

Article IV.—TYRANNOSAURUS, RESTORATION AND MODEL OF THE SKELETON.¹

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PLATES IV-VI.

In three previous contributions² the structure of *Tyrannosaurus* has been partly described; in the present paper a restoration model is published; it is based on the two skeletons secured by Mr. Barnum Brown in the Upper Cretaceous of Montana.

The mounting of these two skeletons presents mechanical problems of very great difficulty. The size and weight of the various parts are enormous. The height of the head in the standing position reaches from 18 to 20 feet above the ground; the knee joint alone reaches 6 feet above the ground. All the bones are massive; the pelvis, femur and skull are extremely heavy. Experience with *Brontosaurus* and with other large dinosaurs proves that it is impossible to design a metallic frame in the right pose in advance of assembling the parts. Even a scale restoration model of the animal as a whole does not obviate the difficulty.

Accordingly in preparing to mount *Tyrannosaurus* for exhibition a new method has been adopted, namely, to *prepare a scale model of every bone in the skeleton* and mount this small skeleton with flexible joints and parts so that all studies and experiments as to pose can be made with the models.

This difficult and delicate undertaking was entrusted to Mr. Erwin Christman of the artistic staff of the Department of Vertebrate Palaeontology of the Museum, who has prepared two very exact models to a one-sixth scale, representing our two skeletons of *Tyrannosaurus rex*, which fortunately are of exactly the same size. A series of three experiments by Mr. Christman on the pose of *Tyrannosaurus*, under the direction of the author and Curator Matthew, were not satisfactory. The advice of Mr. Raymond L. Ditmars, Curator of Reptiles in the New York Zoölogical

¹ Fourth contribution by the author on *Tyrannosaurus*.

² *Tyrannosaurus and Other Cretaceous Carnivorous Dinosaurs*. Bull. Amer. Mus. Nat. Hist., Vol. XXI, Art. xiv, Oct. 4, 1905, pp. 259-265.

Tyrannosaurus, Upper Cretaceous Carnivorous Dinosaur (Second Communication). Bull. Amer. Mus. Nat. Hist., Vol. XXII, Art. xvi, July 30, 1906, pp. 281-296. Editorial abstr. Nature, Vol. 74, No. 1921, Aug. 23, 1906, p. 416.

Crania of *Tyrannosaurus* and *Allosaurus*. (*Tyrannosaurus* Contributions No. 3.) Mem. Amer. Mus. of Natural Hist., N. S., Vol. I, Pt. i, June, 1912, pp. 1-30, pl. i-iv, figs. 1-27.

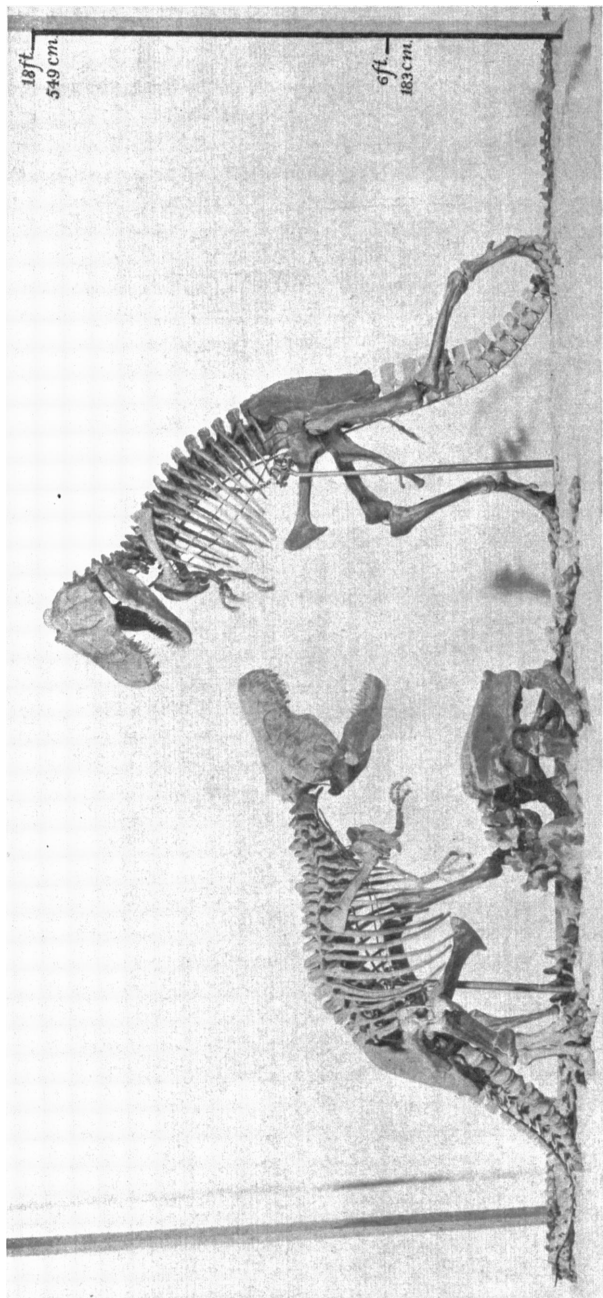
Park, was sought and we thus obtained the fourth pose, which is shown in the photographs published herewith.

The fourth pose or study, for the proposed full sized mount, is that of two reptiles of the same size attracted to the same prey. One reptile is crouching over its prey (which is represented by a portion of a skeleton). The object of this depressed pose is to bring the perfectly preserved skull and pelvis very near the ground within easy reach of the visiting observer. The second reptile is advancing, and attains very nearly the full height of the animal. The general effect of this group is the best that can be had and is very realistic, particularly the crouching figure. A fifth study will embody some further changes. The upright figure is not well balanced and will be more effective with the feet closer together, the legs straighter and the body more erect. These reptiles have a series of strong abdominal ribs not shown in the models. The fourth position places the pelvis in an almost impossible position as will be noted from the ischium and pubis.

The lateral view (Plate IV) of this fourth pose represents the animals just prior to the convulsive single spring and tooth grip which distinguishes the combat of reptile from that of all mammals, according to Mr. Ditmars.

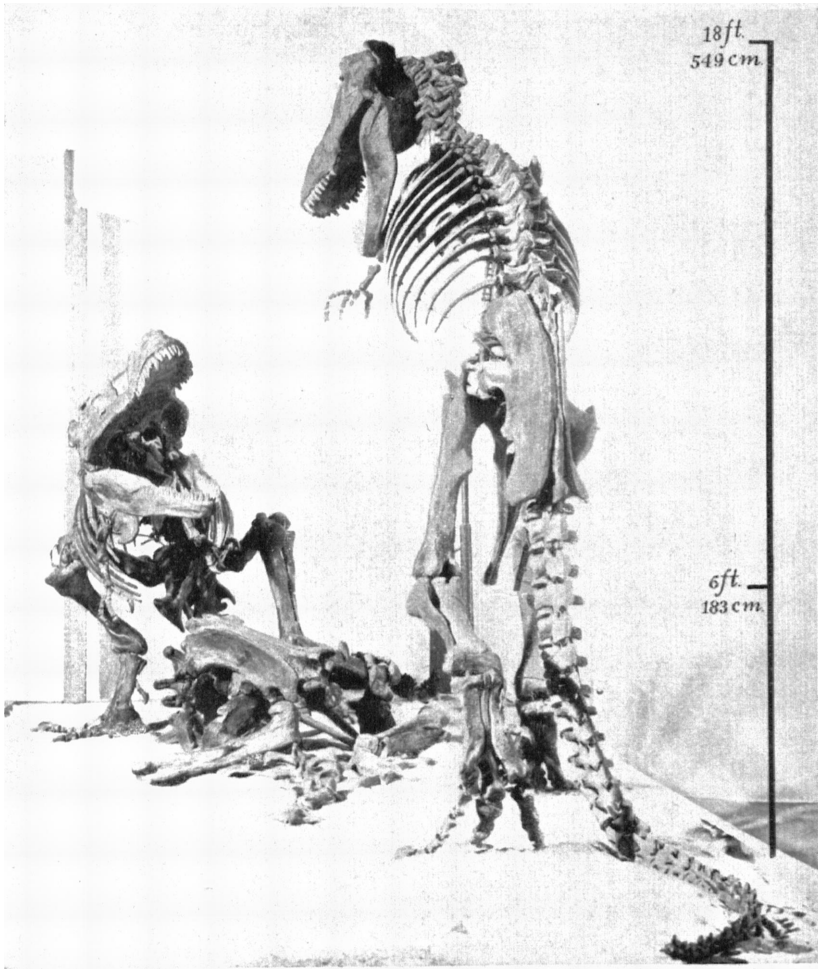
The rear view of the standing skeleton (Plate V) displays the peculiarly avian structure of the iliac junction with the sacral plate, characteristic of these very highly specialized dinosaurs, also the marked reduction of the upper end of the median metatarsal bone, which formerly was believed to be peculiar to *Ornithomimus*.

The only portion of the skeleton of these remarkable animals as here restored which does not rest on actual knowledge is the manus, which is entirely restored.

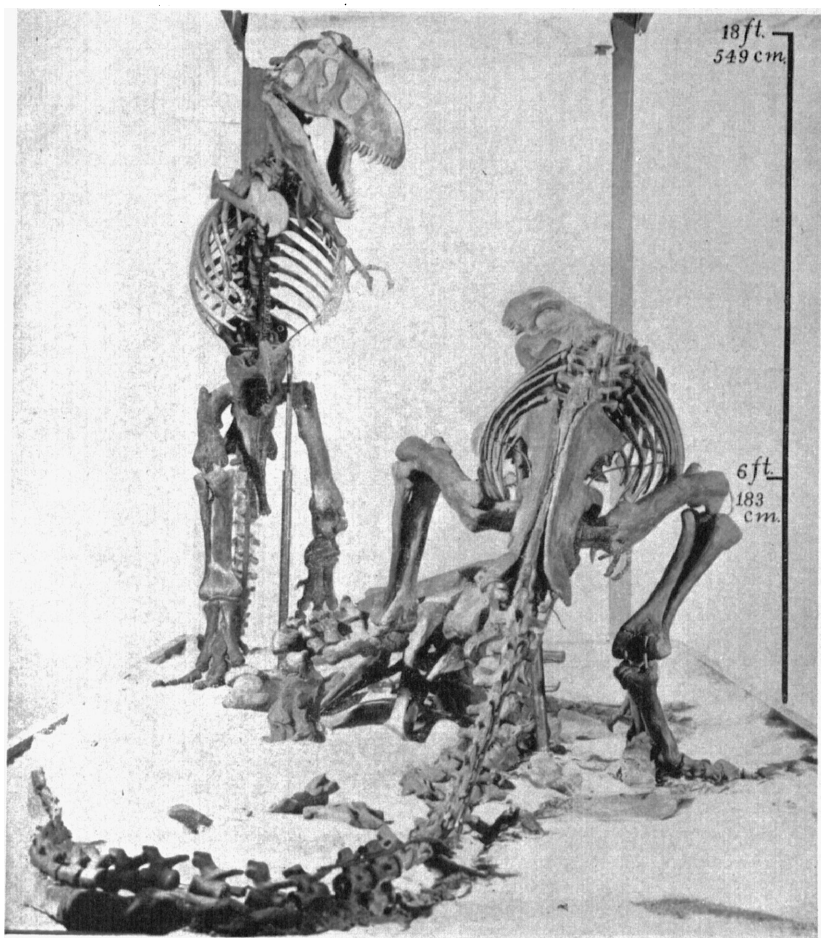


TYRANNOSAURUS GROUP. SIDE VIEW.

From the modelled skeletons, one sixth natural size. Height of original skeletons indicated at right side.



TYRANNOSAURUS GROUP. REAR VIEW OF ERECT SKELETON.
From the reduced models. Height of original skeletons indicated at side.



TYRANNOSAURUS GROUP. REAR VIEW OF CROUCHING SKELETON.
From the reduced model. Height of original skeletons indicated at side.