

APPENDIX.

ART. XXX.—*Principal Characters of the Tillodontia*; by O. C. MARSH. (With two plates.)

THE Eocene deposits of North America have yielded two new orders of extinct mammals, the *Dinocerata*, and the *Tillodontia*, both of great interest, and widely different from all known groups, as well as from each other. The latter order, recently established by the writer,* is comparatively little known, as the animals representing it are of moderate size, and but few of their remains have yet been discovered. The typical genus of this order is *Tillotherium*, the more important characters of which can now be readily determined from specimens in the Yale Museum. This genus, therefore, will be mainly used in the present article to illustrate the order.

Tillotherium Marsh, 1873.†

The skull in this genus resembles in its general form that of *Ursus*. It is of moderate length, much elevated in the frontal region, and with the zygomatic arches widely expanded. (Plate VIII.) The posterior portion of the cranium is depressed, and much constricted behind the fronto-parietal suture. The temporal fossæ are large, and separated by an obtuse sagittal crest. There is no postorbital process. The frontal bones are large, and inflated with air cavities. The nasals are elongate, broad posteriorly, and narrow in front, where they unite with the premaxillaries. The latter are massive, and project forward beyond the nasals. They are united only by a slender bridge of bone, below the anterior narial aperture.

The orbit is confluent with the temporal fossa, which is largely formed below by the squamosal. The latter sends outward and forward a strong zygomatic process, and, downward, a short, obtuse, post-glenoid tubercle, which bounds in front the external auditory meatus. This opening is bounded behind by the posttympanic process of the squamosal, which unites directly with the paroccipital. The tympanic portion of the petrotic does not reach the external surface. The articular face for the condyle of the lower jaw is but very slightly concave. (Plate IX.) The malar bone is slender, and forms the anterior

* This Journal, vol ix, p. 221, March, 1875.

† Vol. v, p. 485.

AM. JOUR. SCI.—THIRD SERIES, VOL. XI, No. 63.—MARCH, 1876

portion of the zygomatic arch. The lachrymal is of moderate size, and is perforated by its foramen in front of the anterior border of the orbit. The infra-orbital foramen is large.

The palate is broad behind, narrow in front, and somewhat excavated. The anterior palatine foramina are confluent, and are enclosed between the premaxillaries and maxillaries. The posterior palatine foramina are in the latter bones, near the first premolars. The posterior nares are behind the last upper molars. The occipital condyles are small, and sessile. The exoccipitals are perforated by a condylar foramen of moderate size. There is no auditory bulla, but in its place, an irregular opening, partially occupied by the periotic. There was a distinct alisphenoid canal.

The brain cavity in *Tillotherium* is small, but proportionally larger than in *Dinoceras*.* The size of the brain compared with the entire skull is shown in the accompanying cut, fig. 1.

1.

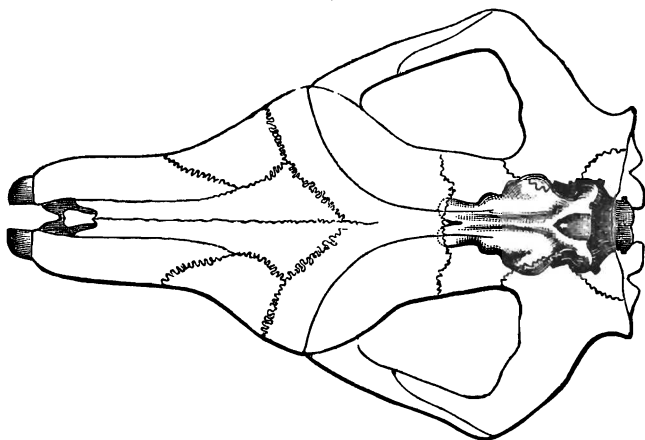


Figure 1. Outline of skull and brain cavity of *Tillotherium fodiens* Marsh. Top view. One-fourth natural size.

As in most, if not all, Eocene mammals, the cerebral hemispheres were small, and did not extend over the cerebellum or olfactory lobes. The latter were large, and projected well forward. The hemispheres were evidently more or less convoluted. There was no distinct tentorial ridge. The cerebellar fossa is large, much expanded transversely, and elevated above the cerebral cavity. There is a shallow pituitary fossa, and no clinoid processes. The exit for the optic nerve is quite large.

The adult dentition of *Tillotherium* is represented by the following formula:

$$\text{Incisors } \frac{2}{2}; \text{ canines } \frac{1}{1}; \text{ premolars } \frac{3}{2}; \text{ molars } \frac{3}{3}.$$

* This Journal, vol. ix, p. 165, Feb., 1876.

The two anterior upper incisors are large and scalpriform, and faced in front with enamel. They grew from persistent pulps, and strongly resemble the corresponding teeth in Rodents. (Plate IX, figure 1.) The upper canines were quite small, and separated by a diastema from the first premolar. In the upper true molars, the fore and aft diameter is much less than the transverse, and the crowns are very short. The form of these teeth is well shown in Plate IX, figure 4, which represents a nearly unworn last upper molar, natural size.

The lower jaw in *Tillotherium* is elongate and massive, and the symphysis is completely ossified. The condyle is broad, convex transversely, and raised above the line of the teeth. The coronoid process is stout, and of moderate height. The angle is thin, and not inflected. The anterior incisors are large and scalpriform, and faced in front with enamel. The canine was quite small. The lower molar series is of the *Palæotherium* type, and the last lower molar has a well developed third lobe.

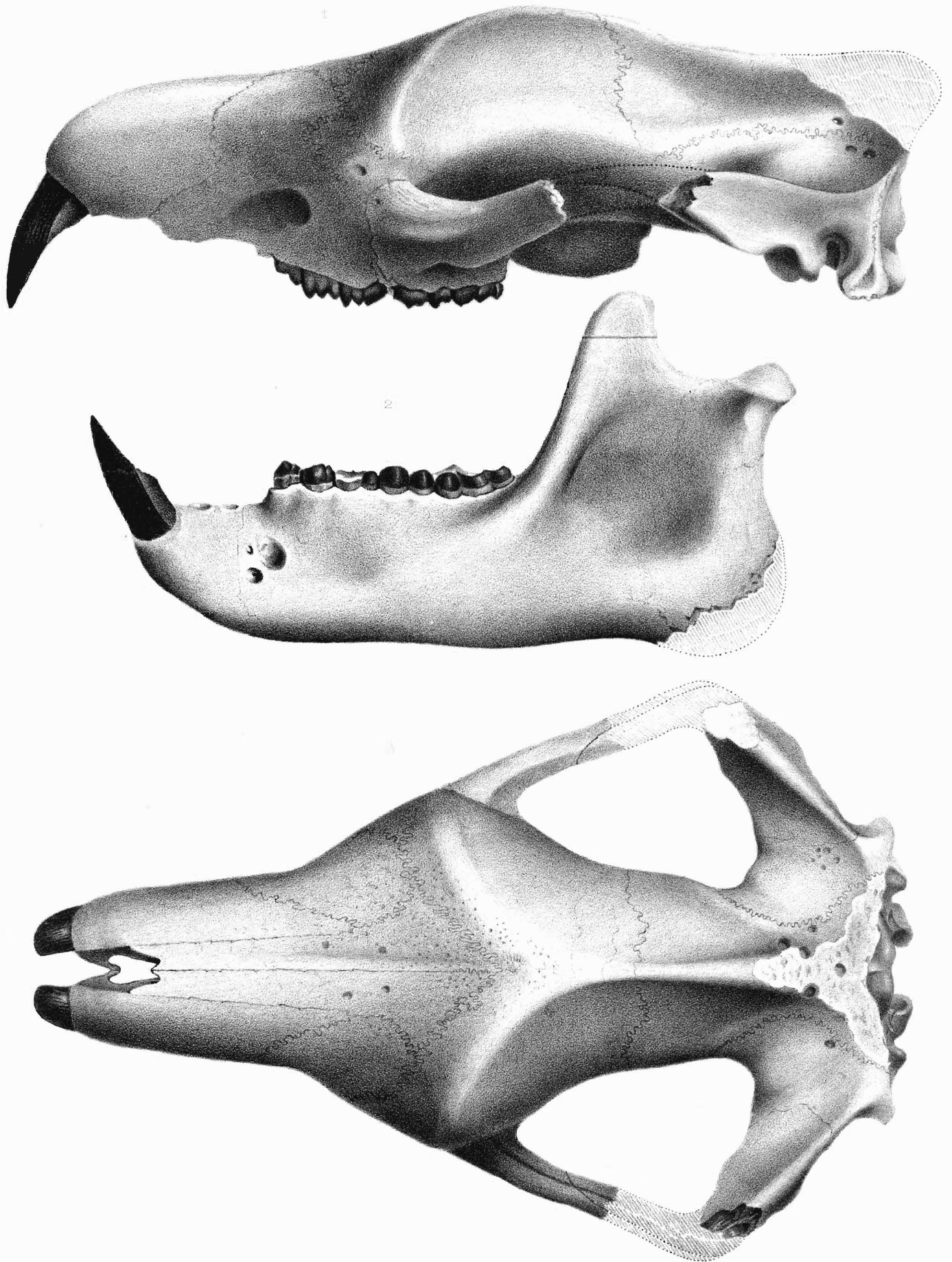
The vertebræ of *Tillotherium* resemble those of some carnivores. The cervicals are short, and the ends of the centra nearly flat. The dorsals are of moderate length, and also amphiplatyan. The lumbar are quite large. The humerus is stout, and broad transversely at the distal end, which has a supra-condylar foramen. The radius and ulna are separate, and of nearly equal size. The radius is short, and both ends are expanded transversely, indicating but little rotation. The scaphoid and lunar bones are distinct,* and the pisiform is large and stout. The feet were plantigrade. There were five digits in the manus, the first being well developed. The metacarpals are short, and the terminal phalanges long, compressed and pointed, somewhat similar to those in the Bears. (Plate IX, figure 3.) The femur is of moderate length, and its head has a pit for the round ligament. There is a well marked third trochanter. The distal end of the femur is compressed in a fore and aft direction. The tibia and fibula are distinct, and the latter is curved and slender. The calcaneum is elongate, and the astragalus, depressed, with only a slight superior groove. The hind feet were plantigrade, and the five digits were similar to those of the manus.

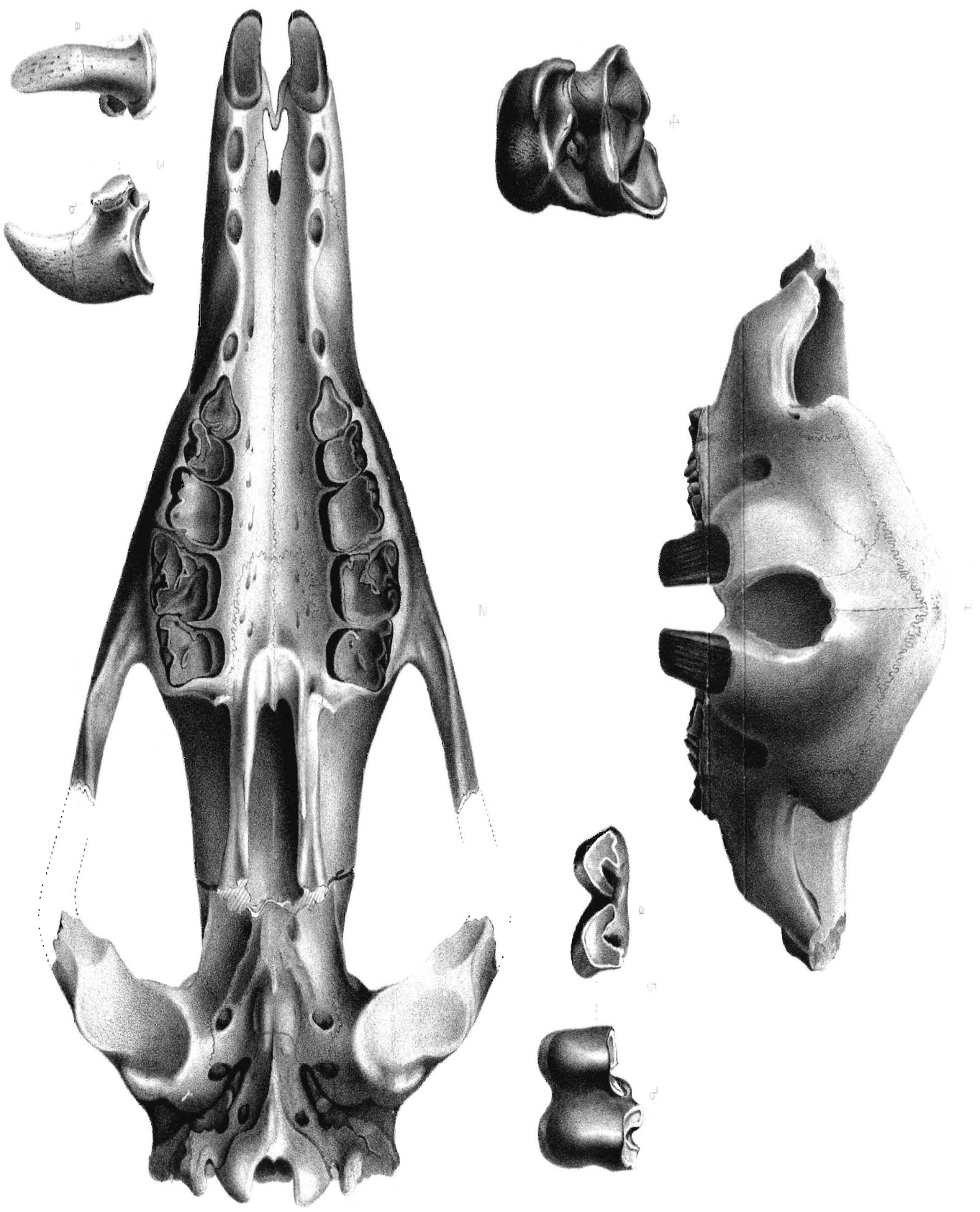
The remains of this genus at present known are from the Eocene of Wyoming. The specimens preserved indicate animals from one-half to two-thirds the size of a tapir.

Yale College, New Haven, Feb. 18, 1876.

* The scaphoid and lunar bones have not yet been found united in any Eocene mammal.

[To be continued.]





Drawn from nature by E. Cressart

TILLOTHERIUM

Henderson & Cressart New Haven Ct