

Article XVII.—THE DORSAL VERTEBRÆ OF *CAMARASAURUS*
COPE.

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The reëxamination of the type material of the genus *Camarasaurus* Cope in the American Museum of Natural History collection has been entrusted to the writer by Professor Henry Fairfield Osborn in preparation for his monograph on the Sauropoda to be published by the United States Geological Survey. It is many years since the *Camarasaurus* types have been carefully examined and in the meantime our knowledge of the Sauropoda has made great advances through the discovery of several complete skeletons.

From our present knowledge of *Camarasaurus* the vertebral formula is as follows: cervicals 13, dorsals 10, sacrals 5, while the number of caudals is unknown.

The type species of *Camarasaurus* is *C. supremus*, and the type specimen was designated by Cope¹ as a cervical, three dorsal, and four caudal vertebræ. These vertebræ were selected from a large series containing the remains of three or more individuals. These vertebræ are now in the American Museum of Natural History and constitute numbers 5760, 5760^a, 5761, 5761', 5761'', and 5761^a.

In 1904 and 1905 an attempt was made to form a composite vertebral column by placing the vertebræ in series according to their characters and rejecting the duplicates. It was concluded at that time that the number of dorsals was fourteen, thirteen of these bones being actually represented in the series. Many of the vertebræ are incomplete and others are distorted, so it becomes a difficult matter to ascertain, in many cases, whether two bones are duplicates or not. At present it appears that the number of dorsals has been placed far too high in this composite. Dorsals 10 and 12 of the series are undoubtedly duplicates, 13 and 14, and also 9 and 11, are not more different from each other than is the case with the opposite sides of a single vertebra, and are probably also duplicates; 13 and 14 are both distorted and 14 is very incomplete, and both exhibit different characters on opposite sides. The fourth is very fragmentary and shows no characters intermediate between 3 and 5; 3 and 5, on the other hand, are close enough to be continuous in a series.

The skeleton of *Camarasaurus* as a whole is remarkably similar to that

¹ Paleontological Bulletin No. 25, published August 23, 1877.

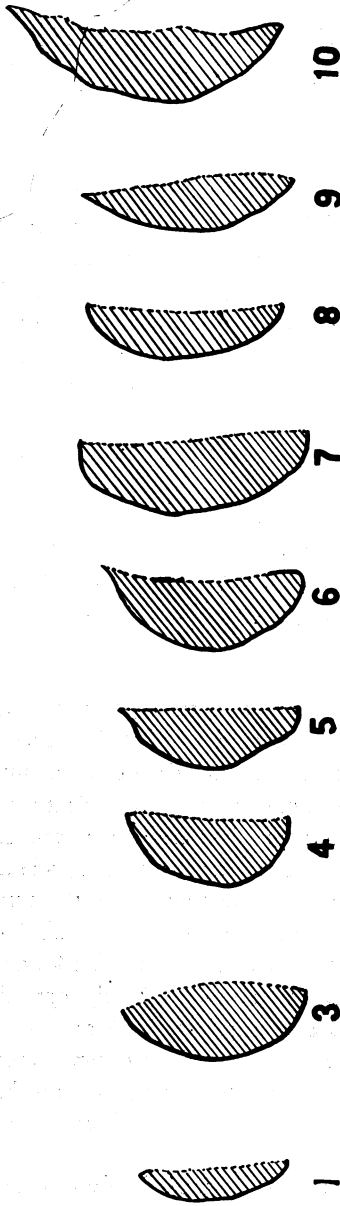


Fig. 1. Diagram showing convexity of anterior ends of centra of dorsal vertebrae of *Camarasaurus* as they would appear in vertical sections. About one-eighth natural size.



Fig. 2. Diagrams of division of spines of dorsal vertebrae of *Camarasaurus*. About one-thirtieth natural size.

of *Morosaurus*, the only difference being that of size. *Morosaurus* has ten dorsals, shown by a specimen of *Morosaurus* in the Yale Museum, in which the dorsals were found in place. The number of dorsals in *Camarasaurus*, then, is probably ten.

The characters of the dorsals are as follows:

General appearance of dorsals much more massive than in most sauro-pods. Centra all opisthocœlous, slightly so in the posterior members and increasing gradually anteriorwards, differing in this respect from *Brontosaurus* and *Diplodocus*, in which the posterior dorsals are platycœlian, and the anterior ones strongly opisthocœlian, the latter character beginning abruptly in one of the central dorsals. The pleurocœls are deep, but occupy less of the surface of the centrum than in *Diplodocus*. They are somewhat more rounded than in *Brontosaurus*. The centra are relatively short and broad, the breadth of the posterior ones being twice the length. In the anterior ones the length exceeds the breadth only slightly.

The neural arches are of medium height, and comparatively simple in form. There is a deep infradiapophysial lamina, dividing the infradiapophysial cavity into anterior and posterior halves. The infrapre- and postzygapophysial laminae are strongly developed. The oblique and intersecting laminae of *Diplodocus* are absent or feebly developed in the posterior dorsals, though of moderate strength in the anterior ones. Hyposphene-hypantrum articulation strong. Pre- and postzygapophyses very strong and connected by a broad horizontal lamina.

Posterior spines low and broad. Anterior spines low and divided. Transition from single posterior spines to divided anterior spines gradual. Dorsals 10, 9, and 8 have a slight suggestion of a notch at the top, in 7 there is a notch about one inch deep, in 6 a notch about 3 inches deep, in 5 a notch about three and one-half inches deep, and in the anterior four vertebrae the division is complete. The deep supradiapophysial cavity on the side of the spine is divided by the supradiapophysial lamina into a large anterior and a small posterior portion. Pre- and postzygapophysial laminae strong. On the posterior surface of the spine there is another vertical lamina interior to the postzygapophysial. This may be called the *suprahypospheneal*. Median prespinal lamina very weak, and the median tubercle between the two divisions of the anterior spines of *Diplodocus* is absent. Anterior and posterior surfaces of spines strongly rugose.

Diapophyses very strong, supporting the tubercular processes of the ribs, widest in the anterior vertebrae. Horizontal and infra- and supradiapophysial laminae form supports for the diapophyses. Tubercular facets for the ribs on ends of the diapophyses, high throughout. Capitular facets high in posterior dorsals, descending gradually anteriorwards until in dorsal 1 it is on the centrum.

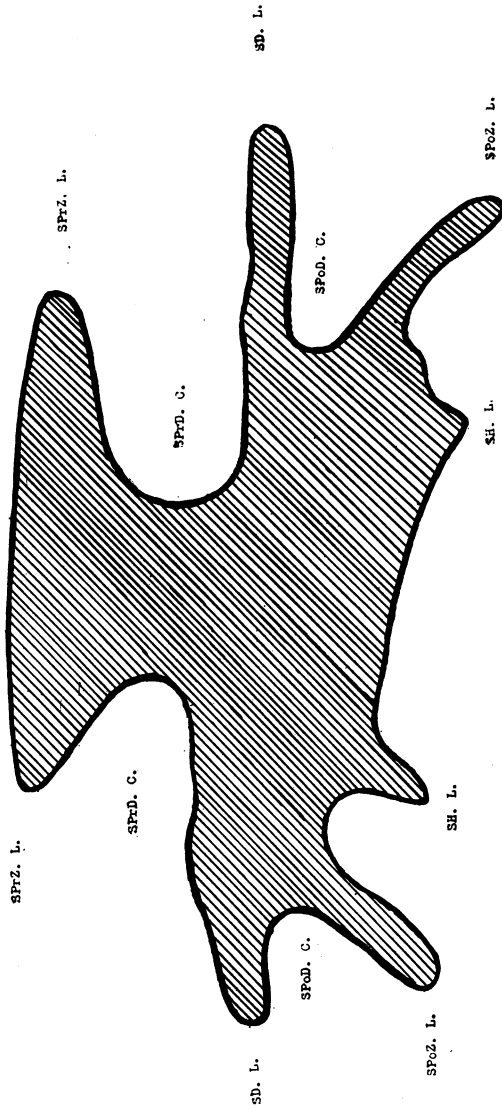


Fig. 3. Transverse section of spine of dorsal 6 showing laminae and cavities. † natural size. SPPrZ. L. = Supraprezygapophysial lamina, SPPrZ. L. = Supraprezygapophysial lamina, SD. L. = Supraprezygapophysial lamina, SH. L. = Supraprezygapophysial lamina, SPPrD. C. = Supraprezygapophysial cavity, SPPrD. C. = Supraprezygapophysial cavity.

The dorsals of *Camarasaurus* resemble those of *Brontosaurus* in being very robust, those of *Morosaurus* in every important particular except size, those of *Brachiosaurus* in having low broad posterior spines. The resemblance to *Diplodocus* is slight. They differ from those of *Brontosaurus* in having low broad posterior spines, those of *Morosaurus* in being much larger, those of *Brachiosaurus* in being shorter in anterior-posterior direction and in having only three or four spines single, and from those of *Diplodocus* in having low broad spines and more massive simple structure.

