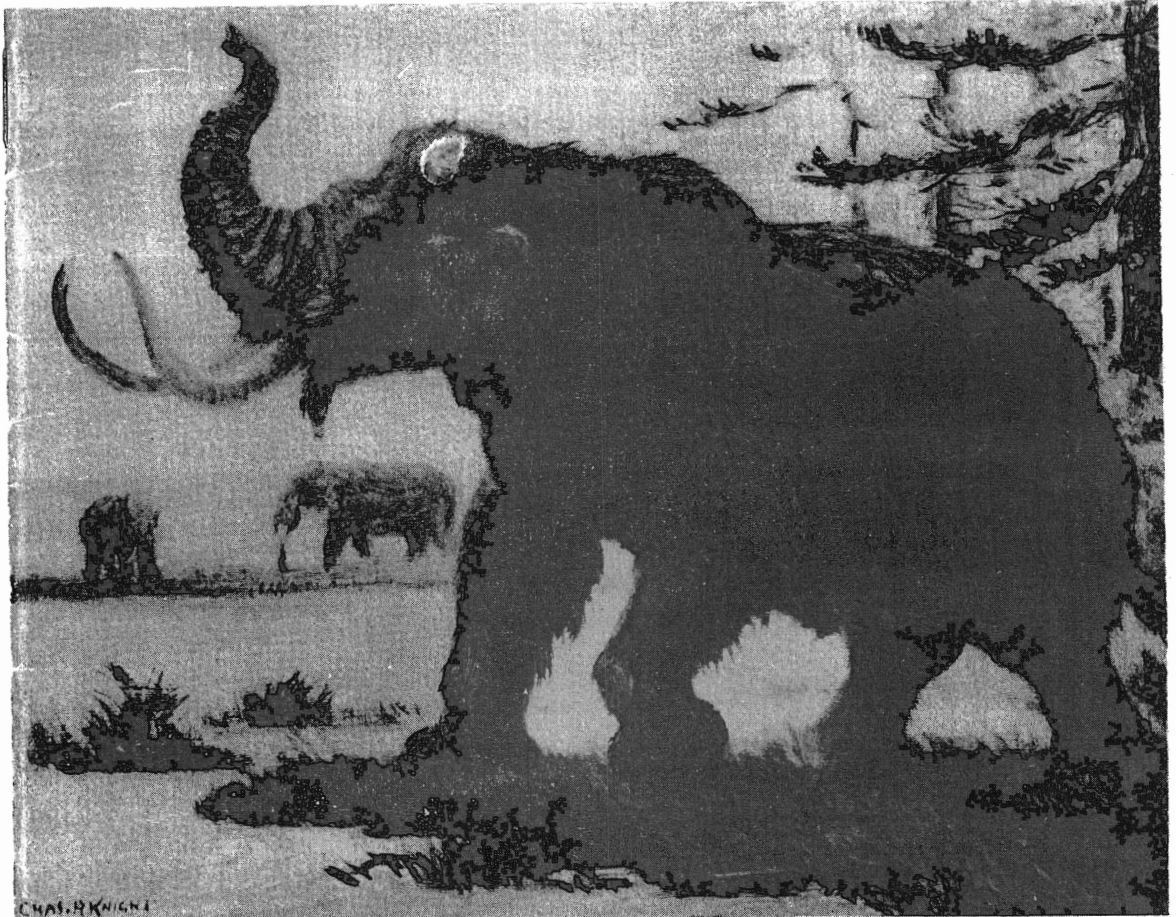


A NEW JERSEY MASTODON



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NEW JERSEY STATE MUSEUM, TRENTON, N. J.

DEPARTMENT OF EDUCATION OF NEW JERSEY

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AMERICAN MASTODON, *original painting by CHARLES R. KNIGHT*
in Museum of Natural History, Princeton University

MAPS drawn by BERNICE JAMIESON

A NEW JERSEY MASTODON

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SINCLAIR PROFESSOR AND CURATOR OF VERTEBRATE PALEONTOLOGY, PRINCETON UNIVERSITY

A few years ago the massive bones of a young female mastodon were accidentally dredged up from a swamp in northern New Jersey. This bulletin is a report upon the discovery and the significance of the skeleton which is now exhibited in the State Museum.

For hundreds of centuries mastodons, both dead and alive, have had an effect on man's knowledge and imagination and history. Early tribes in Europe, Asia, and the Americas hunted these huge elephant-like creatures and may have helped to exterminate them, several thousand years ago. In more recent times the searches for mastodon remains and the studies of them have had an influence (now largely unknown or forgotten) on several aspects of civilization. These old bones changed some of the ideas of our ancestors about science, philosophy, art, glaciology, geology, zoology, paleontology, economics, mythology, religion, agriculture, humor, transportation, climatology, politics, astronomy, diplomacy, oceanography, and psychology, as well as other areas of knowledge.

Learned and inspired scientific advances as well as curious superstitions and outrageous hoaxes and deliberate distortions of the truth have been based upon long-dead mastodons. The whole story of these adventures in human relations would be a long and exciting tale of scientific detection and adventure. Entirely new kinds of ideas, amounting almost to revolutions in thought, and new ways of thinking about man's place in nature were inspired by the riddles and interpretations of mastodon teeth and bones. Looking backward, from our present know-

ledge about fossils, it is hard to realize how speculations about mastodons could have been as varied and important and sometimes as erroneous as they were in the 18th and 19th centuries. The science of comparative anatomy, the fact of extinction, and many other wholly new developments in thought were based upon observations of these fossil animals.

At least two presidents of the United States were interested in vestiges of mastodons. Washington owned a molar tooth of one, and Jefferson personally paid William Clark (of Lewis and Clark fame) for bones, including some of mastodons, which were collected in Kentucky and filled a room in the White House. Discussions of mastodons by men in such high political and social positions made the subject attractive to many people. For decades, the science of mastodons was a very popular topic of conversation, and new ideas were encouraged by this attention. Some of our current beliefs about phylogeny, of evolutionary descent with modifications, were developed more than a hundred years ago by Darwin in South America when he saw and speculated about bones of mastodons.

MASTODONS IN AMERICA

What are mastodons? They are an extinct group of mammals closely related to modern elephants (*Loxodonta* of Africa and *Elephas* of Asia) and resembling them in many ways. There are also many differences. Mastodon ancestors appeared abruptly in the fossil record in northern Africa about 50 million years ago in late Eocene time. (See diagram). These boar-sized animals

(*Moeritherium*), swamp-dwelling and rather tapir-like, form a basal part of the vast and complicated family tree of the proboscideans (animals with trunks) which spread to all the continents except Australia and Antarctica. One large branch of this hypothetical tree represents the mastodons. They reached North America via Siberia and the Bering Strait land bridge in Miocene time, approximately 25 million years ago. They had been here a long time when the first human immigrants to America used the same bridge from the Old World to the New, probably less than 50,000 years ago. Perhaps several waves of migrating mastodons and people came to this country by the same route.

In America the mastodons evolved into several divergent forms, or branches of the family tree, and some had curious flat shovel-like tusks in the lower jaw. The word "mastodon" however, usually refers to the end member of the lineage, the kind of mastodon that lived during the Ice Age or Pleistocene Epoch and preferred the temperate and cold forests rather than warm or hot regions.

Mastodons were all dead when the early Spaniards arrived in America, and the Indians had no reliable folk lore about the existence of big elephant-like animals. Indians told the white men that large fossil bones belonged to giants who lived in the earth and perished upon exposure to light and air. This myth explained the fact that the bones were in the ground and that none of the living animals were seen on the earth. How else could the dead carcasses get into the ground — close to the surface?

In 1519 Bernal Diaz del Castillo, an officer in the army of Cortez, was given a large bone, probably part of a mastodon leg, by Indians from the village of Tlascalala, near Mexico

City, as evidence of the former presence there of giants. Diaz accepted this explanation, which continued to be a common belief for nearly two hundred years, and sent the bone to Spain "for his majesty's inspection." This was probably the first fossil to be noticed by Europeans in North America, and the first American fossil to be taken to Europe. Mastodon bones are still being exposed by erosion in the stream valleys near Tlascalala and, a few years ago, I saw several teeth and dark brown bones of the "underground giants" in a glass case in the lobby of an inn in the village. Perhaps Diaz saw some of the same bones four and one-half centuries ago.

Throughout the 16th and 17th centuries, before paleontology was developed as a science, great giants and horrible dragons were reasonable explanations for the "facts" at hand. Such dark and oppressive superstitions vanish as knowledge throws light upon our thoughts.

In 1706 the eminent clergyman Cotton Mather and Governor J. Dudley of Massachusetts had an interesting correspondence about mastodon teeth and bones that had been found in the Hudson River Valley. These relics were of course regarded by many people as the remains of giants, drowned in the Biblical flood, who would "be seen again at or after the conflagration, further to be examined." Other people thought that such "hideous diabolical giants" were still living in the forests, but this view slowly gave way, during the 18th century, to the novel idea of extinctions.

Some of the most famous and far-traveled mastodon bones were dug up from a mudhole in southern New York state in 1801 under the direction of the noted painter of portraits of George Washington, Charles Willson Peale. His amateur excavation crew, mainly farmers, made a festival

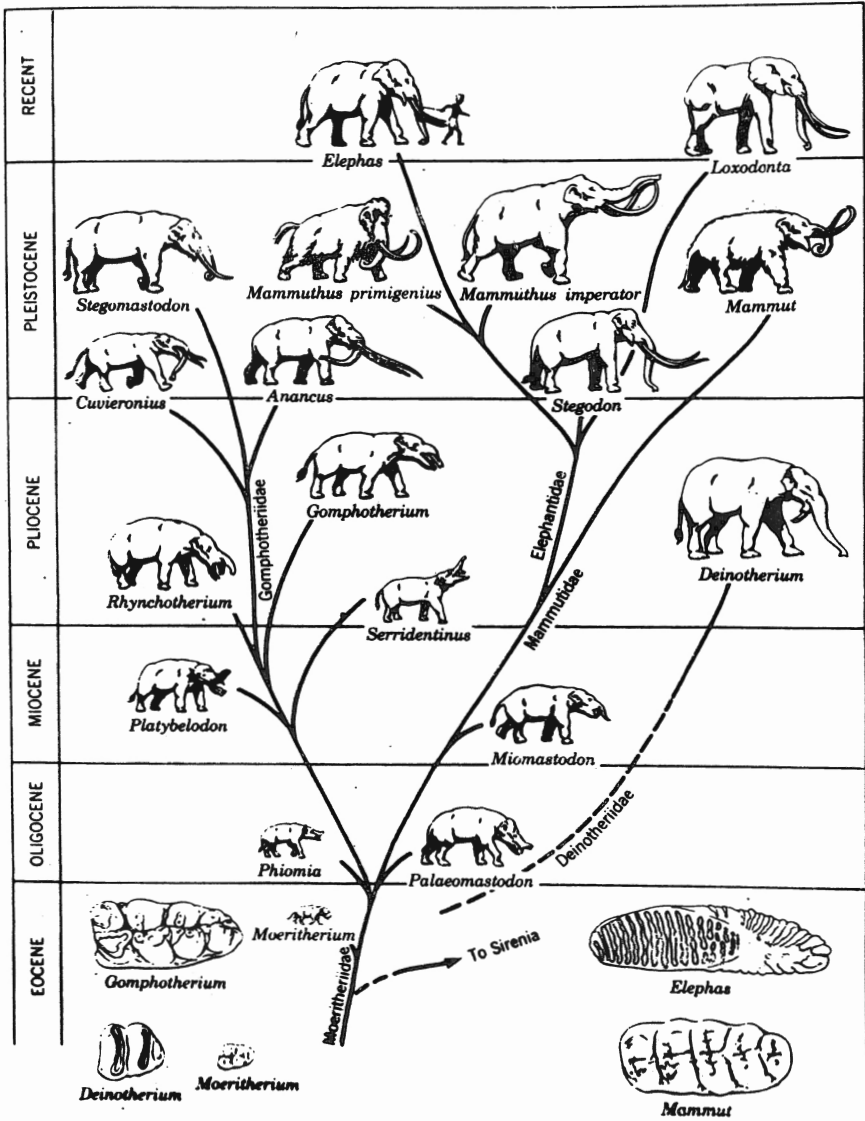


Diagram of evolution of mastodons and elephants. Restorations after Osborn, about one two-hundredths natural size; molar teeth approximately one-tenth natural size, but are not drawn to exact scale. Reproduced from "Time, Life and Man" by R. A. Stirton by permission of John Wiley & Sons, Inc. and the American Museum of Natural History.

of the work and removed enough bones for a complete skeleton. This assembled and reconstructed mastodon was the first fossil skeleton to be mounted in America (and probably the second in the world). Artist Peale and his sons, Raphael, Rembrandt, Rubens and Titian, exhibited the skeleton for many years in their Philadelphia museum. Later it was taken apart and sold to King Louis Philippe of France and then to a museum in Darmstadt, Germany, where it is today.

MASTODON FOOD

Mastodons were said by some writers to be flesh-eating beasts of prey, with "great claws, fierce dispositions, and the ability to catch other animals, by mighty leaps." Mastodons may indeed have been formidable animals, but even when they were alive they hardly deserved to be described by such purple prose as "this monster, with the agility and ferocity of the tiger, must have been the terror of the forest and of man," or "it was cruel as the bloody panther, swift as the descending eagle, terrible as the angel of right." With such ideas about the mastodon in mind one author was justified in saying "we cannot but thank heaven that its whole generation is probably extinct."

Benjamin Franklin was among the first people to conclude from the shape and size of the teeth that mastodons ate plants rather than meat. This theory has been abundantly proved since by the discovery of several skeletons each of which had several bushels of undigested food between the rows of ribs. Mastodons undoubtedly were browsers — they ate leaves and twigs (up to one-half inch in diameter) and cones of pine, cedar, fir, spruce and hemlock, and occasionally the leaves of other trees and grasses and reeds. They probably had to spend most of their

time in eating, perhaps 16 to 18 hours per day, as living elephants do. Mastodons were more abundant in our eastern forest than in other parts of the United States, and they seem to have been restricted to the areas where their preferred food grew in great abundance. Some of them lived as far north as Alaska and the Yukon, and as far south as Brazil.

SAVE THE PIECES!

Many mastodon bones have been discovered in swamps or morasses, and this had led to the belief that the creatures dwelt in marshes, a concept that is supported by the fact that the skeletons are sometimes found in a "standing pose" with the bones of the feet more or less in an upright position. Even groups or herds of remains are said to have been seen in this attitude. The bones are usually brown in color although some are light tan to off-white, and the fact that they often occur in the shallow soil of forests close to the surface has led to the conjecture that mastodons were living only a few hundred years ago—an idea now generally discounted in favor of a longer time since they became extinct. Bones and tusks of modern elephants disintegrate rapidly on the surface of the ground, and are completely destroyed by exposure to the elements in a few years. Burial by only a few inches of soil helps preserve them for a much longer time. Recent tests show that bone of related proboscideans, the mammoths, which have been in the deep freeze of the permafrost of Alaska for hundreds or thousands of years have not changed much chemically although they are now tan and brown instead of white as they originally were.

Whenever large bones of mastodons (or any other fossil animals) are found on or near the surface of the ground specialists should be call-

ed at once to preserve and collect, them. This may be a difficult job. Nearly eighty years ago a mastodon skeleton was found in an old beaver meadow near Freehold. The ivory of the tusks "was in consistency like new white cheese" and as they were removed and dried they "crumbled to powder." Modern collecting methods could have saved them.

NAMING THE AMERICAN MASTODON

Early in the 19th century the great French anatomist Cuvier concluded that, contrary to dogmatic ideas, many links in nature's chain had indeed become extinct. This included the elephant-like mastodon and the related mammoth which was a true elephant. Before the real differences between these two forms were observed they were both usually called "the mammoth" and this fact has led to much confusion. In the long history of the study of mastodons they have been given many other names, and some of these now seem ludicrous and misleading. Common names in this country were The Great American Incognitum, The Leviathan Missouriium, The Carnivorous Elephant, Ohio Incognitum, *Elephas americanus*, a Behemoth, The Pseudelephant, Le Grande Mastodonte, *Mastodon giganteus* and many others. *Mastodon* (Cuvier's term) was frequently used as the scientific name for the mastodon but unfortunately it is not the correct name because another formal name, *Mammut*, was applied still earlier to the animal and hence, according to the rules of nomenclature, takes precedence as the correct name in classification. Thus, *Mammut americanus* is the proper name for the American mastodon. This is doubly confusing because *Mammut* is so similar to the scientific name of the well-known woolly or hairy mammoth, *Mammuthus*. Many writers

have simply refused to use the name *Mammut* even though it is correct because they prefer the descriptive term *Mastodon*. The best way to resolve this difficulty in nomenclature seems to be the use "mastodon" or *Mastodon americanus* as a common or general or slang term, and "*Mammut americanus*" where scientific precision is necessary.

MASTODONS AND TRUE ELEPHANTS

Several skeletal differences readily distinguish mastodons from mammoths and living true elephants. Mastodon bones are more massive or heavily built than elephant bones and the whole body of a mastodon was comparatively wide, bulgy, and stocky — less flat or narrow from side to side. Mastodon skeletons were "primitive" or less "specialized." Their ribs were relatively heavy and the pelvis was broad. Although mastodons did not grow as large as the bigger mammoths or modern elephants a good sized mastodon was 9 to 10 feet high at the shoulders and about 15 feet long. It had a comparatively flat head, straight pillar-like limbs and five fingers and toes on its big feet. In its skull there were relatively fewer of the large openings or sinuses in the thick bone that enclosed and protected the brain. It was a marvel of adaptation for life in the forest.

Male mastodon tusks were heavier and longer than those of the average elephant and reached a length of 10 feet. All individuals of both sexes seem to have had tusks (vastly enlarged upper incisor teeth) and some young males also had small tusks in the lower jaws. One of the early writers (who was also a habitual prevaricator) said that mastodons obviously had lived in the water in rivers and anchored themselves to trees at night by their tusks! He claimed that they were shaped

like turtles, and he made and exhibited in Europe a fantastic and grotesque restoration which was 32 feet long and 15 feet high, with a skull 6 feet long and tusks 21 feet in length.

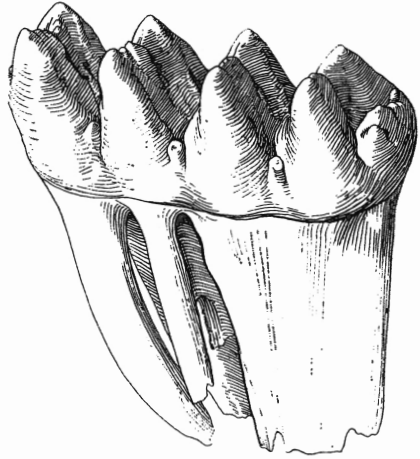
Not much is known about the skin texture of mastodons, but coarse brown hair about 7 inches in length is said to have been found with a few skeletons. Mastodons, however, probably lacked the long heavy hair that grew on the bodies of the Siberian mammoths or "woolly elephants." Details of the anatomy of these elephants are well known, from parts of frozen carcasses that have been found in the permafrost. Cossacks and fur trappers have recovered pieces of the skeletons, mostly tusks which are sold for ivory, of more than 50,000 mammoths.

Mastodons probably didn't need or have the huge ears that serve as heat regulators for modern elephants, but this is a subject of conjecture. So is the relative intelligence of mastodons a matter for guessing. They had large brains, but great size of brain doesn't guarantee that an animal will be "brainless." Brains are like purses, for contents are more important than size. Living elephants have the largest brain of any land-living animal, and it may attain a weight of about 11 to 12 pounds, nearly two times the size of a man's brain. No one (not even an elephant), however, believes that elephants are twice as smart as people.

TEETH

Mastodon teeth inside the mouth were smaller than elephant teeth and instead of having rather flat chewing-surfaces with many low ridges running from side to side, the unworn crowns of the cheek teeth of young mastodons had a few prominent cusps, covered by enamel. This shape led Cuvier to invent the term

"mastodon," which has Greek roots meaning "nipple tooth," as a descriptive name. (See illustration)



Last lower molar tooth of American mastodon, showing long roots and nipple-like cusps on the crown. About one-third natural size. Drawing by Robert Bruce Horsfall.

These teeth are so different from elephant molars that early explorers to whom elephants were familiar, regarded them as belonging to some kind of wholly different animal—it was not believed that the tusks and cheek teeth could possibly belong to the same creature.

During its life growth a mastodon may have had as many as six teeth on each side of each jaw, above and below, a total of twenty four. These came in a series, and formed excellent chopping devices with the ridges of the upper teeth fitting into the furrows of the lowers. By the time the sixth tooth in a series was erupted the "nipples" on the crowns of the front two or three, sometimes called "milk teeth," had been worn down by constant use to flat surfaces and were usually shed. The first two of these teeth had two cross-

ridges formed by pairs of cusps and the others, except the sixth which had four or five ridges, each had three. Very old individuals lost all but the last tooth, the sixth, in each series, but these four teeth were very large, some reaching a length of eight inches or more and a weight of several pounds. The roots of these teeth formed long prongs that were solidly anchored in bone. Mastodons probably didn't live as long as elephants do because the "nipple teeth," beautifully designed as they were for twig cutting, wore away rapidly, and no mastodon could survive as a "gummer."

Male mastodons had larger molars and much longer tusks than lady mastodons and the left and right rows of their cheek teeth were more nearly parallel. Also in males the space was greater from the tusks to the other teeth.

EXTINCTION

Why is the mastodon now as extinct as the dodo and the Passenger pigeon? No one really knows why, but professional as well as amateur paleontologists have made many guesses about the cause of its disappearance. Until recently some people imagined that a few mastodons might even now be tramping and trumpeting through the woods in unexplored areas of North and South America. In the 1780's President Jefferson was firm in his belief that no race of animals was ever lost from "nature's chain," and he cited as evidence the stories of some Indians about living mastodons in the northern and western parts of North America. These Indians told tales about ancient battles, which their ancestors had witnessed, between giant beasts, and also reported that parts of the trunks and other fleshy bits of big animals could be found buried near the surface under leaves and thin layers of dirt.

Most of these claims were inspired by wishful thinking or by efforts to please an audience through the invention of interesting myths about creatures that had obviously excited the imaginations of white men who were eager to explore the wilderness and to see and collect its animal treasures.

The truth is as remarkable as the lies. It is true that Indians and mastodons and giant beavers and ground sloths and mammoths and sabretoothed "tigers" and camels and extinct kinds of horses and bison all lived at the same time in America some thousands of years ago. Indian artifacts have been found with the bones of these animals as well as others which have also vanished from the face of the earth. In Texas, California, Tennessee, Florida, and New Mexico there are evidences that man and mastodon knew and slew each other, and this was probably true in many parts of the forests of North America. Mastodon meat, either roasted or raw, may have been a delicious treat that was well worth the effort and the difficulties of the kill.

How long ago? Chemical tests of the age of American mastodon tusks or of wood found close to mastodon bones in Ohio, Indiana, and Michigan indicate that the animals were living as recently as 5,000 to 10,000 years ago. Archeologists have debated for many years about the age, nature, and meaning of ancient rock carvings in Asia and America that seem to represent mastodons and mammoths. In Europe the cave artist of about 25,000 to 12,000 years ago depicted the mammoth with a curiously "bombed" or elevated skull and with long hair on its belly. When the caves were discovered and explored by modern man these features were believed to be mere exaggerations, the result of artistic license. Frozen carcasses of mam-

moths, found in Siberia, proved that the murals were true to life, natural and accurate.

Most everyone now agrees that the mastodons are all gone, but the cause of their demise isn't clear and it may have been the result of many factors combined. Disease and epidemics have been suggested as a cause, but there is no clear evidence for this, nor are there any indications that giant bears (the supergrizzlies) or other kinds of natural enemies could have destroyed the mastodon. Other suggested causes which can't be proved include catastrophes or cataclysms such as a sudden shift of the poles, quick or extreme changes of climate, insufficient food, intense cold, poison plants, lack of adaptation to changing conditions, slow locomotion, overgrowth of tusks, thinning skin, various deforming genetic effects, fire drives by Indians, blood sucking or stinging or poison insects, great floods (including the mythical submergence in the Biblical story), warfare among themselves, and so on. No one really knows, and perhaps we will never know.

MASTODON HUNTING IN NEW JERSEY

Many mastodon bones and teeth have been found in New Jersey, and many more, now lying a few inches to a few feet below the surface of the land, will be uncovered in the future by natural processes of erosion in stream valleys and along the ocean shore and on the floor of the Atlantic and in man's excavations for buildings and roads and for drainage control. The sites of most of the described discoveries are indicated in the diagram on page 10, but some of the publications about mastodon discoveries don't give enough information for precise map locations. An article printed in 1811 on "Organic Remains of a Former World" stated that mastodon bones

had been found "in New Jersey a few miles from Philadelphia," and this may be the earliest record of the "pseudelephant" or "animal incognitum" in New Jersey.

Individual skeletons of noteworthy fossil forms are often given familiar names as a mark of distinction and affection by the people who dig them up and prepare the bones for exhibit, and the mastodon skeleton in Trenton was dubbed Miss Matilda Mastodon by the many people who had a hand in her resurrection.

Unfortunately, there isn't enough space here to describe all the details of the discovery or to give proper credit to the scores of people and the many organizations that generously contributed time and energy to the successful cooperative effort of changing Matilda from some old and unknown bones, which had been buried in mire for thousands of years, into a spirited museum treasure that is valuable for knowledge and education. Nor can printed words really express the suspense and excitement and the sounds (digging and scraping noises, off-key singing, occasional shouts of joy and groans of disappointment) as the diggers sought and found the old brown bones and cleaned off the black sticky shroud of swamp muck.

The discovery was a surprise and remarkable accident for, although many mastodon bones had been dug up previously nearby in southern New York State, and a few had been unearthed in northern New Jersey, no one was looking for old fossils when Matilda came to light. A small lake or pond in a marsh on the property of affable Mr. and Mrs. Gus Ohberg, south of the Highland Lake Road in Sussex County, about 2 miles south of Vernon, was being enlarged by a dragline. It is safe to say that, just before noon on February 19, 1954, the operator, the late Mr. Archibald McMurtry, was

not thinking about fossil elephants. He was astonished to see part of a large brown skull, with huge molar teeth and broken stubs of tusks in it, tumble out of a dragline bucket in a load of heavy mud and peat which had been under about eight to twelve feet of water. This is the way Matilda burst out of an obscure antiquity into a very lively present time. Leg bones, the lower jaws, a few ribs and some vertebrae were soon recovered from the mud.

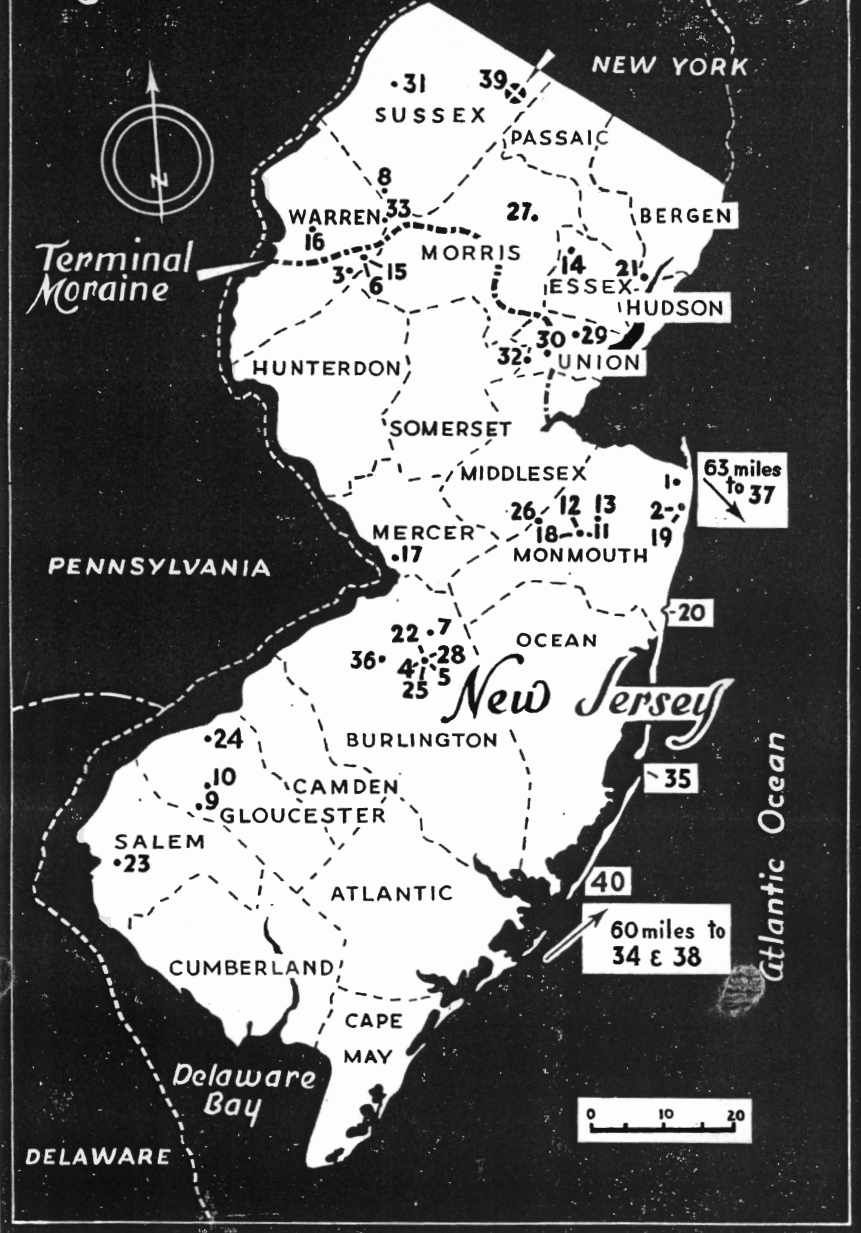
Mr. Ohberg promptly reported the remarkable and puzzling discovery to the New Jersey State Police of the Department of Law and Public Safety, and they informed Mrs. Kathryn B. Greywacz, Director of the New Jersey State Museum, who phoned the news, that perhaps a mastodon had been found, to me. The happy word of a major fossil find spread rapidly. The next day Dr. Kemble Widmer (then Principal Geologist and now State Geologist of the Bureau of Geology and Topography of the Department of Conservation and Economic Development) and Mr. Frank Markewicz (Geologist) went to the Morristown police barracks and examined the official State Police photos of the lower jaws.

They immediately recognized the teeth as those of a mastodon and this dental identification was soon confirmed by Dr. John Clark (research associate at Princeton University) and Mr. Paul Neimeyer (formerly a preparator at the State Museum) when they arrived to join the digging in the half-frozen muck that the dragline had scooped out of the pond. More people came. All the bones were taken to Mr. Ohberg's nearby filling station and milk bar. Newspaper reporters also showed up, always alert for human interest stories about ancient bones, and quickly published enthusiastic (and exaggerated) accounts of the dis-

covery. Many more people, large and small, families and neighbors, drawn by the printed reports about the Ohberg-Sussex County mastodon, came to see what the excitement was all about. In a couple of days they were arriving in large numbers and at all times of day and night and began to become a source of concern and annoyance to Mr. and Mrs. Ohberg and a threat of damage, through careless handling, to the growing collection of Matilda's mortal remains. In many ways, the scene, with crowds of people expressing awed interest in the fossil bones, was like the scenes of one and two centuries ago when mastodon bones were dug up. Costumes were different, automobiles had replaced horses and carriages, dragline and bulldozer had taken the place of spade and bucket and wheelbarrow. No one mentioned fearsome giant men or terrible and colossal predatory clawed beasts. No one claimed that the mastodon had been shaped like a turtle or that the bones might have moved about after the animal's death or might have been formed in the ground and were never part of a living animal. Knowledge and education had killed some ancient superstitions and fears, but the excitement and pleasure of looking into the past had not changed. No Amerindians, whose ancestors, had hunted live mastodons, came to watch us bring to life a dead mastodon.

Exposure to the air was beginning to cause the bones to crack and split and flake, and Mr. Ohberg wisely and generously decided to present the specimen to the State Museum. Mr. Meredith Johnson (then State Geologist, now retired) tenderly took the bones to Trenton for restoration and treatment with penetrating plastics and other preservatives. Mr. Charles Lang, formerly a preparator at the American Museum of Natural History in New York, helped with the laboratory work on the specimen.

Mastodon Discoveries in New Jersey



**DATES OF DISCOVERIES OF
NEW JERSEY MASTODONS**

(Numbers refer to locations on map)

- | | |
|---|---|
| <p>1. Before 1818
Navesink Hills, Monmouth Co.
Part of tibia (leg bone)</p> <p>2. 1824
Long Branch, Monmouth Co.
Most of skeleton</p> <p>3. 1827
Rockport, Warren Co.
Jaw, teeth, vertebrae, leg bones</p> <p>4. 1832
Pemberton, Burlington Co.
Bones and teeth</p> <p>5. 1840
Pemberton, Burlington Co.
Parts of skeleton</p> <p>6. 1844
Hackettstown, Warren Co.
5 or 6 skeletons, one at Harvard
University</p> <p>7. 1846
Plattsburg (Sykesville), Burlington Co.
Part of skeleton</p> <p>8. 1851
Greendell, Sussex Co. (formerly
Green(s)ville)
Part of skeleton</p> <p>9. Before 1868
Harrisonville, Gloucester Co.</p> <p>10. Before 1868
Mullica Hill, Gloucester Co.</p> <p>11. Before 1868
Freehold, Monmouth Co.
Bones</p> <p>12. Before 1868
Freehold, Monmouth Co.
Milk tooth</p> <p>13. Before 1868
Marlboro, Monmouth Co.
Portion of jaw</p> <p>14. Before 1868
Verona, Essex Co.
Tooth</p> <p>15. Before 1868
Hackettstown, near Vienna, Warren Co.
Tooth</p> <p>16. Before 1868
Hope, Warren Co.
Part of skeleton</p> <p>17. 1878
Trenton, Mercer Co.
Tusk</p> <p>18. 1882
Freehold, Monmouth Co.
Tusks, skull, and teeth</p> <p>19. 1882
Long Branch, Monmouth Co.
Tooth</p> <p>20. 1882
Manasquan Inlet, Monmouth Co.
Tusk and bones</p> | <p>21. 1888
Corona, Bergen Co. (S. E. of Lodi)
Tusk and other teeth</p> <p>22. 1887
Pemberton, Burlington Co.
Parts of skeleton</p> <p>23. Before 1894, maybe as early as 1870
Mannington, Salem Co.
Skeleton in Rutgers University</p> <p>24. Before 1903
Woodbury, Gloucester Co.
Remains</p> <p>25. Before 1903
Pemberton, Burlington Co.
Skull (used as stepping stone)</p> <p>26. Before 1903
Englishtown, Monmouth Co.
Remains</p> <p>27. Before 1903
Boonton, Morris Co.</p> <p>28. Before 1923
Pemberton, Burlington Co.
Tooth</p> <p>29. 1930
Union, Union Co.
Tooth</p> <p>30. 1936
Cranford, Union Co.
Tusks and bones</p> <p>31. 1939
Stokes State Forest (Shotwell Pond),
Sussex Co.
Teeth and bones</p> <p>32. 1940
Westfield, Union Co.
Part of skull</p> <p>33. 1941
Quaker Church, Warren Co.
Teeth</p> <p>34. 1948
At sea off Atlantic City
Tooth</p> <p>35. 1951
Off Barnegat Inlet
Tooth</p> <p>36. 1951
Lumberton, Burlington Co.
Teeth</p> <p>37. 1951
At sea off Ambrose Lightship
Teeth</p> <p>38. 1953
Off Atlantic City
Tooth</p> <p>39. 1954
Vernon, Sussex Co.
Skeleton</p> <p>40. About 1957
Holgate (South of Beach Haven)
Part of a leg bone</p> |
|---|---|



General view of mastodon site near Vernon, New Jersey, March 1954. Mr. Ohberg's place (now a sporting goods shop and refreshment stand) and road to Highland Lakes from Highway number 515 may be seen in the background.

Cold rains frequently stopped the search for more parts of the skeleton in the peaty material which the dragline had scooped out of the pond, but the staunch searchers continued whenever possible, digging and looking. Everyone and every organization cooperated admirably in the cheerful group effort and enjoyed the work and fun of delving into American prehistory. Mr. Clifford Dennis, Sussex County Superintendent of Schools and Senator George B. Harper, County Engineer, helped with numerous problems, and the Sussex County Road Department supplied men and bulldozers, to move piles of frozen muck, and equipment to pump water out of the pond so that the bottom could be scraped and examined and probed for traces of the bones that were still missing from the skeleton.

One of the hopes most frequently expressed by the searchers (teachers, geologists, bulldozer operators, students, wives, and casual sidewalk-

superintendents who just happened to drop in) was that the tusks, the most interesting parts of the entire skeleton, would be found. A few more bones turned up in the heaps of peat and muck but none were discovered in the bottom of the bog, even in the area that was thought to be the spot the skeleton had originally occupied.

At last, about seven weeks after the skull had dropped from the past into the middle of the twentieth century, both tusks were recovered, in several pieces but in excellent solid condition!

After the bones were cleaned and patched and partly reconstructed in Trenton they were taken to the American Museum of Natural History in New York. There, through arrangements made with Dr. E. H. Colbert, Chairman of the Department of Geology and Paleontology, the skillful and experienced technicians in the "fossil lab," repaired and restored the bones and, with

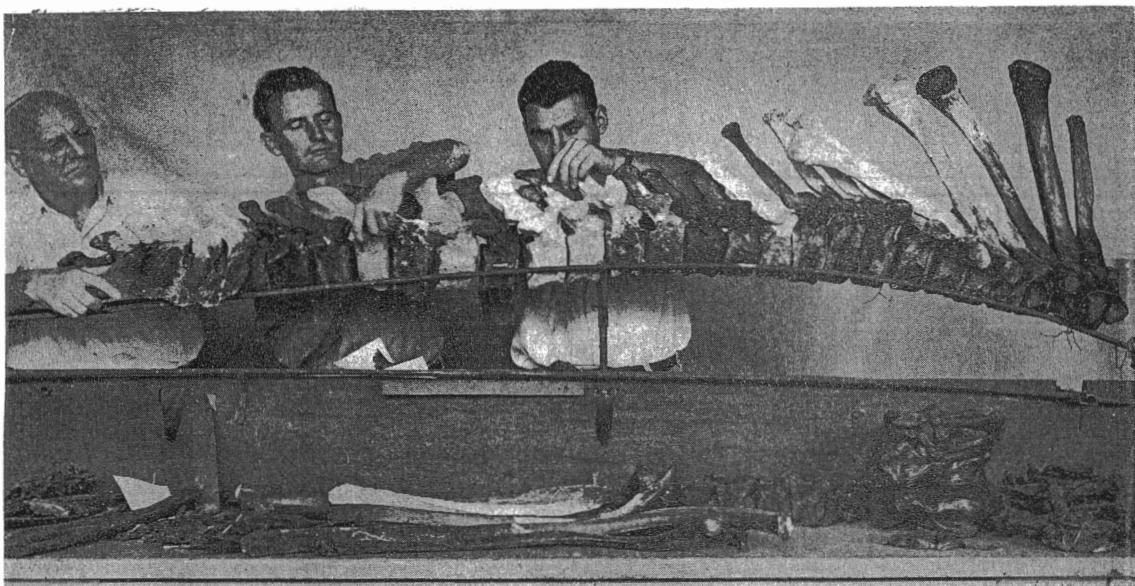
metal supports, placed them in the positions they'd had thousands of years ago when Matilda was peacefully chewing a mouthful of leaves. Missing bones were cast in plaster, using other specimens as models. Then the skeleton was dismounted, in sections, and trucked home to Trenton for reassembly, christening, and perpetual display, a proud addition to the State Museum.

The absence of any foot or toe element (a total of about 70 bones) caused many discussions and led to the speculation that the animal had been trapped by the bog, had died while standing up, and that the feet were deeper in the mud than any

other parts. There was, however, no real evidence to support such a hypothesis. Neither is there any support for the thought that the animal might have drowned after slipping into a deep hole in the peat bog. (Elephants do drown, of course, and two of them perished in the spring of 1847 when their keepers improvidently attempted to swim them across the Delaware River. The skeletons of one of these pachyderms, Pizarro by name, was exceptionally large and was studied and compared, bone by bone, with the skeletons of New Jersey mastodons).

Gus Ohberg with mastodon skull and lower jaw, February 19, 1954. The lower jaw is not exactly in proper position.





Reconstructing the backbone of the Ohberg Mastodon by Carl C. Sorensen and Walter Sorensen, preparators, Vertebrate Paleontology Laboratory, American Museum of Natural History, and Mervin King, preparator, New Jersey State Museum. (Note restorations in white plaster. Shoulder vertebrae are toward right.)

GEOLOGICAL CLUES TO MASTODON LIFE

Other questions were asked, some about the length of time since the bones had been part of a living animal and had been inside of hide and muscles, and other questions arose about the conditions in New Jersey when the creature had been a member of a herd of mastodons. Dr. Kemble Widmer, in order to help answer some of the questions about time and geology, has very kindly prepared the following report.

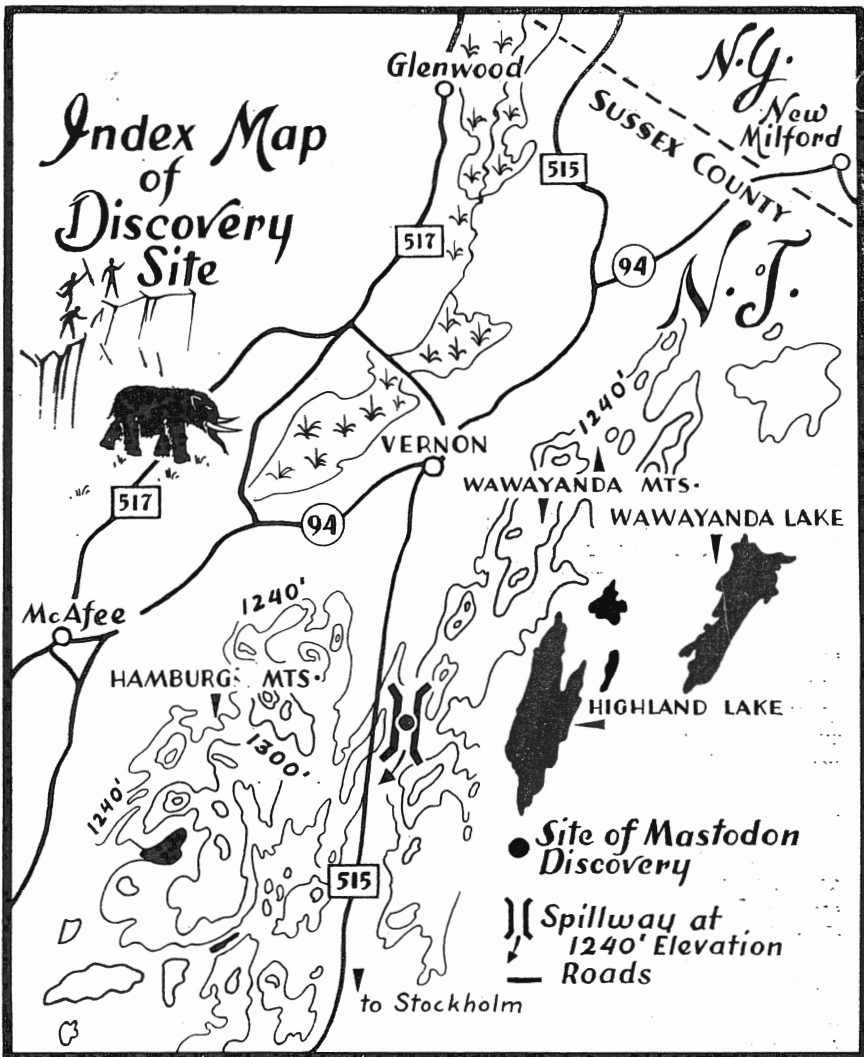
“During the Pleistocene or Ice Age, parts of New Jersey were repeatedly covered by great continental glaciers. A terminal moraine (indicated on the map, page 10) through Metuchen, Summit, Dover, Hackensack, and Belvidere marks the maximum advance of the late Pleistocene or Wisconsin glaciation. The retreat of the ice from this moraine was marked by readvances and further retreat before the final disappearance of the ice. The last of

the readvances, in middle Wisconsin times, sent a tongue of ice along the valleys of the Wallkill and Paulins Kill Rivers toward Belvidere. In the vicinity of Vernon this tongue of ice was bordered on the south and east by the Precambrian gneissic ridge of Wawayanda and Hamburg Mountains of the New Jersey Highlands (indicated on the map, page 15) and on the north and west by the Shawangunk conglomerate ridge of Kittatinny Mountain.

“The position of the lateral or edge moraines south and east of Vernon suggest that for a long time ice occupied the valley but did not cover the mountain tops. Whenever the ice melted, the melt water would collect between the ice on the northwest and the gneissic ridges on the southeast and then drain off through the lowest open gap in the rock rampart. One such gap, at an elevation of 1,240 feet, directly

south of Vernon, was the site at which the mastodon was found, on top of a hard blue clay till and beneath about eight feet of peat, approximately at the watershed divide in the Vernon gap. An examination of topographic maps shows that this is

the lowest outlet toward the south or southeast along about nine miles of mountain front between New Milford, New York and Vernon and Hamburg, New Jersey. Once the ice had melted back (north) or down (lower in elevation) far enough



Mastodon site area map showing those areas adjacent to the site which were above the ice and above the ice marginal lake lying north of Wawayanda Mountain. The 1,240 foot overflow channel from this lake and the discovery site are shown by the special symbols.

to uncover lower gaps east of Wawayanda Mountains, the outlet channel south of Vernon was abandoned.

"The sequence of events between the abandonment of the outlet channel south of Vernon as an outlet for the ice margin lake bordering the middle Wisconsin ice tongue of the Wallkill Valley and the death of the mastodon can only be inferred from several isolated bits of indirect evidence. A rather complete sampling of a section of peat, more than 15 feet thick, immediately west of the mastodon site was made by Dr. Selman A. Waksman, Chairman of the Department of Microbiology of Rutgers, and sent to the late John E. Potzger, Butler University, Indiana for a pollen count study. Unfortunately, however, Dr. Potzger could not determine from these samples the exact nature of the forest conditions at the time the mastodon died. He observed a large number of algal filaments and young prothalli of germinating fern spores in some of the peat, and pointed out that when fern spores germinate in water, they usually remain in the algal filament stage, and that this would suggest that the peat accumulated not in a deep lake, but perhaps a wet depression rich in ferns.

"In excavating for the mastodon, the personnel from the Bureau of Geology observed many short lengths of rotting 'punk' wood, with pointed ends, and marks such as would be made by the chisel-teeth of beavers. As the excavation was drained by mud pumps, a small waterfall near the base of the peat, a few feet north of the site where the skeleton had been recovered, was caused by a large

number of these pieces of wood which were close together in the peat—probably the remains of a beaver dam.

"Dr. Potzger's analysis of pollen in the peat samples at the 90-99 inch depth, approximately the level of the mastodon, indicates a forest cover of 36% White pine type, 26% Jack pine type, 20% Hemlock, 8% Oak, and 10% miscellaneous trees. There is no certainty, of course, that the mastodon died at this period of peat accumulation. It might have walked into the area at a somewhat later date, and its dying struggles or the weight of the bones after death may have caused the remains to sink into the older and deeper peat levels.

"While the mastodon was being excavated, a sample of peat was taken from the horizon in which the bones had been found and this was submitted to the Lamont Geological Observatory of Columbia University for a radiocarbon age determination. Professor J. Laurence Kulp advised the Bureau of Geology that the peat sample No. L-231 is 10,890 years old, plus or minus 200 years, indicating that this peat 'was deposited at the very end of the Wisconsin rapid retreat.' Although the mastodon can be no older than this, it may be quite a bit younger, but it is felt that most of the peat in the area accumulated fairly rapidly during early post-glacial forest times before the area began to have the present topographic and climatic relations. The present forest cover consists predominantly of hardwoods, and although it is not well drained, it would not be considered a true bog, but rather a poorly drained forest area."

MATILDA MASTODON

Matilda was young, just past her teens, and not yet full grown, when she died in the ancient peat bog. The ends (epiphyses) of her limb bones had not yet fused to the shafts and the bony discs at the ends of some of her vertebrae were also separate from the solid middle parts. Her incisors or tusks had not reached their full lengths, and they show little sign of the wear that is obvious on the tusks of old mastodons. Each of her splendid pointed tusks extends out of its socket in a gentle and graceful curve for about $2\frac{1}{2}$ feet. From tip of tusk to tail she measured a dainty 15 feet, and at the shoulders she was $7\frac{1}{2}$ or 8 feet tall. Her head was $2\frac{1}{2}$ feet high (from top of forehead to base of jaw) and about a yard long (not including the tusks). Her thigh bone was 37 inches long, and she was just a little more than 5 feet wide at the hips. Her dimensions were perfect for Miss Peat Bog of 9000 B. C.

It is remarkable that most of her hyoid bones, thin long elements from near the base of the tongue, were found. They would have been easy for the diggers to overlook, and the fact that they were discovered emphasizes the thoroughness of the search. Discovery of these bones is most unusual for they have been found with only a very few mastodon skeletons.

She had two cheek teeth (molars) in place in the upper and in the lower series on the left side and three on the right above and below, for a total of ten teeth. One tooth, probably the left front upper molar, had dropped out and was found separately. It and the other front teeth (right upper and lower) were flattened by wear. Each of these three teeth measures about $3\frac{1}{2}$ inches in length from front to back. Each middle tooth, of the series above and below, is approximately

$4\frac{1}{2}$ inches long. The four rear molars are each about $6\frac{1}{2}$ inches long and each has four of the transverse ridges that typify mastodon molars. These teeth had erupted shortly before the animal's death and show little evidence of use in food crushing. Color of the teeth now varies from pearl gray to dark brown or black.

Some of the vertebrae bear marks of injury or disease but the cause of the lesions is unknown. They may have resulted from mechanical damage to the bone or from osteo-arthritis or tuberculosis. A post mortem diagnosis of bone defects in a mastodon presents difficulties but further study would undoubtedly reveal interesting facts because nearly every skeleton of the "pseudelephant" known shows some effects of violence or sickness.

MASTODONS IN MUSEUMS

Most large natural history museums now exhibit a mastodon skeleton or two, and many of these came from Orange County in southern New York, (adjoining Sussex County) which must have been an area of dense population by mastodons or a preferred corridor of migration. A skeleton in the Princeton University Natural History Museum was assembled from the bones of several Orange County discoveries. An exceptionally complete mastodon skeleton, a large male who was so old he had lost all but four of his chewing teeth (one on each side of the upper and lower jaws), was found near Monroe, New York in 1952 and may be seen now in the Museum village at Smith's Clove.

At Harvard University in the Museum of Comparative Zoology there is a fine mastodon skeleton from a farm near Hackettstown, New Jersey, collected in 1844. This was one of six skeletons, representing five adults and a calf, that were found together at a depth of about six feet,

when a boggy depression was drained and dried. Three of the skeletons indicated the animals were "as if in a standing position" when they died and one was "on its back." These attitudes of the bones led to the belief that the creatures "had been overwhelmed in one of their native hunts by some sudden catastrophe." Two of the skeletons "fell to pieces on being exposed to the air" and only the teeth and parts of the larger bones were saved.

Rutgers University has a fine-looking mastodon skeleton from a marl pit near Mannington, Salem County. Again the bones began to disintegrate "the minute they were exposed to air." Nevertheless they were left exposed at the side of the pit for two years and were then sold to a travelling circus. Later they were bought by alumni of Rutgers and the skeleton was mounted in 1896. By this time the bones had been so frequently patched up and restored with plaster that very little of the original bone surface remained. The original tusks have been replaced, one by a tooth from Ellenville, New York, and the other from southern New Jersey.

MASTODONS AND SEA LEVEL IN THE ICE AGE

Many separate molars and pieces of tusks of mastodons have been recovered from the floor of the Atlantic Ocean off the New Jersey coast, and the questions raised by these specimens are of great interest and significance in geology. How did they get there? They are frequently found by scallop fishermen in the dredges which are dragged along the bottom of the ocean, and we are indebted to the owners and operators of the fishing boats and to other interested friends in the Atlantic City area for discoveries and reports of these valuable records.

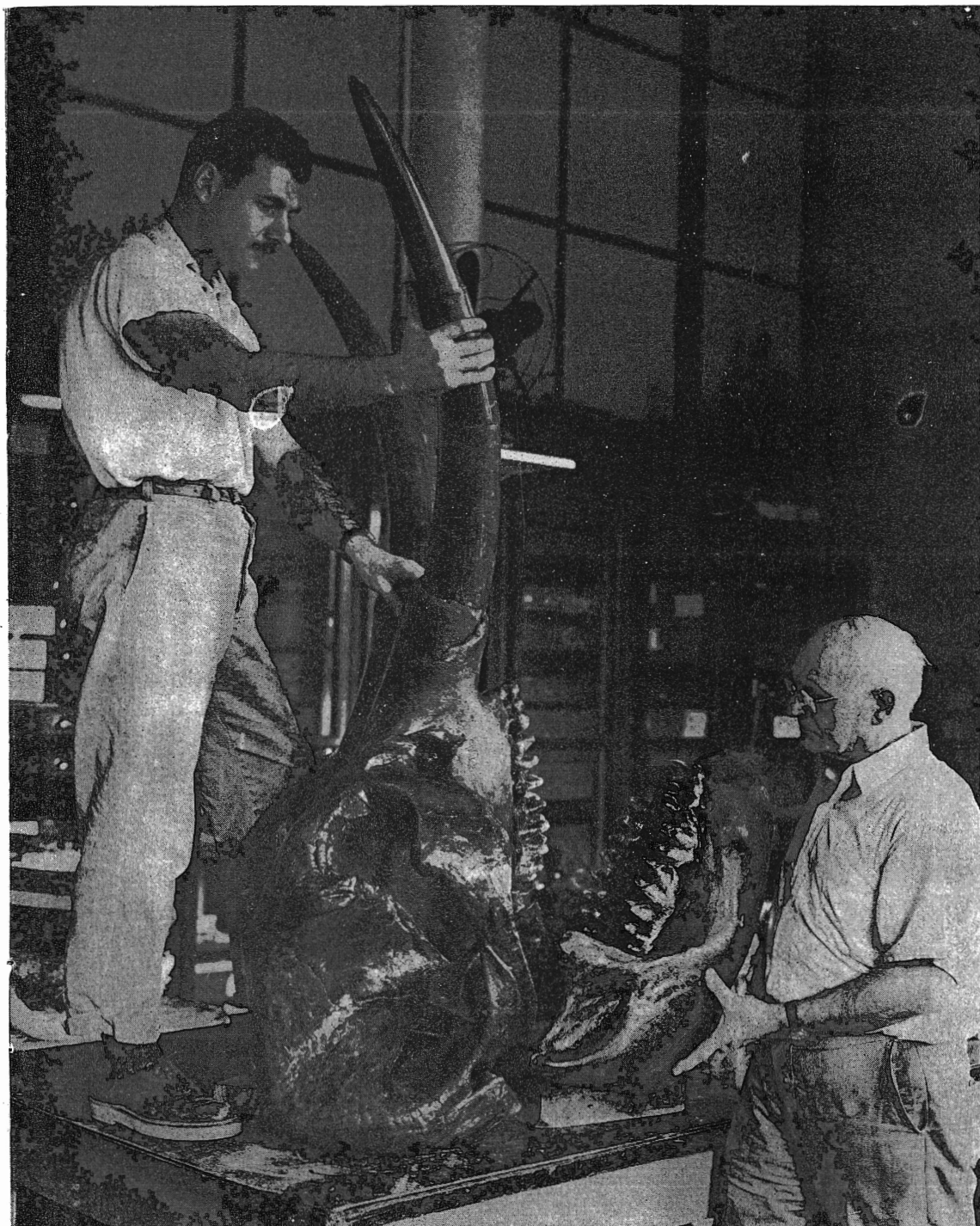
So many teeth of mastodons and bones of other land-living mammals have been discovered on the sea

floor that it seems unreasonable to insist upon transport by water currents or iceberg rafts rather than to assume that the animals lived where the bones are found, now reported to be under as much as several hundred feet of water, and as far as several hundred miles from the coast. If the creatures were living there on dry land the ocean level must have been much lower than it is now, perhaps the result of the vast amount of water that was locked as ice in the great glaciers of the Ice Age. The submarine fossil fields may be a favorable place for future collecting by skin divers.

Most of the teeth found in the ocean are gray or brown or black in color, and they show signs of beginning to become petrified. When part of one such mastodon tusk was treated with preservatives it unexpectedly turned pink, - the only pink elephant I ever saw!

LET'S LEARN MORE ABOUT MASTODONS!

Members of the teaching and research staffs in the colleges and museums in New Jersey are very eager to learn more about mastodons and also about more mastodons. We will be grateful if future discoveries are reported promptly so that the processes of preservation and study can be continued as successfully as possible within the state. Ancient mastodons are one of our educational treasures and should be treated with care and respect. They are both valueless and priceless (although one tooth was once sold for a gill of rum). It is our privilege, if we wish, to "waken the slumbering ages," and we will find the fun of work and companionship as well as the exhilaration of knowledge each time we discover a fossil skeleton and clothe it with life and color and beauty for future students to enjoy, perhaps for hundreds or thousands or millions of years, in the endless flow of time.



Fitting upper and lower jaws together with tusks set in place in laboratory of American Museum of Natural History.

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Back cover:

SKELETON of MASTODON in New Jersey State Museum, Trenton.

