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Ohio During the Ice Age

By Harvey Wilson Compton

Superintendent of Toledo Public Schools, 1886-1897—Died 1916

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At the close of the Revolutionary War, when the struggling American colonies had gained their independence, they found themselves in possession of the English title to the great North-West Territory.

This vast expanse of forest, river, valley and prairie stretched from the Alleghenies to the Mississippi and from the Ohio river to the great northern lakes. For untold centuries this wide area of fertile land had been inhabited only by wild animals and shifting hordes of nomadic Indians. But out of this territory six of the wealthiest and most populous states of the Union have been carved since 1802. Of these states Ohio was the first. It was the gateway to the great west. And when our forefathers began to crowd over the mountain barriers, with their eyes fixed upon the forest and prairies of the west, they met stubborn foes in the French, English and Indians who disputed every inch of territory west of the Alleghenies. With this struggle to determine who should possess the great western territory really begins the authentic, recorded history of Ohio. But there is an older history of Ohio, running far back into the past, which cannot be gathered from the lips of pioneers or read from historical documents filed in the archives of government. It must be deciphered, imperfectly, it is true, from the lakes, hills, rocks and rivers, and from the surviving works of a race of men long passed away.

THE GLACIAL EPOCH

Archaeologists have been busily at work for many years, and they tell us marvelous stories of the wondrous physical conditions that, ages ago, prevailed in Ohio and her sister states east and west, and of the ancient races that inhabited this region. The student of Ohio's history should know something of the great glacial epoch and of the "glacial man" who is supposed to have existed at that time.

The physical evidences that have been observable for a long time prove beyond question that the beautiful and rolling surface of Ohio, and indeed of all northern America, was at one time covered with a vast sheet of ice from one to three thousand feet thick. This great icy mantle gradually crept down from the polar regions with irresistible power, and was accompanied by intense cold. It enveloped all of Ohio except the southeastern portion, and from the Atlantic to the Pacific ocean. It extended nearly as far south as Philadelphia. In localities where the conditions were favorable the ice wave flowed down even into Kentucky. This great mass of moving ice acted upon the surface of the earth over which it moved, much like a mighty plane, or sometimes like a vast plow. As it advanced in its irresistible course it thrust the edge of its icy blade against the hills and

smaller elevations and they disappeared as the knots and roughness of a board disappear before the carpenter's jack-plane. It swept this earth before it like shavings, or ground it beneath, filling up vast valleys and depressions in the soil. Sometimes it conformed its shape to the surface of the land and flowed around mountains and high hills, sank into deep valleys, and buried beneath its masses of traveling earth luxuriant forests of cedar and pine. Again it gouged out great valleys and vast basins like Lake Erie, which have only existed since the glacial period. In places it plowed over the hills and mountains and left its unmistakable scorings and striations upon their loftiest summits. Into the bottom of the glacial sheet were frozen rocks, pebbles, boulders and sand which enabled it to act upon the land and rock surface like a mighty rasp; and wherever it traveled are found the planed, polished and scored surfaces of the underlying rocks. The limestone of Kelley's Island in Lake Erie, near Sandusky, shows the most marked evidence of this glacial action. This hard unyielding rock has been fluted and polished for long distances as by the chisel of a sculptor, sometimes even to a depth of two feet. Whole acres of the limestone rock, when freshly uncovered, show the furrowing and grooving of the ice rasp that moved over it with granite teeth. The same evidence of the ice sheet's action are seen in nearly all parts of Ohio whenever the drift soil is removed from the bedded rock.

GRANITE BOULDERS AND NIGGER HEADS

But the evidence of glacial action that is most readily perceived and understood is found in the granite boulders that are strewn over so large a portion of the surface of Ohio, wherever the ice mantle covered it. These fragments of granitic rock, varied in size from half a pound to thousands of tons, the smaller ones, round and smooth were called in different localities "hard heads," or "nigger heads," and must have long been a puzzle to the human eyes that beheld them. It was found that they were scattered throughout Michigan, Ohio, Indiana, Pennsylvania and other parts of the United States and Canada, wherever the ice sheet had traveled in its generally southward course. It was observed, too, that these round fragments of granite lay over the surface of land where there was no rock of a similar kind; or no other rock of any kind visible. Glaciers in other parts of the world, in existence at the present time, have been studied and are found to be carrying vast masses of rock and boulders upon their surfaces. The glaciers are also found to deposit the rock, earth and gravel carried by them, where the ice melts, in great masses called "terminal moraines," at the end of the glaciers, far from where they were originally picked up by the slowly moving ice streams. The boulders of Ohio and Michigan have been compared with those in the highlands and granite mountain ridges of northern Canada and found to be identical in substance. Thus it has been established beyond a shadow of a doubt that our Ohio boulders, many of which are now built into fences or dwellings or crushed for pavements, had their origin in the granite ridges of Canada. They were broken from the ledges of those northern mountains, rounded and polished on ancient beaches by the washings of geologic seas long ages ago, then mounted upon the back of the great ice steed and carried fifty, one hundred, even five hundred miles, to be scattered over the present farmlands of Ohio and its adjacent states. The transporting power of ice is unlimited. It carries a thousand-ton rock as easily and swiftly as a grain of sand. Near Lancaster lies one of these granitic boulders that must have been brought at least five hundred miles. It is partially embedded in the earth and is eighteen feet long and twelve feet wide. The glaciated surface of Ohio, nearly three-fourths of the state, is studded with large sandstone and granitic rocks of irregularly rounded shape which were left by the melting ice. These are often poised delicately upon hillsides, or along the edges of ravines, or embedded in plains where the ice left them. President Hitchcock tells of one left by the ice near Bradford, Massachusetts, weighing over two thousand tons, and of another at Fall River one hundred and fifty feet in circumference, weighing over five thousand tons.

THE UNGLACIATED PORTION OF OHIO

The southeastern counties of Ohio form the unglaciated portion of the state. The soil of the hilly regions of these counties is the disintegrated bed rock. The river valleys are composed largely of drift washed down from the moraines of

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the glacier. Immense, irregular masses of sandstone lie in the fields and woods, and upon the hillsides, of this unglaciated region of Ohio. These great rocks are pitted and scored by centuries of rain. They are fringed with ferns and mosses and grey with lichens. The prickly wild goose-berry flowers and ripens upon their summits. Pines, hemlocks and maples are rooted in their crevices and wild animals burrow beneath them for winter homes. They lend a picturesque charm to the meadows and the fields of waving grain, and a dignity and solemn grandeur to the woods. These rocks, massive, immovable, ancient as time, were not brought by the glacier. They lie not far from where they were first formed. They are portions of the bed rock that were undermined by primeval seas, in the dawn of the world, and tumbled down the hills in the wrinklings and upheavals by volcanic forces. These huge rocks, washed out by ancient seas, and the vast masses of stone brought by the glaciers from the far north to Ohio and her sister states have been utilized in many a stately building. From the smaller flint and granite stones scattered everywhere the cave dwellers, mound builders and later Indians made many of their implements such as stone axes, hatchets, hammers, mortars, pestles and celts.

Skepticism concerning the ice age, in the face of the evidence, has long since passed away. It has been determined by Dr. Kane and many other arctic explorers that the same condition prevails in Greenland today as was present in Ohio, perhaps 10,000 years ago. Greenland is a little continent twelve hundred miles long and about four hundred miles wide. It contains a half million square miles of territory. It is equal in extent to that portion of the United States east of the Mississippi and north of the Ohio river. Yet all Greenland, except a small southeast portion and a slight fringe of the western shore, is covered with a mantle of ice from 1,000 to 3,000 feet thick which is flowing constantly to the ocean, breaking off with a noise like thunder and filling the seas with mighty icebergs which occasionally float down into the path of the steamer lanes from New York to Europe.

EFFECTS OF GLACIAL MOVEMENTS IN OHIO

The glacial age in Ohio has been mentioned at some length for two reasons: first, because of its effect upon the soil and topography of Ohio; and second, because the ice and the torrent-like streams flowing from it when melting, have been the means of preserving the traces of man who existed at that time.

The beautiful, rolling, prairie-like surface of a large portion of Ohio is largely due to the great masses of ice which once covered it. The ice acted like a mighty drag or harrow, leveling and scraping and distributing rich soil over wide expanses and shaping it for future agricultural and mechanical wealth. The rivers that flowed from the melting ice, and the pouring rains following the glacial age, of course, greatly modified its surface, fixed its river basins and moulded its river terraces and valleys. The floods which followed the breaking up of the ice age in Ohio washed out and carried down into river valleys and basins, as sediment, vast quantities of clay, sand and gravel. This clay, sand, gravel, fragments of rock, boulders and broken organic and mineral matter of every kind which the ice sheet pushed before it or carried upon its surface, in its crevasses, or frozen into its bottom, is called the "glacial drift." It is important to understand the nature of the drift and how and where it is deposited over the surface, because it is underneath, or deeply embedded in this glacial drift that the first evidences of man's existence on this continent are found. This drift covers the glaciated surface of Ohio to an average depth of about one hundred feet.

EUROPEAN DISCOVERIES IN GLACIAL DRIFT

In 1841, a French scientist discovered beneath the glacial drift in the terraces of the river Somme, near Abbeville, France, rudely shaped, chipped stone implements that were evidently of human manufacture. Some time after this discovery famous English scientists, among whom was Sir Charles Lyell the great geologist, visited the valley of the Somme, examined the glacial deposits in which the "palaeoliths" or ancient stone implements, were found, and the objects themselves. They at once recognized this as a most important discovery, bearing directly upon the great question of the antiquity of the human race upon the earth. These eminent archaeologists and geologists immediately called public

attention to the momentous nature of this discovery of human implements buried deep in the undisturbed gravels of glacial origin. The river valleys of southern England below where the ice sheet began to melt, before it retreated slowly northward, were eagerly examined. Excavations were made, the freshly rain washed banks of river terraces and the margins of railroad cuttings through the drift were carefully scanned. The result was a large collection of palaeoliths or rude stone tools with which men existing at the time of the glacial epoch had dug their caves, slain their enemies or attacked the formidable wild beasts swarming about them.

BONES OF MAN AND EXTINCT ANIMALS FOUND

Soon the fields, holes and pits in regions that had been partially covered by glacial deposits began to be excavated and minutely examined. This search revealed to astonished but expectant eyes the remains of human skeletons mingled with the bones of animals that had become totally extinct in Europe, and some that became extinct in those particular regions during or shortly after the glacial age; such as the bones of the cave bear, the musk sheep, the mammoth, the mastodon, the tapir, rhinoceros and the terrible machairodus, or sabre-toothed tiger, with tusks like the blade of a dagger. Thus was incontestably secured to science the fact that man had existed upon the European continent for thousands of years. The most eminent scholars, German, French and English, among them such as Dr. Falconer, Prof. Prestwich, Sir Charles Lyell and Sir John Lubbock, agreed that man had existed previous to and during the great glacial age, and, with the fierce beasts who had been his companions, had slowly retreated before the fierce icy wave that rolled downward from the arctic regions.

RESEARCHES OF AMERICAN SCIENTISTS

Soon the search for traces of pre-historic man was transferred to America. In 1875 Dr. C. C. Abbott found deeply embedded in the undisturbed glacial gravel of the Delaware valley, near Trenton, several specimens of the palaeolithic tools similar to those that had previously been found in the valley of the Somme and in the river basins of southern England.

Dr. Abbott's specimens were examined by such eminent archaeological experts as Lucian Carr of the Peabody Museum, Cambridge, J. D. Whitney, F. W. Putnam, and many others, all of whom pronounced them to be genuine products of the palaeolithic or glacial man. These same eminent authorities soon after discovered for themselves several other chipped stone implements of human manufacture in the same locality, from five to twenty feet below the surface of this glacial gravel.

EARLY DISCOVERIES IN OHIO AND THE WEST

After repeated and careful study of the gravel at Trenton and a comparison of its structure with that of the Ohio glacial drift, Prof. G. Frederick Wright of Oberlin, in 1883, at a meeting of the Boston Society of Natural History, predicted that the palaeolithic implements of glacial man would in all probability be found in the drift of the river basins of Ohio south of the watershed running south-westerly across the state. It is a remarkable fact that this prediction was soon verified. In 1885, Dr. Metz, at Madisonville, Ohio, found in the terrace gravel of the Little Miami, a rude implement made of the same material, and of the same shape and size, as those found by Mr. Abbott in the Trenton gravel. In 1887, he found another near Loveland, Ohio, in undisturbed gravel thirty feet below the surface of the gravel. The finding of these perfect palaeoliths by Dr. Metz was the first evidence of the existence of glacial man in Ohio and was naturally received as a great discovery by the scientific world. Mr. H. T. Cresson had in 1885 discovered a perfect palaeolithic implement in the valley of the White river at Medora, Indiana, eight feet below the surface. In 1887, Mr. Upham described several palaeoliths that had been found by Prof. Winchell and Miss Franc E. Babbitt in the glacial deposits of the Mississippi river at Little Falls, Minnesota. Miss Babbitt further showed the probability that in that region of chert and quartz had existed a pre-glacial work-shop for the manu-

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facture of these stone implements. One of the most important and most recent discoveries was a perfect black flint palaeolith at Newcomerstown, Ohio, in the glacial gravel which lines the valley of the Tuscarawas river. This implement was found by Mr. W. C. Mills, in undisturbed strata, fifteen feet below the surface of the terrace.

PALAEOLITHIC COLLECTIONS OF PEABODY MUSEUM

All of these chipped stone implements mentioned are now on exhibition in the Peabody Museum at Cambridge, Massachusetts. This collection contains over 20,000 stone implements made by pre-historic man. The palaeoliths of Ohio, New Jersey and other sections form a separate class by themselves and are not to be confounded with the neolithic implements of a later age and the flint arrow heads of the Indians of historic times. Some of these latter implements are quite distinct from the palaeoliths in structure, material and appearance, and were obtained from graves, mounds and ash-heaps, or picked up from the surface of the soil; while the chipped stone implements of palaeolithic man were excavated from deep beneath the clay, gravel, and other debris washed down upon them by the floods of the glacial age. Nor are we confined to the stone weapons and tools of glacial man for the evidence of his existence at that time. In various parts of North America, as in Europe, fragments of human skeletons have been found in caverns beneath deposits of drift earth, and in river basins buried deep in the clay and gravel of glacial origin. These bones are almost invariably mingled with the bones of animals that became extinct during the ice age or shortly afterwards.

EVIDENCE THAT MAN EXISTED BEFORE GLACIAL AGE

This account of the evidence as to the existence of human beings in Ohio and her sister states during the ice age may close with the statement that the great weight of scientific authority of today regards man as having not only lived in North America during that remarkable epoch, but as having existed throughout the vast region from the Atlantic to the Pacific ocean long prior to the glacial age. The ice age fixes only his minimum antiquity. Ten thousand years, measured by the erosion of the Niagara gorge, is the most recent date which science gives for the ice age. Man had no doubt already existed in North America and in Ohio when the great icy wave crept slowly downwards with its bitter, arctic breath. Geology shows that Ohio was covered with magnificent forests at that time. Among the relics of the glacial age in the archaeological collection of the Ohio State University, such as fluted and polished limestone slabs and matched boulders, are some remains of the pre-glacial forest trees rescued from the drift of Ohio. Prof. Orton exhibits in one of the cases some shavings and ribbons cut from the trees as the ice in flowing over the forests abraded their surfaces. In the same cabinet is also a section of a cedar log which Prof. Orton secured fifty-five feet below the surface of the Ohio drift. This log is scarred and twisted, showing that the ice instead of gently flowing about and enfolding the trees often did them great violence. Animals, gigantic in size and of unbounded ferocity, roamed through the pre-glacial forests. Man, a rude savage, naked or clad in skins, was among these ferocious beasts and not afraid to attack them with his arrows and stone knives. But as the earth's crust subsided in the north, and the increasing snows were precipitated, the irresistible ice wave flowed onward. The forests were covered, the innumerable lakes of the north were gouged out, the waterfalls of New England were made, the arctic butterfly and the Alpine flowers were brought to Mount Washington, the elephant and mastodon whose bones are still found deep in the bogs and drift were frozen by the bitter cold or drowned in the vast glacial floods and forever extinguished. But man survived it all. The monsters of the forest, the biting cold, the roaring floods, the desolation and death around him could not annihilate the hardy and cunning savage who took refuge in the caves, or retreated southward as the ice advanced upon him. But when the ice and the floods began to disappear, these human beings, who have left us such scant traces of their existence, followed up the retreating glacier; and it is the opinion of many anthropologists that they survive in the squalid Eskimo of today who loves the frigid cold and the gleaming fields of ice that cover the arctic wastes. He still clings to the arctic islands and inhospitable fringe of shore along the coast of Greenland, builds his simple hut by

the edge of the glacier and hears the music of the iceberg's thunder as it breaks from the crystalline wall and flashing with iridescent beauty, floats far out to sea. Other investigators believe that the pre-glacial man who survived the ice age in Ohio lingered in the southern river valleys after the retreat of the ice; that his descendants formed an intermediate race between glacial man and the mound builders and were the progenitors of the latter people.

GLACIAL AND PRE-GLACIAL MAN; FURTHER PROOFS NEEDED

In concluding this subject, it is proper, to say that some eminent authorities do not consider the proofs of glacial man's existence in America, or indeed in Europe, to be sufficient to place the matter beyond all doubt; but, at any rate, a broad and rich field for scientific investigation has been opened in Ohio, and the problem to be solved is an inviting one to the geologist and antiquarian. The gravel deposits in the streams of Southern Ohio are similar in almost all respects to those in New Jersey and in Europe in which this class of implements has been found, and the evidence, so far as it goes, is specific and of a high order. To remove all doubt from the minds of many, other discoveries are desirable. The hope of making such discoveries rests with local observers where excavations in the gravel are being made for public or private purposes.

NOTE—Mr. A. P. Brigham in "Geology" page 460 (1928) says: "No undisputed Palaeolithic remains associated with glacial deposits, have been found in America. Chipped implements found at Trenton, New Jersey, and in the drift of Ohio and Indiana have been held to be true palaeoliths or representatives of the earliest man but the evidence is deemed insufficient by many."

Mr. H. C. Shetrone in "Mound Builders" page 482 (1930) says: "Although alleged or supposed finds of great antiquity are a constant occurrence, scientific investigation up to the present time has failed to disclose a single human bone or relic ante dating the epoch assigned for the beginning of human occupation of American soil. Naturally, however, the quest for the palaeolithic is keenly pursued since the distinction accruing to the Archaeologist or to the layman from a bona-fide discovery of great geological age would be of major importance."

—Editor.

The Ohio Mound Builders

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Superintendent of Toledo Public Schools 1886-1897—Died 1916

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Few scientists or archaeologists today doubt that man has existed for innumerable centuries upon the American continent. His precise origin and antiquity are shrouded in unfathomable mystery. The existence of pre-glacial man in Ohio is still questioned by some, and must, perhaps, be regarded as an open question until the discovery of more numerous and convincing proofs. But however incomplete and unsatisfactory to some minds may be the evidence of glacial man's existence in Ohio, there is no room for skepticism concerning that ancient race whose monuments are still visible, and which were everywhere present to the eyes of the first white men who penetrated the wildernesses of the Buckeye State. Huge mounds of earth from two to ninety feet in height, and hundreds of feet in circumference, and lofty walled enclosures met his wondering gaze. These countless mounds and earthworks were overgrown with vast forest trees, the product of centuries. The astonished white settlers beheld in the rich river valleys and creek bottoms, and upon high hills, great earth walls from five to forty feet high. These walls of earth in some places enclosed hundreds of acres. They were built in the form of squares, circles and crescents, and suggested to the early inhabitants of Ohio a strong and numerous race, possessing a considerable degree of civilization, who had long passed away.

AMERICAN INDIANS HAD NO KNOWLEDGE OF MOUND BUILDERS

Even the Indians, who dwelt in Ohio in the eighteenth century, looked with awe upon the huge mounds and earthworks, overgrown with mighty forest trees, and could tell the white invaders nothing about the vanished people who had built them. The early white settlers of Ohio were wholly absorbed in building their rude cabins, clearing away forests and fighting hostile Indians. They had no time, while struggling for their own existence, to study the relics of a vanished race. But about the year 1840 scientific investigation of the remains of the mound building race of the Mississippi valley began. Since that time, and especially within the last few years, many investigators have been at work, many volumes have been written and much curious and interesting knowledge has been brought to light concerning that mysterious pre-historic race commonly called "mound builders."

THIRTEEN THOUSAND EARTHWORKS IN OHIO

Ohio is richer in relics of the mound builders than any other state of the Union, although their mounds and enclosures are found from eastern New York to the Mississippi and as far south as the Gulf of Mexico. There are over ten thousand mounds of various sizes, which together with the forests and enclosures of different kinds bring the total number of earthworks left by this strange people up to **more than thirteen thousand in Ohio alone**. Most of these works are situated south of the watershed of Ohio, along the rivers and small streams tributary to the Ohio river. They are especially abundant in the alluvial valleys of the Muskingum, Scioto, Little Miami and Great Miami rivers, and along the smaller streams emptying into these rivers. Many of the mounds and high walled enclosures are situated upon hills and broad, high terraces adjacent to these fertile valleys. Many early writers and observers, beholding the pottery and carved implements, and the huge earthworks of the mound builders, laid out with mathematical precision, fondly imagined these relics to be the vestiges of a highly civilized race, of the greatest antiquity, who had mysteriously disappeared, leaving behind them no name and no history. But the close scientific study of these remains during the last ten years has rather rudely dispelled this dream of early investigators. Great numbers of the mounds, large and small, have been sliced away, a shovel full at a time, the earth analyzed and all the

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contents of the mounds closely examined and classified with minutest care. The village sites and cemeteries of the mound builders have been excavated to a depth of six or eight feet below the surface with pick and shovel. The lofty walls of fortifications have been carefully subjected to the tests of modern engineers, and large sections of these massive ramparts have been cut down and analyzed. Public and private collections of the weapons, tools and ornaments of the mound builders have been compared and classified with scientific accuracy and precision. Geologists have examined the flint, copper, mica, lead and iron ore and other minerals, from which their implements of various kinds were made, and have located and surveyed the mines from which they were obtained.

RESULTS OF INVESTIGATIONS

Although this searching study of the mound builders, impelled by scientific enthusiasm, may be said to have really just begun in earnest, enough has been done to determine the social and mental condition of this strange and numerous race once occupying the fair valleys of Ohio. It is seen that they depended for their sustenance mainly upon the cultivation of the maize and vegetables, in the broad and fertile valleys they inhabited, and upon the abundant fish in the rivers. They were an agricultural people, unlike the hunting, nomadic tribes of savages who succeeded them. But with the rude stone tools which they possessed for cultivating the soil, they could only live a settled organized village life in the fertile river bottoms, where the earth readily yielded its increase. They had no domestic animals, without the help of which man can attain no true civilization. He must have these to aid him in labor and to furnish him food and clothing. They had no metallic iron or steel, without which no nation can rise out of barbarism. They had the iron ore, hematite, but they worked it as a stone, and had not discovered the art of smelting it, although they roasted it in order to utilize it more readily as a paint. They had metallic copper, which they obtained from Lake Superior mines, but they worked it cold, pounding it with stone hammers into knives and other forms. Their sculptures and carvings and pottery, exhumed from the mounds and graves and village sites, often show much skill and taste in their designs and execution. They certainly show what long continued, patient labor, with imperfect tools can produce, tho they are in no true sense artistic to the modern eye. But the emotion with which we now gaze upon them is chiefly one of interest and wonder, as we muse upon these products of barbaric skill, wrought with infinite patience in our fair Ohio valleys, long centuries before Columbus discovered America. Their clothing was made from the skins of wild animals or a coarse textile fabric woven from the grasses or the inner bark of trees, or the coarse long hair of the buffalo which inhabited Ohio. They had not learned to utilize the force of gravity. They made no machine of any sort, even grinding their grain for bread with pestles and mortar, or pulverizing the maize by pounding it upon blocks of wood or flat stones. It had not occurred to them to construct even a simple hand machine that would turn one stone upon another to grind their corn. They used in no way the vast power of waterfalls and running streams, depending solely upon their own muscular strength in providing their food, building their great earth and timber fortifications, mining their flint and copper and manufacturing their various implements. The social and artistic condition of the people who built the mounds was not such as to render probable among them a knowledge of the art of writing. Various inscribed stone tablets, alleged to have been taken from the mounds, have been reported from time to time. These engraved tablets have been diligently and carefully studied by scholarly antiquarians, and are now pronounced frauds and forgeries. They were executed and secretly inserted in the mounds, or excavated earth of the mounds, to aid in establishing certain theories as to the origin of the mound builders.

VILLAGES OF THE MOUND BUILDERS

An examination of the village sites and "kitchen middens," where the mound builders dwelt, shows that this people lived in lodges made of bark and poles, like the modern Indian who succeeded them. Deep under the sediment formed by the overflow of the Little Miami river have been found rings of poles, the

decayed butts still sticking in the earth, with the circular ash heaps and refuse in the center, plainly revealing the forms of the temporary lodges in which the mound builders made their homes. Nothing in the shape of a lamp, or receptacle for burning oil or fats to produce artificial light, has been discovered. The mound builders probably spent their nights in darkness, or like the Indians of historic times, depended for light upon wood fires burning in the center of their lodges. They did not even utilize for fuel the abundance of bituminous and cannel coal all about them, using it only as material from which they carved and polished rude ornaments. In view of all these facts, which have been established in the light of very recent scientific investigation, the old picture of a race learned in all the highest arts of civilization quickly vanishes. We see instead a patient, plodding, agricultural people, still within the confines of an almost hopeless state of savagery, with little inventive capacity, far removed from the comforts and amenities of even the lowest grade of barbarism. But yet they were human beings, populous, multitudinous in number, they loved and hated, warred and labored for centuries on the beautiful surface of Ohio, on the very sites where splendid cities now are, where the electric current flashes its messages or propels its cars, or where vestibuled, limited trains glide over their graves, or through the towering walls of fortifications which their hands erected.

EARTHWORKS OF THE MOUND BUILDERS

The earthworks themselves are the most remarkable monuments which this strange people left behind them. And yet the engineering skill necessary to construct them has been greatly overestimated. The imposing walls miles in extent, the great squares, crescents and circles and huge mounds, by methods known to school boys who construct snow forts, could have been erected without any knowledge of the principles of geometry. Indeed it has not been determined at any time that these great mounds and enclosures are in a strict sense true geometrical figures. The erosive action upon them of rain, flood and frost, has made it impossible to locate an angle or determine the precision of a curve with mathematical accuracy. Although the more important of them have been surveyed repeatedly the most that has been accomplished is the exact measurement of their present height, linear extent and cubical contents. The vastness of the labor involved in the erection of some of these structures fills the modern mind with amazement. The making of such a vast earthwork as that of Fort Ancient in the Little Miami valley of Warren County, Ohio, thirty-five miles northeast of Cincinnati, has been pronounced by over enthusiastic visitors a task comparable in magnitude to the building of the Egyptian pyramids. According to the recent survey of Mr. Moorehead, while making his collection for the World's Columbian Exposition, the artificial walls and terraces of this great enclosure were found to be about three and one-half miles in length. The walls are from twelve to thirty feet high and seventy feet broad at the base. Alternately, interior and exterior to the walls, is a moat which was originally seven feet deep. Conical, oval and crescent shaped mounds are situated within the enclosure. Within the walls are deep pits, doubtless used as reservoirs for water in case of sieges. The walls are not wholly constructed of earth, but are strengthened in exposed places by limestone slabs of great weight, carried from the river below. The crest of the enclosing wall was doubtless furnished with palisades, and the gateways closed with timber work and fortified with bastions, though but very scant traces of the palisades and gateway timbers remain. We are filled with awe and wonderment on contemplating this colossal fortification, and thinking of the length of time and the number of human beings that must have aided in its construction. Our astonishment is increased when we reflect that these people had no adequate tools with which to work, no machinery, no animals or wheeled vehicles to aid them in the stupendous task. The hard earth had to be dug up with flint and stone implements and hoes made of perforated mussel shells, and was carried in wicker baskets or skins, a peck or two at a time, to the summit of the walls. Many human lives must have contributed their energies to this mighty earthwork, as the polyps of the sea give their lives to build up the coral reefs and islands of the ocean.

Detailed descriptions of this most remarkable earthwork of the American Continent may be found in numerous works upon the archaeology of Ohio, as

it has been repeatedly surveyed and minutely described by expert antiquarians. The most accurate and exhaustive account is to be found in Mr. Warren K. Moorehead's book entitled, "Fort Ancient." Mr. Moorehead discovered in the immediate vicinity of Fort Ancient the sites of seven or eight villages which had evidently been the homes of the thousands who fled for refuge to this citadel when a hostile invasion of northern savages occurred. Deep beneath the sediment of the river and the accumulations of the forests were found numberless graves, protected by limestone slabs. When these rude stone graves were opened the grinning skeletons that had lain there for centuries, crumbled to ashes at a touch. Even within the precincts of the fort, beneath the logs and rocks and tangled wild grape vines, was found a cemetery. The stone graves were filled with skeletons, doubtless the remains of warriors who had fallen upon the walls, defending their citadel from the attacks of savage foes. Situated upon a high plateau nearly three hundred feet above the river, surrounded on all sides by lofty walls and flanked on two sides by deep and precipitous ravines, Fort Ancient was practically impregnable. Its selection and fortification shows, at least, that the crude savages who chose and strengthened this promontory by the labor of patient and countless hands, were not wanting in bravery, foresight and military skill, even if they were untrained in the knowledge and arts of civilization.

BURIAL, SACRIFICIAL, EFFIGY, TEMPLE AND SIGNAL MOUNDS

The various mounds scattered along the river, valleys and adjacent hills and plains of Ohio have been classified by different investigators according to their notion of the purposes for which the mounds were erected. Those mounds which have yielded skeletons have been called burial mounds. Those revealing but few human bones to the excavator, and containing little beside charred fragments of bones and the hard-burned clay altar, have been called sacrificial mounds. It cannot be determined whether the charred human bones are the remains of victims who were immolated upon these altars or are the fragments remaining from the cremation of the dead. Those mounds erected on hills and plateaus and commanding long ranges of valley country have been called lookout or signal mounds. From the summits of these mounds perhaps, the movements of foes were watched, signal fires were flashed to announce the invasion of an enemy or proclaim the result of a battle, much as Eschylus represents the tidings of Troy's fall to have blazed from promontory to mountain height until it reached the weary watcher on the roof of Agamemnon's palace at Mycaena. Other mounds, built to represent the form of some animal connected with the religious symbolism of the people, are called effigy mounds. Still others erected within enclosures of walls or near village sites, from their peculiar oval or truncated shape, are called temple mounds, and are supposed to have been used in religious or state ceremonies. These distinctions are probably of little value. By far the greater number of the mounds were built for the interment of the dead. Many of the mounds, formerly supposed to contain nothing, have recently revealed to more thorough investigators, skeletons and numerous relics of this ancient race.

There is a good deal of sameness about the objects found in the different mounds. Those of the Muskingum valley between Zanesville and Marietta yield, in conjunction with numberless skeletons, such objects as these: copper beads, bird bones, elk teeth, bear teeth, stone grooved axes, bone awls, sandstone tablets, cups made from the shell of the land tortoise, beautiful, polished, perforated ornaments of banded or metamorphic slate, finely wrought flint arrow heads, long spear-heads made of blue or white chalcedony, stone and hematite celts, copper spear-heads and disks. In one of these mounds the bones of a young woman were found in a kneeling position with the skeleton of a child in her arms.

THE LONG HEADS AND THE SHORT HEADS

These aborigines of the Muskingum valley have been classed by craniologists who have studied their skulls closely as belonging to the long-headed (dolichocephalic) race in distinction from the short-headed (brachycephalic) race inhabiting the valleys of the Scioto and Miami farther westward. These long-heads were a race of fierce warriors, less agricultural in their tendency than the more peaceful short-head agriculturalists living west of them.

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THE OHIO FLINT MINES

The long heads were skilled weapon makers and owned and controlled the great flint and chalcedony deposit called Flint Ridge, nine miles south-east of Newark. This great deposit of beautiful mineral, so useful to the aborigines, deserves at least a brief mention, as it is the largest in the state and together with one other, near Coshocton on the Walhonding river, was the source of all the finest and most effective weapons, both for the ancient mound builders and the nomadic Indians of later times. The glacial drift furnished ample material for the making of axes, hammers, mortars, pestles and celts, and other implements for heavy, rough work, but the diorite and syenite of the glacial boulders were useless for weapons requiring a keen cutting edge. The flint, hornstone, chert and chalcedony of the two deposits mentioned furnished a hard, steel-like material, showing definite cleavage lines and flaking under the blows and pressure of the skilled artisan to beautiful, delicate shapes with sharp needle-like points and keen edges. The deep pits and the acres strewn with huge blocks, chips and flakes and other debris about these two Coshocton and Newark mines, show how extensively the mining of material and the manufacture of weapons was carried on. The deposit of flint near Newark lies upon the limestone rock and was originally eight miles long and three miles wide. The hard earth overlying the flint can now scarcely be penetrated with a steel pick more than two or three inches. But the mound builders, in some way, with their rude tools made of sticks hardened in the fire, antler horns and stone scrapers, managed to dig away the hard earth above the precious deposit. It is now found that a man with the best steel drill, working a whole day, cannot make a hole in the hard flint deep enough to put in a blast of powder. How, then, did these savages get out this adamantine substance, making pits in it from twenty to a hundred feet deep and a hundred feet in diameter?

Modern research has revealed their methods. After they had dug away the overlying earth they built a huge wood fire upon the surface. When the rock was superheated they suddenly drew away the fire and threw cold water upon the glowing surface. The rock then cracked and shattered in every direction. Prying up the fragments they built another fire and proceeded as before until they had literally burned their way down to the limestone. This they readily burned out, undermining the flint. Then with huge hammers made of glacial boulders weighing from twenty to one hundred and fifty pounds, still found in the pits, they broke down the flint in great blocks, carried them to the surface and thence to their work shops. The material from the Newark deposit consists of milk-white flint, light blue chalcedony and striped jasper. Much of it when exposed to the action of the atmosphere for a long period assumes an infinite variety of brilliant colors, surpassing in beauty the finest agates and carnelians. Its peculiar gloss and brilliant tints have enabled antiquarians to determine that the mound builders were a widely scattered race, weapons from the Newark deposit having been found from the Mississippi river to the Hudson. It also proves that for long centuries the aborigines were accustomed to resort to those mines of Ohio for material for the manufacture of their weapons.

LICKING COUNTY EARTHWORKS

Near the Flint Ridge deposit in Licking County is situated one of the most extensive series of earthworks which the mound builders ever erected. It is not known whether these great walls, enclosing over a thousand acres of land, heaped with huge mounds of every shape, were the site of a fortified town, or a great central metropolis of the mound builders, constructed for the purpose of celebrating with savage pomp their mysterious civic and religious rites. One of the circles of this great enclosure is now used for the fairs of the Licking County Agricultural Society. Other portions of this mammoth earthwork have been washed by rains and leveled by the plow until they are almost obliterated.

But every year, through the summer and autumn, the railroads intersecting at Newark bring thousands of excursionists from east, west, north and south, who walk over the walls and mounds and contemplate with interest and amazement the mighty monuments of Ohio's ancient inhabitants.

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In the numerous burial mounds were interred only the great families of the mound builders. The chieftains and noted warriors and their women and children were honored by burial in the mounds, while a rude limestone box or a sitting posture in the sand or gravel near the surface of the ground was sufficient for the great mass of the people. They evidently believed in a future life, for they buried with the bodies their weapons and other implements to accompany them on the journey.

PIPES OF THE MOUND BUILDERS

Especially abundant in mounds, graves and ash pits are the pipes of the aborigines, and these form the most remarkable artistic products that have been found. While these carved pipes are not beautiful to the modern eye, they are curiously and laboriously wrought, and we scarcely understand how with their inferior tools they could produce objects which approach so nearly to artistic excellence. The bowls of these pipes are always carved to represent with surprising fidelity the body of some bird or animal, such as the beaver, elk, panther, owl and swallow. The cavity of the bowl is exceedingly small as compared with the modern pipe. This goes to show that the mound builder required but a small quantity of tobacco at a time because he evidently inhaled the smoke rapidly to produce stupor and insensibility, a practice common among uncivilized people.

From one to seventy-nine skeletons have been found in a single mound. The skulls of these skeletons are sometimes crushed as by a blow from a stone axe or war club, sometimes a skull is pierced by an arrow point or spear-head and the missile is found within, and the limbs are frequently broken in several places, these facts going to show that the skeletons were those of warriors who had fallen in battle.

THE MADISONVILLE DISCOVERIES IN 1879

One of the most remarkable archaeological discoveries of modern times was that of an aboriginal village site and cemetery near Madisonville, in the Little Miami valley, in 1879. A laborer struck a spade into the soil of a sloping plateau above the river and found a skeleton. The Madisonville Scientific Society began to excavate and within a short time took from the various slopes of the plateau, from graves and ash pits, thousands of fine implements, ornaments and utensils and upwards of **fourteen hundred skeletons**. Archaeological interest was aroused throughout the entire civilized world. Prof. Putnam of the Peabody Museum and his corps of expert assistants took up the work of excavating, and the many cases of that museum, filled with thousands of the mound builders' ancient implements, testify to the thoroughness of their work. Prof. Putnam regards the study of history as beginning with the early monuments of man's occupancy of the earth. Through his carefully classified collections, his photographs and descriptions obtained from burial places, village sites, roads, enclosures, mounds, mines, and work shops, we can get as accurate a conception of pre-historic days, with the exception of names, as we can concerning the people and events of modern historical times. The Peabody Museum, connected with Harvard University, is a great and inexhaustible storehouse of relics, illustrating the social and mental condition of the pre-historic American races.

THE SERPENT MOUND

Prof. Putnam has done much for the preservation and study of the Ohio mound builders' monuments. In 1887 he raised \$6000 for the purchase and preservation of the great effigy mound in Adams County, Ohio, known as the Serpent Mound.

This purchase included seventy acres of land, and the whole has been converted into a beautiful park called the Serpent Mound Park, which is fast becoming a favorite resort. This mound which was rapidly disintegrating before Prof. Putnam's purchase, is perhaps, one of the most important and interesting

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earthworks in the West. This mound was unquestionably built for worship as it is in a sequestered and beautiful spot, suitable for the performance of sacred rites. The mound is thirteen hundred feet long, five feet high and its greatest width is thirty feet. The mound is built in the form of a serpent swallowing an egg. The egg, which is in the mouth of the serpent, is represented by an oval enclosure of earth one hundred and twenty-one feet long, sixty feet wide and five feet high. The jaws of the serpent are widely distended in the act of swallowing; the body winds gracefully backward, making four huge folds before reaching the tail, which, tapering gradually, twists up in three close coils. It is well known that serpent worship entered into about all the religions of the ancient races of Europe and America. It brings this fact close home to modern civilization to behold this monstrous effigy stretched out upon an Ohio promontory. Here upon the sides and at the rear of the plateau was ample room for a vast concourse of the pre-historic savages to gather and bury their dead, offer their sacrifices and chant their rude hymns to the serpent deity.

OTHER MOUNDS

The numerous other mounds and enclosures of great interest, like those of Fort Hill in Highland County, an impregnable fortress with lofty walls now covered with forests situated on a plateau five hundred feet above Brush Creek, the Alligator Mound and many village sites near Granville, and the great enclosure at Marietta, cannot be here described. It is worth something to the reader of Ohio's history to have had a glimpse, however imperfect, of that ancient people who inhabited our fair state so many centuries ago. The works upon the archaeology of the state, the public museums and the existing monuments themselves, will furnish detailed information. While the snows and rains and eroding streams and the farmer's plow will gradually obliterate the earthworks of the mound builders, yet it is to be sincerely hoped that the generosity and intelligence of the state, through its legislature may unite with the scholarly zeal of the antiquarian to promote such extensive and searching investigations as will enable us to know all that it is possible to know about the primitive inhabitants of Ohio.

THE UNANSWERED QUESTIONS

One question that is often asked remains to be answered. Who were the people that inhabited North America, from ocean to ocean and from Cape Horn to the arctic seas in pre-Columbian times? Columbus, and the explorers following him, found them here all closely akin, in language, appearance and manners. The mound builders were undoubtedly one of these American races. They were Indians, like all the rest upon this continent which had been occupied by them for unknown centuries. Two diverse races, differing in some physical peculiarities evidently met in Ohio. Modern scholars express the opinion that immigration to this continent began by way of Behring Strait, which may, in a remote age, have been unsubmerged land. About the same time other Asiatics reached the southern portion of our continent by way of the Pacific Islands. These people differed chiefly in the shapes of their heads. Those coming from the north had low, long heads, and those coming from the south were characterized by the short, high cranium. The fierce war-like long heads met the short-heads in the valleys of Ohio. They warred for centuries and the long-heads were finally the victors. The two diverse races then blended, and the modern hunting, nomadic tribes of historic Indians were a product of the fusion of the two races. This is the view of modern archaeological science, based upon long and patient research, and is undoubtedly the true explanation of the origin of the mound builders and their successors, the American Indians, who in turn yielded to the superior prowess and civilization of the Caucasian race.

It would give us extreme satisfaction and pleasure could we know certainly how long ago it was when these thronging hordes of savages whom we call mound builders, filled our valleys and swarmed upon the plateaus, plains and river terraces of Ohio. But this one fact we can never know. We can only estimate

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and conjecture, and authorities are not agreed. Measured by the erosion of streams upon their fortifications and by the growth of mighty forest trees upon walls and mounds, it could not have been less than one thousand years ago. It may have been much longer. They were doubtless here, tilling their corn, beans and tobacco, catching their fish from streams with bone hooks fastened to spun bark fiber or cords of skin, hunting elk, deer and bear in the primeval forests, before Julius Caesar had landed in Britain or a Saxon prow had crossed the English Channel. For the period of their dominion in Ohio we ask in vain. Their silent mounds, their deserted fortresses, their mouldering skeletons, to our eager questioning give no reply.