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ANDREWS, 1921

the great development of the anterior ascending process of the astragalus shows clearly that this Liassic type is more nearly related to the Jurassic members of the group than to those from the Trias. Dr. von Huene (Palæont. Abhandl. Suppl. 1, Lief. 5 (1908), p. 326) agrees with this view, and goes so far as to refer the animal to the genus *Megalosaurus*.

These two specimens seem to be the only Megalosaurian remains known up till now from the Lower Lias—at least, of this country.

Recently Mr. S. L. Wood has obtained from the Lower Lias of Barrow-on-Soar, Leicestershire, portions of the pelvis, an imperfect left femur, and part of a vertebral centrum of a small Theropodous Dinosaur: these specimens form the subject of the present note.

The pelvis is represented by (1) the anterior portion of the left ilium, with which is united the proximal end of the pubis; (2) the acetabular region of the right ilium, with which are united portions of the proximal ends of the pubis and ischium; (3) the posterior end of the right ilium, the precise position of which in relation to the anterior portion can only be approximately determined. The femur belongs to the left side and is imperfect at both ends. The vertebra is represented only by about half the centrum and part of the neural arch; it probably belongs to the dorsal region.

The *ilium* (fig. 1), so far as preserved, is very similar to that of *Megalosaurus bucklandi*. Its anterior portion (*a.l.*) forms a broadly rounded lobe, the outer surface of which is gently concave externally; the bone in this region is very thin, with a slightly thickened upper border, the surface of which is somewhat roughened for the attachment of muscle. The anterior lobe is separated from the relatively massive pubic process (*p.p.*) by a much narrower preacetabular notch (*p.n.*) than in *Megalosaurus*, and more nearly similar to what is seen in *Ceratosauros*, in which, however, the pubic process is less massive. The narrowness of this notch seems to be due partly to the relatively large size of the pubic process and partly to its being directed more forwards and less downwards than in the other forms referred to. The pubic process is triangular in section, the ventral (acetabular) surface (*acet.*) being deeply concave from side to side. This concavity is continuous with the rest of the acetabular surface of the ilium, the outer edge of which forms a prominent and sharp-edged lip, which increases in width towards the point of union with the ischium. The anterior end of the pubic

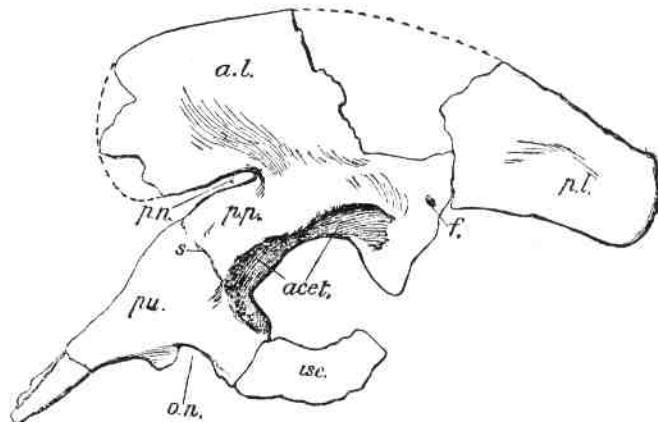
LVI.—*On some Remains of a Theropodous Dinosaur from the Lower Lias of Barrow-on-Soar.* By CHARLES W. ANDREWS, D.Sc., F.R.S. (British Museum Natural History).

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REMAINS of Theropodous Dinosaurs in deposits of Liassic age are of extreme rarity. Lydekker has described and figured (Catal. Foss. Rept. Brit. Mus. pt. i. (1888) p. 173, fig. 28) a tooth from the Lower Lias of Lyme Regis, which he doubtfully refers to the Triassic genus *Zanclodon*. Later, Dr. Smith Woodward gave an account with a figure (Ann. & Mag. Nat. Hist. ser. 8, vol. i. (1908) p. 257) of a small slender right tibia from the Lower Lias of Wilmcote, Warwickshire. This he regards as belonging to a lightly-built and active Megalosaurian Dinosaur, pointing out that

process unites with the pubis in a slightly convex surface. Behind the acetabulum the ilium unites with the ischium, but the details of the suture are not clear. The posterior fragment of the right ilium (*p.l.*) narrows gradually towards its posterior end, which is gently convex, being somewhat thickened and roughened for the attachment of a muscle, probably the ilio-caudal. The outer surface is concave from above downwards, while on the inner face there is a thickened and downwardly-reflected flange running down from the postero-superior angle to the base of the ischial process. The inner face of this flange is roughened, and no doubt united with the posterior part of the sacrum.

Fig. 1.



Pelvis of *Sarcosaurus woodi* from the left side, partly restored from the right side. $\frac{1}{2}$ nat. size. *acet.*, acetabulum; *a.l.*, anterior lobe of ilium; *f.*, foramen in (?) ilium; *isc.*, ischium; *o.n.*, obturator notch; *p.l.*, posterior lobe of ilium; *p.n.*, preacetabular notch; *p.p.*, pubic process of ilium; *pu.*, pubis; *s.*, suture between ilium and pubis.

The Pubis (fig. 1).—The proximal ends of both pubes are preserved, that of the right side being the more complete. This bone, which seems to have been larger in proportion to the ilium than in later forms, unites to the pubic process of the ilium in a slightly concave suture; below this it bears on its posterior face a triangular surface, which forms the anterior wall of the acetabulum (*acet.*); beneath this again there is a short process, separated from the acetabulum by a distinct notch and curving backwards to unite with the pubic process of the ischium in a flat suture, triangular in

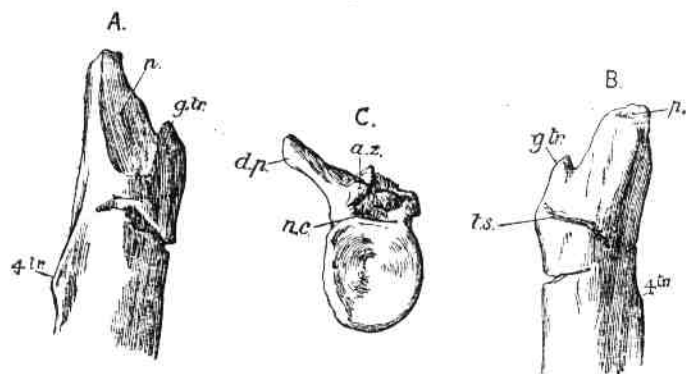
outline, the lower border being thin and sharp. Anteriorly the ischial process of the pubis is limited by a large and well-defined obturator notch (*o.n.*), which, when the bone was unbroken, may have been a closed foramen, though this does not seem likely. Distal to this notch, and separated from it by the prominence forming its anterior border, the shaft of the pubis narrows very rapidly and becomes compressed from above downwards; this region is strengthened by a ridge on its inner side continuous with the anterior border of the obturator notch. The distal portion of the bone is wanting on both sides.

The Ischium (fig. 1, *isc.*).—This bone is represented on the right side by some fragments of its proximal end. A portion of the pubic process is present: this forms the lower border of the acetabulum. It thickens towards the junction with the pubis; its ventral edge is thin and sharp throughout. The relation of the ischium to the ilium is obscure; there does not seem to have been a definite ischial process on the ilium. Immediately behind the acetabulum there is a deep rugose pit, from which a foramen (*f.*) penetrates to the inner face of the bone. It is doubtful whether this pit is borne by the ilium or the ischium, but it seems to correspond in position with the rugosity on the ischium of *Ornitholestes* figured by Gregory and Camp (Bull. Amer. Mus. Nat. Hist. vol. xxxviii. (1918) pl. xlvi.), and regarded by them as serving for the origin of the flexor tibialis internus (semi-membranosus) muscle.

The Femur (fig. 2, A, B).—The femur of the left side was found associated with the pelvis, but, unfortunately, it is badly preserved. The head is broken away, as also is the end of the fourth trochanter. The distal end is much crushed, and the condyles are wanting. The bone, as a whole, is rather strongly curved, the convexity being in front. The middle part of the shaft is nearly cylindrical, but tends to widen out towards the ends, particularly distally. The summit of the bone, just external to the fractured surface which marks the loss of the head, bears a shallow pit (*p.*), beneath which on the outer side of the bone there is a narrow flat surface running down to the trochanteric shelf (*t.s.*), described below. The anterior face of the upper end is also nearly a flat surface, terminating below in the notch formed by the peg-like anterior (great) trochanter (*g.tr.*). From the base of this projection a shelf-like surface (*t.s.*) runs back to the posterior border of the bone. From the base of the trochanter a strong roughened ridge runs down the shaft towards its inner

border, probably reaching the upper angle of the inner condyle, but the distal portion is incomplete. The fourth trochanter (4 *tr.*) forms a very prominent ridge on the upper part of the posterior face of the shaft; on its inner side there is a large, slightly concave roughened area for the attachment of muscle. The lower end of this trochanteric ridge is at about the middle of the shaft. As already mentioned, the distal condyles are wanting, but it can be seen that, even allowing for expansion due to crushing, the distal articulation must have been a fairly wide one. The walls of the bone are relatively very thin, the central

Fig. 2.



A. Upper end of femur of *Sarcosaurus woodi*, from outer side; B, Ditto from inner side; C, Anterior face of imperfect dorsal vertebra. $\frac{1}{3}$ nat. size. *a.z.*, anterior zygapophysis; *d.p.*, diapophysis; *g.tr.*, great (anterior) trochanter; *n.*, broken surface of neck of femur; *n.c.*, neural canal; *p.*, pit at upper end of femur; *t.s.*, trochanteric shelf; 4 *tr.*, fourth trochanter (imperfect).

cavity being large; thus in the middle of the shaft, where its diameter is about 35 mm., the thickness of the bony wall is only between 4 and 5 mm. Towards the proximal end of the bone a fracture shows that the central cavity was divided up by irregular septa of bone.

The anterior half of a vertebra (fig. 2, C), apparently from the posterior dorsal region, is preserved. The neural arch, with part of one of the diapophyses and the anterior zygapophyses are present, but the neural spine is wanting. The anterior face of the centrum is very slightly concave. Its upper border beneath the neural canal (*n.c.*) is nearly

straight; its height is about equal to its breadth. The border of the articular face forms a sharp edge, behind which the centrum contracts very rapidly in diameter; beneath the pedicle of the arch the sides of the centrum are excavated by a fairly deep elongated fossa. The anterior zygapophyses (*a.z.*) are small, and project very little in front of the anterior face of the centrum, their articular faces look directly upwards. The diapophysis (*d.p.*), which is only partly preserved on one side, projects upwards, making an angle of about 45 degrees with the vertical plane. The postero-ventral face of the diapophysis seems to have been concave. There may have been a small parapophysial facet.

The enlargement of the anterior lobe of the ilium sharply differentiates this Dinosaur from the Triassic Theropods. This expansion seems to be the consequence of the necessity for a larger surface for the attachment of the ilio-femoralis externus muscle, the enlargement of which, as von Huene has pointed out, is probably due to the adoption of an upright bipedal mode of progression. This muscle is inserted distally upon the great trochanter of the femur, but, although this is better developed than in the Triassic forms, it does not form the prominent flange of bone usual in most of the later types*, but remains small and peg-like; in this respect the present species occupies an intermediate position between the Triassic and later Jurassic forms, such as might have been expected from the horizon at which it occurs. The development of the anterior process of the astragalus deduced by Dr. Smith Woodward from the structure of the tibia, described by him and referred to above, is no doubt correlated with the change in the mode of progression.

The relatively large size of the pubes and probably of the ischia seems to be a primitive character.

The Dinosaurian remains above described certainly belong to a member of the Megalosauridæ, but at the same time differ so considerably from the corresponding bones of *Megalosaurus* itself that it seems necessary to refer the species to a new genus, for which the name *Sarcosaurus* is suggested, the specific name being *Sarcosaurus woodi*, in honour of the discoverer, Mr. S. L. Wood. Probably the tibia described by Dr. Smith Woodward is referable to the same species.

* In *Ceratosaurs* the trochanter appears to have been considerably smaller than in *Anthrodemus* (*Allosaurus*) or *Megalosaurus*, but, nevertheless, is larger than in the present species.

The dimensions (in centimetres) of the specimens are:—

Height of anterior lobe of ilium	7·0
Height of the proximal end of the pubis	6·0
Width of the proximal end of the pubis (from within outwards)	2·7
Greatest width of the acetabular cavity (from within outwards)	3·7
Length of the femur, so far as preserved	31·5
Diameter of the middle of the shaft of the femur	3·6
Width of the anterior face of vertebral centrum	4·0
Height of the anterior face of vertebral centrum	4·0
