

ART. LV.—*The Sternum in Dinosaurian Reptiles*; by Professor  
O. C. MARSH. (With plate XVIII).

THE presence of a sternum in Dinosaurs has long been in doubt, as hitherto this element has not been found in position, or identified with certainty among the known remains of the group. The evidence in favor of an ossified sternum in these reptiles rests mainly on a single bone, found, in the Jurassic of England, with the remains of *Ceteosaurus*, and described by Phillips.\* Owen subsequently accepted this determination, and reproduced the original figure of this supposed sternum.† A few other specimens have been referred, with doubt, to the sternum of Dinosaurs, but apparently without any particular reason for the reference.

The Yale Museum has recently received a nearly complete skeleton of *Brontosaurus excelsus*, one of the largest known Dinosaurs. This huge skeleton lay nearly in the position in which the bones would naturally fall after death, and fortunately the entire scapular arch was in excellent preservation. The coracoids were in apposition with their respective scapulæ on each side, and between them lay *two* flat bones, that clearly belong to the sternum. This discovery, as interesting as it was unexpected, removes the main uncertainty about the scapular arch of Dinosaurs, and likewise indicates a new stage in the development of this structure, not before seen in adult animals.

These two sternal bones are suboval in outline, concave above, and convex below. They are parial, and in position nearly or quite joined each other on the median line. The anterior end of each bone is considerably thickened, and there is a distinct facet for union with the coracoid. The posterior end is thin, and irregular. These bones are shown in position

\* *Geology of Oxford*, p. 268, 1871.

† *Palæontographical Society*, p. 31, 1875.

on Plate XVIII, figure 1, and one of them is more fully illustrated in figure 2. The inner anterior margin of each bone is smooth and rounded, and gives no evidence of union with an episternal element, which the vacancy there suggests. The amount of cartilage between these two sternal bones, or posterior to them, is not indicated by the present specimens. They were evidently separated by cartilage from the coracoids.

The nearest analogy among living forms to this double sternum may perhaps be found in immature birds. A close resemblance is apparent in the scapular arch of the young American Ostrich, represented on the same plate, figure 3. If the ossification of the sternum were permanently arrested at this stage, it would afford almost precisely the structure seen in the genus *Brontosaurus*; and this is evidently the true explanation of the fossil specimens here figured.

It is more than probable that, in many Dinosaurs, the sternum long remained cartilaginous, or so imperfectly solidified that it is not usually preserved. Several specimens of the genus *Camptonotus*, found nearly in their natural position, were apparently destitute of an ossified sternum. The large size, and doubtless great age, of the specimen of *Brontosaurus* above mentioned may perhaps have been the cause of its more perfectly developed sternum.

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