

590.573

3

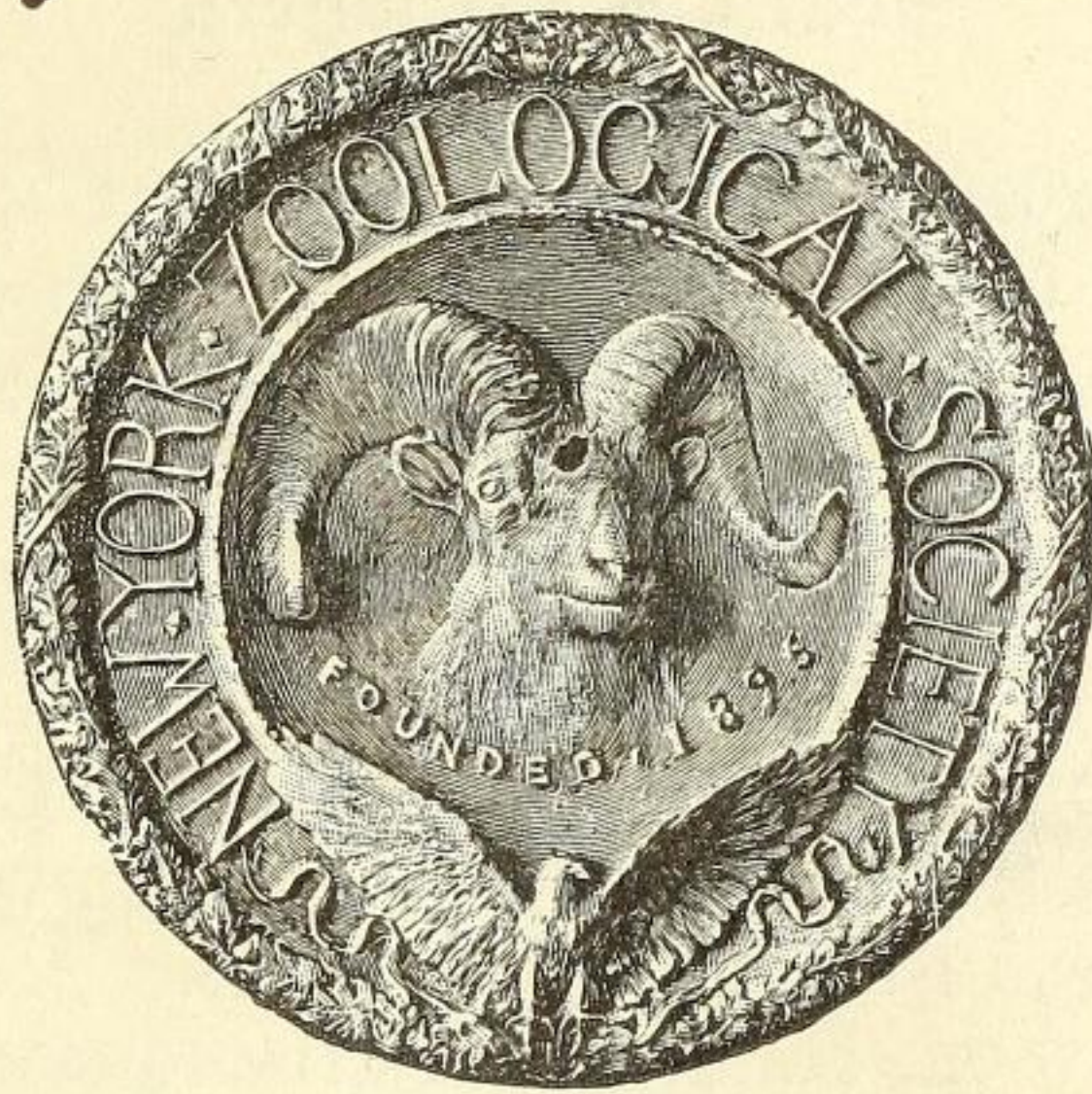
140926

Smithson

29

ZOOLOGICA

SCIENTIFIC CONTRIBUTIONS OF THE
NEW YORK ZOOLOGICAL SOCIETY



VOLUME IV

DECEMBER 1923-1926 SEPTEMBER

NUMBERS 1-5 INCLUSIVE

PUBLISHED BY THE SOCIETY
THE ZOOLOGICAL PARK, NEW YORK

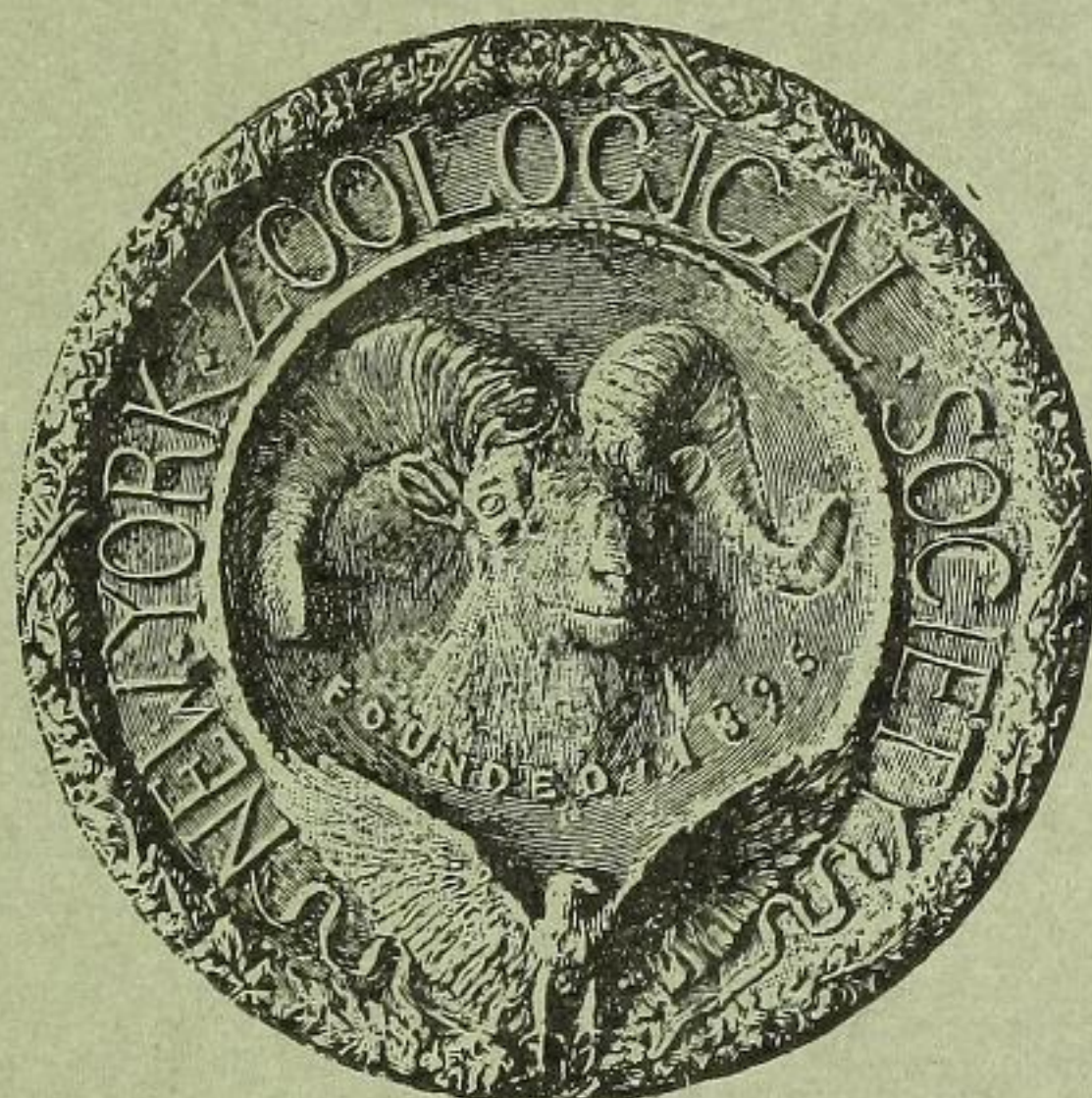
1927

TITLES OF PAPERS

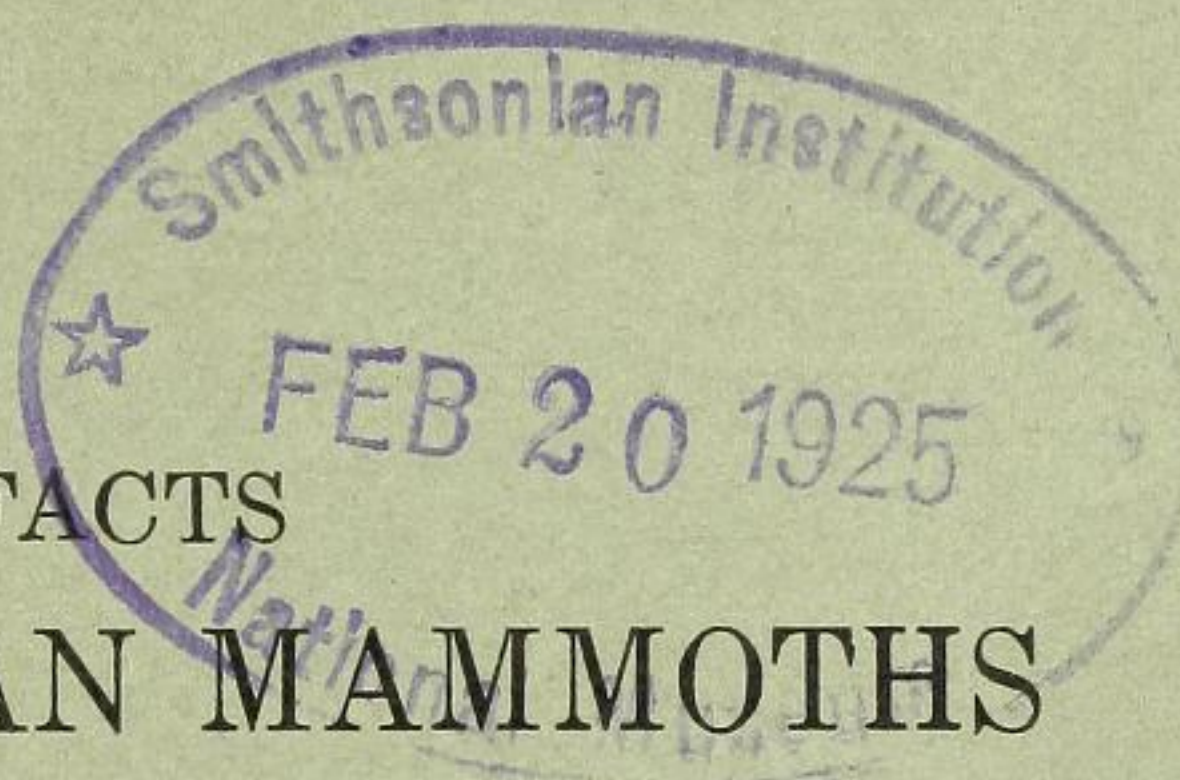
	PAGE
1—A List of Fishes, Amphibians and Reptiles Collected in Ashe County, North Carolina..... <i>Breder</i>	3
2—Problems and Facts About Frozen Siberian Mammoths (<i>Elephas primigenius</i>) and Their Ivory..... <i>Lang</i>	25
3—The Galapagos Tortoises in Their Relation to the Whaling Industry <i>Townsend</i>	55
4—Notes on Fishes from Three Panama Localities: Gatun Spill- way, Rio Tapia and Caledonia Bay..... <i>Breder</i>	137
5—The Locomotion of Fishes..... <i>Breder</i>	159

ZOOLOGICA

SCIENTIFIC CONTRIBUTIONS OF THE
NEW YORK ZOOLOGICAL SOCIETY



VOLUME IV. NUMBER 2



PROBLEMS AND FACTS
ABOUT FROZEN SIBERIAN MAMMOTHS
(*ELEPHAS PRIMIGENIUS*) AND THEIR IVORY

BY HERBERT LANG

*Associate Curator, African Mammals, American Museum of Natural History,
Fellow, New York Zoological Society*

PUBLISHED BY THE SOCIETY
THE ZOOLOGICAL PARK, NEW YORK

January 8, 1925

PROBLEMS AND FACTS
ABOUT FROZEN SIBERIAN MAMMOTHS
(*ELEPHAS PRIMIGENIUS*) AND THEIR IVORY¹

BY HERBERT LANG

*Associate Curator, African Mammals, American Museum of Natural History,
Fellow, New York Zoological Society*

(Figs 9 to 19 Incl.)

Centuries ago rumors of the discovery in northeastern Asia of great curved tusks of ivory persistently drifted into Western Europe. Could it be true that animals apparently surpassing an elephant in size lived on the bleak tundra of northeastern Siberia? Did it not sound like a fairy story that such gigantic beasts burrowed and lived underground somewhat like our tiny moles?

Ides, the famous Dutch traveler and ambassador to China, seems to have been the earliest to gather first-hand information. On traversing northern Siberia between the years 1692 and 1695 he learned that many of the Yakuts, Tunguses, and Ostyaks steadfastly believed that these huge monsters spent their lives deep underground, moving about easily in spacious tunnels even though the earth was thoroughly frozen. Should they become particularly active the whole ground might rise above them, caving in later as they passed on. But let the "mamonts" or "ground-dwellers" come to the surface and breathe the warm air, they instantly died.²

This is not so strange a story when we consider that actual circumstances helped strengthen native belief. At certain places in Siberia, after the melting of the snow, plenty of bones of what later came to be called the mammoth were lying about the surface or sticking up from the ground. Here and there after the thawing and slipping of portions of steep river banks the more or less complete remains of these proboscideans had been exposed to view in the very sites where inadvertently they might have reached the fateful daylight. At other times one of these frozen giants was discovered at a point the natives imagined to be the end of the mammoth's diggings.

¹ The photographs and some of the data in this article have been kindly contributed by Dr. E. W. Pfizenmayer, Curator, Natural History Museum, Stuttgart. Formerly: Assistant, Petrograd Zoological Museum; Member of the Beresovka Mammoth Expedition; Leader of the Sangajurach Mammoth Expedition.

² Ides, Isbrand, 1704, 'Dreyjarige Reize naar China.' Amsterdam, p. 31.



Fig. 19.—The famous frozen mammoth of the Indigirka River, Siberia. From Beukendorf's romantic story, Mrs. E. Rungius Fulda pictures the ice-mummy with hind limbs still anchored in the unthawed banks. Later, when the ground, together with the mammoth, was carried away by the force of the onrushing floods, the discoverers had a narrow escape. Reproduction from W. T. Hornaday's "Tales From Nature's Wonderland." Copyrighted by Charles Scribner's Sons.

It is with amusement we turn to the many heated, rather sprightly controversies that centered about the early finds in Europe of certain fossil bones of enormous proportions. Did they belong to giants? Certainly the few pieces available showed a more striking resemblance to those of man than to any other quadruped they could then be compared with. In Switzerland, after unearthing in 1577 some of these huge bones, the city elders of Lucerne desired to express pride in what they were pleased to consider their giant ancestor. After many enthusiastic comments they decided to figure him as bearer of the town escutcheon. More remunerative proved the resurrection of the supposedly nineteen foot tall Cimbrian king Teutobochus in 1613 near Montrigaud (Drôme), in southeastern France. The astute surgeon Mazurier arranged a traveling show, making the curious crowds pay for the pleasure of viewing the relics.

After parts of skulls, molars, and tusks had finally been obtained there was of course no question as to their belonging to some kind of elephant. Cuvier, who was the founder of the Department of Palaeontology in the Paris Museum, was the first to recognize that these gigantic bones exhumed in Western and Central Europe and the frozen remains in northeastern Siberia belonged to the same kind of animal, the extinct mammoth *Elephas primigenius*.

There was naturally a keen desire on the part of the more enlightened to recover for scientific purposes at least one of the ice-mummies, soft parts and all. As early as 1722 Peter the Great of Russia gave orders to that effect to the governor of Siberia. From time to time quantities of bones collected apparently at random were sent in. Small portions of the coveted quarry occasionally reached interested centers and kept alive the yearning for real success. But in the hope of securing more complete remains the Petrograd Academy of Science before the close of the century sent several expeditions into Siberia to have exceptionally promising finds followed up, exhumed if possible, and transported to their zoological museum.

During those early periods travel into such desolate, far-off regions was a slow and difficult process and rendered even the most hopeful of these enterprises uncertain. By the time adventurous men of science made their way over thousands of miles, the particular frozen mammoth whose quest called them into the howling wilderness had literally melted away. Exposed soft parts rapidly decayed or were destroyed by carnivores that often scattered the

bones. Floods frequently carried whole portions away, or else the oncoming winter thwarted all further attempts at recovery.

Not until 1806, however, came the really epoch-making find which solved many questions about this extinct form. A Tungusian fisherman in 1799 had located a complete, frozen mammoth on the banks of the Lena River at the threshold of the Polar Sea. Imbedded in ice, as it had been for thousands of years, its meat was still in such condition as to be eagerly devoured by polar bears, wolves, and other carnivores attracted from great distances. As time went on every warm season bared more of the body; only the natives contested the booty by securing some of the meat for their dogs through the following years of exposure. It was then that the intrepid explorer and botanist Adams happened to arrive in the neighborhood and, hearing of the famed monster, lost no time in reaching it. Most of the soft parts were gone, one limb had been carried away, and a native had sawed off both tusks and sold them for about fifty rubles. Through Adams' energy and foresight practically all remaining bones were collected. He also took to Petrograd a piece of the hide with the hair in place. It was from the still frozen side upon which the mammoth lay, and so heavy as to tax the strength of ten men to drag it along the shore. A large amount of loose, coarse hair, evidently trampled into the snow by feasting polar bears, was long enough to be considered as having formed a mane.

This mounted "Adams" mammoth, to which some of the dried parts were left adhering, served Tilesius³ as a basis for the first figure of a complete skeleton, which by the way measures nine feet eleven inches at the shoulder and remains even to-day the largest ever recovered from Siberia. An Indian elephant from Ceylon but three inches less in height weighed 8,700 lbs. G. Cuvier soon after copied the figure of the Adams' skeleton in his famous work on fossil bones.⁴ Subsequently the same illustration found its way into nearly every scientific text book and is still used in the eleventh edition of the *Encyclopedia Britannica*. It also was taken as a model for the setting up of practically all fossil mammoths found in Western Europe. Unfortunately it was far from satisfactory. The missing tusks of the mammoth had been replaced by com-

³ 1815, *Mém. Acad. Imp. Sci., St. Petersbourg*, V, Pl. X.

⁴ 1821, '*Recherches sur les Ossemens fossiles.*' *Nouv. ed.*, I, Pl. XI, opp. p 204.

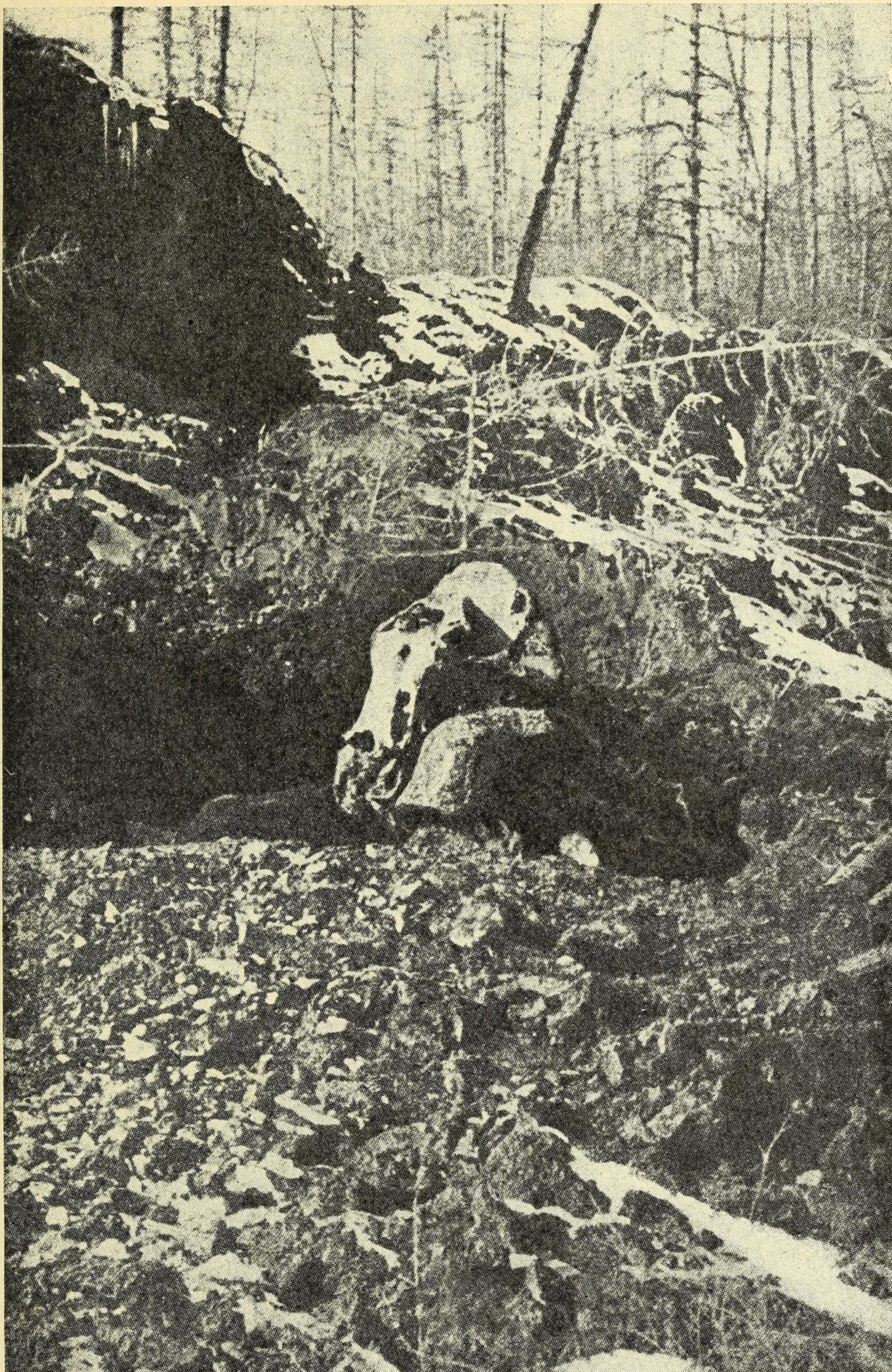


Fig. 9. The steep slope where the Beresovka frozen mammoth was discovered. Masses of thawed ground slipped and uncovered the ice-mummy that reposed here perhaps anywhere from 12,000 to 25,000 years.

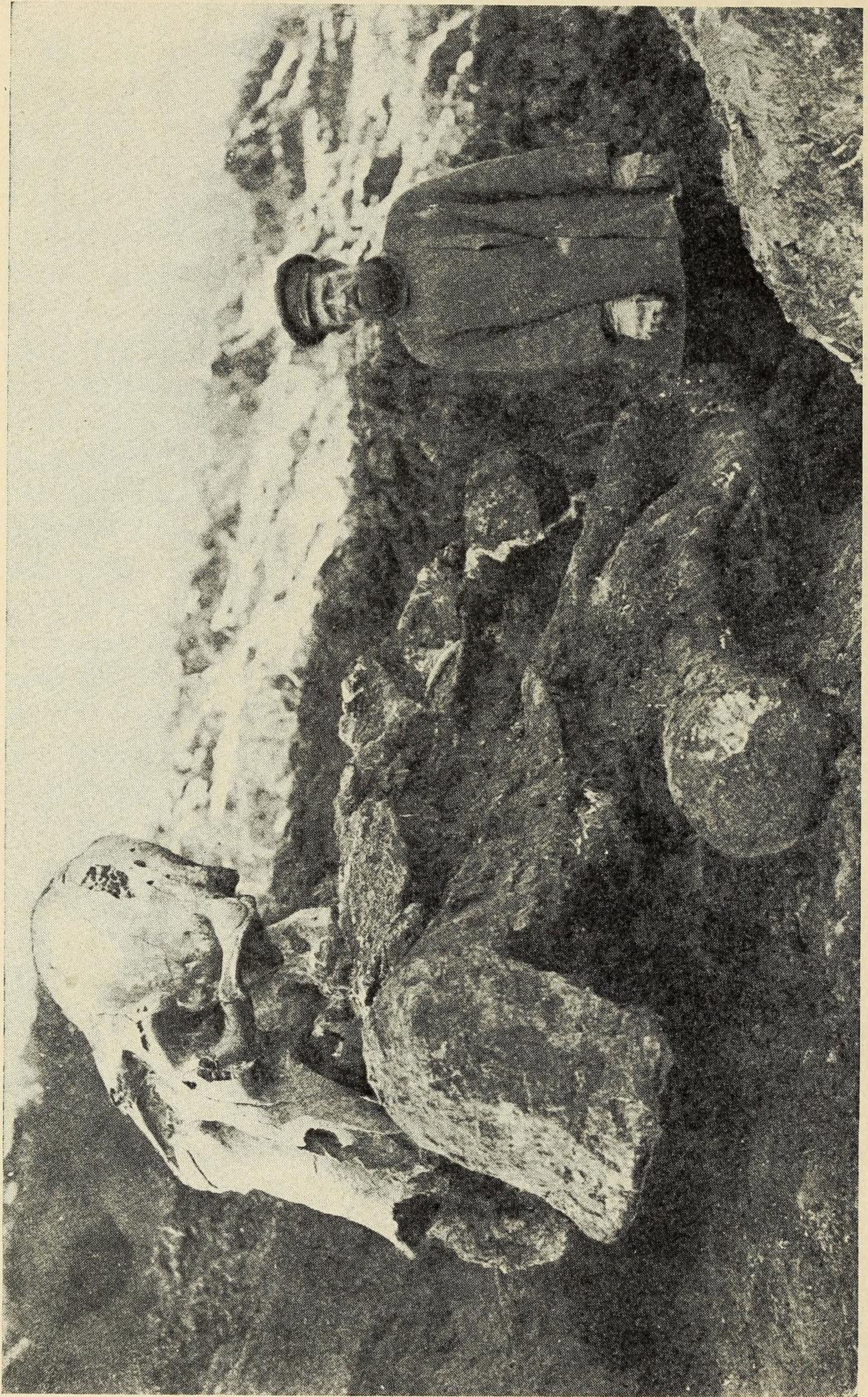


Fig. 10. The Beresovka mammoth ice-mummy in process of being recovered, after the debris had been cleared away and two-thirds of the frozen body exposed to view. The skull, in the upper left corner, has been cleaned of all flesh.

binning several other pieces of ivory. According to later authorities⁵ these substitutes do not correspond in either size, length, direction, or curvature with those this huge bull originally seemed to have carried.

For nearly a hundred years after Adams' mammoth skeleton had reached Petrograd no important contributions were made in this line. Attempts to secure the entire frozen remains of some of the most promising of the twenty-one finds recorded during this period resulted practically in failure. They were too widely scattered over the bleakest of ice-bound solitudes, mostly in regions beyond the Arctic circle. Here nature seemed to be intent on holding on to one of its most fanciful creations—ice-mummies.

Several Alaskan mammoths in a very much poorer and more fragmentary state were also investigated. The great credit for the rapid advance of our knowledge about frozen mammoths is due chiefly, however, to the extraordinary success of the three following expeditions: Herz-Pfizenmayer, on the Beresovka, a right tributary of the Kolyma River, Arctic Ocean drainage, Province of Jakutsk, 1901–1902; Pfizenmayer-Vollosovic, on the Sangajurach River, in the Arctic coast region opposite the New Siberia Islands, 1908; and Vollosovic, on the Liakhoff Islands, southernmost of the New Siberia Archipelago, Arctic Ocean, 1912–1913.

The Beresovka Expedition was the first to profit by the rapid transportation facilities of the then new Trans-Siberian Railway. But even from Irkutsk, the last railroad station on their route, nearly 4,500 miles had to be covered on foot, horseback, and sleigh to the Beresovka River and back. In order to continue the work of salvage in the intense cold a hut had to be built over the partially exposed remains and stoves kept burning. After tremendous hardships and in the incredibly short time of ten months all that was worth while to be had of the mammoth was transferred to Petrograd. As it reached there the middle of February, most of it was still in frozen condition. This was the first time that the almost complete skin of any fossil mammal could be mounted for exhibition. Nearly all the hair had come off but some of it was put back later. For many reasons it was found advisable to represent the mammoth in the position in which it had met its untimely death. Careful study of the exceptionally perfect skeleton of this young bull, in which but one tusk was lacking, brought out many points of

⁵ Pfizenmayer, E. W., 1907, *Ann. Rept. Smithsonian Inst. for 1906*, Washington, p. 332.

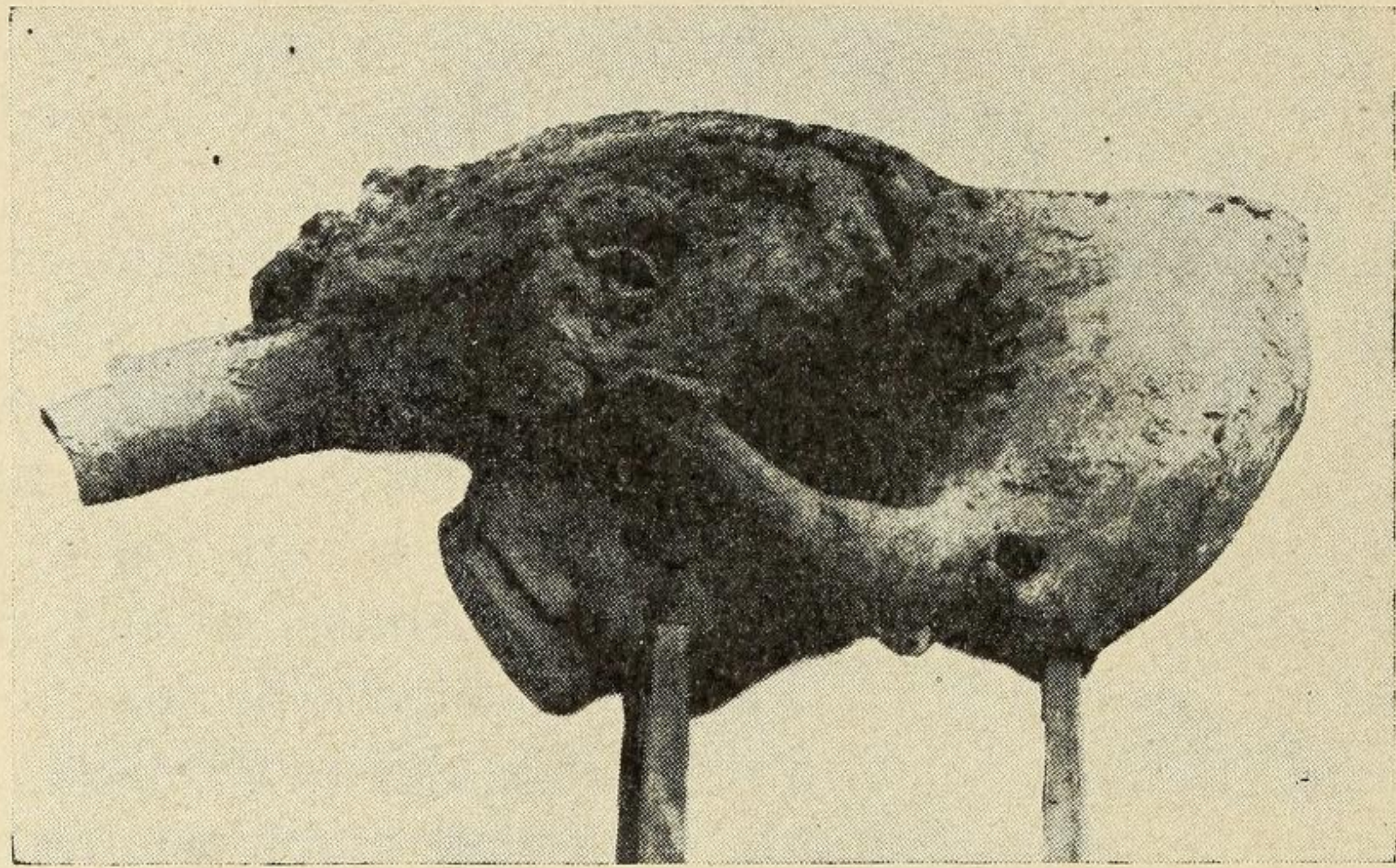


Fig. 11. Skull of the adult female Sangajurach mammoth with soft parts removed except about upper portion of face. Tusks of female elephants being easily detached, especially after a slight amount of decay, in this case they were not recovered.

interest. Modern scientific methods of collecting made possible a number of unique results in the study of various parts, such as tongue, feet, tail, stomach, muscles, hide, fat, blood, as well as its food. (Figs. 9, 10, 17, and 18.)

The Sangajurach Expedition, under the leadership of Dr. Pfizenmayer, seemed at first but little favored, for the greater part of the mammoth had been washed downstream or destroyed by Arctic foxes before the party arrived. But some lucky cause had

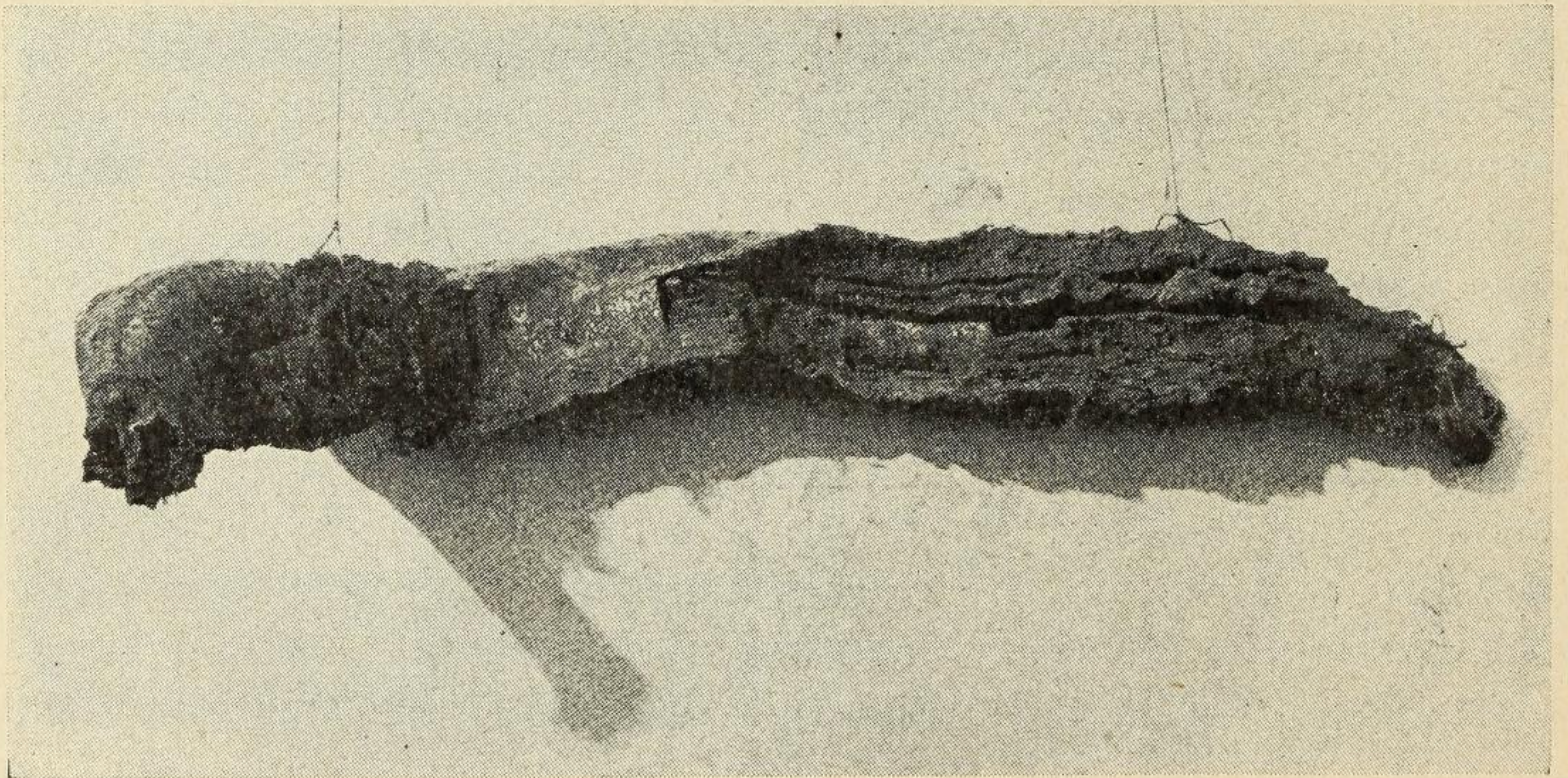


Fig. 12. Portion of the trunk of the Sangajurach mammoth, showing essentially the same structure as those of living elephants. Near the lower part, to the left, a piece of the dense hair cover.

preserved large pieces of the hide of the body and limbs with complete hair covering in place (Fig. 15). Even more fortunate was the recovery of some of the upper portions of the head and the nearly complete trunk (Figs. 11 and 12). In the case of the Beresovka ice-mummy the destruction of these particular parts as well as of the back by decay and carnivores had been a keen disappointment to all at the time.

The Vollosovic Expedition was financed by Count Stenbock-Fermor, who presented the results to the Paris Museum. This mammoth proved to be in as good condition as the Beresovka specimen and has helped to confirm and extend many of the researches made on the material from the two Russian expeditions.

Following this the late Czar issued an imperial ukase prohibiting the exportation of any mammoth or parts thereof found in Russian territory, reinforcing a former order whereby all mammoth ivory and bone had to be submitted to a committee appointed by the Petrograd Academy of Science, that might retain any parts desired.

The field observations and researches based upon the wonderfully well preserved material from the Beresovka and Sangajurach mammoths settled a number of disputed questions. Different phases of the life history of the fabulous monsters of the frozen tundra were finally cleared up, such as appearance, structure, size, habits, and even relationship. No other fossil type has left such remarkably complete data as the Siberian mammoth and to a lesser extent its partner, the woolly rhinoceros.⁶

Apart from its shaggy coat the main distinctions between the Siberian mammoth and living elephants were its much shorter, more massive body and above all its large, bulky head. The big skull had to furnish support to the enormous, spiraled tusks and weighty molars.

As in recent elephants the tusks are variable in form and much smaller in the females. Their sockets run nearly parallel. At their point of emergence from the skull the tusks first diverge—sideward, forward, and upward—and then slightly converge in the general direction of the shoulder, with tips curved inward and downward.

The tremendous size and peculiar shape of mammoth tusks have aroused many discussions. Was so excellent a student as Adams⁷ right when he suggested that the hooked extremities thereof

⁶ Preserved parts of a mammoth and rhinoceros were also unearthed in 1907 in pits of mineral wax in Starunia, Galicia (Poland).

⁷ Adams, Andrew Leith, 1870, 'Notes of a Naturalist in the Nile Valley and Malta,' Edinburgh, p. 231.

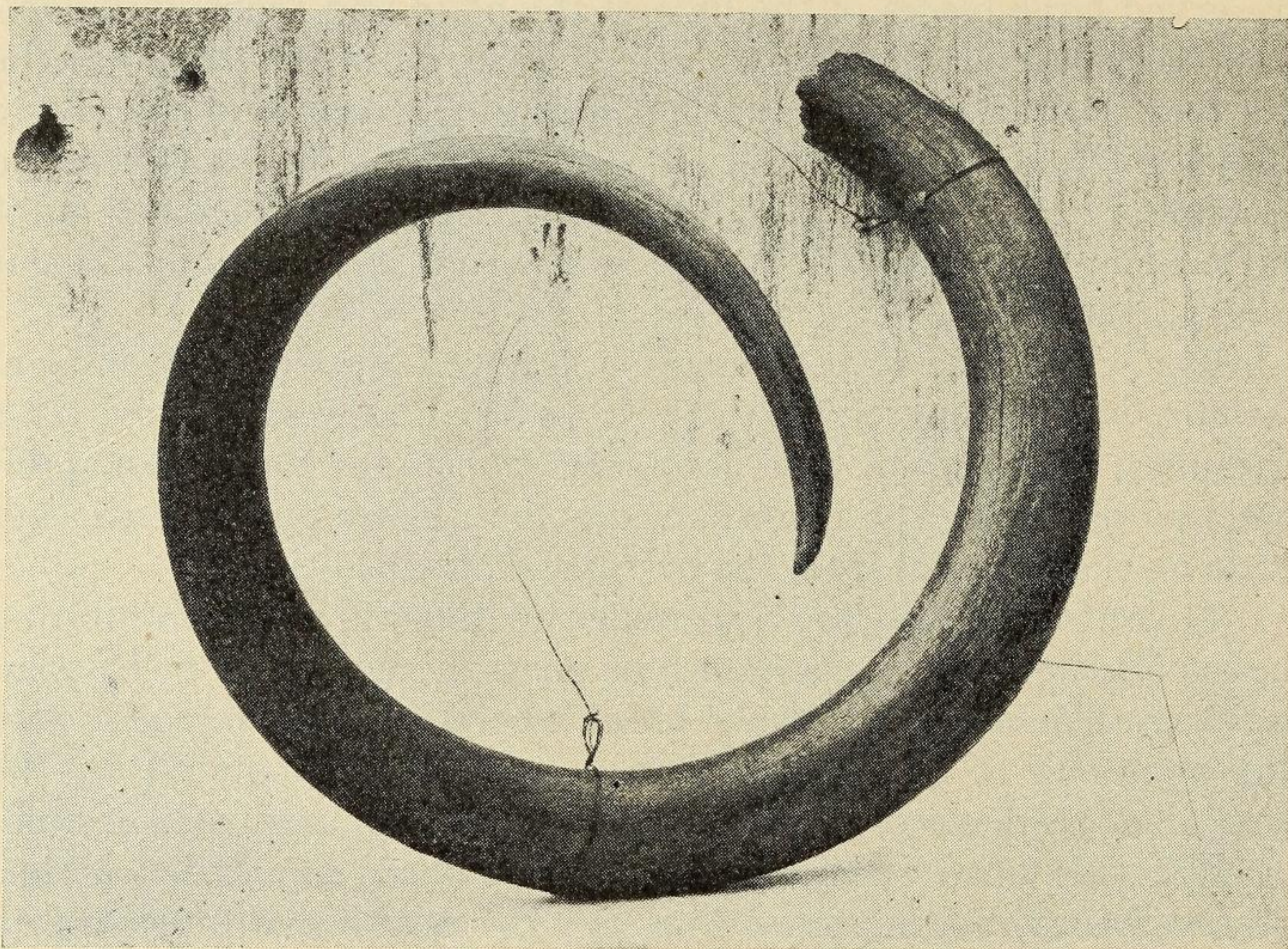


Fig. 13. An abnormally spiraled mammoth tusk. Perhaps all the part rooted in the socket, and more, is missing. From the worn tip one might presume the ivory was a bothersome burden for its bearer. Much rubbing at that point somewhat reduced its thickness.

may have been "used for pulling down and retaining branches of lofty coniferous and other trees"? Or is there reason to follow Pfizenmayer in his explanation that some apparently abnormal tusks with obliquely forward and downward directed tips served to break the crust of snow and scrape together food? Did these tusks grow to such gigantic proportions merely so the males might have a better chance to secure plenty to eat? Seldom would they care for the weaker among them. Nature would not treat in so step-motherly a fashion females and young, on whose welfare the continuity of the race depends.

In nearly all larger mammals the horns, antlers, and tusks serve essentially as weapons. In each case they are applied in the most suitable fashion. Among elephants the strongest bull of the herd enforces his right to perpetuate the race by battering every contestant with his tusks. Just one wrong blow during the fury of a contest and these ivories snap off like glass. Not rarely have large African bull elephants left one of their tusks on such battlefields.

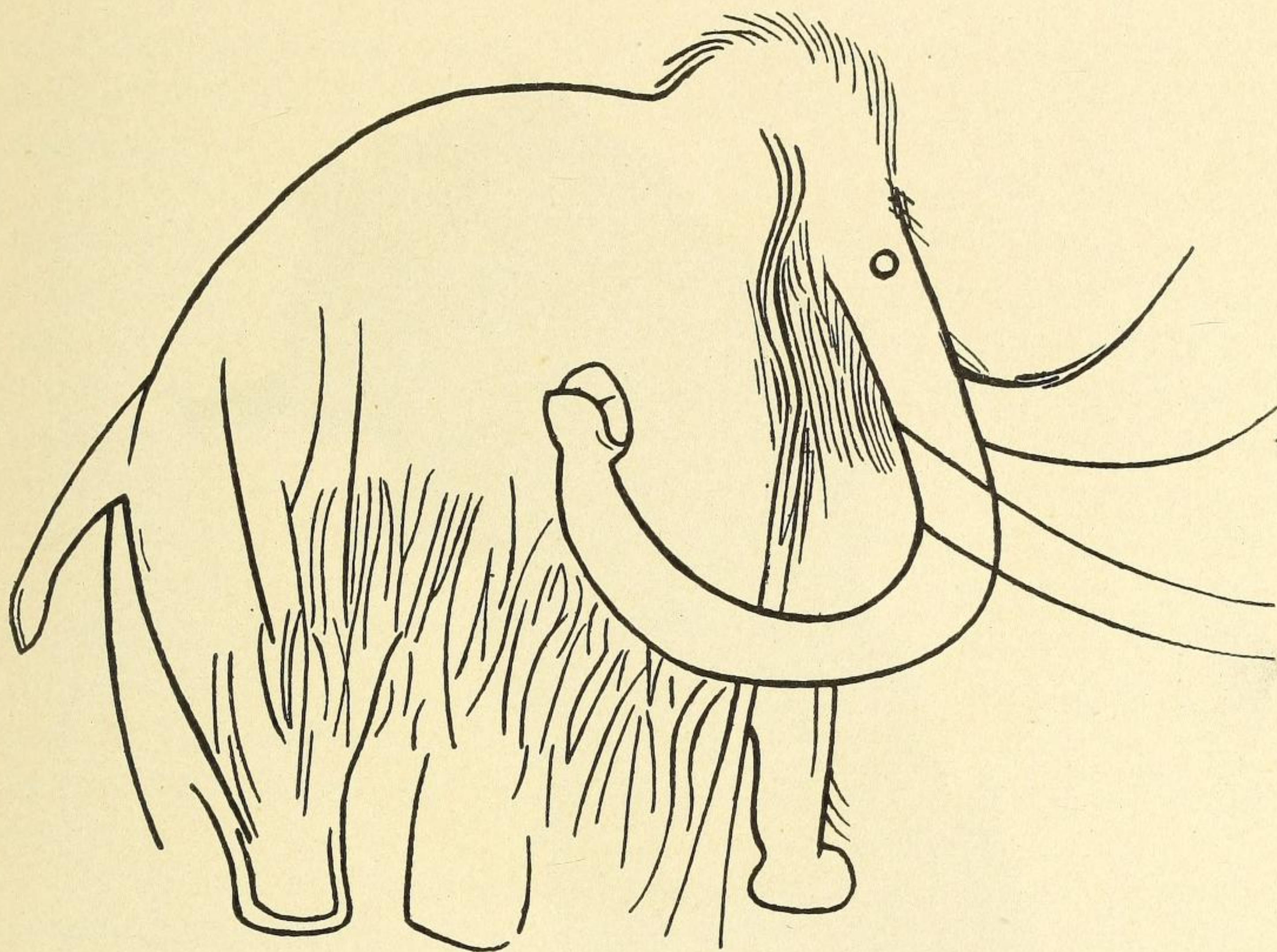


Fig. 14. Outline engraving of woolly mammoth carved by Aurignacian man of early Magdalenian times on the rocky walls of the cavern at Combarelles, Dordogne, France. After Capitan and Breuil, 1901.

Of course the extremely large, recurved tusks of mammoths, describing in many specimens fully three-quarters of a circle, undoubtedly became useless even for such a purpose. Neuville may be correct in looking upon them as more embarrassing than useful and as showing degenerating influences at work.

The largest Siberian mammoth tusk, preserved in the Petrograd Zoological Museum, measures along the outside curve thirteen feet seven and three-quarter inches, and weighs 186 lbs. The American Museum of Natural History possesses one from the Liakhoff Islands somewhat heavier, weighing 200 lbs., but only twelve feet eleven inches in length, with a greatest circumference of twenty-one inches. Lucas⁸ reports one from Alaska but slightly smaller, twelve feet ten inches.

The trunk, as instanced by the Sangajurach specimen, from which only the tip was lacking, was dwarfed and weak in comparison with those of recent elephants. With all proboscideans it is an important organ, the corner-stone of touch, scent, respiration,

⁸ Lucas, F. A., 1901, Ann. Rept. Smithsonian Inst. for 1899, Washington, p. 355.

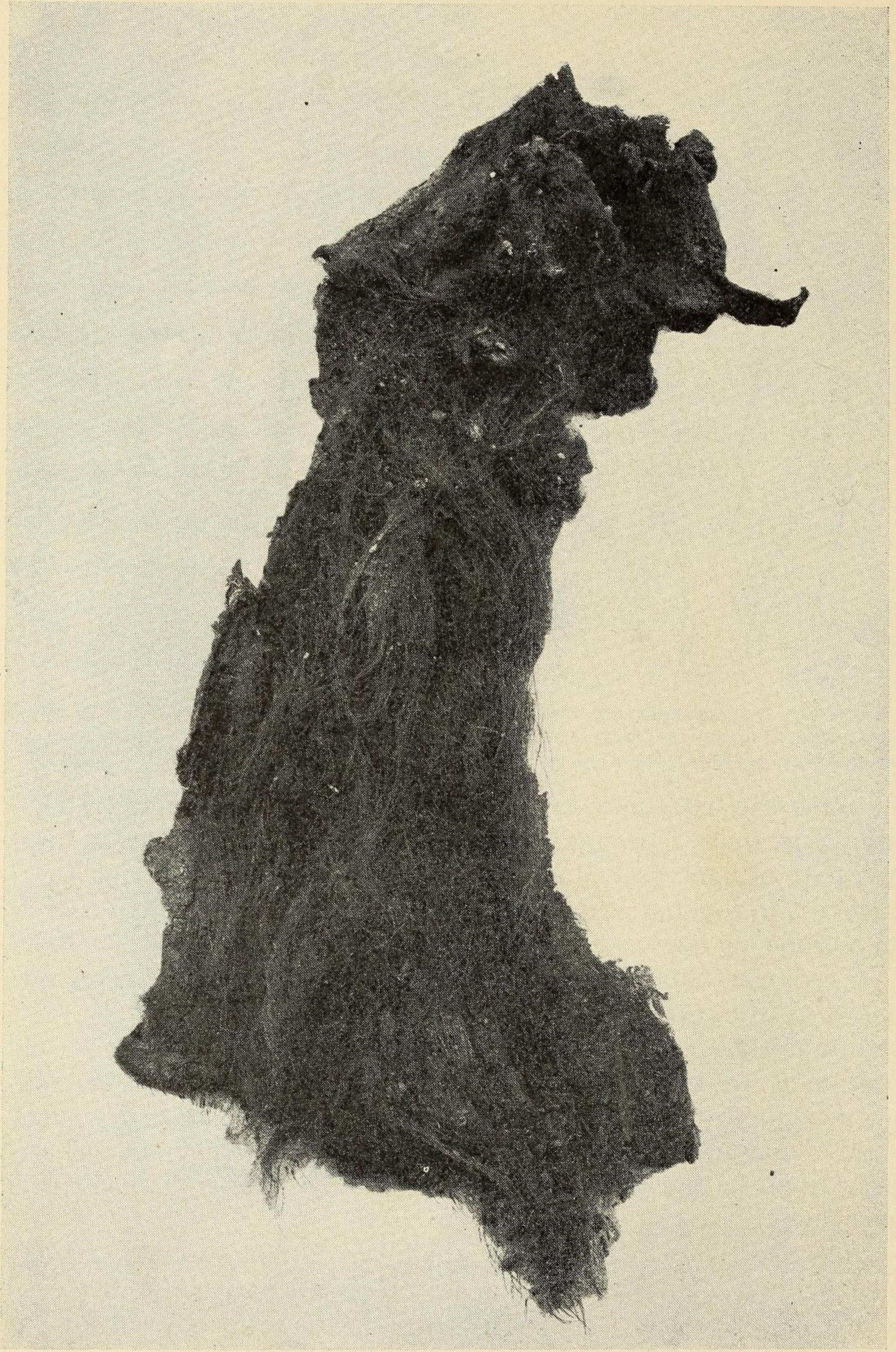


Fig. 15. A piece of frozen mammoth skin from the upper part of the thigh with most of the hair still in place. Where longest this shaggy coat measured about one foot six inches. From the Sangajurach specimen.

and constantly used to secure food and drink, as well as for defensive and offensive purposes, and during swimming, when the body is submerged.

In the mammoth, however, there is relatively little space reserved for the trunk between the huge, closely set tusks. Correspondingly small are the chief points for its support about the nasal and premaxillary bones. Evidently the principal function of this organ was to pluck grass from the forest meadows. Perhaps the Aurignacian cave man of Combarelles, Dordogne, France, whose rudely sketched outlines of the huge beast showed a two-fingered tip to the trunk, may still earn his fame as an observing naturalist.

We might conclude from the very slight development of the trunk that, influenced by the boreal climate, the mammoth's temper was of a milder sort. It seems not to have been used as an instrument of fury to devastate, break, and tear whatever may have been in its way, as is the case with the well-developed trunk of its African cousin.

The ears were considerably smaller than those of the Indian elephant, measuring in the old Adams' bull only about fifteen inches in length and six and three-quarter inches across their greatest breadth. They were densely covered with short, woolly, and longer, bristly hairs.

The bony structure of the digits of the feet showed a pronounced tendency towards reduction. Some at least of these mammoths had already lost most of what in other mammals would correspond to the thumb and big toe and were four-toed (tetradactyl) and not, like living elephants, five-toed (pentadactyl). The random numbers of toe-nails of the Paris mammoth were ascribed by Neuville⁹ to degeneration. Many of these supernumerary horny growths had striking resemblance to the normal nails, others were extraordinarily long and upturned, like those recorded from some menagerie elephants.

More decisive evidence of the mammoth's truly boreal habitus was furnished by its heavy, shaggy coat. It covered the entire body, but even where longest it did not form a distinctive mane. In general appearance and arrangement it resembled that of the musk-ox. The dense, matted, woolly underfur, varying from fawn to golden brown, attained according to location up to two inches in length. A longer, coarser, yet fluffy hair had an average length on

⁹ 1919, *L'Anthropologie*, XXIX, p. 207.