters, and curves forward beneath the articular head. The width across the trochanters, where greatest, is 18 millim. There is a small pit about 3 millim. in diameter, which lies immediately behind and below the posterior trochanteroid margin, so as to be between that process and the narrow termination of the articulation of the proximal articular surface. Owing to the posterior thickening of the lateral margin of the great trochanter, its inferior border is wider than the part which rises from the head.

There is no existing lacertilian which this fossil closely resembles. Compared with the Monitor, the more striking differences are that the fossil has the articular surface more developed on the upper and anterior parts of the head, so as to form a deep concavity in the

middle of the superior aspect. Secondly, the great trochantor extends further proximally, but is not developed to quite the same depth distally. The well-marked longitudinal posterior concavity defined by the reflected posterior margin of the trochanter is also a distinctive feature. The comparatively thin proximal epiphysis seems to mark the beginning of a condition of the extremities which has attained greater development in modern lizards. Yet the configuration of the bone is in no sense embryonic or indicative of imperfect ossification, but rather shows that the modern lizards have diverged from this ancient type so far that it is likely to belong rather to a subordinal modification than to an extinct family.

First Sacral Vertebra (Pl. XII. figs. 11, 12).

It is impossible to say that the vertebra which is now to be described pertained to the same species as the femur, for there is no record of the exact locality in the neighbourhood of Cambridge from which the specimens were obtained; but since there is nothing inconsistent with natural association in the characteristics of the two bones, and the sacrum, while conforming to the general plan of existing lizards, yet differs from them in notable characteristics of the neural arch, I have not hesitated to describe them as probably the remains of the same species.

The fossil consists of the first sacral vertebra made up of the complete centrum, the neural arch, which has lost the neural spine, and the prezygapophyses; and the transverse processes which are fractured through the middle were probably complete when the specimen was discovered. These parts are united together by conspicuous sutures (fig. 11).

The centrum is depressed, 11 millim. long and 14 millim. wide, to the sutures with the sacral ribs, which form quadrate transverse processes. The inferior surface is concave in length and convex from side to side in the middle, becoming depressed laterally and constricted posteriorly from side to side, so that behind the transverse processes the bone narrows towards the posterior surface to a width of 9 millim.

The anterior articular cup is about 11 millim. wide and 7 millim. deep, transversely reniform, with a concavity above impressed by the neural canal, and the convexity below. It may have been slightly deeper, since the inferior margin is worn. It is moderately concave from side to side and from above downward, and shows in the middle a small notochordal pit. The posterior articular surface is much smaller and, though not perfectly preserved, may be described as semicircular, 9 millim. wide and nearly 5 millim. deep, very slightly convex from side to side, but on the whole flattened, with a small central notochordal pit.

The neural arch is sharply defined by the sutures which separate it from the transverse processes; but the suture which divides it from the centrum placed at the summit of the anterior articular cup is only seen on the right side. The width of the neural arch

is 13 millim., but rather more dorsally, and slightly less on the centrum as the sutures with the transverse processes diverge upward. The prezygapophyses are broken away, but the width across them from side to side was about 9 millim. Behind the transverse processes the bone is notched in, so that the neural platform projects backward to form the postzygapophyses, and the measurement is a little less over them from side to side than over the prezygapophyses. The dorsal aspect of the neural arch is the most distinctive feature of the specimen, each half of it being horizontal and flattened, with a depression at the base of the neural spine, which was narrow and is broken away. There is no trace of zygapophysial ridges such as occur in *Varanus* and some other lizards. The neural canal is vertically ovate in front, and reaches nearly the height of the neural arch, 7 millim., while the transverse measurement is over 5 millim.

The transverse processes are directed outward and backward as in the first vertebra of existing lizards (fig. 12). They are compressed from side to side and from above downward, so that the transverse section is vertically oblong and inclined a little backward. The process extends from the base of the centrum to the platform of the neural arch, and is 11 millim. deep at the suture. It is 8 millim. wide at the base and 5 millim. wide at the neural platform, so that the flattened anterior aspects look obliquely forward, outward, and upward. The posterior aspect is vertical, with a transverse concavity in the middle. The posterior margins of the processes appear to have been sharp and angular, while the anterior margins are slightly rounded. Both upper and under surfaces are flattened and converge outward. The width of the fragment, as preserved, is 24 millim.

The most distinctive features of this vertebra are found in the convexity of the base of the centrum, and in the transverse processes rising to the level of the flattened neural platform.

I am acquainted with no form of sacrum which approximates toward this fossil so as to need to be distinguished by further comparison.

EXPLANATION OF FIGURES.

Plate XII.

(The figures are of the natural size.)

Fig. 9. Antero-superior aspect of femur of *Patricosaurus merocratus*.
10. Proximal aspect of the same bone.
11. Anterior aspect of first sacral vertebra.
12. Inferior aspect of first sacral vertebra.

Discussion.

Mr. Hulke said *Ornithodesmus* was another old acquaintance of his. Several bones were found with it, now lost. He had looked upon it as Pterodactylian.

Mr. Blanford suggested that the name *Patricosaurus* should be founded on one specimen, not on the two, lest they should prove to belong to distinct animals, and confusion result as to which should bear the name.

Prof. SEELEY said that out of many thousands of bones from the Cambridge Greensand that had passed through his hands these were the only fragments of Lizards. He thought no others were likely to be found for some time, and there was little chance of any remains of two Lizards occurring. If, however, one bone were to be selected as the type, he would take the femur, to which the specific name referred.

With regard to *Ornithodesmus*, he said that it differs from all Ornithosaurs in having a horizontal neural platform running through the sacrum, and from which a continuous neural spinous ridge rises. The transverse processes and pneumatic foramina did not tend to approximate the two groups; while, so far as he was aware, the Wealden Ornithosaurs had the ventral side of the sacrum much more convex from side to side. He further pointed out that the texture and form of the sacral vertebræ differed from those of known Pterodactyles.