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THE MASTODON AND MAMMOTH CONTEMPORARY WITH MAN

BY FREDERICK BENNETT WRIGHT

THE continuous reports which we receive from Alaska noting discoveries of more or less complete Mammoth skeletons, the Scientific Expedition sent out by the Imperial Academy of Sciences of St. Petersburg, in 1902, for the recovery of a fine Mammoth skeleton and the huge Mammoth head from Texas, which has just reached the American Museum of Natural History in New York City, bring the subject of the distribution of the Mammoth and Mastodon, the cause of their extinction and the question as to their contemporaneous existence with Man into special prominence at the present time.

DESCRIPTION HABITAT AND GEOGRAPHICAL DISTRIBUTION OF THE MAMMOTH

The Mammoth, which is closely related to the present elephants of India and Africa, resembled those animals very closely. However, the long hair and underlying fine wool found on the Mammoth carcasses in Siberia show that they were adapted to a cold climate. They were clothed with 3 distinct suits: "the largest, rough, black bristles, about 18 inches in length; the next, a coat of finer, close-set hair, fawn-colored, from 9 to 10 inches long; and the last, a soft, reddish wool, about 5 inches long, filling up the interstices between the other hair, and enabling the animal to withstand an arctic cold" [*The Lenape Stone*, by H. C. Mercer, p. 8].

In general appearance the Mastodon very much resembles the Mammoth, their chief distinction being in the form of their teeth. The Mammoth (*Elephas primigenius*) has a large flat grinding tooth, while the Mastodon has a tooth bearing large conical projections.

In Europe and North America there were two species of Mammoth, *Elephas primigenius* and a larger species. In North America the larger species was *Elephas Columbi*, which corresponds to the larger species of Europe, *Elephas Meridionalis*. In North America the smaller species inhabited the northern part and the larger species roamed as far south as Mexico. For our present purposes it is not necessary to pay any attention to these finer distinctions so long as it is borne in mind that under the term Mammoth is included both of the species referred to above.

There is a general tendency to overestimate the size of the Mammoth. It is probable that the average size was above that of the present elephant, but possibly not much greater than such specially large elephants as Jumbo, who stood 11 feet high, or an African elephant reported by Mr. Thomas Baines, which measured 12 feet in height. The Mammoth skeleton in the Museum of the Chicago Academy of Sciences stands 13 feet as mounted, which would make him about 14 feet when alive. However, Mr. Frederic A. Lucas, of the U. S. National Museum, thinks that the specimen is mounted too high and that the height of the live animal was not more than

13 feet. The St. Petersburg skeleton stands only 9 feet, and the one in the Royal Museum of Natural History in Brussels 11 feet high. The principal basis for calculating the approximate sizes of Mammoths from their remains is the size of the thigh bones and tusks. Jumbo's thigh bone is 4 feet 1 inch, as compared with the thigh bone of the Mammoth in the Museum of the Chicago Academy of Sciences, which is 5 feet 1 inch. The latter is the largest complete skeleton which has been found, and does not represent the average. Mr. Lucas considers the Chicago Mammoth as belonging to the more southern type *Elephas Columbi*, which is the largest of the elephants, as noted above.

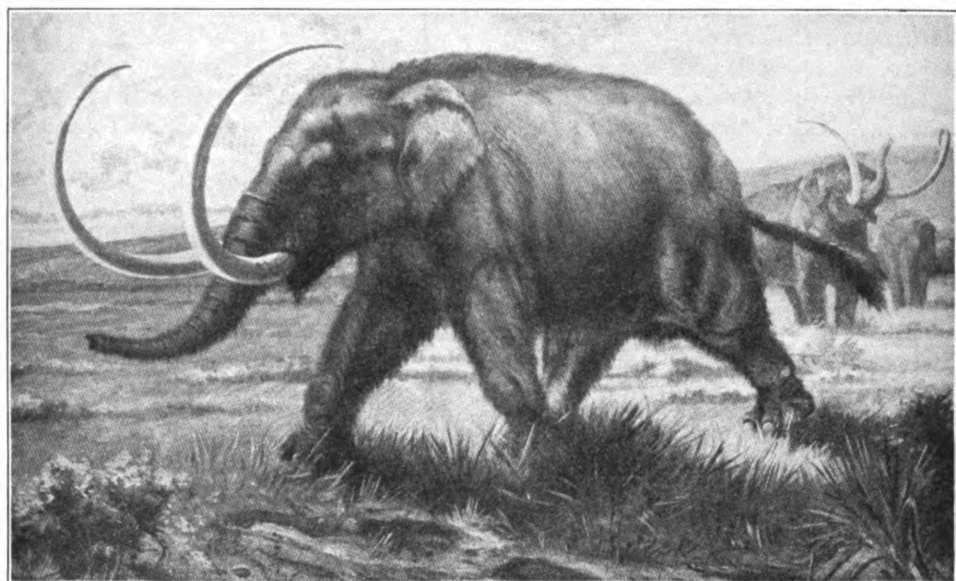
The tusks make a convenient criteria for determining the relative size of their possessors, especially as tusks are vastly more numerous than thigh bones, which decompose more rapidly. The average length of the tusks from full-grown Mammoths varies between 8 and 14 feet. The St. Petersburg skeleton carries tusks 9 feet 3 inches long and the Chicago specimen tusks 9 feet 8 inches long. Two of the largest tusks have been found in Alaska, one measuring 11 feet and weighing 200 pounds and the other 12 feet 10 inches. The great Mammoth head from Texas, now in the American Museum of Natural History, of New York City, however, holds the record, the tusks being 13 feet 10 inches long.

Perhaps the best description of the Mammoth is that given by a young Russian engineer, Mr. Benkendorf, who, while working on the Indigirka River, in Northeastern Siberia, in 1846, saw a perfect carcass washed out from the banks of the river by a flood. With great difficulty he succeeded in hauling it upon the land and examining it, but, unfortunately, it was washed away later. The following is his description of the animal:

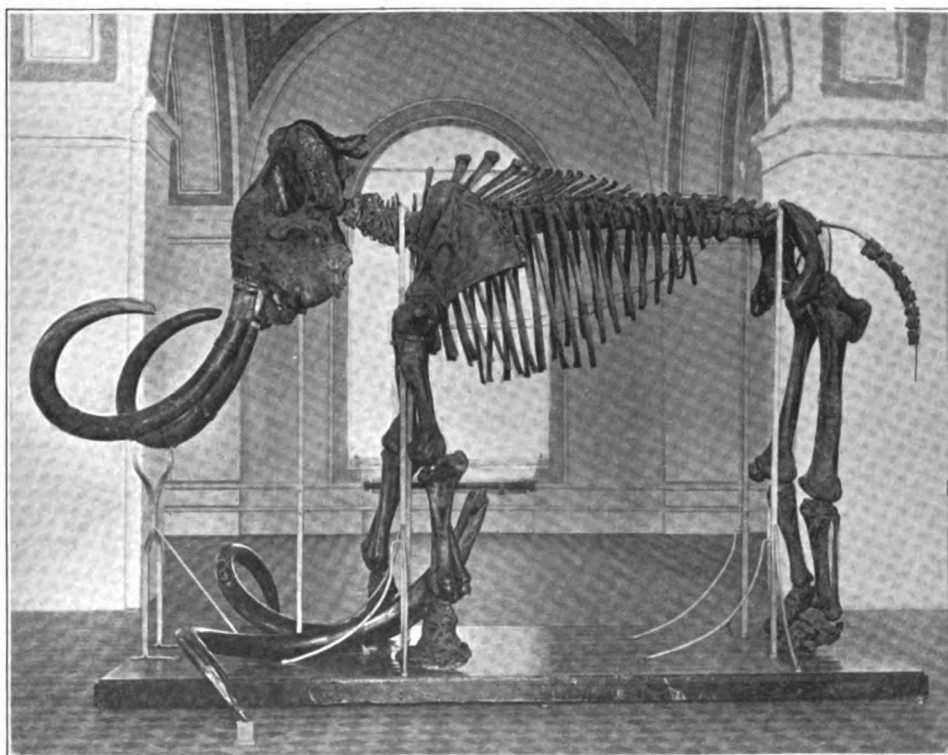
Picture to yourself an elephant with a body covered with thick fur, about 13 feet in height and 15 in length, with tusks 8 feet long, thick and curving outward at their ends, a stout trunk 6 feet in length, colossal limbs of 1½ feet in thickness, and a tail naked up to the end, which was covered with thick, tufty hair. The animal was fat and well grown; death had overtaken him in the fullness of his powers. His parchment-like, large, naked ears lay fearfully turned up over the head; about the shoulders and the back he had stiff hair, about a foot in length, like a mane. The long outer hair was deep brown and coarsely rooted. The top of the head looked so wild, and so penetrated with pitch (und mit Pech so durchgedrungen), that it resembled the rind of an old oak tree. On the sides it was cleaner, and under the outer hair there appeared everywhere a wool, very soft, warm and thick, and of a fallow brown color. The giant was well protected against the cold. The whole appearance of the animal was fearfully strange and wild. It had not the shape of our present elephants. As compared with our India elephants, his head was rough, the brain case low and narrow, but the trunk and mouth much larger. The teeth were very powerful. Our elephant is an awkward animal, but compared with this Mammoth it is as an Arabian steed to a coarse, ugly dray horse. I could not divest myself of a feeling of fear as I approached the head; the broken, widely-opened eyes gave the animal appearance of life, as though it might move in a moment and destroy us with a roar.*

The partly digested food found in his stomach showed that his diet had been young shoots and cones of the fir and pine. In North America some teeth have been found in which there were fragments of food preserved, which showed that the Mammoth's diet on this continent was much

*From a partial translation of Dr. A. von Middendorff's *Siberische Reise, Band IV. Theil II. Erste Lieferung: Die Thierwelt Sibiriens*, p. 1082, which appeared in an article by W. Boyd Dawkins, on the *Range of the Mammoth*, in *Popular Science Review*, Vol. VII, 1868, p. 282.



THE MASTODON. [FROM A DRAWING BY J. M. GLEESON.]



THE MAMMOTH SKELETON FROM SIBERIA NOW IN THE MUSEUM OF THE ACADEMY OF SCIENCE IN ST. PETERSBURG.

the same as in Siberia, viz., twigs of spruce, white cedar and other northern trees and bushes.

Mr. Robert Bell has inferred the habitat of the Mammoth from the shape of its tusks. He believes that these animals must have preferred tundras, open barren lands and open woods, because the great curve in the tusk would prevent their progress in dense woods. To support his reasoning he states that:

In 1884 I observed on Nottingham Island, in the Hudson Strait, a curious fact bearing on this question in connection with the antlers of the reindeer. On the mainland, where these deer may require to traverse the thick forest in some part of their migrations, their antlers, although much larger and longer than those of the woodland reindeer or caribou, are straight at the tips and of such a form as to be readily dragged through branches of the trees; but on the large island referred to there are no trees of any kind and the antlers of the deer are more spreading, while the tines are strongly curved or hooked. . . . The peculiarities of the tusks of the Mammoth, which have been already referred to, would not only prevent the creature from traveling in thick woods, but they would also render the tusks useless for digging up trees, which is the principal use to which both African and Indian elephants put their straighter tusks. These characters would also indicate that the Mammoth was adapted only for living where it was not necessary to dig out the roots of trees and to pull them down, but in some region where he might obtain all the brush he required, as he could on the extensive northern plains of both continents in summer, as well as among the small branchy trees at the edge of the forest in winter. The fact that in this habitat the ground would be frozen for the greater part of the year is another reason why he would not use his tusks for digging.*

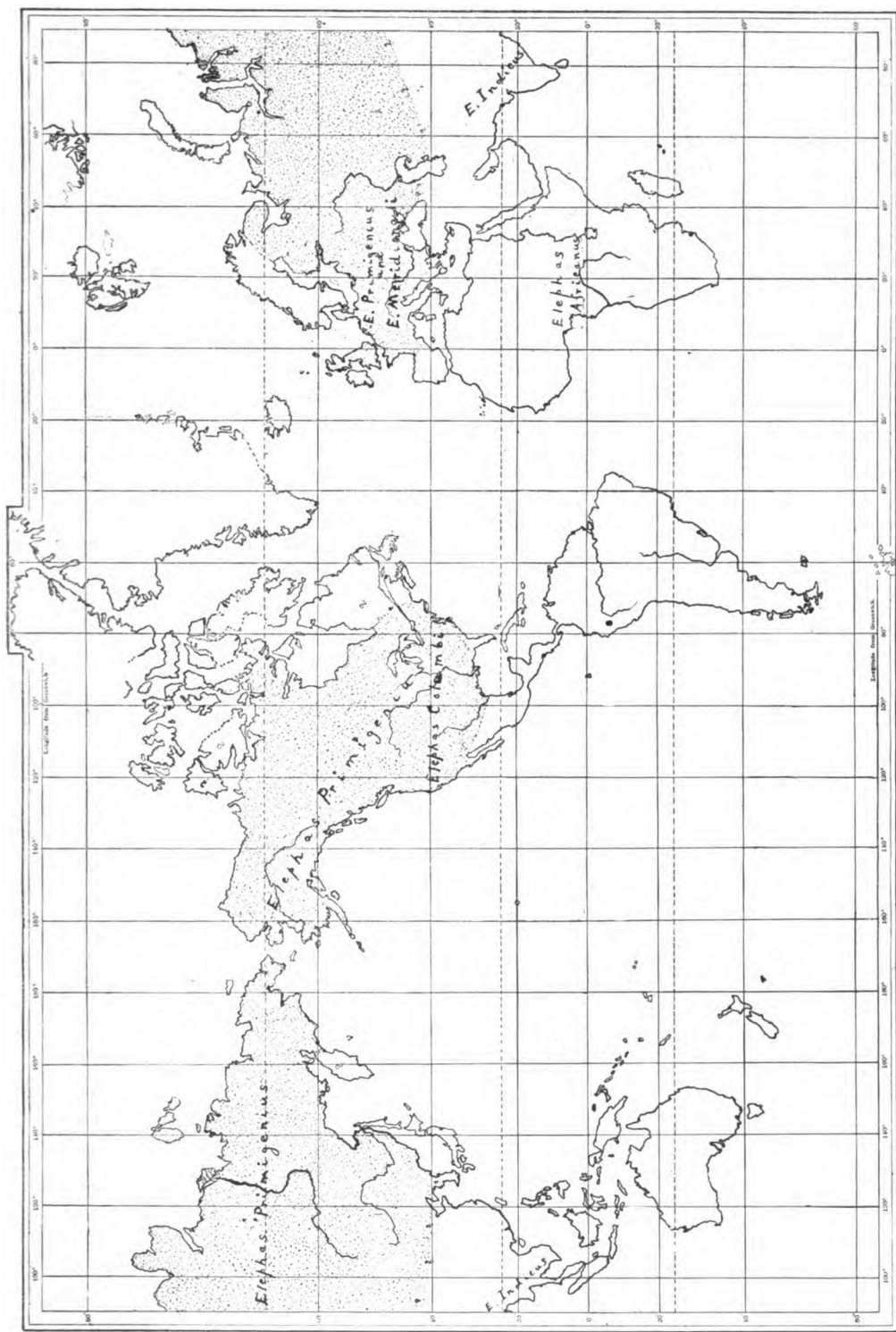
Mammoth bones have been found associated with those of the Mastodon, the woolly rhinoceros, horse, bison, cave bear, wapiti and musk sheep. The bone caves of Western Europe have been specially rich in accumulations of these bones of different mammals.

The present range of the two surviving species of elephant is restricted to Southern Asia and Africa from the southern edge of the Sahara Desert to Cape Colony, its southern limit being due to the exterminating influence of the advancing civilization

The accompanying map shows at a glance the approximate limits within which the Mammoth and Mastodon ranged over Europe, Asia and North America. Roughly speaking, they roamed over England principally south of Scotland; over Northern Europe and as far south as the Pyrenees, Rome and Northern Greece; over Northern Asia, and from there into Alaska, from which point they migrated as far south as Southern California, Northern Mexico and the middle of Alabama, and as far east as New York. North of Lake Ontario and east of Hudson Bay no remains have been found to my knowledge, but as there has been little chance for discovering their remains, if they exist in this region, traces of their former presence here may yet be found.

The elephant family seems to have appeared first during the Miocene epoch in Southeastern Asia, from which place in later times new species migrated into Europe, Africa, Northern Asia and North America. To the latter place it was by way of Behring Straits, which in early Pliocene times was an isthmus connecting the two continents. The depth of water

**Bul. Geol. Soc'y of America*, 1897-98, Vol. IX, pp. 382-383. *Mammoth and Mastodon Remains*, by Robert Bell.



SKETCH MAP SHOWING THE APPROXIMATE RANGE OF THE MAMMOTH. THE DOTTED PORTION INDICATES THE REGION IN WHICH HIS REMAINS HAVE BEEN FOUND

here is now only 180 feet, so that a slight elevation of the land would accomplish this result.

The abundant remains found on the Aleutian and Pribilof Islands, which are now widely separated from the mainland, show that there must have been an extensive elevation in the region of the North Pacific during the time when the Mammoth roamed over Siberia and Alaska. The depth of the sea between Alaska and the Pribilof Islands averages less than 240 feet, so that a slight elevation would lay bare a great area of what is now sea bottom, over which the Mammoth could freely roam.

Although Mammoth remains have been found in considerable numbers over an exceedingly wide area, as noted above, yet by far the most celebrated locality is Northern Siberia, where the tusks are so numerous and well preserved that the ivory trade has been a great attraction to the traders and adventurers for several centuries. Here the physical conditions have been specially favorable for the preservation not only of the bones and tusks, but also, in some instances, of the carcasses themselves.

In Europe the remains have generally been found in bone caves, peat bogs and river bottoms; in Russia and Siberia in loess deposits and the frozen earth of the Arctic Tundra and delta deposits along the Arctic Ocean and the islands, especially the New Siberian Islands, off the Siberian coast. In North America they have been found in the flood plains of the Yukon and Mackenzie Rivers, the Pliocene deposits of California, the peat bogs in Southern Canada and the United States, in deposits laid down at the close of the Glacial period, showing that he followed up the retreat of the ice, and in the great bone licks of Kentucky and Tennessee, where herds of the larger mammals used to congregate. In the United States Mastodon remains are numerous, especially in the central portion, the deposits at Kimmswick, near St. Louis, being the most noted. In tropical India abundant remains of fossil elephants have been found, which De Blainville refers, with some doubt, however, to the same species as the Siberian Mammoth.

THEORIES TO ACCOUNT FOR THE EXTINCTION OF THE MAMMOTH

A host of theories have been advanced to account for the apparently sudden extinction of the Mammoth. James Geikie suggests that one of the principal causes of their extinction in Northern Siberia was that they were mired in the Tundra, which is very treacherous toward the latter part of the summer. Moss and lichens creep over the great snowdrifts which accumulate during the winter, and thus protect them from melting until some exceptionally warm season, when this compact snow or ice melts, leaving the surface apparently solid, but forming a trap into which the heavy animals would readily fall.

Mr. Robert Bell suggests the following theory to account for the extinction of the Mammoth in Siberia: During the winter the Mammoth would seek shelter within the forest line, but with the opening of spring he would migrate to the open country of the North, where he could browse on the small trees which lined the river courses to the Arctic Ocean. With the return of winter they would again seek the forest belt for protection from the winter winds. He believes that in time these migrations would become a fixed habit "and it would be difficult or impossible to overcome the inertia of long-fixed habit," so that, as the climatic conditions became more severe and the forest belt receded toward the South, as is proved by

abundant evidence, the migrations would become longer and the winters, which in this region are often preceded by severe snowstorms, would come upon herds of Mammoths when they were still a long distance from the protecting forest belt. These herds, following down the great rivers to the Arctic Ocean, might also be induced to remain too late in the season by the modified temperature caused by the large amount of warm water being brought down by the rivers. For this reason they might stay until late in the autumn and be caught in one of these early winter storms and perish. He cites numerous cases to support this theory, one where an enormous herd of reindeer perished during a single storm. On the Island of Akpatok, in Ungava Bay, a whole herd of reindeer perished from starvation during one storm, when a heavy snowfall was followed by rain, which formed a crust, thus cutting off the supply of moss. This island has never been restocked since that catastrophe.*

Another theory which has been advanced as a potent cause for the extinction of the Mammoth in Siberia is, that herds of these heavy animals, in attempting to cross the ice of the Northern rivers, broke through and were drowned, and their bones washed down to the Arctic coast and the islands of the New Siberian group.

Another theory, which, however, applies only to Siberia, has been put forward by Prof. G. Frederick Wright. From his researches in Siberia and Turkestan he has come to the conclusion that a great inland sea covered Western Siberia and Turkestan and "perhaps extended through the Sungarian depression," so as to cover the Desert of Gobi, at the same time that the Mammoth was living in Eastern Asia. Such a vast body of water would greatly modify the climate of the higher land in North-eastern Asia. So that, during this time, the Mammoth could have ranged freely to the Arctic Ocean under genial conditions. The re-elevation of Central Asia and the consequent draining of this inland sea would gradually bring on the severe conditions of a continental Arctic climate, with its enormous range of temperature, as is now the case at Verkhoyansk, in Siberia, where the thermometer registers 90° below zero in winter and as high as 90° above in summer. This change of climatic conditions might have been too rapid to permit the Mammoth to adjust himself to the change, and the final result would be his extinction.

No single cause is adequate to account for the sudden disappearance of the Mammoth and the Mastodon, but it seems to have been a frequent occurrence in geological history, in fact, so frequent that it might be stated as a law, that the life of a species varies in length according to its size and the complexity of its structure. Throughout geological time the great families of both animal and plant life, especially in the more complex forms, have passed through some period of special development when not only the number of species, but also the number of individuals in each species, has increased greatly, but after a short time there has been a thinning out of those species which have had a special development in size or the complexity of their organism. This is well shown by the sudden disappearance of the huge, ungainly reptiles which had such a remarkable development in the latter part of Mesozoic time, when some of them, such as one species of the genus *Elasmosaurus*, produced animals 45 to 50 feet long, which

*See *The Occurrence of Mammoth and Mastodon Remains around Hudson Bay*, in *Bul. Geol. Soc'y of Am.*, Vol. IX, pp. 369-390.

had necks 22 feet long, containing over 60 vertebræ, or the great bird-like *Pterosaurs*, the span of whose wings was 20 feet.

It would seem as if the elephant belonged to a genus of the mammalian family whose size had developed abnormally, and, as seems to have been the case with similar developments of genera and species in other families, his life history was short. In this case our present elephants represent the remnant which, even if it were not for his destruction by man, would soon become extinct. The great size of the Mastodon and Mammoth, possibly his lack of ability to adapt himself to changing environment, together with the general tendency stated above, the reason for which is unknown, is as satisfactory an answer as can now be given to the question concerning the reason for the sudden disappearance of these huge mammals in the Northern Hemisphere.

EVIDENCE OF THE CO-EXISTENCE OF MAN, MAMMOTH AND MASTODON

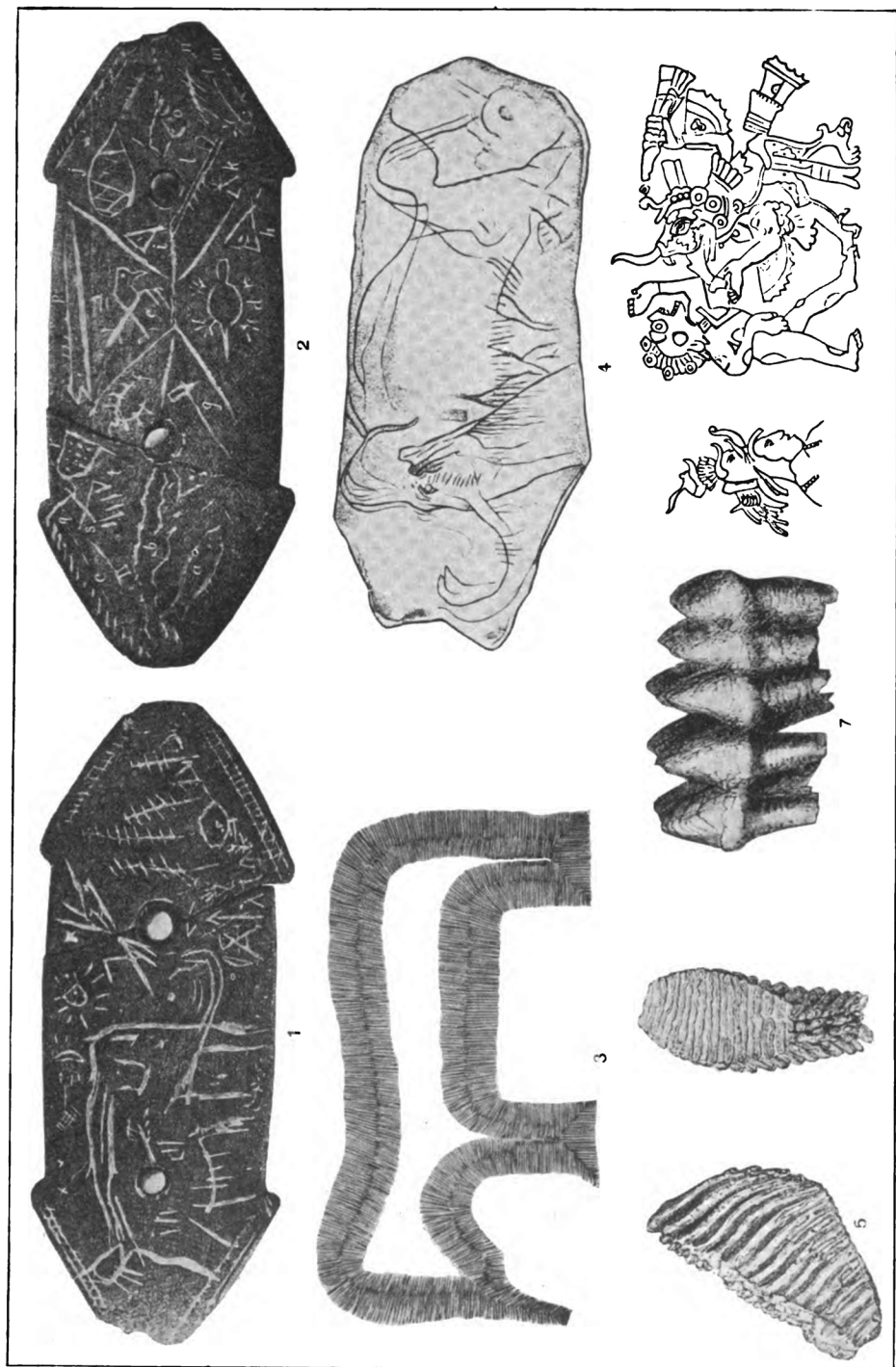
In Europe the evidence that prehistoric Man and the Mammoth were contemporaries is of two kinds. First, the association of Mammoth bones with human bones and implements, and second, drawings and carvings of the Mammoth, which were evidently made from life.

The first accurate account of discoveries showing the association of Man and the Mammoth appeared in 1834, in a report made by Dr. Schmerling, an anatomist and Palæontologist, stating the results of his researches in the caverns near Liège, Holland, during the years 1833 and 1834. He notes finding, in different caverns at Liège, human bones mixed with those of the "elephant" (Mammoth), cave bear, hyæna and rhinoceros, as well as some animals which still existed in the region. All the bones seem to have been swept into the caves at the same time during some flood. "In the Engis Cavern, distant about 8 miles to the southwest of Liège, on the left bank of the Meuse, the remains of at least 3 human individuals were disinterred. The skull of one of these, that of a young person, was imbedded by the side of a Mammoth's tooth. It was entire, but so fragile that nearly all of it fell to pieces during its extraction. Another skull, that of an adult individual, and the only one preserved by Dr. Schmerling in a sufficient state of integrity to enable the anatomist to speculate on the race to which it belonged, was buried 5 feet deep in a breccia, in which the tooth of a rhinoceros, several bones of a horse and some of the reindeer, together with some ruminants, occurred."¹ This is but one of a number of caves in which this commingling of remains was found.

Much more common, however, than the human bones were the flint knives, etc., found in the floor deposits of these caves. Schmerling explored 40 of these "fossiliferous caves," as he calls them, and reported human bones to be the exception, but flint implements to be almost universal. Concerning these implements he says: "None of them could have been subsequently introduced, being precisely in the same position as the remains of the accompanying animals."² Although the theories which Dr. Schmerling put forth in a vain attempt to reconcile the geological, zoological and anthropological views of the time are far from satisfactory, yet his observations of facts and conditions are of the highest importance, and their accuracy has

¹See *Antiquity of Man*, by Lyell, pp. 67, 68.

²*Researches sur les Ossements fossiles de' couverts dans les Cavernes de la Province de Liège*, 1833-1834, by Schmerling, Part II, p. 179.



1, THE LENAPE STONE, SHOWING THE SIDE BEARING THE DRAWING OF A MAMMOTH; 2, REVERSE SIDE OF THE LENAPE STONE; 3, THE SO-CALLED ELEPHANT MOUND IN WISCONSIN; 4, THE CELEBRATED MAMMOTH CARVING-FROM LA MADELEINE; 5, 6, A MAMMOTH TOOTH; 7, A MASTODON TOOTH; 8, 9, MEXICAN HEAD-DRESSES WHICH BEAR A STRIKING RESEMBLANCE TO ELEPHANT HEADS

been attested by later scholars, notably by Lyell [See *Antiquity of Man*, by Lyell, p. 72, *et seq.*], who visited the locality 26 years after Dr. Schmerling and after many of the caves had been "annihilated."

In 1864 M. E. Dupont explored 43 caves in Belgium, and in 25 of these he found traces of man's existence. In the lowest of the 3 divisions into which he separated these cave deposits he found flint implements, Mammoth and rhinoceros bones, and in one cave, that at Trou Magrite, rude carvings on reindeer bone.

Besides the examples cited at some length above, the caves of England and France have furnished much evidence showing conclusively that Man and the Mammoth were contemporaneous in Western Europe and the British Isles.

In Siberia we have the most striking and indubitable proof of the co-existence of Man and the Mammoth. On the Obi River, near Tomsk, in 1896, Prof. N. Th. Kashchenko found the "remains of a Mammoth 12 feet below the surface of a cliff which stands 136 feet above the present level of the River Tom. Only a few small bones of the skeleton were missing, and with it were associated 30 flint knives, besides scrapers and about 100 flakes. The large bones were split in the usual way for the extraction of the marrow, and there were other clear indications of the presence of Man. . . . The position and various other circumstances exclude any recent date for the find."*

More interesting, however, than the finding of Mammoth bones associated with human implements in the same deposits are the carvings of Mammoths which have been found in Europe. The most celebrated of these is that from the cave of La Madeleine. This carving was found in 1864, in the cave of La Madeleine, Perigord, France, by M. Louis Lartet. The engraving is on a piece of Mammoth ivory and has a very lifelike appearance, as will be seen by examining the accompanying illustration. It was broken into 5 pieces, but when these were placed in their correct positions the outline of the Mammoth was remarkably distinct. It shows a high degree of skill, and must have been drawn by someone who had actually seen the animal represented. M. Lartet has several other less perfect carvings of Mammoths in his collection, which have been gathered from Northern France.

From what has been said, it is evident that there is abundant evidence to prove conclusively the co-existence of Man and the Mammoth in Europe. However, when we turn to North America our evidence is more scattering and less definite.

The relation of Man to the Mammoth and Mastodon in North America is confined to the evidence furnished by a few drawings, one example of Mastodon bones having been found in connection with human implements, and a general probability that they must have existed together on this continent, on account of the recent date of the disappearance of the Mastodon, as shown by the character of the deposits in which his remains have been found. There are also a few Indian legends which may possibly have had their origin in the minds of a people who had seen these huge animals alive.

The drawing which has attracted the most attention is that on the Lenape Stone, which was described and championed by H. C. Mercer in

**Man Past and Present*, p. 269.

his book *The Lenape Stone, or The Indian and the Mammoth* [New York, 1885]. This stone was discovered in 1872, in Bucks County, Pennsylvania, and remained lost for 10 years in a large collection of arrowheads, spear-points, axes and broken banner stones which Mr. Hansell had collected. In 1881 the collection was sold to Mr. Paxson, who recognized the peculiarity of this stone and brought it to the knowledge of Mr. Mercer and other scientists. The evidence of the authentic character of this stone is very good. The principal objection which has been raised is that the drawing is too good, and very much resembles the famous carving of the Mammoth from the cave of La Madeleine in France. For a full discussion of the merits of this stone I would refer to Mr. Mercer's book, cited above.

The stone represents an encounter between a Mammoth and 4 men. "In the sky overhead, and as if presiding over the event, are ranged the powers of heaven: forked lightning flashes through the tree-tops, and from between a planet and a crescent moon, beyond which we seem to see a constellation (represented by a series of cross lines) and two stars, the Sun's face looks down upon the scene. Four human forms confront the monster; the first holds in his right hand a bow, from which the arrow just discharged is sticking in the side of the enraged beast, and in his left, if it is not planted in the ground, a long lance; a second warrior, with head-dress of feathers, stands farther to the right; and still farther, and near what may perhaps be called a rock, a third sits upon the ground, apparently smoking a pipe. A fourth figure is easily distinguishable, trampled under the fore feet of the Mammoth." Although Mr. Mercer considers that the animal represented is a Mammoth it is quite as possible that it is a Mastodon.

There is in the possession of Mrs. B. W. Ritter, in Durango, Col., a piece of pottery, probably made by the Cliff Dwellers, which bears the painting of a figure representing an animal belonging to the elephant family and probably a Mastodon. This piece of pottery, which is $3\frac{1}{4}$ inches in diameter and $4\frac{3}{4}$ inches high, was found in Montezuma Valley. Some drawings found in Mexico would indicate that they also were acquainted with a species of elephant, some of the headdresses being representations of a proboscidean. In Wisconsin, the so-called "Elephant Mound" is very interesting in this connection, although it is somewhat uncertain as to whether or not the animal represented belongs to the elephant family.

In 1886 Prof. J. M. Clarke reported finding the bones of a Mastodon associated with human relics in Attica, N. Y. Four feet below the surface of the ground, in a black muck, he found bones of the Mastodon, and 12 inches below this pieces of pottery and 30 fragments of charcoal. This seems to be the best single piece of evidence which we have of the contemporaneous existence of Man and the Mastodon. There seems to be no direct evidence of the existence of Man and the Mammoth in North America, the Mastodon having continued much later than the Mammoth. However, later discoveries may change the possibility of the Mammoth's co-existence with Man on this continent to a probability or even a certainty.