On a Sauropodous Dinosaurian Vertebra from the Wealden of Hastings

R. Lydekker

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21. *On a* Sauropodous Dinosaurian Vertebra *from the* Wealden *of* Hastings. By R. Lydekker, Esq., B.A., F.G.S. (Read December 21st, 1892.)

In an earlier volume of this Journal Mr. Hulke figured and described certain vertebræ of a large Sauropodous Dinosaur from the Wealden of the Isle of Wight, under the name of *Ornithopsis*,[1] that name having been substituted for *Eucamerotus*,[2] which the author had previously intended to use on account of its being the earlier. I have subsequently had reason to indicate that the name *Ornithopsis* itself must, for the same reason, yield to *Hoplosaurus*,[3] which was proposed by Gervais on the evidence of a tooth of the same animal.

In addition to *Hoplosaurus armatus* and the still larger *Pelorosaurus Conybeari*, there is evidence of another large Sauropodous Dinosaur in the Wealden, now known as *Morosaurus brevis* (Owen).[4] Up to the present time it has, however, been impossible to compare adequately *Hoplosaurus armatus* with *Morosaurus brevis*, owing to the circumstance that while the former is known by teeth, cervical and dorsal vertebræ, and the pelvis, the latter is mainly represented by the bones of a forelimb and some caudal vertebræ; an imperfect centrum of a late dorsal vertebra having been also tentatively assigned to it.

Recently Mr. P. Rufford, of Hastings, has sent to the British Museum (Nat. Hist.) for identification an imperfect dorsal vertebra of a large Sauropodous Dinosaur from the Wealden of Hastings, which has enabled the desired comparison to be made.

I would observe in the first place that the specimens which must be regarded as the types of *Cetiosaurus brevis* are four associated caudal vertebræ from the Wealden of Cuckfield, bearing the numbers 2544–2550 in the British Museum Register.[5] Subsequently Prof. Marsh[6] applied the name *Morosaurus Becklesi* to a Dinosaur represented by the bones of a forelimb formerly in the collection of the late Mr. Beckles, which have now been acquired by the British Museum. Still later I pointed out that there was every probability that these limb-bones belonged to *Cetiosaurus brevis*, for which the name *Morosaurus brevis* was accordingly substituted.[7]

Now, all these bones are characterized by their ochreous colour, and are thereby very different from those of *Hoplosaurus* from the Isle of Wight, which are blackish. Mr. Rufford's specimen is likewise of the same ochreous tint, and comes probably, therefore, from the same bed as the limb-bones obtained by Mr. Beckles. This

[1] Quart. Journ. Geol. Soc. vol. xxxvi. (1880) p. 31, pls. iii. and iv.
[2] *Ibid.* vol. xxviii. (1872) p. 36.
[3] Cat. Foss. Rept. Brit. Mus. pt. iv. (1890) p. 243.
[4] *Ibid.* p. 237.
[5] *Ibid.* pt. i. (1888) p. 140.
[6] Am. Journ. Sci. ser. 3, vol. xxxvii. (1889) p. 325.
[7] Nicholson & Lydekker, 'Manual of Palæontology,' vol. ii. (1889) p. 1179; and Cat. Foss. Rept. Brit. Mus. pt. iv. (1890) p. 236.

Fig. 1.

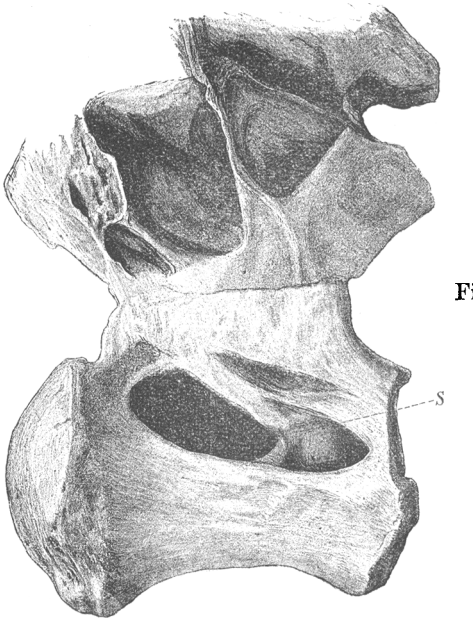

Fig. 2.

Fig. 1. Left lateral view of an imperfect dorsal vertebra of *Morosaurus brevis*, from the Wealden of Hastings.

Fig. 2. The corresponding view of a dorsal vertebra of *Hoplosaurus armatus*, from the Wealden of the Isle of Wight.

s = septum in lateral cavity. Both figures are $\frac{1}{5}$ natural size.

accordingly affords a strong presumption that all the three sets belong to one and the same species, which is conclusively shown by the present specimen to be quite different from *Hoplosaurus armatus*.

The vertebra in question, which probably belongs to the middle portion of the dorsal series, has lost the anterior ball of the centrum, and the upper part of the neural arch, the base of the transverse process being absent. It is figured from the left side in fig. 1 (p. 277), and for comparison I have added a reversed reproduction of a portion of Mr. Hulke's figure of the dorsal vertebræ of *Hoplosaurus armatus*, from pl. iv. vol. xxxvi. of this Journal. So far as I can determine, both vertebræ occupied nearly the same position in the series. There is no very great dissimilarity in the two specimens, but the present vertebra is, on the whole, smaller and apparently relatively shorter than the other, with a stouter centrum. In the present specimen the width of the hinder face of the centrum is about 7 inches, and its height 6 inches; the corresponding dimensions of the other specimen being approximately 7 and $5\frac{1}{2}$ inches.

The most obvious point of distinction between the two vertebræ is to be found in the form and position of the lateral cavity. In the vertebra of *Hoplosaurus* this cavity is of a very elongated egg-shape, tapering to a point posteriorly, and it is divided into two moieties by a vertical partition placed some distance below the general level of the centrum. These two moieties are of nearly equal length, and the hinder opens directly outwards. The total length of the cavity is $5\frac{1}{4}$, and its height $2\frac{1}{4}$ inches; and the lower border of the hinder moiety reaches to within 2 inches of the nearest part of the lower border of the centrum.

On the other hand, in Mr. Rufford's specimen the lateral cavity (of which the innermost recesses are choked up with ironstone) is more ear-shaped, being much shorter and higher than in *Hoplosaurus*. Moreover, the septum between the two moieties is placed close to the posterior end, and is very deeply sunk. In consequence of this the posterior compartment has scarcely any lateral extent, and its aperture looks nearly directly forwards, so that the portion seen from the outside forms a vertical ellipse. Then, again, above the deeper portion of the anterior end of the cavity, there is a shallow depressed area which is totally wanting in the other vertebra; while the cavity is bounded anteriorly by a vertical wall of bone which does not exist in *Hoplosaurus*. The length of the lateral cavity is $4\frac{1}{4}$, and its height about 3 inches; while its lower border does not come within 3 inches of the level of the lower border of the centrum.

Above the lateral cavity is a large, triangular, flat surface bounded by ridges, which is directed more upward and less forward than in *Hoplosaurus*. Moreover, the *V* bounding the first triangular hollow on the side of the arch is placed much more forward than in the latter. There are also differences in the form of the 'fore-and-aft' surfaces of the two bones, into which I need not enter, as the imperfect condition of the present specimen renders them difficult to describe satisfactorily.

It might be urged that the difference in the form and structure of the lateral cavity in the two specimens is due to difference in serial position. I find, however, that all the numerous series of dorsals of *Hoplosaurus* in the British Museum have the same general characters, some of them being identical with the one here figured. In others, however, which occupied a different position in the series, the cavity is shorter and higher, but it still retains the same egg-like shape with the vertical septum near the middle.

It seems, therefore, certain that the present specimen cannot belong to *Hoplosaurus*, and the presumption, accordingly, is that it should be referred to the so-called *Morosaurus Becklesi*, which, as I have said, cannot apparently be separated from *Cetiosaurus brevis*. As I have been unable to compare Mr. Rufford's specimen with the dorsals of the American *Morosaurus*, I have not this aid in coming to a conclusion whether the English Dinosaur is correctly assigned to that genus. If, however, I am right in my conclusions, we are now in a fair way to be able to define tolerably well two species of English Wealden Sauropods.

I may add that the centrum of a vertebra from Cuckfield in the British Museum (No. 2239),[1] figured long ago by Mantell, is probably a late dorsal or lumbar of *Morosaurus*.

Discussion.

The Chairman (Prof. Judd), in opening the discussion, insisted on the importance, where such a course is possible, of getting rid of palæontological names which had been given to different parts of the same organism.

Mr. Hulke endorsed the remarks of the Chairman respecting the great utility of re-assembling under a smaller number of genera and species the many genera, etc., often founded on scattered bones belonging frequently to different skeletal segments; where such reduction of unnecessary genera and species can be done with certainty, the worker is a benefactor to palæontology. Mr. Hulke would not follow the Author through all the details he had placed before the Society, but he would say that vertebræ, of the type of the large specimen exhibited formerly from the Fox Collection, occurred at widely different horizons—and in Isle of Wight horizons so far apart and representing such long periods of Wealden time—that he was prepared to find the family represented by these vertebræ a very large one, comprising several distinct genera and species.

Prof. Seeley said that, without further study of the specimen described than was possible at the table of the Society, he was not prepared to express a final opinion on its interpretation. On the general question of the classification of the genera which had been reviewed, he urged that the first need of science was accuracy in the evidence on which its truths were to be based. He was not aware of any evidence on which it could be predicated that the humerus known as *Pelorosaurus* belonged to an animal which possessed the

[1] Cat. Foss. Rept. Brit. Mus. pt. i. (1888) p. 142.

caudal vertebræ known as those of *Cetiosaurus brevis*. There was no principle of correlation which could infer a generic type of humerus from the tail. In the same way, there is no evidence at present from association of specimens which would justify reference of the tooth named *Hoplosaurus* to any of the other Wealden remains: it is a type of tooth which shows but little modification in allied animals. And therefore it seemed to him safer not to assume knowledge, when the evidence did not prove the nature of the rest of the skeleton. With regard to the vertebræ named *Ornithopsis*, he had long been prepared to find that the Wealden vertebræ, originally described from Tilgate, might belong to a different species from the Isle of Wight type; because he believed that few, if any, of the species of fossil reptiles are common to these two Wealden areas. He had not yet seen evidence of generic difference; and he thought that weight was to be attached to the Author's suggestion that the new vertebra from Tilgate came from a vertebral region not previously known. There was no means of showing that these vertebræ could be associated with the remains referred to the other genera discussed. It therefore seemed to him that the future progress of science required that these genera should be kept separate. Future discoveries may enable some of them to be put together; but if that was to be done hereafter, great caution was required so as not to attempt formulating conclusions beyond the limits of knowledge.

Mr. E. T. Newton acknowledged the desirability of uniting under one name parts of skeletons which had been differently named, when there was reasonable evidence of their belonging to one form; but he pointed out the necessity of caution in this matter, lest the troubles of nomenclature should be increased rather than diminished.

The Author replied, maintaining his conclusions.