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ERMINE C. CASE, IRVING D. SCOTT, BYRNE M. BADENOCH,
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[Reprinted from PAPERS OF THE MICHIGAN ACADEMY OF SCIENCE, ARTS AND
LETTERS, Vol. XX, 1934. Published 1935]

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IN 1929 the Museum of Paleontology of the University of Michigan received word of the discovery of large bones in a marl pit near the small village of Union in Cass County, Michigan. Investigation revealed that these were the bones of an elephant. Since such remains are relatively scarce in Michigan, the material was carefully preserved and is now mounted in the Hall of Evolution in the University Museums Building.

The skeleton was found during the excavation of a marl bed in the northwest corner of Porter Township, Cass County, Section 32, Township 7 S., Range 13 W. Mr. George Wagner, the owner of the pit, most generously donated the specimen to the University and aided materially in its recovery.

The position of the specimen gave an opportunity for a more accurate dating than any previously discovered, and so the help of Professor I. D. Scott and certain of his advanced students was enlisted to determine what could be made out from the associated glacial and physiographic features concerning the time of burial. The following is a report of the combined findings of all engaged in the study.

The specimen consisted of the major portion of the skeleton of an adult individual. The skull and tusks were not found, but all four of the cheek teeth were recovered in good condition. These teeth were determined by Dr. H. F. Osborn, of the American Museum of Natural History in New York, as those of *Elephas primigenius americanus*, the woolly or hairy mammoth of the American continent.

The humerus measures 3 feet 11 inches in length, which indicates a height of 10 feet 6 inches at shoulders, and a length of over 13 feet

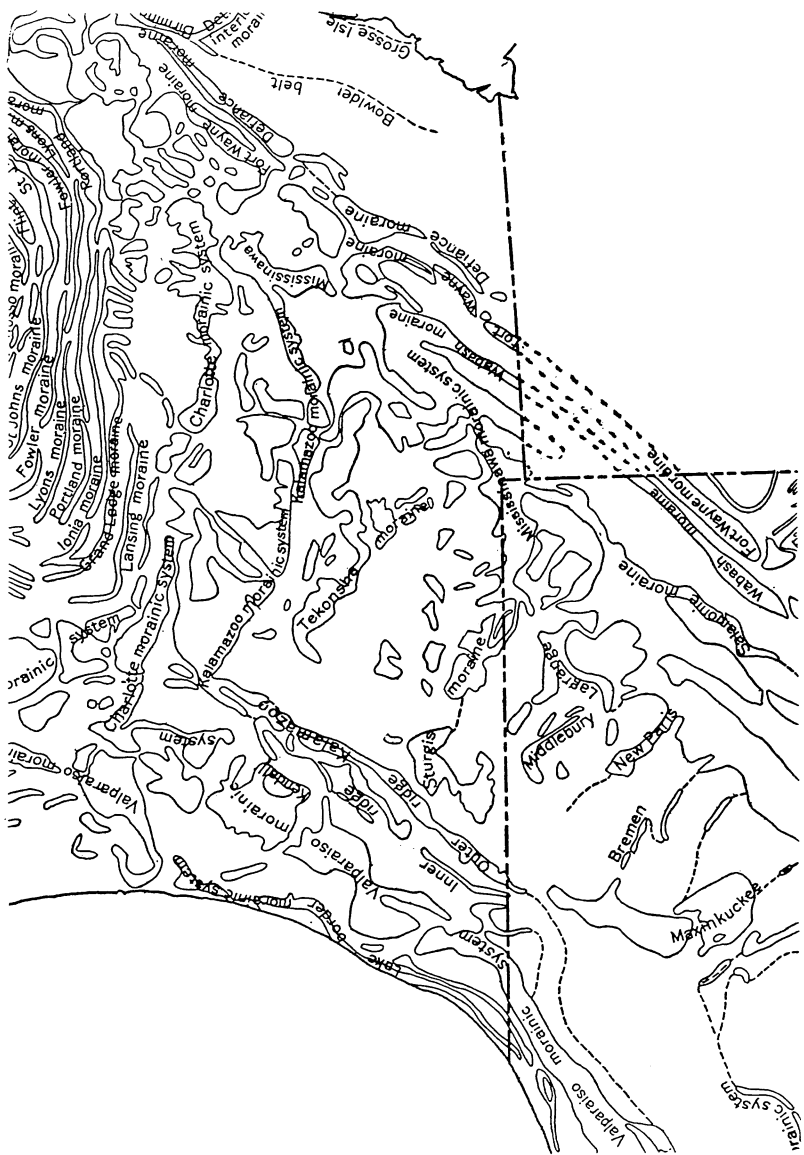
from the base of the tail to the base of the tusks, somewhat larger than the Indian elephant commonly seen in the circus or zoölogical garden. Because of the absence of tusks, which reach a large size in the male, it is believed the skeleton is that of a female.

The skeleton lay upon a yellowish, clayey sand which formed the bottom of the lake in which the marl developed. Above the specimen lay 8 feet 8 inches of undisturbed marl, mostly white, but with bands of a brown and bluish color. The marl is an almost pure calcium carbonate, formed from the shells of fresh-water invertebrates and by direct precipitation from the water. According to a personal communication from Mr. Calvin Goodrich, curator of molluses in the Museum of Zoölogy, the abundant shells of lamellibranchs and gastropods preserved in the marl are indistinguishable from those of living forms. The undisturbed condition of the marl beds shows that the cadaver was deposited before the marl was formed and did not sink down through all or any part of it at any subsequent time. The condition of the bones, some badly injured by decay and the skull almost entirely destroyed, indicates that they lay partly exposed to the air for some time before burial. These are important points, since they date the deposition of the specimen at the beginning of the formation of the lake.

The examination of the physiographic evidence by Professor Scott and two of his advanced students, Mr. B. M. Badenoch and Mr. T. E. White, leads to the following considerations.

The glacial deposits of the region south of the Saginaw-Grand lowland were formed by the Wisconsin ice sheet. The Kalamazoo-Mississinawa morainic system may be taken as characteristic. It consists of three parts, a western part with a northeast-southwest trend formed by the Michigan lobe, a central part with a northwest-southeast trend formed by the Saginaw lobe, and an eastern part with a northeast-southwest trend formed by the Huron-Erie lobe. It will be seen from the map (Map 37) that these three sections form a large rectangular reëntrant.

The Kalamazoo-Mississinawa morainic system marks the first great halt of the receding ice front. Three earlier minor halts are indicated by the Lagrange, Sturgis, and Tekonsha moraines which, although not continuous, have a northwest-southeast trend and therefore were deposited by the Saginaw lobe. It is important to note that there was a readvance of the ice to form the Tekonsha moraine



MAP 37. Southern Michigan and northern Indiana, showing the moraines

and that the Lake Michigan sector covered the western ends of the Lagrange and Sturgis moraines.¹ This advance was sufficient to cover the basin in which the skeleton of the elephant was found and for which the name "Lake Mogodore" is proposed. This name was apparently used first by Mr. John Eby, a former resident of the region, who probably derived it from the earlier name of Chapel Hill schoolhouse near the find of elephant bones, and from the local name, Mogodore Valley, applied to the lower end of the depression formerly occupied by an extension of the lake.

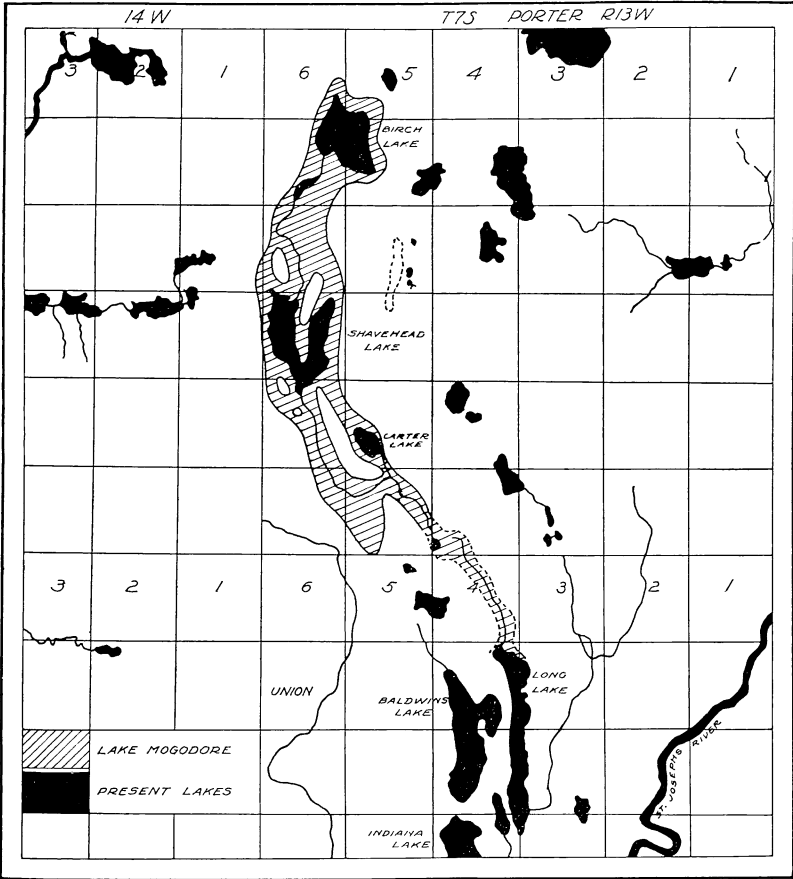
The borders of Lake Mogodore are identified by a well-defined offshore terrace, often consisting of marl, and in places by low, wave-cut cliffs. The terrace stands between thirty-five and forty feet above the present level of Shavehead Lake and at about the same height above Carter Lake. At Birch Lake, however, the terrace is only about six feet above the present lake level. At its greatest extent Lake Mogodore had a total length of about six and one-half miles and a maximum width of about one mile. It was irregular in shape and contained several islands, some of which were topped by wave action. It covered nearly all of Sections 7, 18, 19, 30, 32, the southwest part of Section 5, the southeast part of Section 6, the northeast part of Section 31, the southwest part of Section 29, and the west half of Section 8, all in Township 7 S., Range 13 W. (See Map 38.)

The present drainage starts with Birch Lake, which is the highest in the Mogodore Basin. It discharges southward into the western arm of Shavehead Lake. The outlet of the latter lake takes a southeasterly course and is joined by the drainage of Carter Lake at the head of the Mogodore Valley. The stream continues to the south and east into Long Lake and thence into the St. Joseph's River. The drainage of Lake Mogodore followed approximately the same course.

From the explanation given above it is evident that Lake Mogodore came into existence after the recession of the ice from the Tekonsha moraine. The condition of the bones necessitates postulating a rise in the level of the lake to its maximum stage but, unfortunately, no physiographic evidence of this was found.

The date of burial of the elephant is uncertain. It surely post-dated Tekonsha time and must have been previous to the draining of the lake, the date of which is not known. Assuming burial to have

Frank Leverett, personal communication.



MAP 38. A portion of Cass County, Michigan, showing the site of glacial lake Mogodore and the find of *Elephas primigenius americanus*

taken place during the time between the formation of the Tekonsha and Kalamazoo moraines, the following glacial history ensued: The Kalamazoo-Mississinawa system was followed by the Salamonie, the Wabash, and the Fort Wayne moraines, all of major importance. The recession of the ice from the Fort Wayne moraine initiated a series of glacial lakes with Maumee, Arkona, Whittlesey, Warren, Algonquin, and Nipissing as the main stages.

It is impossible to state with any certainty the duration of this time in terms of years, and any attempt must be in the nature of an

estimate. Our best clock is Niagara Gorge, which was started in Algonquin time. According to Dr. Frank Leverett in a personal communication, it has taken Niagara River approximately 18,000 years to carve the gorge. The same authority places the Tekonsha moraine at somewhat less than 35,000 to 40,000 years ago. Thus the elephant must have lived in southwestern Michigan at some time less than 35,000 years ago, but how much later the genus survived in the state is still a question.

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