

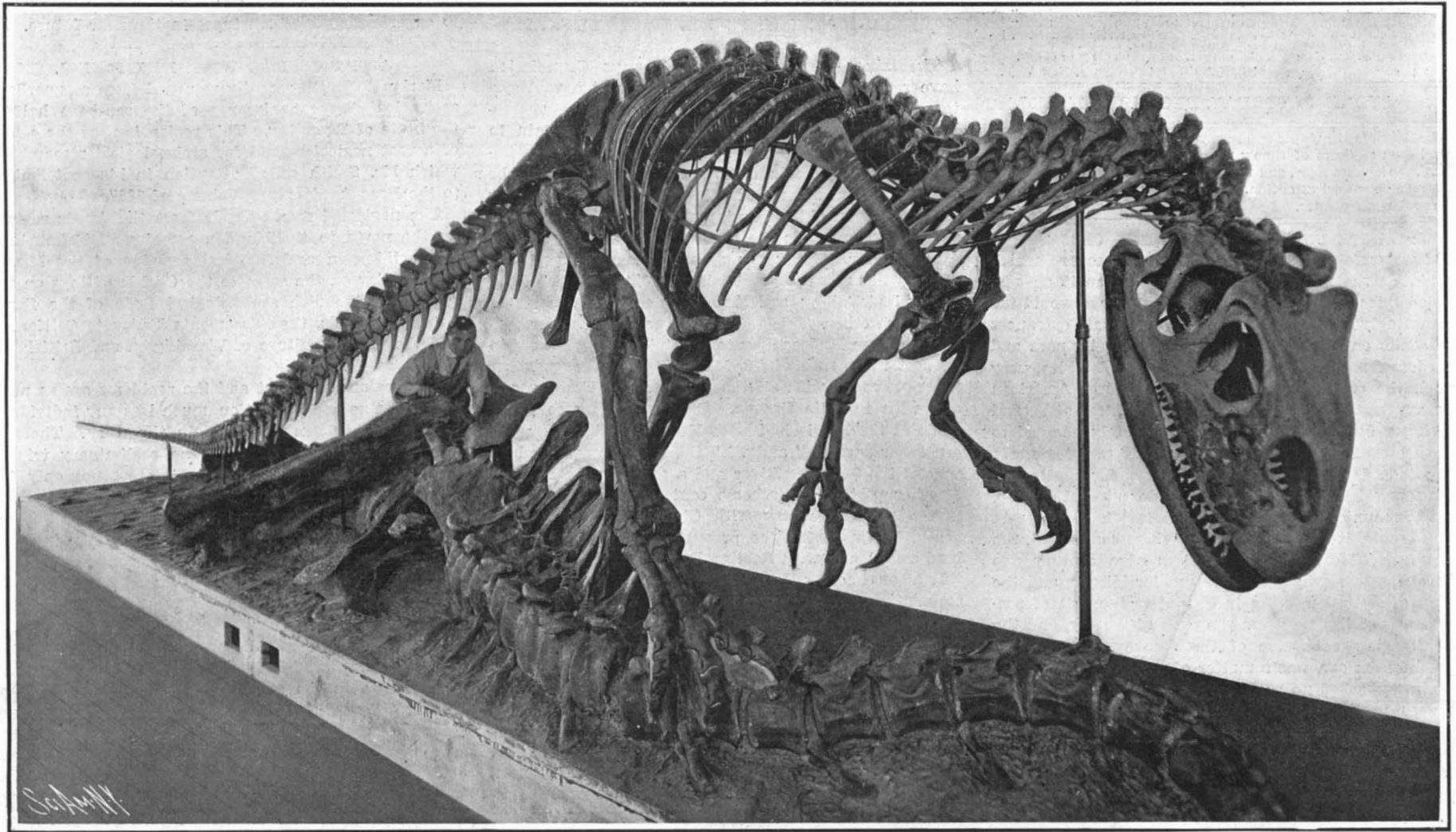
SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1907, by Munn & Co.]

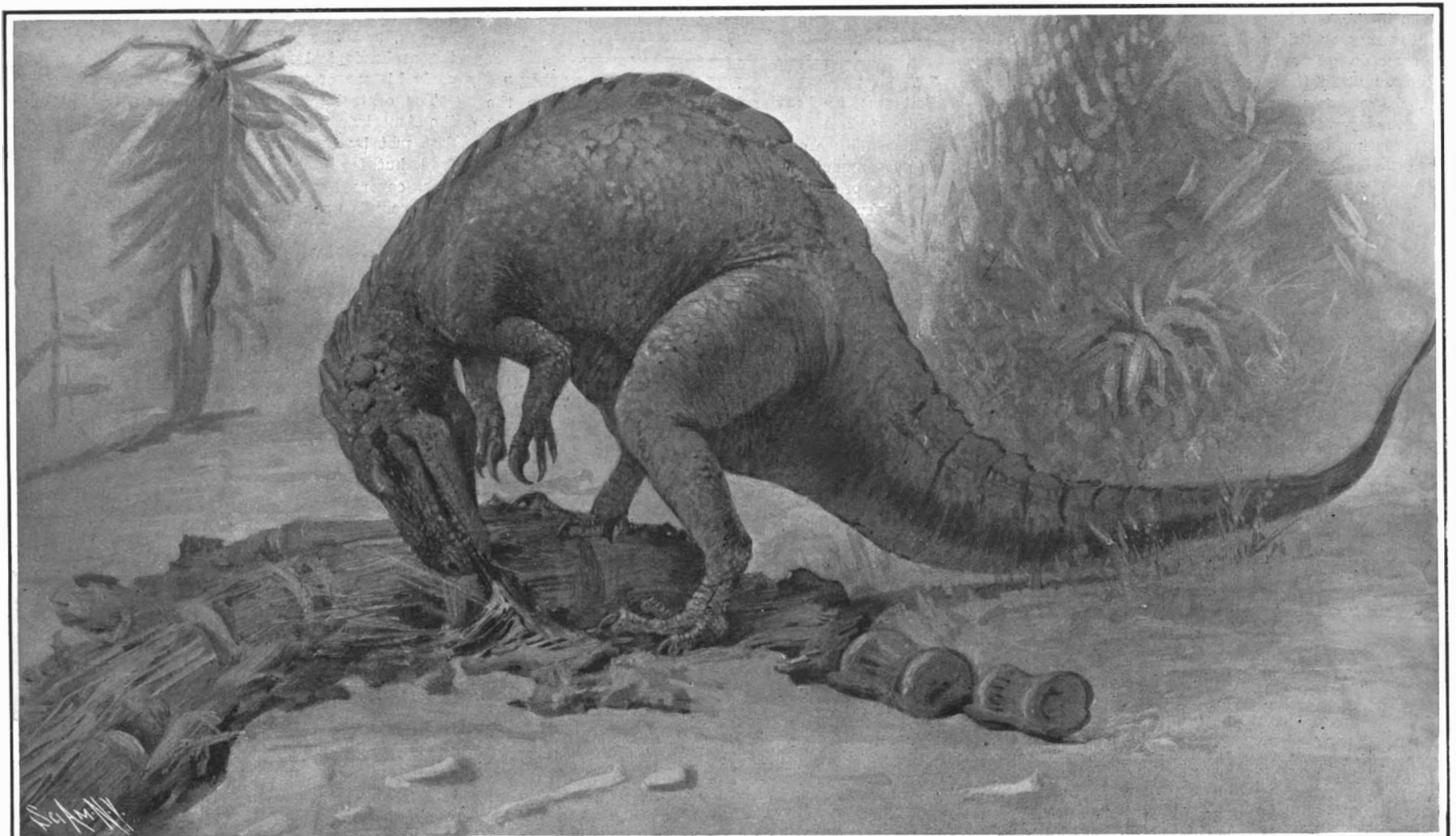
Vol. **XCVII.**—No. **24.**
ESTABLISHED 1845.

NEW YORK, DECEMBER 14, 1907.

[10 CENTS A COPY
\$3.00 A YEAR.]



The Mounted Skeleton of the Allosaurus Standing Over the Vertebrae of Its Prey.



From a painting by Charles R. Knight.

Allosaurus was a flesh-eating dinosaur that preyed upon the larger vegetarian dinosaurs. Thus the great unwieldy brontosaurus, seventy feet long, was exterminated by the smaller and more active allosaurus.

Probable Life Appearance of the Allosaurus. The Creature is Here Shown Feeding on the Remains of a Brontosaurus.

A CARNIVOROUS DINOSAUR.—[See page 446.]

the aeroplane are made of plain white silk tightly stretched over the ribs of the wooden framework, which is slightly inclined upward from rear to front.

The motor is far simpler and considerably less powerful than the 8-cylinder, V-type, water-cooled engine with which Santos Dumont first flew over a year ago. It is a double-opposed-cylinder gasoline motor of the air-cooled type, capable of developing from 17 to 20

horse-power, and two representatives of the SCIENTIFIC AMERICAN.

After making a preliminary run upon the ground, he made a fine flight of three hundred feet or more at twenty feet height; and then a second flight of about the same distance, keeping at fifteen feet from the ground. The best performance was a flight of 450 feet made quite near the ground, during which he changed



Three-Quarter Front View of the Aeroplane, Showing the Horizontal and Vertical Rudders in Front and the Combined Rudders at the Rear.

the height from five to six feet at will by means of the horizontal rudders. After changing the direction of the posts so as to bring the wind dead ahead, he attempted to make an arc of a circle, being part of the time in flight and the remainder on the ground; but after several attempts of this kind he found that he was hindered by the faulty working of the carburetor, which was at too high a level for the gasoline to flow into it properly. For this reason he was obliged to finish the test for that day. Henri Farman expected to begin work the next day, so that it was agreed that the two aeronauts should compete for the prize on alternate days.

On November 21 Santos Dumont again tried his machine in the presence of the Aero Club committee. After two or three unsuccessful attempts to get the aeroplane up in the air, he finally made several short flights of from 90 to 120 feet. Just as the machine landed after one of these, a propeller blade broke off, and, hurtling through the air for a distance of 393 feet, buried itself in the turf. The aeroplane fell over on one wing and stopped abruptly. Although Santos Dumont escaped injury, the motor broke loose, and the machine was rather badly damaged.

As already stated, the whole apparatus is carried on three wheels placed underneath the chassis, and there is also a supporting piece fixed under the middle of the bamboo pole. What is remarkable about the new flyer is its small size and its compact appearance. It is much smaller than most of the aeroplanes which have been built recently. The total overall length of the machine from front to rear is 8 meters (26.24 feet). The weight is also remarkably low, and it would be difficult to construct an aeroplane much, if any, lighter, as it weighs only 56 kilogrammes (123.45 pounds) for the complete apparatus, and 110 kilogrammes (242½ pounds) when mounted by Santos Dumont. The total sustaining surface of this aeroplane is about 107 square feet, so that each square foot is loaded to the extent of 2¼ pounds when the weight of the aeronaut is included. The weight lifted per horse-power is about 14¼ pounds. During the first flights which were made with his new monoplane on November 17 in the Bois de Boulogne, M. Dumont was well satisfied with its performance, about which he spoke as follows: "I had the aeroplane well under control, and never had such a great sensation of security, even in my airships. During these experiments I did not yet work the rudders, but by shifting my body to the right or left, the apparatus had a tendency to follow this movement by turning in the corresponding direction. The flight was stopped by a somewhat curious accident, that is, a lack of gasoline, as the tank had not been filled up after the first tests, so that the motor came to a stop and the flyer pointed head down; but as I was then sailing about twenty feet high, I had time to rise up again by working the horizontal rudder, and was able to come down easily on the ground." Owing to the breaking of a wheel, the tests were stopped for that day. Santos Dumont then made his formal entry at the Aero Club in order to compete for the Deutsch-Archdeacon prize of \$10,000 on the following day. To do this the aeronaut must fly across the starting line—which line is determined by two poles placed 50 meters (164 feet) apart—and then make the turn about another post situated at 500 meters (1640.4 feet) upon a line running from the middle point of the starting line and at right angles to it. After making the turn, the aeronaut must come back and cross the line while in full flight.

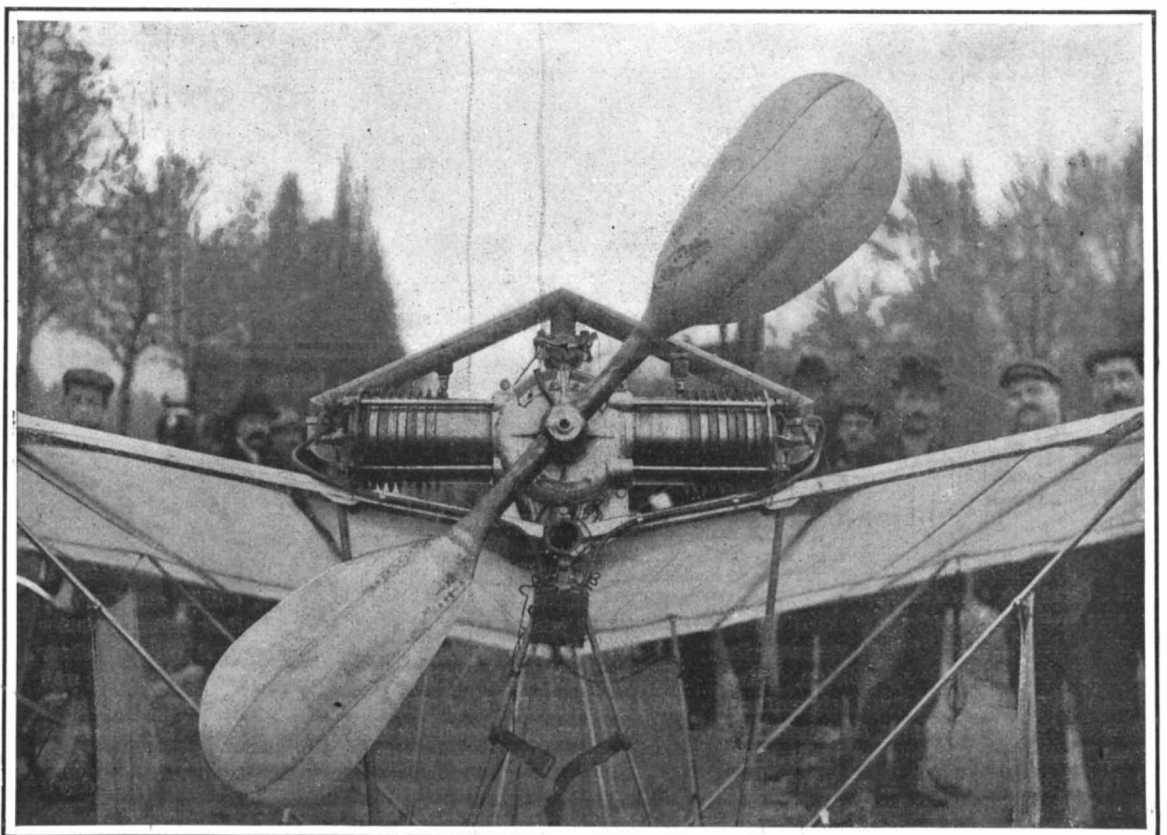
The trial was accordingly carried out the next day at the drill grounds of Issy les Moulineaux, on the outskirts of Paris, with the posts planted and the official timekeepers present. There were many prominent aeronauts assembled, such as Messrs. Archdeacon, Henri Deutsch, Delagrangé, Tatin, Henri Farman, Capt. Fer-

ber, and two representatives of the SCIENTIFIC AMERICAN.

On the sixth instant Dr. Alexander Graham Bell's tetrahedral-cell aeroplane was successfully flown as a kite above the Bras d'Or lakes at Baddeck, C. B. The aeroplane carried ballast representing a man and motor. It rose in the air easily when towed at a speed of about 15 miles per hour. Dr. Bell was entirely satisfied with the result of the test, which was made before fitting the aeroplane with a motor.

TEST OF THE BELL AEROPLANE.

TEST OF THE BELL AEROPLANE.



Front View, Showing Double-Opposed-Cylinder Motor and Propeller on Its Crankshaft.

SANTOS DUMONT'S LATEST AEROPLANE.

A CARNIVOROUS DINOSAUR: A RECONSTRUCTED SKELETON OF A HUGE SAURIAN.

BY WALTER L. BEASLEY.

There is now on exhibition at the American Museum of Natural History, New York, a skeleton of a large carnivorous dinosaur. Following the policy of the museum, Prof. Henry F. Osborn, who is responsible for this reconstruction, has departed from the traditional methods of mounting, for the flesh-eating animal is here poised as feeding upon the vertebrae of his victim, a huge brontosaurus, a herbivorous contemporary considerably larger than his carnivorous foe. These bulky, slow-moving brontosaurus, seventy to eighty feet long, without any armor or apparent means of defense, were hopelessly outclassed and probably easily overcome in battle by the fierce allosaurs. Additional interest surrounds this specimen, as large carnivorous dinosaurs are exceedingly rare. Though three or more distinct types of great dinosaurs lived at the same time and in the same region, the remains of the herbivorous ones have been the most frequently discovered, while the flesh-eating dinosaurs have been found only in a few instances. In this mount, Prof. Osborn, to whose courtesy we are indebted for much of the information here given, has scored a twofold paleontological triumph in the innovation of representing a fossil skeleton in action, and in the fact that this is the first giant carnivorous dinosaur of this type to be mounted and exhibited. In referring to the composition and departure from the customary scheme of mounting, Prof. Osborn made the following statement to the writer regarding this specimen:

"Since the allosaurus skeleton was found in the same bluff as the brontosaurus, namely, the Como Bluffs of Wyoming, and not very far away, it is barely possible, although very far from being a demonstrated fact, that this very allosaurus preyed upon this very brontosaurus skeleton. However this may have been, it is absolutely sure, judging by the intervals between the tooth marks, that a certain allosaurus did prey upon this brontosaurus, and we are justified therefore in bringing the two skeletons together. It is the first time that a fossil animal has been mounted standing over its fossil prey."

A vivid picture of the final scene of such a combat between the two titanic reptiles, the flesh eater and the massive "thunder saurian"—brontosaurus—is obtained from the accompanying reproduction of Mr. Charles R. Knight's water-color drawing, while the photograph shows the characteristic attitude given to the mounted skeleton, as well as the long string of vertebrae, pelvis, ribs, etc., of the overthrown brontosaurus, beneath the feet of the allosaurus. That the beast waged constant warfare upon, and probably put to death its other still larger herbivorous contemporaries, is shown by the finding of their bones all scored and bitten, with the teeth of allosaurus lying close by. A section of the vertebrae with the deep furrows and actual imprints made by the teeth of the allosaurus is shown in one of the accompanying photographs.

In the mount the allosaurus is represented in the act of devouring the carcass of brontosaurus. The head is raised a little, and the fore limbs partly lifted in defiance-like attitude, as if to ward off other animals who might wish to share in the feast. This alert creature was built for speed and strength, as well as for fighting erect; using the very long, powerful hind

limbs, to advance by walking or running, in making an attack upon the most vulnerable parts, probably the throat, of the large dinosaurs. In erect attitude it is estimated the head was about twenty feet above ground. The massive hind limbs, eight feet long, with their huge claws, were well adapted to support the enormous frame and to hold down the body of its prey.

The short fore limbs, three feet in length, with their immense claws, were used exclusively, it is thought, for attacking and tearing off the flesh of a victim, and not for support. The heavy tail, twenty feet long, served to balance the body. A vivid idea of the size of the enormous claws and their flesh-tearing qualities can be judged from the illustration, with the head of a man underneath, one of the claws being twelve inches long. The skull was three feet in length, and many of the tiger-like teeth measured three inches.

This skeleton is thirty-four feet in length and eight feet three inches in height, and is one of the treasures of the famous Cope Collection, presented to the Museum by Morris K. Jesup, Esq., the president of the Museum, in 1899.

The skeleton was discovered by F. F.

Hubbell, a collector for Prof. Cope, in October, 1879, in the Como Bluffs near Medicine Bow, Wyoming, and not far distant from the famous Bone Cabin Quarry, opened by the American Museum, which has yielded the greatest number and variety of dinosaurs of any one spot in the world. Here, by geological uplifts in the distant past, the earth has been thrown into a series of great rock waves or folds. In the downfolds of these, extending to some two hundred and seventy-four feet in thickness, has been found to exist a wonderful layer of entombed dinosaurs of enormous size. The allosaurus was taken to Philadelphia, where it remained in storage in the basement of Memorial Hall for over twenty years until purchased by Mr.

Jesup, who paid \$50,000 for the whole collection. In 1899, after the purchase, Dr. W. D. Matthew, the Associate Curator, went to Philadelphia under instructions from Prof. Osborn, to superintend the packing and removal of the collection to the Museum. The boxes were still piled up just as they came from the West, and had never been unpacked, except in a few

few specimens of the allosaurus obtained from the Bone Cabin Quarry. By comparison and study of the three allosaurus skeletons, with assistance and details from others, the missing bones were reconstructed and the few missing parts were carefully adjusted by Dr. Matthews. Nearly four years, at intervals, were devoted to the preparation of the skeleton. The mount-

ing was accomplished by Mr. Adam Herrman and his assistants, Messrs. Falkenbach, Lang, and Schlosser. Mr. Otto Falkenbach modeled in the missing parts.

The American consul general at Cape Town, South Africa, is establishing a commercial information bureau and reading room in order to promote the sale of our goods in the surrounding region. The intention is to furnish to prospective buyers accurate information with regard to the nature, quality, price, and the like, of every class of exportable commodity produced in this country.

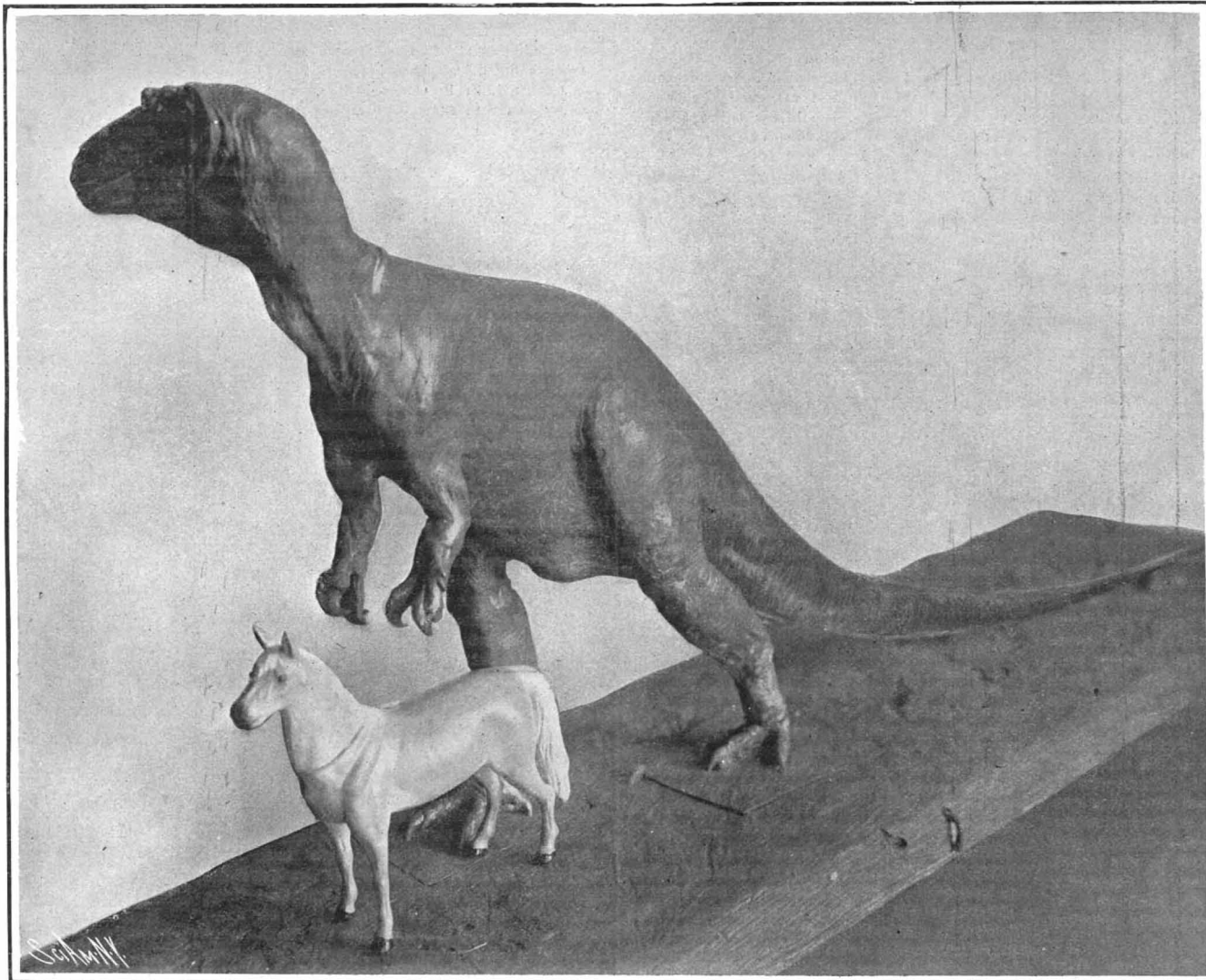
Circulars are being distributed in the territory to be covered bringing the bureau to the attention of those likely to be interested, and inviting correspondence.

It is hoped that American manufacturers will take ad-

vantage of this opportunity to easily enter the rich field opened to them and that they will send to the consulate their catalogues, price lists showing wholesale and retail discounts for goods to be exported, and all other useful information that they possess.

Another Eruption of Vesuvius.

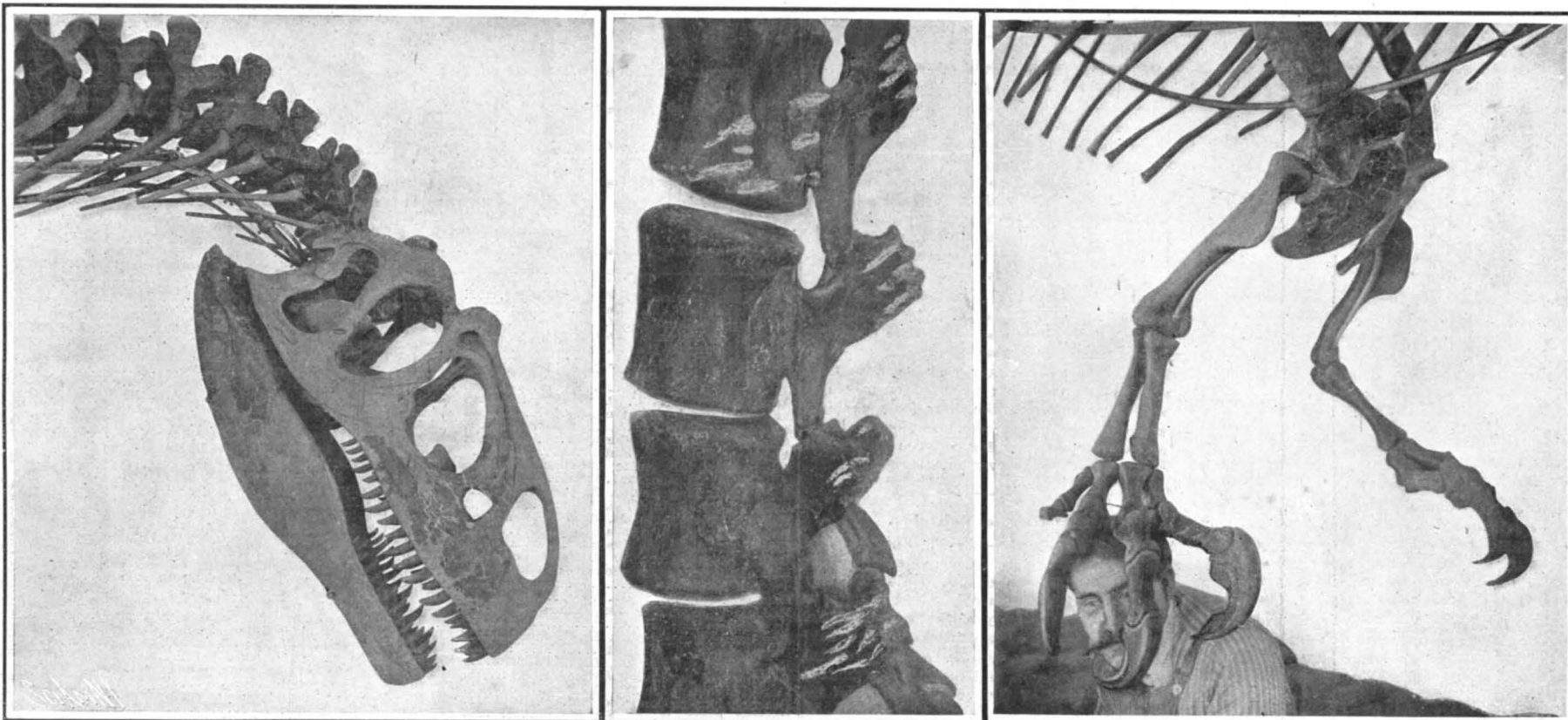
After two months of inactivity, Mount Vesuvius is again emitting clouds of smoke from three fissures around the old crater. Much rumbling and roaring is also heard. Because of the late earthquake in Calabria, some alarm is felt, for the great eruption of April, 1906, followed after the Calabria earthquake in 1905.



Modeled by Charles R. Knight.

The Size of the Allosaurus Compared With a Horse.

instances. It was thought that the Hubbell collection was not of any great value, as his letters from the field had not been preserved; and as some of his earlier collections had been fragmentary the balance was supposed to have been of the same nature. When the collection was unpacked at the American Museum, this lot of boxes, which was regarded as of little interest, was not opened until 1903. When this specimen was laid out for examination, it was recognized as a prize. Although collected by the crude methods of early days, it consisted of nearly a complete skeleton, with the bones in wonderfully fine preservation. They were dense black, hard and uncrushed, even better preserved and somewhat more complete than the



The Three-Foot Skull and the Large, Tiger-Like Teeth of the Allosaurus.

Teeth Marks on the Vertebrae of a Brontosaurus.

The Short Fore Foot of the Allosaurus, Showing the Huge Size of the Claws.

A CARNIVOROUS DINOSAUR.