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NOTES ON CAMARASAURUS COPE

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Original Description

Camarasaurus was originally described by Edward D. Cope in "Paleontological Bulletin 25," published August 23, 1877. The type species is *Camarasaurus supremus*, and the type specimen consists of a cervical, three dorsal and four caudal vertebræ. These bones were found near Canyon City, Colorado, and in the same quarry a considerable number of bones were excavated, belonging to three or more individuals. These bones were more or less associated with the type and it is impossible to say which belongs to one individual and which to another. The vertebræ of the original type may not all belong to the same individual. The various remains are of the same general character and there need be no hesitation in referring them to the same genus and species. Some of these later bones were described in a subsequent paper in the *American Naturalist* for February, 1878, and figures of vertebræ, scapula and pubis were given. All of these remains together now constitute numbers 5760, 5760′, 5761, 5761′, 5761″, 5761*a*, of the collections of the American Museum of Natural History.

The original description by Cope confounds to some extent the generic characters of *Camarasaurus* with the characters of the Sauropoda as a whole. The hollow centra, and lightly built, laminated neural arches and spines are possessed by all the Sauropoda, some members of the group possessing the lightening structures to a much greater degree than does *Camarasaurus*.

The general characters of *Camarasaurus*, without giving detailed descriptions, are as follows:

Cervicals: Number probably thirteen, of moderate length, of considerable height, with spines double, without a median tubercle.

Dorsals: In the restoration made by Cope the number of dorsals was placed at twenty. Later the series was studied at the American Museum, and a composite column was made up by placing together vertebræ showing progressive fore-and-aft characters. At this time the number was estimated to be fourteen, of which thirteen were actually represented, dorsal two being absent. In the fall of 1913, opportunity was given the present writer by Professor Henry Fairfield Osborn to restudy these vertebræ in preparation for his monograph on the Sauropoda. It was then found that by the elimination of duplicate bones the number is probably ten.

Relationships

The close similarity of *Camarasaurus* with *Morosaurus* has long been considered ground for placing the two genera in the same family. At the present time, it appears that this similarity is close enough to force the conclusion that the two animals belong to the same genus. Among the characters common to *Camarasaurus* and *Morosaurus*, the following may be mentioned:

1. Centra of dorsals increasing gradually in opisthocœlianism from the posterior to the anterior region.
2. Principal laminæ supporting the transverse processes strong, with little development of accessory laminæ.
3. Spines low and broad, with only one cavity of any importance on their sides.
4. Caudals short, with inferior surfaces of centra convex in transverse direction.
5. Scapulæ short, greatly expanded at both proximal and distal ends.
6. Humerus short and stout, index of maximum length into minimum circumference about .440.
7. Ulna slightly twisted at the distal end.
8. Femur very stout, index about .440. Ratio of length of femur to length of humerus about .600.
9. Metacarpals long and slender.
10. Sacral spines low and broad.
11. Ischium slender, tapering distally.

The only characters in which the two forms differ are those which may be taken as individual variations or specific characters, such as size, position of capitular rib facets on anterior dorsals, presence or absence of a median tubercle between the two spines of the anterior vertebræ, or slight differences in the laminar supports of the transverse processes.

It is concluded, therefore, that *Camarasaurus* and *Morosaurus* are generically identical, and as *Camarasaurus* has a priority of about one month, the species now under *Morosaurus* should be referred to the former genus.

FIGURE 1.—*Restoration of Camarasaurus by Cope.* About 1/100 natural size
The position of the fore limb in relation to the vertebral column was not indicated by Cope

Cope's Restoration

A life-size restoration of *Camarasaurus* was made by Dr. John A. Ryder under the direction of Professor Cope about 1878, parts of several individuals being assembled to make a composite individual.

The material on which the restoration of the skull was based was very incomplete, only the posterior portion of the cranium and the anterior portion of the mandibles being represented. The restoration of the skull was, therefore, almost entirely hypothetical. The teeth were restored as of carnivorous rather than herbivorous type, and were placed along the sides of the jaws instead of in the front as is now known to be the case in the Sauropoda. The teeth extend posteriorly behind the orbit, some of them even appearing to be rooted in the jugal bone.

The cervical and dorsal vertebræ are not distinctly separated in the restoration, nor are the dorsal and sacral. No ribs are represented. The cervical series as restored contains ten or twelve vertebræ, no atlas being represented. The dorsal series contains sixteen, seventeen or nineteen vertebræ, according to the interpretation of vertebræ eleven and twelve as dorsals or cervicals, and vertebra twenty-nine as dorsal or sacral. Sixty caudals are present in the restoration. According to our present knowledge of *Camarasaurus*, the number of cervicals should be twelve or thirteen, the number of dorsals ten, of sacrals five, while the number of caudals is doubtful. In the restoration, there are too many anterior caudals and too few small distal ones.

The bones of the fore-limb are too long in the restoration. Four hypothetical carpal bones are represented. The phalangeal formula of the restoration is 4, 5, 5, 5, 5. The ischium is represented as slightly expanded at the distal end as in *Brontosaurus*, instead of tapering slightly as it does in the type. The tibia and fibula are each about seven inches longer than the actual bones. Three tarsal bones, of which at least one is hypothetical, are represented. The phalangeal formula as restored is 2, 3, 3, 5, 4.

It is interesting to observe that, at this early date, Professor Cope concluded that the Sauropoda walked upright, instead of crawling, as was contended a few years ago by Tornier and others, and denied by Matthew and Holland.