Note on the Structure of the Posterior Foot of Toxodon. By E. D. Cope.

The position of the genus *Toxodon* in the system of Mammalia, is a question upon which few authorities have expressed positive opinions, and which is generally regarded as still an open question. In the lack of certainty on the subject, a separate order, the "*Toxodontia*," has been proposed for its reception. It is known that the genus is ungulate, but the opinions of authors are much divided as to its relations to the three principal orders included under that head. Resemblances to the *Proboscidea* have been detected, but Professor Gervais (Comptes Rendus, 1878), asserts that there is a close resemblance to the genus *Hippopotamus* in the structure of the posterior foot.

Having come into possession of remains of *Toxodon*, which include the greater part of the skeleton, I make a few observations on the affinities suggested by the posterior foot, the only portion just now accessible in my collection. The calcaneum and astragalus have been more or less imperfectly figured by De Blainville and Burmeister, but no one has, to my knowledge, represented the entire foot. The calcaneum is rather short and stout, and its external convex tuberosity is of unusual size. Its articular surface is divided into two subequal parts, the internal of which supports the astragalus, the external the fibula. Thus the fibular articulation is of unusual size. The cuboid facet is on the inferior face of the extremity of the calcaneum, thus looking directly downwards when the bone is prone. In order to articulate with the remainder of the foot, the calcaneum must have been inclined upwards and forwards at an angle of 45°, and the cuboid inclined downwards and forwards at a similar angle. That the axis of the astragalus had the latter inclination is proven by the fact that the superior plane of the sustentaculum lies at that angle to the axis of the remainder of the calcaneum. The great convexity of the external tuberosity for the astragalus will also permit of such a position for the astralagus. The navicular facet of the astragalus is plane and truncates the bone somewhat inferiorly as well as distally, so as to present in the same way as the cuboid. There is probably no cuboid facet. I have not seen the cuneiform bones. The metatarsals and phalanges are robust and rather short. The distal keels of the former are posterior and rudimental. Their proximal extremities have a small lateral tarsal facet as well as the principal one. The median digits are of unequal length, and the lateral ones are much shorter, but robust. Whether there are four or five digits I cannot definitely ascertain.

The above characteristics are very significant. They at once refute any supposition of affinity to the *Artiodactyla*, whether suilline or ruminant. The form of the astragalus and wide fibular condyle of the calcaneum, opposes the reference of the genus to the *Perissodactyla*. On the other hand, all the characters of the feet thus far adduced, are found in the *Proboscidea*. They are not only those of that order, but they are carried to a degree of exaggeration, as though *Toxodon* represented a high grade of

specialization of that order. The posterior feet were more truly plantigrade, for the extremity of the calcaneum reached the ground, while the instep was elevated above it, being supported, no doubt, by a more or less elastic pad. This arched or angulate plantigrade type of foot, has a remote parallel in that of man. It is quite unique among ungulate *Mammalia*.

What difficulties the other parts of the skeleton may present, I do not yet know, but I perceive nothing in the dentition which forbids the reference of *Toxodon* to the *Proboscidia*. The dentition is scarcely more different from that of *Mastodon* or *Dinotherium*, than that of *Bos* is from *Dicotyles* or *Hippopotamus*. The former genera may be the extremities of a series whose intermediate members are as yet undiscovered. In the latter case, the intermediate forms are mostly known.

Stated Meeting, May 6, 1881.

Present, 22 members.

President, Mr. FRALEY, in the Chair.

Capt. McCauley and Mr. Ellis Yarnall, two newly-elected members were introduced to the presiding officer and took their seats.

Visitor, Lieut.-Commander Gorringe, U. S. N.

Letters acknowledging receipt of diplomas were received from Messrs. W. B. Taylor, C. P. Patterson, Asaph Hall, J. J. Stevenson, C. F. Adams, J. F. Mansfield, A. S. McCreath, J. Douglas, Jr., L. M. Haupt, R. H. Alison, O. W. Holmes, Alvan Clark and J. J. Sylvester.

Letters accepting membership were received from Mr. Alvan Clark, dated Cambridgeport, Mass., April 25th; Prof. J. J. Sylvester, dated Baltimore, April 25th; Judge Wm. Butler, dated Philadelphia, May 6th; Prof. E. A. Barber, 4101 Walnut street, Philadelphia, April 25th, and Mr. W. W. Griscom, 2009 Pine street, Philadelphia, April 18, 1881.

Letters of acknowledgment for publication, and letters of envoy were read from the Musée Guimet, Herr Sommerbrodt, of Breslau, April 11th, 1881; the Physico-Central Observatory, St. Petersburg, the Smithsonian Institution, April