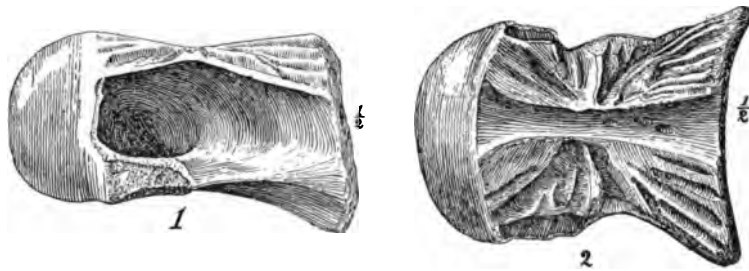


II. DISCOVERY OF REMAINS OF ASTRODON (PLEUROCELUS) IN THE ATLANTOSAURUS BEDS OF WYOMING.

By J. B. HATCHER.

While engaged during the season of 1901 in collecting dinosaur remains in the Atlantosaurus beds on Sheep Creek, Albany Co., Wyoming, Mr. C. W. Gilmore discovered two vertebral centra (No. 578), which I am unable to distinguish either generically or specifically from those described and figured by the late Professor Marsh as pertaining to *Pleurocælus nanus*, which, as will be shown later, should be regarded as a synonym of *Astrodon johnstoni* Leidy.



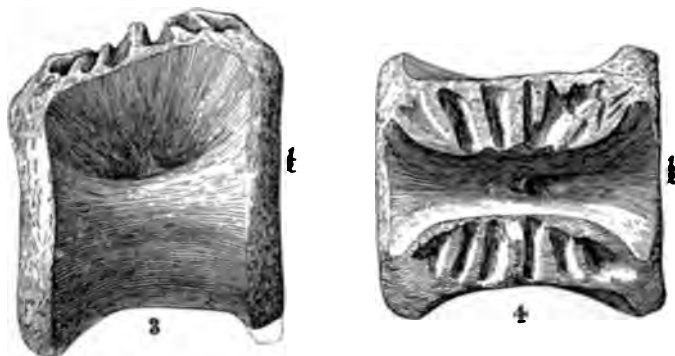
FIGS. 1 and 2. Cervical centrum of *Astrodon johnstoni* Leidy, seen from left side and above; one half natural size. (No. 578.)

One of these centra, lateral and superior views of which are shown in Figs. 1 and 2, I regard as pertaining to a posterior cervical. Its sides are deeply excavated in such manner that the body of the centrum is reduced throughout its middle region to superior and inferior horizontal plates connected by a thin median vertical lamina. The neural canal was small and much constricted medially. The centrum is strongly opisthocœlous and the transverse diameter is greater than the perpendicular. It agrees almost perfectly in size and general characters with the cervical centrum of *Astrodon (Pleurocælus) nanus* figured by Marsh in his *Dinosaurs of North America*<sup>1</sup>, except that in

<sup>1</sup> Sixteenth Ann. Rep. U. S. G. S., Pt. 1, Pl. XL.

the present specimen the facet for the cervical rib is broken away, thus giving to this region a somewhat different aspect.

The centrum shown in Figs. 3 and 4 I regard as pertaining to the last dorsal. The posterior extremity is moderately concave, and the anterior slightly so. The lateral cavities are deep, though not so pronounced as in the cervical; that on the left side is decidedly deeper than the one on the right. The neural canal was much larger than in the cervical and at about its middle there is a deep pit giving origin to two small foramina which no doubt served for the transmission of nutrient blood vessels to the interior of the bone. The vertebral cen-



FIGS. 3 and 4. Centrum of last ? dorsal seen from left side and above. (No. 578.) One half natural size.

trum described by Marsh as a posterior dorsal and figured in plate XL., Figs. 4 and 5, of his *Dinosaurs of North America*, in reality pertained to an anterior dorsal, as is evidenced by its strongly opisthocœlian character and the more extended pleurocentral cavities, while the dorsal centrum figured in the text as pertaining to *Pleurocœlus* was from the mid-dorsal region, as is evidenced by its less decided opisthocœlian nature and smaller lateral cavities.

In Figs. 5 and 6 are shown lateral and superior views of a posterior caudal centrum, pertaining to about the same region as that figured by Marsh in plate XL., figs. 8 and 9, of his *Dinosaurs of North America*, from a specimen found in the Potomac beds of Maryland. The present specimen was found by Mr. Gilmore in the *Atlantosaurus* beds, on Sheep Creek, Wyo., but in a different quarry from that which furnished the dorsal and cervical centra figured above.

A careful comparison of these remains with those figured by Marsh as pertaining to *Pleurocælus nanus*, based on material discovered by the present writer in the Potomac beds of Maryland, will, I think, show it to be quite impossible to definitely distinguish these remains either generically or specifically from the latter. The same may be said of



FIGS. 5 and 6. Lateral and superior views of centrum of distal caudal. (No. 585.) One half natural size.

the material upon which was based Marsh's description of *Pleurocælus montanus*. These western forms may, however, be specifically distinct from the Maryland species.

SYNONYMY OF PLEUROCÆLUS NANUS MARSH AND ASTRODON  
JOHNSTONI LEIDY.

It now remains to discuss the synonymy of the above-mentioned genera and species.

The generic name of *Astrodon* was given without description in the *American Journal of Dental Science*, 1859, by Dr. Christopher Johnston to certain reptilian teeth obtained by a Mr. Tyson from a bed of iron ore near Bladensburg, Maryland.

In 1865,<sup>2</sup> as *Astrodon johnstoni*, Dr. Leidy fully described and figured these teeth, thus placing the genus on a valid foundation. A comparison of Dr. Leidy's figures of the teeth of *Astrodon johnstoni* with Marsh's figures of *Pleurocælus nanus* will show a very striking similarity between the two, which is rendered all the more striking by an actual comparison of the specimens themselves. Moreover since I myself collected all of the material described and figured by Professor Marsh I can assert that it likewise was found in a bed of iron ore near Bladensburg, Maryland. The exact locality of the Marsh material was certain iron ore mines on the farm of Mr. Wm. Coffin, and especially in that one locally known as "Swampoodle" and situated about one and one half miles northeast of Beltsville on the Baltimore and Ohio Railway, some thirteen miles from Washington. Since these remains

<sup>2</sup> Memoir on the extinct Reptiles of the Cretaceous formations of the United States, Smith, Contr. to Knowl., Vol. 14, Pl. XIII, figs. 20-23.

were found in essentially, and perhaps identically, the same locality and horizon, and, in consideration of the very great similarity which they exhibit, there appears no good reason for considering them as pertaining to either different genera or species. *Astrodon johnstoni* Leidy having priority should therefore be retained, while *Pleurocælus nanus* would become a synonym of that genus and species.

RELATIONS OF ASTRODON JOHNSTONI LEIDY (PLEUROCÆLUS NANUS MARSH) AND ELOSAURUS PARVUS PETERSON AND GILMORE TO OTHER GENERA OF JURASSIC SAUROPOD DINOSAURS.

It will have been noticed no doubt that the character of the remains which have been referred to the above-mentioned genera and species indicates that they pertain to animals not yet fully adult. This is shown by the sutural connections exhibited between the centra and neural arches of the various vertebræ ; by the free coracoid in *Elosaurus* ; and by the character of such portions of the skull of *Astrodon* as have been recovered. While collecting in the Potomac beds I secured a number of fragments of skulls pertaining to both upper and lower jaws. Whenever teeth were present they invariably belonged to the first series and were not yet fully erupted, the points of the crowns scarcely rising above the borders of the jaw, showing conclusively that the animal had not yet reached the adult stage. Some of the larger limb bones from Maryland described by Professor Marsh as *Pleurocælus altus*<sup>3</sup> may perhaps have pertained to fully adult individuals, but unfortunately only the tibia and one or two other fragmentary limb bones of this is known. Now it would seem somewhat remarkable that only immature specimens of these animals should have been secured while for the most part only fully adult representatives of such genera as *Diplodocus*, *Morosaurus*, *Brontosaurus*, etc., are known from the same deposits. Since these last-mentioned genera must have been represented by young and immature individuals it does not seem at all improbable that some of the remains which have been referred to *Pleurocælus*, *Astrodon*, or *Elosaurus* may in reality belong to the young of some of these genera of the larger *sauropoda*. From what we know of the cervicals and dorsals of *Astrodon* (*Pleurocælus*) they might very well have belonged to a young specimen of *Brontosaurus*, as might also the detached teeth figured by both Leidy and Marsh ; while the fragment of a jaw figured by Marsh

<sup>3</sup> *Am. Journ. Sci.*, Vol. XXXV, 1888, p. 92.

in plate XL. of his Dinosaurs of North America as pertaining to *Pleurocælus nanus* agrees very well, except in size, with a similar fragment of *Brontosaurus* figured in plate XX. If one compares the detached teeth of *Brontosaurus* and *Astrodon* (*Pleurocælus*) as shown by Marsh respectively on plates XX. and XL. of his Dinosaurs of North America, he cannot but be impressed with the remarkable similarity which they exhibit. While it is true that some of the remains described by Professor Marsh as pertaining to *Astrodon* (*Pleurocælus*) could not possibly have belonged to a young Brontosaur, it is equally true that the association of this material is purely conjectural. No two bones or fragments of all that material collected from the Potomac beds in Maryland were found in such relation to one another as to demonstrate that they had belonged to the same individual. In any discussion as to the affinities of these various genera and species of small sauropod dinosaurs, not only the immature nature of the remains upon which they have been based, but also the scattered and disarticulated state in which they were found, must be constantly borne in mind. With the possible exception of *Elosaurus parvus* it remains to be shown that any of these forms are not the young of some of the well-known larger forms, and most of the known remains of this last-mentioned genus resemble very closely in many important details like parts of the skeleton of *Morosaurus*, as has been pointed out by Peterson and Gilmore in their original description.

The discovery of these remains of *Astrodon* in the Jurassic deposits of Wyoming is of the greatest importance as furnishing additional evidence in favor of the reference of these two widely separated deposits to one and the same geological horizon as was originally suggested by Marsh. Should future discoveries demonstrate that any one, or all of these smaller sauropods, are but immature representatives of the larger forms, the evidence in favor of this correlation will be strengthened rather than weakened. Marsh has reported remains of *Astrodon* (*Pleurocælus*) from the Jurassic deposits near Havre in Normandy, while the type of *Astrodon* (*Pleurocælus*) *suffosus* was derived from the Kimmeridge of Swindon, England. It is evident therefore that these dinosaurs had a very wide geographical distribution and that while the European forms may belong to different species than the American they nevertheless furnish important evidence as to the relative age of the European and American deposits. Since the Kimmeridge clays are of undoubted Jurassic age, and considering the simi-

ilarity existing between the dinosaur remains of that formation and those of the Potomac and Atlantosaurus beds, the age of the two latter would seem to be not more recent than Jurassic.

CARNEGIE MUSEUM,

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