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Exploration of an Adena Mound at Natrium, West Virginia

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EXPLORATION OF AN ADENA MOUND AT NATRIUM, WEST VIRGINIA

By RALPH S. SOLECKI

INTRODUCTION

Through the cooperation of the Smithsonian Institution and the Pittsburgh Plate Glass Co., one of the few remaining earth mounds of the Adena¹ culture on the Ohio River was excavated at Natrium, W. Va., during December 1948 and part of January 1949. The chemical company owns the property on which the mound was situated (fig. 13). To the writer's knowledge, only one other tumulus in the East—that on the property of the Wheeling Steel Corp. at Beech Bottom, W. Va.—has ever been opened with the aid of an industrial enterprise.

Natrium Mound, of medium proportions, was totally explored in record time during unseasonal working conditions. It yielded a wealth of data pointing to late Adena affiliations. There are a number of interesting new artifact traits represented among those of the more usual Adena types. Fifty-one features are noted, of which 22 were unmistakably burials containing osseous material. Presumably many of the other features may have been burials also, but all skeletal evidence had disappeared.

This earthwork had been in danger of destruction at least twice. Delf Norona of Moundsville, W. Va., deserves credit for originally bringing the attention of the mound's plight to the Smithsonian Institution about 5 years ago. The Pittsburgh Plate Glass Co., which had contemplated destroying the mound at that time, subsequently abandoned the plans, only to revive them again 3 years later. This time, Joseph H. Essington,² in a letter dated October 4, 1948, which he wrote to the Bureau of American Ethnology, Smithsonian Institution, appraised the situation. He informed Dr. Frank H. H. Roberts, Jr., Associate Director of the Bureau, who

¹ The Adena culture takes its name from historic "Adena," near Chillicothe, Ross County, Ohio, the pretentious estate of Thomas Worthington, early governor of Ohio. The type mound of what since has been called the Adena culture was first examined and reported on that estate in 1901 by William C. Mills (Mills, 1902; Shetrone, 1930, pp. 167-168).

² Mr. Essington, a civil engineer, was employed during that period by the Columbia Chemical Division of the Pittsburgh Plate Glass Co. of New Martinsville, W. Va.

carried out the initial necessary steps for the research, that the Pittsburgh Plate Glass Co. was willing to cooperate in the mound exploration. After some correspondence was exchanged between the interested parties, arrangements were made for the removal of the mound. Controlled archeological methods were used. The writer was authorized to supervise the exploration for the Smithsonian Institution. It was stipulated that the Pittsburgh Plate Glass Co. would provide four workmen for the labor. Mechanical excavating equipment, such as was required, would also be provided. The total estimated time in working days for the completion of this project was 20 days. It was through the kind efforts of Earl Wolf, plant superintendent of the Columbia Chemical Division of the chemical company, that these requirements and conveniences were met.

Excavation was started on December 7, 1948, the day following the writer's arrival on the site. Mr. Essington acted as assistant supervisor when he could find opportunity from his other regular duties at the plant. It was fortunate that several volunteers helped with the more painstaking and time-consuming tasks of the excavation. These men were Delf Norona, Sr., and Delf Norona, Jr., of Moundville, William and Robert Athey of New Martinsville and Proctor, and Oscar Mairs of Charleston, W. Va. These men gave freely of their time, rendering invaluable assistance while the writer was engaged in the more technical aspects of the mound excavations. Without their help, in the press for speed, the record would certainly have been less complete. The workmen also showed a keen interest, indeed became quite expert in their unaccustomed tasks. Naturally, the green crew had to be trained during the progress of the exploration.

In the preparation of this report, the writer is indebted to the following persons who made laboratory studies of the mound materials: T. Dale Stewart, Department of Anthropology, George S. Switzer and Edward P. Henderson of the Department of Geology, all of the United States National Museum; George Ellinger of the National Bureau of Standards; and Robert M. Salter of the Department of Agriculture. Thanks are also due to Dolores Nourse for her assistance in the preparation of the manuscript.

THE MOUND

The mound was situated on a field adjoining the chemical plant at Natrium, 12 airline miles south of Moundville and 8 airline miles north of New Martinsville. The property, a fairly level tract of land called Wells Bottom, had formerly been part of the Arrick farm. The mound was conspicuously situated within view of the factory

and the State highway on the second bottom or terrace above the Ohio River. It was 1,100 feet from the left bank of the river and 250 feet from State Route No. 2, at an elevation of 680 feet mean sea level. The sparsely wooded hills fronting the Ohio Valley rose steeply 650 feet to the northeast of the mound.

Like the Beech Bottom Mound farther north (Bache and Satterthwaite, 1930, p. 134), the top of Natrium Mound had been dug into by "pot-hunters," and the south side had been disturbed in modern times.

This aboriginal feature, designated 46 Mr-2 in accordance with the trinomial system of site designation adopted for West Virginia (Solecki, 1949, p. 5), was not without neighbors. Another, and larger earth mound, is situated approximately three-fourths of a mile north of the Natrium Mound on Wells Bottom.³ It is also on the property of the Pittsburgh Plate Glass Co., but formerly belonged to the Wells family. A double or twin earth mound is situated at Captina, 5 airline miles north of Natrium. One of the most famous of all mounds, the Grave Creek Mound at Moundsville, W. Va., is only a few minutes' drive to the north. The latter tumulus, a conspicuous one, has excited speculation since the first time it was observed by white man. A mound had been recorded in New Martinsville, but this earthwork had been destroyed without a trace during the expansion of this town in the nineteenth century. (Hennen, 1909, pp. 18-19).

A comparative analysis of Adena culture or complex was first made by E. F. Greenman (1932), who listed its diagnostic traits, comparing evidence from 70 sites in 5 States on the Ohio River. Subsequently the Adena culture was termed as part of the Burial Mound I Stage, or the beginning of a series of four mound-building stages in the east (Ford and Willey, 1941, pp. 334-338). Webb introduced additional material to the study of the Adena culture in a later work (Webb and Snow, 1945), systematically synthesizing this culture complex and its ramifications. Southern central Ohio and its immediate adjoining area seems to have been the most heavily concentrated region of the Adena culture (Webb and Snow, 1945, map 1, pp. 132-136).

The mounds suggest a sedentary population which left evidence of its social and religious structure. Pottery, although scarce, is present and agriculture seems to have been known. Hence, we may conclude that the Adena people included pottery and agriculture in their economy (Setzler, 1940, p. 268; Webb and Snow, 1945, pp. 313-314). In Griffin's (1943, p. 306) words, the Adena culture appears ". . . to represent a more highly institutionalized burial complex of the first semisedentary agricultural populations of the area."

³ Wills De Haas (n. d.) in the late nineteenth century cryptically notes a mound at "Wells, above Proctor."

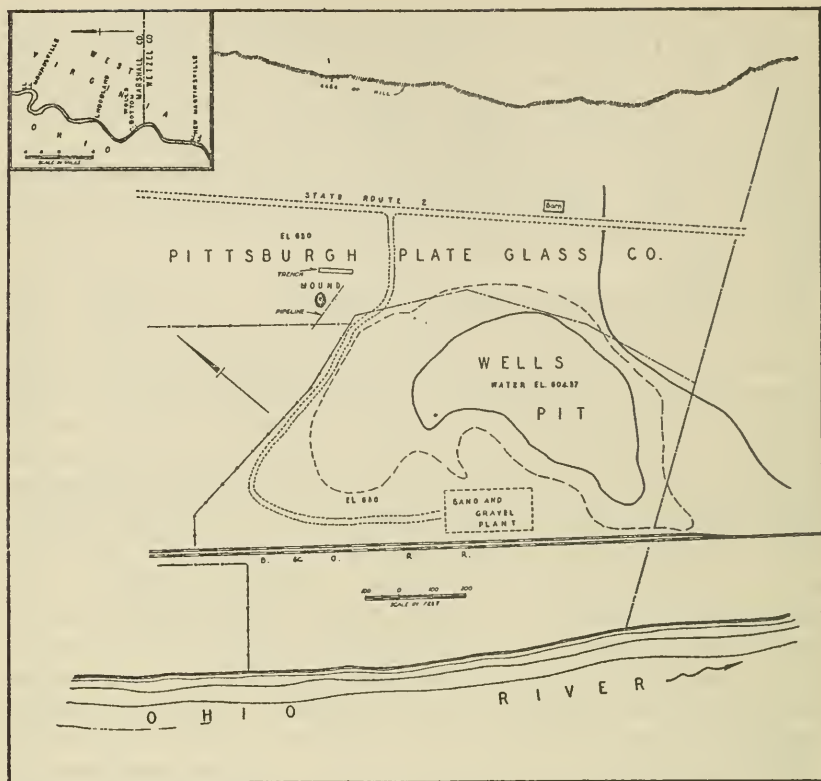


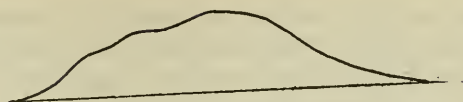
FIGURE 13.—Map showing location of Natrium Mound.

Map prepared by Joseph H. Essington.

THE MOUND EXCAVATION

A certain amount of preparation had to be made in order to ready the mound for test excavation. A telephone company had taken advantage of the eminence by erecting a pole for the wires on the mound summit. This had to be removed before work could begin. There was a dense growth of scrub trees and bushes on the mound dominated by a large cherry tree, 2 feet thick at the base. These also had to be removed.

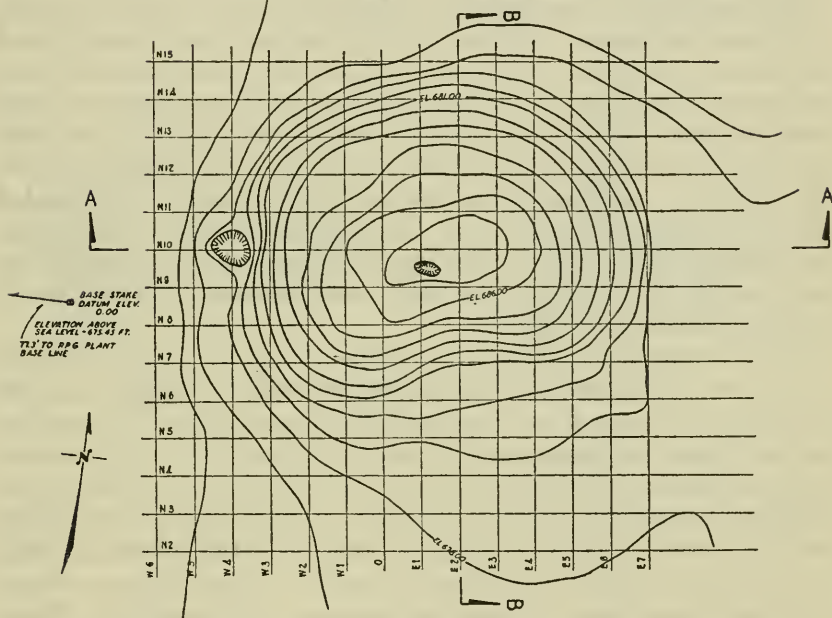
Mr. Essington and another engineer from the plant surveyed the mound in 1-foot contours (fig. 14), enabling the writer to attend to other preliminary duties. The tumulus presented an ovate or kidney-shaped outline in ground plan, since earth had been removed about 50 years ago from the southeastern side for use in a fill. It was reported that when the elder Mr. Wells had cut into the mound side for soil, he had unearthed several aboriginal artifacts. At least this report was encouraging. The mound proper was 9.5 feet high and about 55 feet



SECTION B-B



SECTION A-A



PLAN
NATRIUM MOUND

CONTOUR INTERVAL
1 FOOT

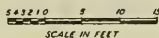


FIGURE 14.—Horizontal and vertical plans of Natrium Mound.

Map prepared by Joseph H. Essington.

in diameter. Instead of presenting the classic conical Adena shape in vertical profile, the mound appeared rather slumped. Undoubtedly, it had been at least 4 or 5 feet higher at one time, since the top was flattened and the sides were eroded. There were distinct traces of a

shallow moat or ditch around the base of the mound about 6 inches deep and 4 feet wide. The weeds and grass growing in this low place were markedly distinguished by their large size and profusion. There was a small ovate hollow about 3 by 4 feet on top of the mound. It was less than 6 inches deep.

The mound surface and its immediate locale was examined critically for evidence of artifacts, a search which was not too successful. A large single-pitted stone was recovered on the hill slope to the south-east of Natrium Mound. This was the only artifact found nearby. Two sandstone slabs, one measuring 1 foot by 8 by 2 inches, and another 8 by 8 by 1.5 inches were observed on the north side of the mound near the base.

The necessity for completely leveling the mound within the time limit posed a dilemma, viz, how best to excavate with rapidity and yet not lose the record. Since much of the task in mound excavation (approximately 90 percent of the time involved) was concerned with earth removal, this was obviously our major problem. We were concerned mainly with the overburden and the excavated earth or "back-fill." Hence, a bulldozer was proposed for the expeditious removal of the bulk of the unwanted earth. Shovels, wheelbarrow, and trowels, and similar light tools were to be used for the more delicate tasks. In this manner, the available manpower was conserved for the strictly necessary hand operations.

As the months of December and January were not the most auspicious times of the year and bad weather was the rule rather than the exception, shelter and some warmth had to be provided. Three canvas tarpaulins, approximately 20 by 20 feet square, were tied on to elevated frameworks of wooden poles cut from nearby tree limbs. This shelter was kept over the work area. It helped to cover the men and the work's progress during rain and snowfalls alike (pl. 24*e*). A fire was kept close to the area of operations, since the temperatures frequently went below freezing, and down to 14° F. one day. Not a single working day was lost. It was necessary to keep the dig open 3 days over the estimated time for final completion, but this required only one or two regular workmen.

PROGRESS OF THE MOUND EXCAVATION

The progress of the mound excavation during the 23 days spent at Natrium is described below. References are made to one plate of photographs (pl. 24), six progress diagrams (fig. 15), and two detailed vertical cross sections (figs. 16 and 17) which convey an idea of the work involved, perhaps more vividly than written description. The bulldozer which facilitated the mound excavation and dug a test trench east of the mound proper, was operated for a total of 6 hours. De-

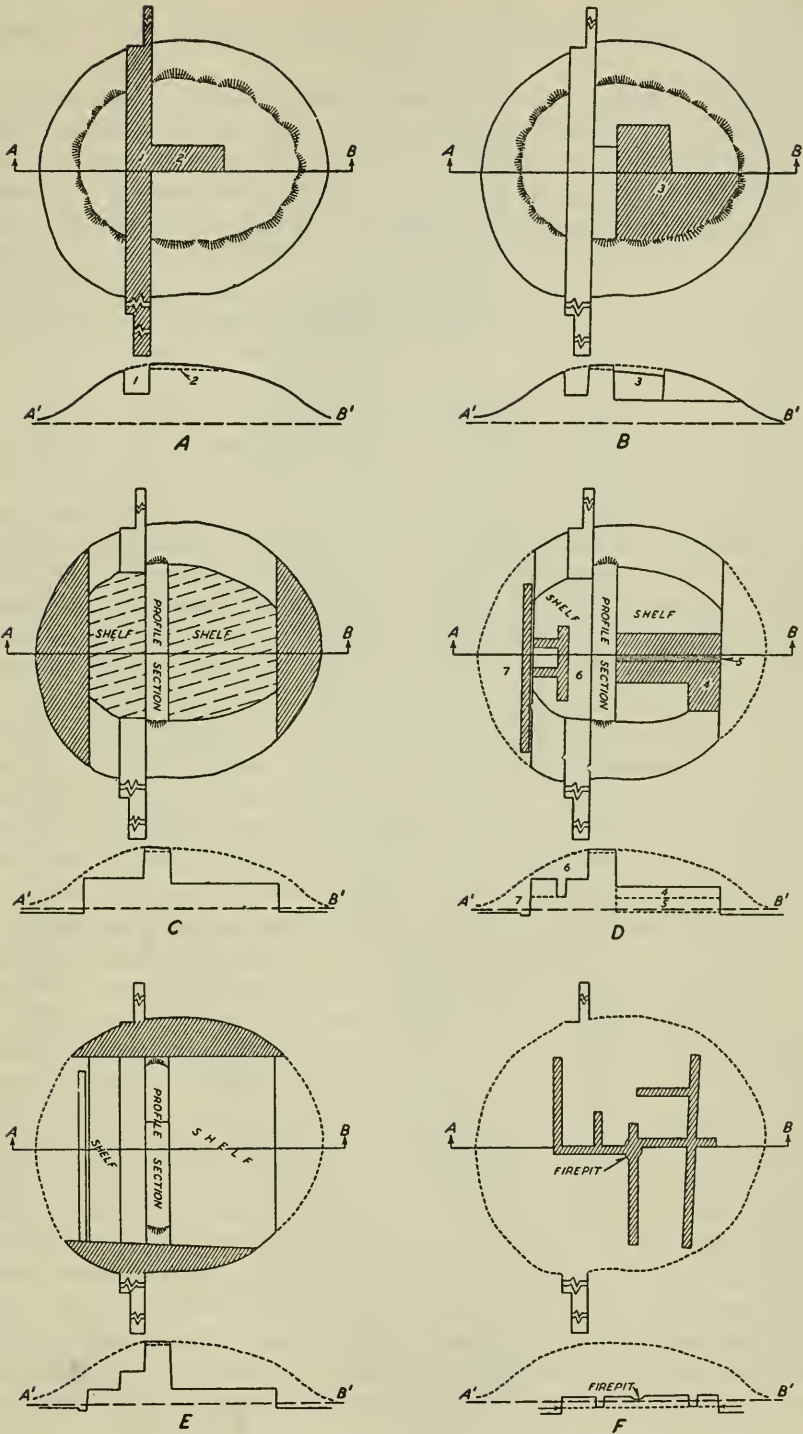


FIGURE 15.—Six stages in the mound excavation.

scriptions of the various features (fire beds, burials, etc.) are given elsewhere.

The photographic record of the excavations is good. One hundred and sixteen 9-by-12-cm. black-and-white negatives were made of all stages of the operations from start to finish. In addition, eight photographs ($2\frac{1}{4}$ by $2\frac{1}{4}$ inches) were taken with another camera. To preserve some of the color features of the operations, 57 exposures of 35-mm. Kodachrome were made by the writer. Delf Norona, Jr., took 400 feet of 16-mm. color film in his motion-picture camera and 40 Kodachromes (35-mm.) in his still camera. The Pittsburgh Plate Glass Co.'s photographer took several views of the site and of the excavation progress.

After the mound had been cleared of trees and bushes (pl. 24a) a grid system of 5-foot squares was superimposed on the mound and it was staked (fig. 14). The lines ran approximately N-S and E-W. A center line (ordinate), running to the west of the mound center, was established as "0" with respect to east and west. Another center line (abscissa), well to the south of the mound, was established as "0" with respect to north and south. All the stakes were marked. In order to keep directional notations correct, the abbreviations for east and west (E, W) and north and south (N, S) were used. The stakes were reset on the grid as the excavations progressed down to the mound base. A 0.0-foot datum elevation point was established well to the west of the mound. This datum point was tied in to the base line of the Pittsburgh Plate Glass Co. All elevation measurements during the course of excavation were made from the datum point with a Locke hand level and a Philadelphia rod. The hand level was found to be entirely satisfactory for the many readings taken during the work.

In order to ascertain the character of the mound and its contents, a test trench No. 1 (total length 125 feet) was started well out (45 feet) from the mound proper on the south side and carried forward on line E-0, W-0 (pl. 24b; fig. 15A). This trench was carried to a width of 2.5 feet from stake S4-0 to stake N5-0 (the latter close to the mound base) where the trench width was increased to 5 feet. A deep filled-in cut encountered in the southerly part of the approach trench between stakes N1-0 and S4-0 posed an interesting problem (fig. 16, insert). This cut, 20 feet wide at the top, tapered downward at a rather steep angle. We were forced to discontinue this section of the test, as the loose, sandy soil threatened to cave in after a depth of 4 feet had been reached. One of several shovel tests extending 6 feet farther down (making a total vertical depth of 10 feet) failed to strike bottom. The disturbed soil apparently continued downward. The answer to this perplexing problem was happily elucidated when one of the plant engineers reported that we had cut across the excavation of a chemical

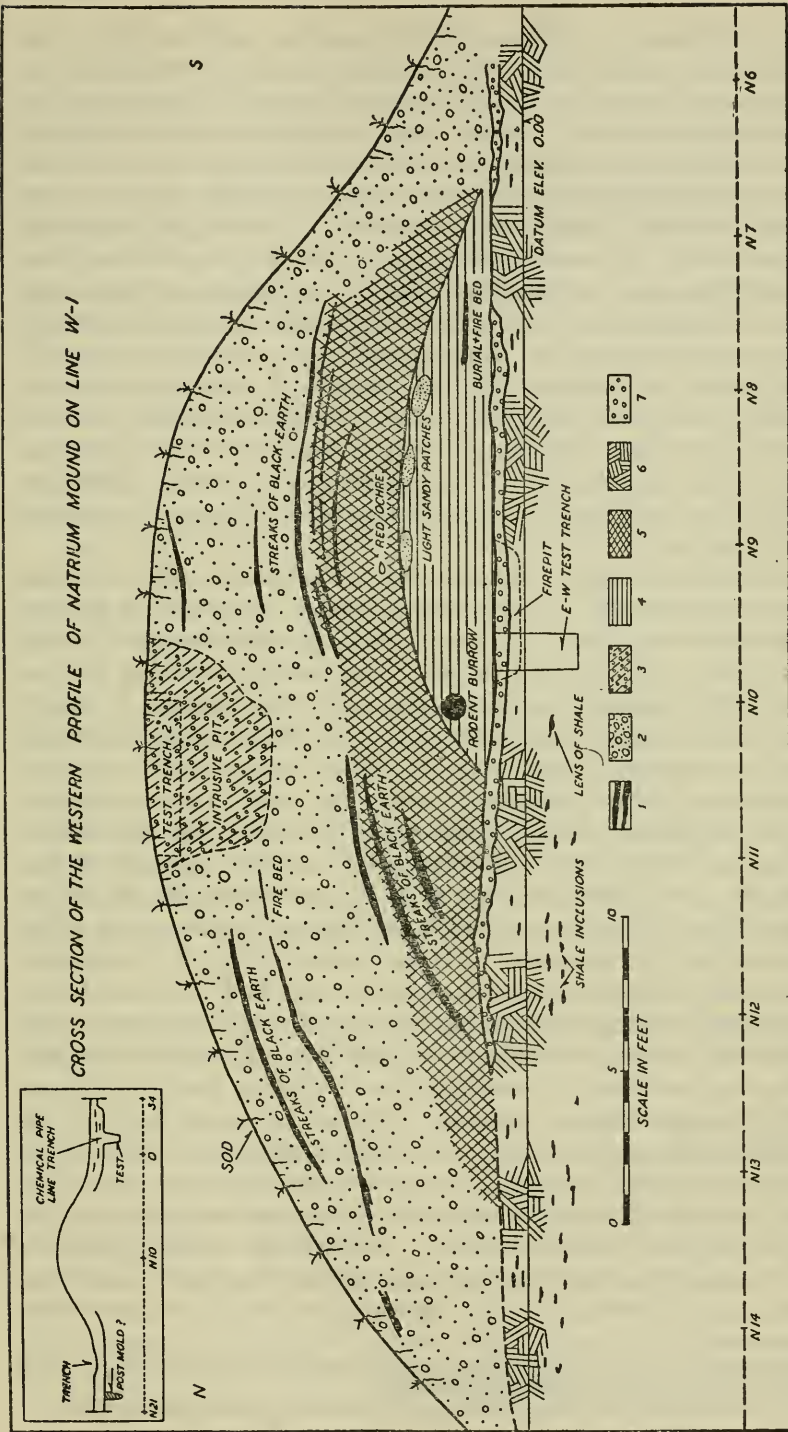


FIGURE 16.—Cross section of the western profile of Natrium Mound on line W-1. Explanation of numbered symbols: 1, Linear streaks of black earth stains. 2, Earthy gravel. 3, Mixture of light-colored gravelly soil. 4, Dark mixed earth. 5, Streaked earthy gravel mixed with charcoal. 6, Sterile gravelly subsoil. 7, Coarse yellow sandy loam (sterile).

pipeline, 12 inches in diameter, which angled through the field at this point from a brine well to the plant, cutting close to the mound (fig. 13). It was reported that this excavation reached a depth of 15 feet and had to be made rather wide, or about 15 feet, because of the loose shifting sands. This problem solved, the test trench was continued over the top of the mound down to the other side (fig. 16); there the trench was brought to 20 feet beyond the mound base. The digging progressed in 6-inch levels. It was originally hoped that profiles of the shallow ditch could be made on both the north and south sides of the mound, but the circumstances of the chemical pipeline obliterated traces of the ditch on the south side. Consequently, only one disturbed profile of this feature was obtained (fig. 16, insert). A dark earth stain resembling a post mold,⁴ 18 inches in diameter and extending 45 inches below the plow line, was found north of the ditch. No explanation could be offered, other than that it appeared to be old. This post mold, if it was such, was the only one encountered during the course of the exploration.

The writer had a predetermined course of action regarding the excavation of the mound. It was deemed best to cut away the western section of the tumulus first, in order that a good photographic record might be had of the initial profile. The best light during the day seemed to be from the west and southwest. The test trench (No. 1) was cut to the west of center avoiding both the intrusive excavation marked by a slump in the middle and saving what possible material of importance might be found in the center for later. It was suspected that, as with most mounds of this type, the center was the locus of importance. While the work progressed on the approach of test trench No. 1, a shallow exploratory E-W test trench (No. 2) 20 feet long and 5 feet wide was carried to a depth of 1 foot on top of the mound and at right angles to the larger trench (fig. 15A). An area of dark burned gravel appeared in the center of this E-W trench and some charcoal was found associated with a fragment of worked chert. This evidence was traced to its source, a dark patch of burned earth and odd fragments of charcoal covering about 1.5 feet in diameter, approximately 3 inches thick at a depth of 1 foot in square N10-0.⁵ No habitation evidence, specifically post holes, appeared in trench No. 2. In order to keep a N-S profile intact for reference purposes, trench No. 2 was discontinued after this exploratory measure was taken and the main trench, No. 1, was continued. The soil was removed from the mound in a series of steps, working upward from the base of the mound on both sides. Two burned beef bones cut by a metal saw were found

⁴ This may be one of the test drill holes made by a contractor in this area, according to a letter dated May 30, 1945, sent by Delf Norona to the Smithsonian Institution.

⁵ The individual square in the grid system is designated by the symbol of the southwest corner stake.

in square N12W1 at a depth of 6 inches. These were among the first artifacts of man recovered. The items were obviously much too recent for archeological consideration, although aboriginal material data was found only shortly thereafter. The test trench was carried to an initial depth of 6 feet below the mound summit and the base of the trench was leveled between stakes N7 and N14. The main soil constituent of the mound to this level was found to be a loose gravelly, sandy soil with an occasional fragment of charcoal. The humus layer, or surface sod, was between 1 and 2 inches thick. Tree roots extended below this depth making a kind of subsurface network. Centering on the mound top was an intrusive excavation which had been refilled, making a distinct outline in the vertical cross section (fig. 16). This excavation was 4 feet deep and approximately 7 feet across the top, tapering downward to a width of 3 feet. The hollow, noted previously on page 322, marked this feature on the surface (fig. 14). It was not immediately ascertained how long the excavation was, but it appeared to be in the neighborhood of 10 feet as the later tests showed. This intrusive hole cut across two bands, about 1 inch thick, of red stains spotted with charcoal, which extended across the upper levels of the mound. These streaks followed the contour of the mound surface. It is presumed that they represent successive additions of earth heaped on the mound. A series of thicker bands, averaging 1.5 inches in thickness, or burned earth and charcoal, were found at a lower depth (fig. 16). They seemed to be part of a smaller included mound. The loose gravelly soil of the upper portion of the mound did not demarcate any stratigraphic evidence other than the lenses of fire-burned earth and streaks of black dirt. Evidence of stratigraphy and indications of individual earth loads were found better preserved closer to the base of the mound, where the soil characteristics were more favorable for these details.

The next step planned was to cut away the gravelly overburden on either side of the tumulus center, leaving a 5-foot-wide reference profile or "key" approximately in the middle of the mound. An L-shaped cut (fig. 15B, 3), an exploratory measure, was excavated to a depth of 6 feet from the top and to the right of the center of the mound. The profile cross section (fig. 17) drawn on line A-B within the limits of this excavation illustrates the lensing and soil stratigraphy. A section of another large intrusive pit, filled with light gravelly soil, cut through the layered lenses of black dirt. It disturbed the southern periphery of a burial, feature 32, which was unearthed later. There was a ½-inch coating of light-colored clay at the bottom of the pit. There was no connection observed between this intrusive excavation and the one mentioned previously, hence it is presumed that these were two

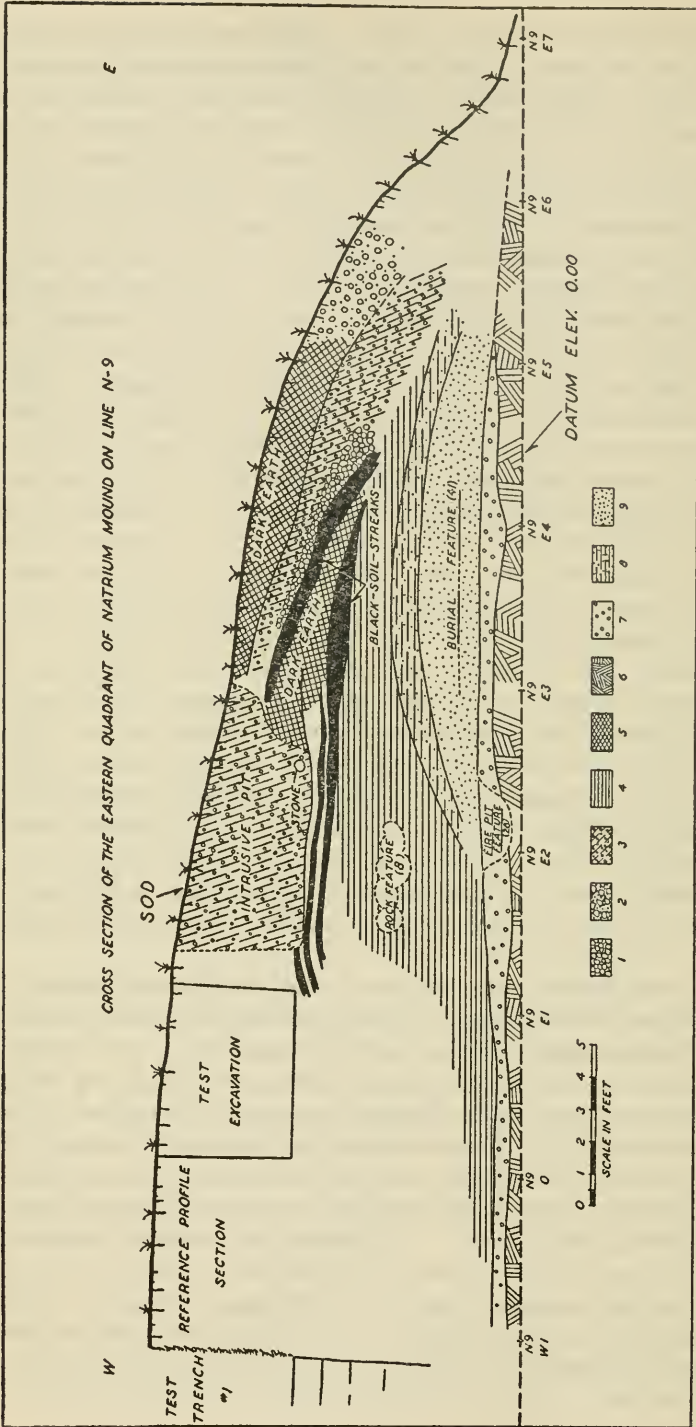


FIGURE 17.—Cross section of the eastern quadrant of Natrium Mound on line N-9. Explanation of numbered symbols: 1, Clean gravelly soil and large pebbles. 2, Earthy gravel. 3, Mixture of light-colored gravelly soil. 4, Mixture of black earth. 5, Concentrated zone of dark earth. 6, Sterile gravelly subsoil. 7, Coarse yellow sandy loam (sterile). 8, Cap of mixed gravelly loam. 9, Loose gray soil.

separate holes dug into the top of the mound. The burial, which had apparently just escaped detection, was the first one we encountered, auguring well for the exploration.

Tracing the soils beneath the humus line on the east side of the mound there was found a 1.5-foot deposit of dark soil which had the usual amount of roots and similar vegetal matter. It is likely that this was some of the dirt thrown out of the large intrusive pit. The soil in this level exhibited more gravelly characteristics toward the outer or eastern periphery of the cut. The pebbles were undoubtedly the products of natural mechanical segregation resulting from the enlargement of the mound, the heavier materials seeking their level at the outer and lower borders. This may be likened to a talus slope deposition. Underlying the dark soil layer was a lighter-colored deposit of gravelly soil about 1 foot thick, with an especially heavy base of pebbles about 5 inches thick concentrated on the bottom. It lay more toward the periphery of the mound. This also was probably a product of natural mechanical soil segregation. Similarly, following the mound contour, but on a steeper bedding plane, was a linear streak of black dirt averaging about 3 inches in thickness. This, in turn, lay over additional alternating lenses of light and dark soil. The latter soils, however, were more horizontally bedded. In the course the excavation artifacts and inclusive features—such as fire beds, burials, etc.—were examined, charted, and excavated as they were encountered.

After exploratory cuts were made in the remaining standing portions of the top of the tumulus on either side of the key, it was decided to summon the bulldozer for the first time. It was determined to make equal cuts into the east and west sides of the mound at base level, paralleling the central reference profile or key. The latter's axis was oriented north and south in the system of grid squares between lines W-1 and E-0. In addition, in view of the time element involved, it was thought best to plane both sides of the key down to the explored depth. Flags were set at the sides of the mound marking the inner limits of the cuts to be made by the bulldozer. The bulldozer operator, an expert at his job, was briefed about the requirements. Thus instructed, he completed his phase of the operations (fig. 15C).

First, the bulldozer scooped up the loose dirt on both sides of the key, planing down the explored overburden to the excavation level. Then he made cuts extending to approximately 2 feet below datum level outside the platform area, sufficiently below any occupation levels encountered. The dirt was heaped at both ends (north and south) of the mound far enough away so that it did not impede further progress. The workmen examined the exposed profile sections after the bulldozer operator had cut away each additional face. The

blade of the bulldozer was an effective side-slicing instrument as well as a horizontal scraper. By exercising good control, vertical slicing was kept to widths of about 1 foot, although it was possible to slice as narrow as 6 inches when necessary. Used as a scraper, it was an easy matter for the bulldozer to skin off 8-inch horizontal levels, one at a time, backing up for each cut.

The result was a key standing on a platform $37\frac{1}{2}$ feet long (east and west). The platform was 6 feet above datum level on the west side of the key and 4.5 feet above datum level on the east side of the key. This done, the stakes of the superimposing grid were reset on the platform, and conventional excavation with wheelbarrow, shovels, and smaller hand tools began anew.

In order to uncover the central area, excavation was begun in a broad, inverted L-shape on the eastern side of the key (fig. 15D, 4). This excavation was carried down to an initial depth of 2.5 feet from the surface of the platform or 2.5 feet above datum. It was discovered that the greatest amount of archeological material, including skeletal remains, etc., came from approximately this elevation. This held true for the rest of the mound as the excavation progressed. Laminated light-colored soil deposits 2 to 3 feet in diameter and about 6 inches thick were noted in the lower deposits. These could have represented individual loads of earth. Large lenses of ash-gray soil were also found. Another test trench (fig. 15D, 5) 2 feet wide was carried east to west through the excavation in the eastern side of the mound at right angles to the standing profile. This trench reached a depth of 3 inches below datum level into virgin soil.

Since the weather was becoming increasingly unfavorable, a framework of poles covered with canvas tarpaulins was erected in order to permit excavation in the central rectangle. A large fire was kept burning each day in the shallow pit which had been dug to the east of the mound.

The mound shelf to the west side of the key was tested with a system of three interlocking test trenches in the shape of the Greek letter π , (pl. 24c; fig. 15D, 6). These trenches, about 1.5 to 2 feet wide, were carried to a depth of 4 feet from the platform surface. Lensed pockets of earth appeared in this western mound section. Another trench (fig. 15D, 7), 33 feet long and 1.5 feet wide, was cut at the base of the western profile section to a depth of 2 feet below the surface which had been cut away by the bulldozer. This trench did not reveal any additional data.

The portion east of the key was taken down with shovel and wheelbarrow. The portion to the west of the key was sliced away by the bulldozer leaving a two-step platform, the lower of which was 2 feet above the datum plane (pl. 24d, fig. 15E). The northern and southern

sides of the mound were crosscut with the bulldozer and the dirt heap resulting from the hand excavations was removed. Since the key or reference profile threatened to slump, it was decided to remove this also, using hand labor. It had been planned originally to leave the key until last. The roots and root tendrils coupled with the frost were expected to help support the key. However, the gravelly character of the soil plus the rain and an unexpected thaw caused the key to slump. Hence it could not be maintained intact.

An increasing wealth of data was uncovered as the mound base was approached. These data were concentrated in the mound center (fig. 18). Domed concentrations and piles of gray-colored soil were noted near the center also, principally near the base. Areas of sterile yellow clay soil were found at the mound base, indicating a prepared floor (figs. 19A, B). The gray and yellow soils were undoubtedly part of the preparation for the interment of burials within the mound. These soils are discussed under the heading "Soil samples" in the appendix. There was a streak of black dirt in the north section of the mound which appeared to be of humus origin. This streak was 1.5 feet above the datum elevation. There was another streak of dark earth on the eastern periphery also. These may have marked the original surface which apparently had been largely stripped of the soil cover in the preparation of the mound floor.

A central fire pit (feature 28) occurred in the mound floor extending into the sterile gravel layer below the mound (figs. 16, 17). This feature, judging from related mounds, was evidently the center of importance within Natrium Mound. However, there was a singular lack of material data recovered in comparison with other features in the same mound. A network series of test trenches were systematically dug through the mound base into this sterile soil (fig. 15F). No further data were found. The test trenches extended from 1 to 2 feet in depth below the base of the mound proper.

The majority of the mound features were found at an elevation varying between 1 to 2.5 feet above the datum plane (figs. 16, 17) or a little above the base of the mound proper. In the final stage of the excavation, after we were satisfied that no more features were to be found, the bulldozer sliced away the remainder. The final cut was from 2 to 3 feet below the base of the mound (pl. 24f).

In the hope of finding village remains, the bulldozer made a test cut 75 feet to the east of the mound (fig. 13). This trench was 116 feet long, 10 feet wide, and 2.5 feet deep. No aboriginal features of any kind were found. The subsoil was a sterile yellow earthy terrace gravel containing stones of various small sizes. Neither the sides of the cut nor the excavation floor area showed anything of interest.

THE MOUND FEATURES

INTRODUCTION

In order to make the feature descriptions more orderly and to facilitate the study, the 51 features were arbitrarily regrouped and renumbered. There were two major classes of features: Those not containing burials or any traces of skeletal material (numbered 1-31), and the second class consisting of the burials (32-51). The latter were represented by one or more osseous fragments.⁶ The features of these two groups were arranged in numerical order depending on their elevations from datum, those encountered at higher elevations having the lower feature number. It was subsequently learned that through phosphate analysis, many of the features of the first group, although not containing preserved skeletal matter, also may have represented burials.

The written descriptions were supplemented by scaled diagrams and photographs. The tapes and scales used in the field were marked in feet and decimal parts of feet. The data presented below were necessarily compressed. Through error, no datum elevation was obtained for three small fire beds (Nos. 29-31). The major features are illustrated in figure 18.

An interpretative summary of the mound features is given at the end of the descriptions.

DESCRIPTION

Feature 1.—This was apparently a fire bed identified by a thin, concave lens of reddened and burned earth, 0.25 foot thick, containing a mixture of pebbles and charcoal. It was situated in square N12E1 at an elevation of 6.1 feet from datum. The outline was 1.3 feet in diameter, and circular in shape. No associated artifacts were present.

Feature 2.—A fire bed, identified by burned-appearing red-brown earth and ashes, was encountered in square N9E3 at an elevation of 5.4 feet from datum. This feature was 1.4 feet in diameter by 0.1 foot thick. There was no associated material.

Feature 3.—There were indications of a strong fire by the amount of fire-burned earth which extended for a depth of 2 feet. This fire bed was situated in squares N5W4 and N6W4 at an elevation of 5.4 feet from datum. Associated remains were absent.

Feature 4.—A thin layer of reddish-brown earth containing associated artifacts and red ochre was found in squares N11E2 and N12E2 (pl. 24g). This layer, only 0.25 foot thick, measured 5.0 feet in NW-SE direction by 3.0 feet in SW-NE direction. It was encountered at an elevation of 4.9 feet from datum and 5.2 feet from the surface

⁶ Dr. T. Dale Stewart, of the Department of Anthropology (Division of Physical Anthropology), U. S. National Museum, identified the burial remains submitted to him for examination.

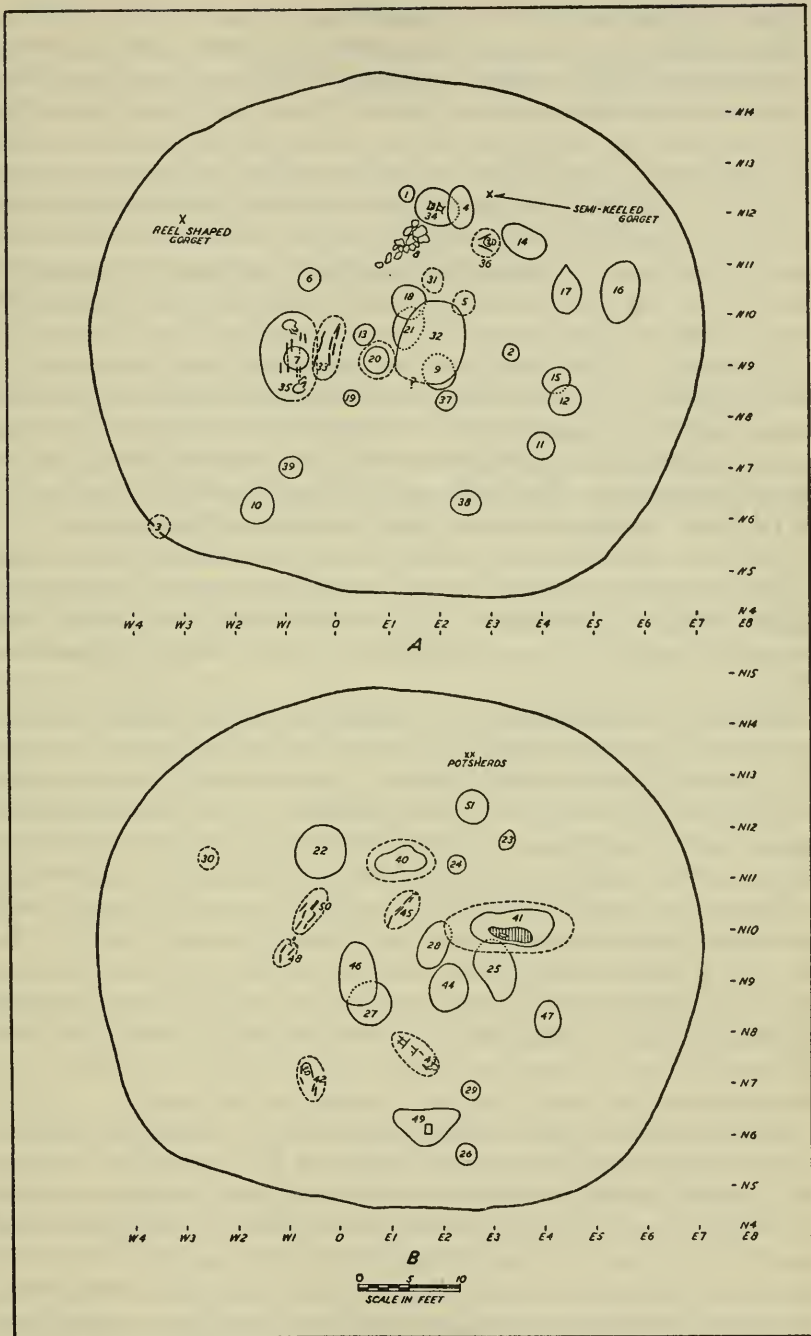


FIGURE 18.—The distribution of the mound features.

of the mound at this point. It contained 13 chert blades or knives, 1 mud concretion, 1 natural ferruginous cup stone, and a quantity of red ochre. These artifacts were undoubtedly arranged with some purpose in view in the manner found. Ten of the chert blades (leaf type) lay close together as in a cache, overlapping one another. They were completely covered by a bed of red ochre, 1 by 0.7 by 0.1 foot in dimension, which had to be scraped off in order to expose the blades. A large stemmed blade occurred in this same red ochre 0.4 foot to the south of the blades. Another stemmed blade associated with a smaller patch of red ochre was exposed 6 inches away from the main cache. A lone stemmed chert blade (pl. 28r) was uncovered 2 feet to the north of this group. This blade was not associated with red ochre. A small deposit of the substance was exposed between the group of blades and the stemmed blade. A darker area, perhaps indicating organic substance long since rotted away, was observed on the eastern side of this feature. The dark area, oblong in outline, measured 0.3 by 1.6 feet. Black mixed earth was found below this feature.

Feature 5.—A small string of seven copper beads, associated with some dark fibrous organic matter resembling bark, was found in square N10E2. This feature, 4.6 feet from datum and 7.0 feet from the mound surface, was uncovered in the course of removing the mound fill.

Feature 6.—Charcoal and some discolored earth marking a fire bed were found in square N10W1. The fire bed lay 4.6 feet above datum and 7.0 feet below the mound surface. It was circular in outline with a diameter of 2.5 feet and 0.1 foot in thickness. The charcoal and discolored earth were separated in two thin lenses. A hematite celt (pl. 26z) was found 2.0 feet to the southwest of this feature in dark earth.

Feature 7.—A fire bed marked by reddish-brown earth and a small quantity of associated red ochre was found in square N9W1. This feature lay 4.6 feet above datum and 7.0 feet from the mound surface. Directly beneath it was a group burial, feature 35. Feature 7 was approximately 2.5 feet in diameter and circular in outline with a thickness of about 0.1 foot. Associated with it was one pestle-shaped stone and one whetstone, including the small quantity of red ochre.

Feature 8.—A low ovate mound of blackened, cracked, and burned-appearing sandstones were found in squares N11-0, N11E1. Several of the stones appear to have been broken in place. Situated 4.4 feet from datum and 6.5 feet below the mound surface, this feature measured 2.5 by 4.0 feet and was 0.75 foot thick. It was oriented in a N-S direction. No artifacts were directly associated with these stones. The tops of several stones had some reddish-brown matter adhering to them. Two more flat sandstone slabs were found close to the main heap. They lay to the southwest.

Feature 9.—A bed of charcoal in which were included several patches of light-colored earth was discovered in squares N8E1, N8E2, N9E1, N9E2 at an elevation of 4.1 feet from datum. This feature was circular, measuring 3.0 feet in diameter by 0.2 foot thick. Associated artifacts were absent.

Feature 10.—The reddened soil of a circular-shaped fire bed with an included thickness of a mixture of charcoal was found in square N6W2 at an elevation of 4.0 feet above datum. The fire bed was 3.0 feet in diameter and between 0.05 and 0.15 foot thick. No artifacts were found in or near this feature.

Feature 11.—A fire bed was found in squares N7E3 and N7E4 at an elevation of 4.0 feet from datum and 1.5 feet below the mound surface. This fire bed, marked by a streak of orange-red earth, lay above a layer of black earth unassociated with any other data. It was circular in outline with a diameter of 2.5 feet and a thickness of 0.05 foot.

Feature 12.—A circular-shaped lens of reddish-orange burned earth, which was associated with decomposed organic remains found to the northwest of this feature, was 3.5 feet in diameter and 0.05 foot thick. Three chert blades were uncovered above the bed. A quantity of red ochre was found on the eastern periphery of feature 12 (square N8E4).

Feature 13.—A fire bed was situated in square N9-0 at an elevation of 3.8 feet from datum. It was circular in outline, 2.0 feet in diameter and 0.5 foot in thickness. The fire bed was composed of charcoal and ashes. Charcoal, which lay longitudinally across the top of this feature, was especially abundant. Artifacts were lacking, but there were some stones within the confines of the lens. The earth immediately above it was discolored a lighter hue for several inches.

Feature 14.—The reddened and burned earth of a fire bed was found overlapping the boundary of squares N11E3, N11E4 at an elevation of 3.6 feet from datum. This thin-lensed feature (0.05 foot thick) was ovate in shape. It was 3.0 feet in width (N-S) and 4.0 feet in length (E-W). Associated material included a small quantity of red ochre recovered on the southern periphery of the bed and a chert flake on the eastern border. A projectile point was found nearby to the east of the feature.

Feature 15.—An orange-colored lens of earth containing a small amount of red ochre and a small string of four copper beads was discovered in square N8E4 at an elevation of 3.5 feet from datum. This feature was ovate in outline with a maximum diameter of 2.0 feet. It was 0.05 foot thick at its maximum point.

Feature 16.—Six copper beads accompanying a fragment of preserved string were uncovered during the examination of a fairly large ovate feature in square N10E5. This feature, found at an elevation of 3.0 feet from datum, measured 7.0 feet (N-S) by 4.0 feet (E-W). It was

shallowly concave in cross section with a maximum thickness of 0.1 foot. There was a layer of gray soil beneath the red earth of this feature. Light-colored gravel occurred above it.

Feature 17.—Three thicknesses of orange-red colored lenses of earth were found in square N10E4 at an elevation 3.0 feet from datum. The over-all thickness was 0.25 foot. The topmost stratum measured 4.0 feet (N-S) by 2.0 feet (E-W). The lower layers, oval in outline, were each 1.5 by 0.5 feet. An intermediate layer of dark earth separated them. Seven heavily patinated chert blades were found associated with the top layer lying immediately to the north side of its boundary. Four were grouped together, while the others were spaced about 1.5 feet apart.

Feature 18.—A heavy black deposit of earth mixed with traces of charcoal and burned earth was found in square N10E1 at an elevation of 3.0 feet from datum. It was circular in outline with a diameter of 3.0 feet and a thickness of 0.075 foot. A chert blade occurred in the burned earth. This feature lay immediately above part of feature 21.

Feature 19.—A charcoal bed containing four fire-burned and fire-cracked stones was uncovered in square N8-0 at an elevation of 2.9 feet from datum. This bed, 1.0 foot in diameter, lay in an area of light-colored mixed soil.

Feature 20.—A reddish-brown colored lens, capped by a layer of brown soil and surrounded by loose gray soil, was excavated in square N9-0. This feature, lying at an elevation of 2.6 feet from datum, was 3.0 feet in diameter and 0.05 foot thick. A number of artifacts, including 5 chert blades, 2 celts,⁷ 1 hematite hemisphere (pl. 27*l*), 1 broken projectile point, 1 chert scraper, 1 round stone ball (pl. 26*f*), and 1 piece of mussel shell were found in it.

Feature 21.—A compacted lens of red-brown earth 0.05 foot thick associated with a large number of artifacts, principally blades, was uncovered in squares N9E1 and N10E1 at an elevation of 2.6 feet from datum. This feature was ovate in outline, measuring 5.0 feet (N-S) by 2.5 feet (E-W). The artifacts recovered include 109 chert blades, 1 fragment of hematite celt, 1 chert drill, 1 fragmentary chert drill, 1 excavated steatite boat stone, 1 projectile point, 1 fragmentary bear canine tooth, and 1 fragmentary chert artifact. A small quantity of red ochre was also recovered in 2 patches. The artifacts were found in layered cluster concentrations indicating purposeful arrangement (pl. 24*i*). The boatstone (pl. 25 *i, j*), situated on the top of the largest group of blades, had its hollow side downward. Some loose dirt and a few small pebbles, apparently sifted in from the outside, were found therein. The blades seemed to have been arranged in no definite orientation and were stuck in the lens at all angles. The fragmentary hem-

⁷ The base of one of the celts (pl. 26*g*) appears to be discolored by graphite.

atite celt (pl. 26a') was found with the bit end pointing downward. All the artifacts, particularly blades, show evidence of intense heating, accounting for some of the blade fractures. Some of the latter objects (pl. 28 *j, k, n*) are encrusted with as much as 1 mm. thickness of black carbonized organic matter which may have been part of a covering or associated perishable goods. A layer of compacted dark earth was found beneath this feature. A lens of loose gray soil overlapped from the eastern side of the mound.

Feature 22.—A group of artifacts was uncovered in this feature which was situated in square N11W1 at an elevation of 2.1 feet from datum. It was 4.0 feet in diameter and 0.45 foot thick. There were two groups of 15 chert blades, some evidence of copper beads, 2 patches of yellow ochre, 2 deposits of red ochre, and 2 small patches of whitish material.

Feature 23.—An oblong-shaped fire bed of orange-red earth was uncovered in square N11E3 at an elevation of 2.3 feet from datum. It was 2.0 feet in diameter and measured 0.07 foot at the thickest part. There were no associated artifacts.

Feature 24.—A fire bed, 1.5 feet in diameter and 0.05 foot thick, was encountered in square N11E2 at an elevation of 2.0 feet from datum. Associated remains were absent.

Feature 25.—An ovate-shaped bed of orange-red earth with a thin covering of white matter was found occupying portions of squares N8E2, N8E3, N9E2, and N9E3 at an elevation of 1.7 feet from datum. This lens, measuring 6.0 feet (N-S) by 3.7 feet (E-W), was 0.05 foot thick. Associated with this feature were 1 fragmentary chert blade, 2 celts, 1 slate pendant gorget (pl. 26*b*), 4 hematite hemispheres, 2 faceted hematite stones, 8 chert projectile points, 1 flaked reject, 3 small concentrations of red ochre and 2 traces of red ochre, a deposit of some yellowish-brown matter, and a small deposit of black organic matter. Seven of the projectile points were found lying close to the gorget. Next to the gorget was also some dark charred organic substance. The artifacts were crusted with a thin coating of the white matter mentioned above. The hematite hemispheres were grouped together, the convex sides upward. One of the flints lay in a deposit of red ochre.

Feature 26.—A lens of reddish-brown earth 2.0 feet in diameter was found in square N5E2 at an elevation of 1.5 feet from datum. Some red ochre was all that was to be noted within this feature.

Feature 27.—A concentration of charcoal and ashes was uncovered partially below feature 46, a burial, in square N8-0 at an elevation of 1.2 feet from datum. This feature was circular in outline measuring 4.0 feet in diameter and 0.45 foot thick. Feature 27, lying 0.5 foot below the burial, was shot through with indications of a strong fire.

This evidence may have been directly associated with the overlying burial.

Feature 28.—This was a pit at the approximate center of the mound intruding into the yellow basal soil stratum in squares N9E1, N9E2, N10E1, N10E2. The top of the pit was 1.0 foot from datum and 10.5 feet from the surface of the mound at this point. This feature was 0.9 foot deep, basin-shaped in cross section, and 4.5 feet (N-S) long by 2.9 feet (E-W) wide. It was oval-shaped in horizontal plan section. The pit was filled with dark earth in which were mixed some loose pebbles. There was a lens of loose gray soil over it and a low heap of the same soil around the pit mouth. The sides of the pit interior were lined with orange-colored soil and some white matter. One stemmed projectile point and a small quantity of red ochre were found in this orange soil near the northern periphery. There was a thickness (approximately 0.04 foot) of orange-red earth in which were included several fragments of charcoal situated near the base of the pit. At the bottom there was a hard layer of reddish-brown earth 0.05 foot thick, while underneath the pit the earth appeared to have been burned for another 0.05 foot. There was no evidence of log tombling or indications of any other kind of structural work associated with this feature.

Feature 29.—A small fire bed, 2.0 feet in diameter, was uncovered in square N6E2 by the bulldozer. Through error, no datum elevation was taken on this feature. It was composed of a reddish-brown earth lens 0.1 foot thick which included a few charcoal fragments. There were no associated artifacts.

Feature 30.—A small lens of reddish-brown earth capped by some loose gray earth was encountered in square N11W3 while bulldozing the loose earth fill aside. No measurements were obtained. There were no associated artifacts.

Feature 31.—A small deposit of charcoal and burned gravel was uncovered in square N9-0. There were no associated artifacts. Unfortunately, measurements were not taken of this feature.

Feature 32.—Cranial fragments were encountered near the bottom of a recent intrusive pit in square N9E2 at an elevation of 8.4 feet from datum and 3.5 feet from the mound surface. The southern edge of feature 32 had been disturbed by the excavation which apparently missed this burial (fig. 17). This feature was oval in outline, 7.5 feet wide (E-W) by 9.0 feet long (N-S). Its determinable depth was 0.2 foot. The bones were found in association with organic discolorations, resembling bark, 0.3 foot above the feature bottom. Two projectile points, 5 blades, a string of 33 copper beads, and 1 whetstone (pl. 27g) were found lying close together on a bed of orange-red earth near the human remains. There was much evidence of intense

heat and burning. The bottom was lined with a thin layer of light-colored clay. The skeletal remains consist of fragments of a skull vault of medium thickness and a few permanent teeth. The skull-vault fragments (parietal and frontal) were found lying one above the other. The edges were somewhat blackened. From the condition of the sutures and the wear of the teeth, this individual was at least middle-aged. Sex could not be determined.

Feature 33.—A burial was uncovered in squares N9W1, N9-0 at an elevation of 5.0 feet from datum. The remains consisted of the bones of two extended postcranial skeletons, both very poorly preserved. These bones were lying on a bed of dark earth and charcoal accompanied by gray ashes and some reddened earth. There were no associated artifacts. The burials appeared to have been articulated. Both were extended in a north-south direction, but headed in opposite directions. The preservation was so poor that only the long bones and a few of the foot bones could be identified.

Feature 34.—A fairly important burial occupied portions of squares N11E1, N11E2, N12E1, N12E2 at an elevation of 4.4 feet from datum. The feature was ovate in outline, about 4.0 feet in diameter with a thickness of 0.5 foot. Among the large number of funerary materials found with the burial are included 2 chert blades and 1 fragmentary blade, 1 copper reel gorget and associated preserved textile remains (pl. 25 *a, b*), coiled strings of 291 copper beads, some chert chips and flakes, 2 projectile points and 1 fragmentary projectile point, 1 chert reject, and a quantity of red ochre. The burial, accompanied by the enumerated goods, lay on a reddish layer of apparently fire-burned earth covered with a small capping mound of ash-gray soil 3.0 feet high. There appeared to have been the remains of a bark covering over the beads and associated copper gorget. The crown of a deciduous canine tooth adhering to a piece of alveolar bone preserved by copper salts was all that was recovered of the human material.

The burial furniture was undoubtedly carefully arranged as found in situ (pl. 24*h*). There was no evidence of tomb construction of any kind.

The artifacts may be divided into three groups of associated objects. Group 1 consists of the copper gorget and associated material; group 2 consists of a string of large copper beads; group 3 consists of a spread-eagle arrangement of at least three different-sized copper beads with other accompanying objects.

Beneath the gorget in group 1 was a piece of textile preserved by the copper salts (pl. 25 *a, b*). To the right of the gorget was a crudely worked black chert specimen. A patch of white powdery material, 2 inches in diameter, was found close to the latter. To the left and im-

mediately adjacent to the gorget was a layer of orange-red colored earth.

Group 2 consisted of a string of 19 large copper beads which had been coiled laterally upon itself. A small rectangularly shaped piece of common coal lay in the center of this group.

Group 3 represents the only figurelike arrangement of beads found in the mound. What may have represented the body was outlined by two parallel strings of copper beads converging toward the top. A wing-spread arrangement of beads closed the figure at the top and a long string of beads whose ends extended several inches beyond the figure, closed the bottom. A patch of white material was found surmounting the figure at the head. Within the center of the enclosed frame of beads was recovered a dark stemmed chert projectile point and the pointed end of a gray chert projectile point. A light-colored stemmed projectile point of chert occurred within the right wing of this figure. A large deposit of red ochre about 0.5 to 0.7 foot in diameter was found in direct association with this group, lying under and next to the right wing. Some yellow-ochre stains were also noted adjacent to the red ochre.

The deposit of white material near the chert specimen in group 1 gave a low test for phosphate, hence it was certainly not cremated bone remains. The other deposit of white material at the head of the figure in group 3 was very high in phosphate content, therefore it probably represented cremation remains or bone ash.

Feature 35.—Extending in squares N8W1, N8W2, N9W1, N9W2 was found a burial feature of large dimensions. It lay at an elevation of 4.6 feet from datum and 7.0 feet from the mound surface. The burial shape was ovate measuring 10.0 feet (N-S) by 8.0 feet (E-W) and was 0.4 feet thick. The skeletal material recovered was that of two poorly preserved adult reburials (?) lying on the characteristic lens of reddish-brown earth. The burials were extended side by side, heading in opposite directions, one to the north (facing east); the other to the south (facing position undetermined). The bones rested on decayed organic matter which in turn overlay the reddened earth patch mentioned. Recognizable bone fragments include right and left tali, sacrum, left scapula, right tympanic bone, lower jaw, and the following permanent teeth: Left upper Pm1, Pm2, M1, M2, M3; upper right M3; left lower Pm2, M1 (?), M2 (?). The teeth are moderately worn and hence adult. These came from the north-heading burial. The bulk of the artifacts recovered lay above the thorax of the burial headed north.

Some small fragments of charcoal were found near the center of the burials. A patch of clay about 8 inches in diameter enclosing a chert blade was found over the lower midsection of the north-headed burial. The skull of this burial lay on a bed of charcoals and red earth. A

whetstone with an associated faceted hematite stone (pl. 27*f*) occurred at its jaw beneath three other faceted hematite stones and a linearly inscribed or cut sandstone. Directly adjacent to it was a drill point (pl. 28*o'*) and some small chert flakes lying in a spongy mass of reddish-brown earth. A fragment of worked bone and a hematite celt were also closely associated with the lower part of the head.

Two small patches of red ochre were observed on either side of this feature.

The total assemblage of specimens from this group includes 1 chert blade (pl. 28*p*), 2 fragmentary chert blades, 1 piece of worked bone, 1 celt, 1 chert drill, 15 chert flakes, 4 faceted hematite stones (1 in situ lying on a grooved silt stone), 1 fragmentary projectile point, 1 chert reject, 1 piece of mussel shell, 1 grooved so-called whetstone of silt stone, and 1 sandstone abrading stone (pl. 27*a*).

Feature 36.—A unique reburial was unearthed in squares N11E2, N11E3 at an elevation of 4.1 feet from datum, occupying an oval area of about 3.5 feet in maximum diameter. The remains consisted of some crushed cranial fragments lying between 2 long bones. These bones, poorly preserved, occupied an area of 1.0 by 2.1 feet. The teeth showed moderate wear and the skull showed the beginning of endocranial suture closing, hence this was an adult. From the skull's thickness, it was judged to be a male. The long bones lay close to either side of the cranial remains converging to the rear. There was a layer of black dirt around the bones which seemed to have been set in a rather shallow pit. The crowns of the five molar teeth recovered (left upper: M1, M2, and M3; right upper: M2, M3), especially those of the right side, were stained black. Associated artifacts were absent.

Feature 37.—Evidence of a cremated burial was unearthed in square N8E2 at an elevation of 2.8 feet from datum. This burial occupied a circular area of 1.0 foot in diameter and was 0.2 foot thick. It consisted of some cremated, or at least burned, bones lying in a little heap on a 0.25-foot layer of reddish-brown earth, also presumably burned, with some associated charcoal. A small patch of red ochre accompanied the burial. Associated artifacts were not present, other than one rubbed hematite stone. Feature 37 lay in dark mixed earth next to a deposit of loose gray soil. A 0.7-foot thickness of gravel and mixed earth lens was encountered directly below the burial. Laboratory examination disclosed that of the large amount of small calcined bone fragments recovered, many have a human character. However, only one, a terminal phalanx, can be definitely identified as human.

Feature 38.—This burial consisted of some verdigris-preserved bone fragments unearthed with accompanying burial furniture in

square N6E2 at an elevation of 2.7 feet. It occupied an oval area, 3.5 (E-W) by 2.5 (N-S) feet with a thickness of 0.5 foot. A basal fire bed of orange-red color comprised the larger visible portion of this feature. It was associated with a patch of red ochre about 0.7 foot in diameter. In the center of the fire bed was an 0.5-foot deposit of brown earth in which was found a string of 61 copper beads, 1 fragmentary chert drill, 1 fragmentary chert nodule, and 1 ordinary beach pebble. The copper-preserved bones associated with the beads were also recovered in the brown-earth area. Within this feature, 1 foot to the east of the human remains, a small pile of 88 chert flakes was encountered lying in a small patch of red earth.

Feature 39.—A bundle burial was unearthed in square N7W1 at an elevation of 2.6 feet from datum and at a depth of 5.0 feet from the mound surface. This feature was circular in shape measuring 2.0 feet in diameter and 0.1 foot in thickness. A number of bone fragments, too small for definite identification, were recovered. The flat bones were too thin and the long bones were too slender to be human. These remains were not accompanied by any artifacts. They were lying on a layer of reddish-brown earth beneath several pieces of stone to the southwest of feature 8 (rockheap). Feature 39 lay nearly directly over feature 42.

Feature 40.—One of the most productive mound burials was uncovered in squares N11-0, N11E1 at an elevation of 2.5 feet from datum or 8.0 feet from the mound surface. This feature was ovate in outline, measuring 5.0 feet (NE-SW) by 2.0 feet (NW-SE) and 0.5 foot thick. There was a 3-foot covering of loose light-gray soil over the burial, at the base of which was a layer of brick-red earth between 0.25 to 0.05 foot thick. The earth surrounding the feature was solidly packed, dark mixed earth. The funcrary furniture accompanying the little skeletal remains recovered was apparently carefully arranged. The total human remains found were a pair of unerupted deciduous lower molars (M2) stained green from contact with copper. The copper preservative was derived from the verdigris of one string of 233 copper beads which had been carefully looped in the center of the feature, surrounded by other material. A small string of 38 pearl and shell beads lay 3 inches away from the copper string. Some fibrous and woody matter was also preserved by the action of the copper salts. Other specimens found in association with this burial were 7 chert blades, 1 celt of nonferruginous stone, 1 chert drill (pl. 28i') and 1 fragmentary chert drill, 1 hematite hemisphere, 1 abrading stone, 3 grooved whetstones, some flint flakes, a small patch of black carbonized particles, 3 concentrations of red ochre (the largest measuring 1.5 feet in diameter), 3 concentrations of yellow ocherous powder, and 2 small concentrations of whitish powder. One of the

white-powder patches, containing a very high amount of phosphate, lay directly above one of the grooved whetstones. Red ochre was associated with the copper beads which were looped over the four largest blades. The hematite hemisphere (pl. 27*k*) had a hollow underside which lay uppermost. The beads and hemisphere lay on what may have been a covering of skins.

Feature 41.—A domelike capping of loose gray soil (fig. 17), similar to that found in feature 40, was encountered in the excavation of this burial which overlapped the boundaries of squares N9E2-N10E2, N9E3-N10E3, N9E4-N10E4. The base of this feature was situated 2.4 feet above datum elevation and 8.7 feet below the mound surface at this point. It was ovate in shape, measuring 18.0 feet (E-W) by 4.0 feet (N-S) and 2.75 feet thick. Within this feature, which was composed of gray soil, was a smaller ovate patch of dark-brown earth measuring 4.5 feet (E-W) by 1.5 feet (N-S). Gray soil occurred at 0.5 foot below the dark oval stain, continuing downward. This inner feature was surrounded by a thin line up to 0.05 foot thick of what seemed to be organic matter. The latter may have been bark or a similar substance. An 0.8-foot ovate patch of clean white sand 0.3 foot thick surrounded by black greasy dirt was observed in the middle part of this enclosure. Fifteen lumps of semiworked hematite and one faceted piece of hematite were uncovered on the south side of the sand patch. Some charcoal was noted to the northeast of the sand patch. Organic (wood?) matter 1.0 foot wide and 0.05 foot thick was found on the south side of the patch.

Skeletal material uncovered in the eastern portion of the inner feature consisted of parts of two or three cervical vertebrae. These were copper-stained by the preservative action of verdigris from associated copper beads. Arthritic lipping on these vertebrae indicates an age of probably over 40 years. Three fragments of molar tooth caps were uncovered very close by in association with a string of 58 copper beads. The verdigris from the copper beads preserved the teeth from total disintegration. Directly associated with the skeletal remains were 2 strings of 64 copper beads, a deposit of red ochre measuring 0.5 foot in diameter, 1 modified tubular sandstone pipe (pl. 25*k*), and 1 side-notched projectile point (pl. 28*g'*). The beads were lying on a 0.05-foot layer of bark. The pipe lay on reddish-brown soil up to 0.05 foot thick.

Some indications of wood were found within the burial confines and near the sides which might have been part of an entombment or covering of some kind. The organic remains of a log or some other woody material measuring approximately 2.5 feet long by 0.3 foot in diameter was uncovered on the northwest border of the larger enclosing

outline. Three smaller woody remains were uncovered on the periphery of this feature. None of these indications were strong enough to be followed in detail.

Arranged in a linear line through the middle of the larger feature on its long axis (E-W) between the inner burial outline and the western border, was encountered the remainder of the associated artifacts. These include 26 chert blades, 1 hematite celt (pl. 26*y*), 2 chert flakes, 2 fragmentary chert rejects, 2 elongate natural flat pebbles, and 4 projectile points. The chert blades were arranged very close together in a line, even overlapping upon each other. They had apparently been laid with the best side up. A heavy patina coating of what appeared to be burned and carbonized organic matter covered the exterior of these blades.

Dark mixed earth was encountered beneath feature 41. An animal burrow, 0.8 foot in diameter, full of light-reddish earth and small pebbles entered the western side of the feature. The burrow was traced from the top of the mound down to below the yellow loam cap into the sterile gravel beneath the mound (fig. 16).

Feature 42.—Excavation in squares N6W1 and N7W1 disclosed a burial at an elevation of 2.6 feet from datum or a depth of 5.0 feet from the mound surface at that point. This feature was 2.0 feet in diameter. There were no associated artifacts. The remains consisted of a poorly preserved bundle burial of what appeared to be an adult, headed north. The skull was crushed and only a few teeth were intact. There were several long bones besides the cranial remains. The thickness of the latter suggests a male adult. Four tooth crowns were recovered for laboratory identification. These are probably upper left Pm2, M1, M2, and M3. There was some charcoal and evidence of burning around the burial. One burned stone occurred beneath the remains. Dark earth was found 0.15 foot below the burial.

Feature 43.—A burial lying in a bed of yellow-brown earth was found in square N7E1 at an elevation of 2.4 feet from datum. The feature measured 6.0 by 3.0 feet with a thickness of 0.45 foot. It consisted of a poorly preserved extended burial headed southeast, and funerary material. The over-all length of what remained of the skeleton measured 5.4 feet. The skull, lying on its left side, was crushed. It faced south. Only the cranium, which was in the better condition, and several pieces of the lower limb bones were preserved. There were five impressions of a small oblong enclosure or entombment found over the burial, indicated by impressions of logs 0.3 foot in diameter in a kind of cribwork, and covering the lower portion of the body from the midregion to the legs. Identifiable fragments of wood were recovered. A tubular stone pipe (pl. 25*f*) was found

lying immediately in front of the face. The long axis of the tube was parallel to the face. A worked hematite stone lay at the curve of the neck and a pile of faceted hematite stones lay 1.0 foot south of the jaw. The other associated artifacts were distributed over the lower parts of the burial. The specimens recovered include 7 nonferruginous stone celts, 3 hematite celts (pl. 26 *s, w, x*), 2 chert flakes, 14 faceted and worked pieces of hematite, 1 hematite hemisphere, 4 complete and 2 fragmentary projectile points, 1 broken blade and 3 fragmentary blades, 1 chert reject, and 1 grooved whetstone. A small quantity of red ochre was also obtained. There was an 0.8-foot deposit of burned clay one-eighth inch thick on the west side of the burial. The center of the burial lay in a shallow depression, the sides being perceptibly higher.

Feature 44.—This feature was excavated in squares N8E1, N8E2, N9E1, N9E2 at an elevation of 2.2 feet from datum. It was 6.0 feet long (NW-SE) by 4.5 feet wide (SW-NE) and about 0.05 foot thick. The basal layer of the feature, a reddish-brown layer of earth, appeared to have three thicknesses. The topmost layer was a thin reddish-brown earth layer lying over an orange-yellow deposit less than 0.05 foot thick. The latter deposit covered a thin layer of white substance which measured less than one-eighth inch in thickness.

A deposit of cremation remains 0.1 foot thick covering an area of 0.9 foot in diameter was found in the center of this feature. These remains consisted of a mixture of charcoal and many unidentified pulverized and charred bone fragments. They were associated with two small deposits of red ochre which occurred next to the bones. A small celt of nonferruginous stone and about 0.05 foot deposit of manganese dioxide were also found adjacent to the bone ashes. Two other small deposits of red ochre were found in the burial area, one associated with a pop-eyed birdstone (pl. 26*d*). The latter lay on its left side coated on the base with a thin layer of whitish material. Between the birdstone and the bone deposit lay a large gabbro celt (pl. 26*h*) and a fragmentary silt-stone hemisphere, both coated on the underside with a thin deposit of white matter. One faceted hematite stone was also recovered.

Two feet to the south of the cremation remains was uncovered a small deposit of black granular material measuring less than 1 inch in diameter. A deposit of white material which may have represented a fragmentary hemisphere was found 1.5 feet to the north of the cremation.

All the artifacts were covered with either a reddish or orange-yellow matter. A small yellowish deposit of earth was especially conspicuous in the southeast quarter of this feature. Underlying this burial was a mixture of loose dark earth.

Feature 45.—Several poorly preserved bones, all postcranial, including the right foot, leg, and right arm of an extended adult burial (probably male) were uncovered in square N10E1 between 2.4 and 1.8 feet above datum elevation. This feature was 5.0 feet long (NE–SW) by 1.0 foot wide (SE–NW). It was not ascertainable at the time of excavation whether the remains comprised a reburial or not. There was no evidence of a pit. The body seemed to have rested on the right side with the feet higher than the rest of the body. The remains lay in dark earth unassociated with any artifacts. There was no evidence of the ribs, vertebrae, pectoral or pelvic girdles. Gray soil was found beneath the dark earth. A patch of fire-reddened earth was observed 2.5 feet south of this burial at approximately the same elevation.

Feature 46.—Two poorly preserved extended adult burials with an accompanying wealth of funerary goods were uncovered in squares N8–0, N9–0 at an elevation of 1.8 feet from datum. The burial area was oval in outline, measuring 6.0 feet (NW–SE) by 3.5 feet (SW–NE) with a thickness of about 0.5 foot. The burials occupied the center of this perimeter, alined in a NW–SE direction. They lay in dark mixed earth and were headed to the northwest. A covering of bark or similar organic matter about one-fourth of an inch thick had apparently covered the remains. Sections of the former had been preserved by the salts from the associated copper beads. Only the lower limb bones or the long bones of the burials were preserved. One patella bone was comparatively well preserved. A mass of white amorphous lumps were uncovered where the cranium of one of the burials should have been. These lumps when examined in the laboratory gave the chemical test for calcium phosphate, an indication of bone. Some of the fragments show cortical bone structure under magnification, hence we may infer that this also was part of the burial proper.

The wealth of data may be judged by the enumeration of the following artifacts recovered from this feature: 1 round stone ball (pl. 26*e*), 33 bone beads (pl. 25*e*), 164 copper beads, 2 chert blades, 3 fragmentary blades, 2 diabase celts (pl. 26 *i*, *j*), 2 hematite celts (pl. 26 *t*, *v*), 3 chert drills, 2 fragmentary chert drills, 28 chert flakes, 1 geode paint cup, 2 barite hemispheres (pl. 27 *h*, *i*), 1 limestone hemisphere (pl. 27 *j*), 1 grit stone or honing stone, 2 hematite paint stones (1 faceted) (pl. 27 *m*, *n*), 1 broken mussel shell, 1 small lot of shell fragments, 7 unworked sandstone pebbles, 1 silt-stone pebble, 2 stone tubes, 3 grooved whetstones and 3 fragmentary whetstones. A quantity of red ochre, yellow ochre, a deposit of graphite, and a small patch of white clay were also noted. The situation of some of these specimens is given in the following feature description.

The skeletal remains, apparently representing two adults lying side by side, were comprised of several poorly preserved lower-limb bones. These were found in the southern part of the feature. From the position of the long bones, these burials evidently headed northwest. The remains of the individual on the right or eastern side of the feature were better preserved than those on the left (western) side. Fragments of five long bones, among which were identified a femur, tibia, and fibula, belonged to the burial on the right side. Fragments of two unidentifiable long bones were recovered from the burials on the left side. At the feet of the former burial was a patch of red ochre and a cremation deposit, each lying under the distal ends of the bones. The cremation remains gave a very high phosphate test, such as one would expect of bone ashes. Several sandstones and a chert blade lay close to the feet. Across the knees was a string of bone beads. A lump of white clay lay about 1 foot below and to the right of the feet.

Several inches to the north of these skeletal remains were two barite hemispheres lying with the convex surfaces up. Close to them was a chert blade.

Lying in about the east-central part of the feature were two celts, a small pile of chert flakes, and a fragmentary shell. The latter was closely associated with one of the celts.

A large pipestone tube (pl. 25*h*) was recovered in two pieces about 1.0 foot to the north and east of the feature's center. It lay on a NW-SE axis with the blocked end to the southeast. A smaller pipestone tube occurred parallel to it in a similar position, 1.4 feet to the west. Some pieces of woody material about 0.05 foot thick were noted lying over the stone tubes.

Two patches of yellow earthy powder, a deposit of graphite, a round stone ball, a patch of white chalky substance, a chert blade, some shale stones, and a string of copper beads were uncovered in the northern part of this feature. Beneath the copper beads was a fragment of preserved bone stained by copper salts.

In the southern and western portion of feature 46 was encountered a group of nine flat shale stones which lay alined over a human lower-limb bone and some smaller bone fragments, the remains of the second individual in this grave. A large deposit of red ochre measuring 1.0 foot in diameter and 0.025 foot thick lay under the stones. The ochre was probably responsible for the reddish discoloration of the earth around these stones.

This was no unimportant burial if the wealth of nonperishable funerary goods is any indication. The remains lay in a matrix of gray soil. No evidence of log tombling or of any structure was noted.

Dark mixed earth occurred below feature 46.

Feature 47.—An oval-shaped burial feature was unearthed in squares N7E3, N7E4, N8E3, N8E4 at an elevation of 1.8 feet. The greatest diameter of this feature was 3.0 feet and the major axis was alined in an east-west direction. It was about 0.05 foot thick. The skeletal remains consisted of what was probably a reburial of the long bones of an adult. The bones, poorly preserved, were approximately 1.0 foot long. They lay in a thin stratum of brownish organic matter. Beneath the skeletal remains were a half handful of 68 small white quartz pebbles, the only associated material. These pebbles and bones lay to the east of the feature's center. Two of the pebbles were about twice the size of the others. Black mixed earth was found below the burial.

Feature 48.—The remains of a poorly preserved adult postcranial skeleton were found in squares N9W1, N9W2 at an elevation of 1.4 feet from datum. The lower-limb bones were among the major items recovered. They were found in a feature of somewhat irregular and poorly demarcated outline, measuring 2.0 feet (N-S) by 1.3 feet (E-W) with a thickness of 1.0 foot. Only traces of the pelvic girdle were present, while the pectoral girdle was absent. Some loose soil was scooped out of a small hollow where the head may have rested. A flint blade was recovered where the left shoulder may have been. This burial, lying in a mixture of dark earth, sloped somewhat. Associated artifacts include one fragmentary chert blade, one fragmentary faceted stone of hematite, and one small natural geode paint cup. The chert blade lay close to one of the bones.

Feature 49.—Some very fragmentary and poorly preserved long bones measuring about 1.0 foot in length were recovered in squares N5E1, N6E2 within a triangular bed at an elevation of 1.4 feet from datum. The outline of this feature measured 7.0 feet in diameter with a maximum thickness of approximately three-fourths of an inch. The bones, presumably of an adult, were lying on an east-west axis closely associated with a patch of red ochre. The latter deposit lay on the northern side of this feature. A string of copper and bone beads were recovered 0.25 foot to the west of the bones. Apparently the preservation of the skeletal material was due to the salts from the copper beads. A three-quarter grooved ax (pl. 26g) was found 1.0 foot to the north and east of the bones. An almost square depression 0.9 by 0.9 and 0.05 foot thick was noted close to the center of this feature. The earth in this particular square was somewhat harder than the rest of the feature, which was overlaid with an orange-colored deposit. The latter's depth was from about one-fourth to one-sixteenth of an inch with a trace of reddish earth or red ochre about one-sixteenth inch extending over all. This bed sloped perceptibly to the south, or outer edge of the mound. Another group of copper

beads, besides those mentioned above, was found in the lower central part of this feature arranged in a circle. A small patch of red ochre 0.1 foot deep, associated with six chert flakes, was uncovered to the east of the square depression. A deposit of whitish material was gathered from below the red ochre. Enumerating the remainder of the artifacts which were recovered from various parts of this feature, the total assemblage includes 1 grooved ax, 16 copper beads (2 strings), 1 fragmentary chert blade, 1 hematite celt (pl. 26*u*), 1 piece of reject chert, 1 flat round sandstone, and 1 ordinary pebble.

Feature 50.—The⁸ posterianal skeletal remains of an adult were found in square N10W1 at an elevation of 1.2 feet from datum, lying in an ovate-shaped lens of light-brown earth mixture. This feature measured 3.5 feet (N-S) by 1.5 feet (E-W) by 2.0 feet thick. Only traces of the upper limbs, the lower limbs, and the vertebrae remained, all in a poor state of preservation. There was observed a trace of the pelvic girdle. The pectoral girdle was absent. The lumbar vertebrae were 1.7 feet lower than the lower-limb bones. There was some reddish-brown earth to the left side of the burial. The bones were quite badly broken and disturbed by root tendrils. No associated artifacts were recovered other than a small natural geode cup stone which was found beneath the distal ends of the lower limbs. The skeleton was oriented with the head to the north.

Feature 51.—The poorly preserved cranial remains of an adult were found lying under a flat oblong stone in square N12E2 at an elevation of 0.5 foot from datum. This feature, measuring 2.5 feet in diameter and 0.1 foot thick, was circular in outline. The stone superimposed over the skull measured 1.0 by 0.9 by 0.2 foot. The burial occurred in a mixture of light-brown earth which contained a considerable amount of gravel. Closely associated with the remains were 1 barite bead (pl. 25*d*), 1 chert blade, 1 fragmentary chert blade, 2 nonferruginous celts (1 made from a flaked artifact (pl. 26*r*)), 1 drill point (pl. 28*n'*), and 4 projectile points. Feature 51 lay on a bed of red-burned earth which in turn lay on the sterile gravel stratum at the base of the mound.

SUMMARY

The 51 features⁸ found in Natrium Mound ranged in elevations from 8.4 to 1 foot from datum, or within a concentrational depth of over 7 feet (fig. 18 *A, B*). The bottommost feature was No. 28, located 1 foot above datum. The topmost feature was No. 32, a burial uncovered 8.4 feet from datum, or 3.5 feet from the mound surface.

⁸ The features were arbitrarily divided into two groups—those lacking skeletal evidence, and those containing recoverable skeletal data, as mentioned above.

The features were largely situated in the "primary mound," which consisted of a number of smaller included mounds in a matrix of dark earth. This in turn was capped by a secondary mound composed mainly of loose gravelly soil with a few dark earth stains running through it. There were fewer occupational evidences in the latter mound (figs. 16, 17).⁹

The earthwork seems to have been built by increments as the burials were added. The featural data conform to a single classificatory unit, the Adena complex. Therefore we infer that cultural stratification other than Adena is not present.

Features were interspersed throughout the center of the inner tumulus with two notably heavier concentrations, one at about 4 feet from datum, the other between 2 and 3 feet from datum. This evidence, indicative of a group deposition of the remains is deduced from the field data and notes. It was impossible, because of the conditions imposed, to lay bare all the burials, etc., level by level over the entire excavation.

Considering the top of the prepared yellow-soil cover (average elevation about 1.3 feet above datum) as the base of the mound, the greatest weight of all the features lies somewhere between 2 and 3 feet above the approximate center of the mound base. The majority of the largest and most important features were concentrated near the bottom. The greatest concentration of the burials (identified from skeletal remains) lay approximately 1 foot above the loam floor, decreasing in numbers sharply with increasing height from the base. The burial (feature 32), 8.4 feet above the base, is unusual with regard to this dispersion.

Significantly interesting to note, all the features discovered, except four (features 5, 36, 42, 48),¹⁰ contained observable evidence of former fires. Primary indications were patches and lenses of red-orange fire-burned earth of a loamy consistency pointing to the presence of intense fires. Delimited areas of charcoal, burned gravel, and fire-burned stones were secondary in profusion. Many of the associated artifacts were fractured or discolored by fire.

The importance of red ochre to the cultural complex is attested by the finding of recoverable quantities of this mineral in a little less than one-third of the features.

A pile of 16 burned and broken stones (feature 8) found about 12 feet north of the mound center could not be assigned to any particular purpose. The pile lay about 2 feet over feature 40. These stones may have been related to feature 34, a very productive burial, which lay just to the northeast on the same level.

Not all of the features are shown in the cross sections illustrated.

¹⁰ The latter three features were burials.

Careful attention was paid by the writer and his assistants to any signs of wooden structures, such as post molds. No actual post molds were found, other than the probable recent test hole outside the mound. There was some evidence of tombing, as in feature 43, where indications of a small wooden cribwork were found superimposed over an extended burial. Feature 41 also contained strong signs of some kind of entombment and covering. Feature 46 had definitely been covered with some kind of organic mantle like skins or bark.

What, perhaps, should have been the most productive feature of all (feature 28), the subfloor pit, was actually devoid of skeletal and artifactual remains, with the exception of a single projectile point. This pit, which seemed to be not quite long enough for an average-size extended burial, should not be confused with the hard, well-made clay basins of some mounds. Careful search failed to reveal any structural details within or directly outside this feature. Incidentally, the latter was situated a little to the east of center. The heavy degree of burning indicated and the large amount of ash-gray soil outside the pit points to the possibility that it may have been a cremation pit. It could have served for such use on successive occasions.

Caps of ash-gray soil (see Appendix 1 for description) were found superimposed over six features (Nos. 20, 30, 34, 40, 41, 43). This apparently was not a circumstantial coincidence. The texture of the soil resembles ash deposits, presumably the product of cremation fires.

Twenty of the fifty-one features contained osseous material in various stages of preservation, mostly very poor. Some of the burial remains were fortuitously preserved, such as copper-stained bones from several burials. This would immediately suggest that many of the remaining features, in all probability, were also burials from which the skeletal matter had since disappeared. It is not improbable that the acid nature of the mound had a great deal to do with the poor preservation of the skeletal remains. Acid soil of clay¹¹ or loamy texture is not particularly well adapted to the preservation of bones. The better-preserved skeletons at Natrium did not lie immediately on the patches of reddened loam¹² frequently associated with the features.

Cautiously speaking, one might say that mound burials are usually accompanied by burial furniture, with or without red ochre, an ob-

¹¹ According to pedologists or soil scientists (Kellogg, 1941, pp. 51-52, 71-72), clay has the greatest influence on the chemical activity of the soil. Because of its physical characteristics, clay tends to hold and concentrate a reservoir of soluble substances.

¹² These are the deposits which are probably synonymous with the "puddled clay" of Webb and Snow (1945, p. 73). Webb and Haag (1947, p. 68) claim that puddled clay when associated with a burial results in the total disintegration of the skeletal remains. According to these authors, this is caused by the acidity of the clay.

ervation strengthened by Webb and Haag's (1947, p. 68) comments. It is unnecessary to state that stone or nonperishable items were not the only offerings interred with the burials, since we have distinguished the remains of organic substances in several features. Some features in the first group (features 1-3, 8-11, 13, 23, 24, 26, 27, 29-31) lacked both skeletal material and artifactual data. On the other hand, some burial features (features 33, 36, 39, 42, 45, 47) contained no associated funerary objects. An exception might be made of feature 47 in which a tight clump of 68 pebbles was found. Hence, it is seen that we cannot use the criterion of grave goods, in this instance at least, to indicate whether we have burials or not. Perhaps the surest measure of ascertaining the former presence of burials is by chemical tests of the soils. (See Appendix 1.) A very high proportion of bone phosphate in a suspected area is a good positive clue to a burial or at least osseous matter.

Not much can be said regarding the physical remains of the Natrium Mound dead. The major remains, those identified, seem to be adult and male. In all, there were seven partial reburials and bundle burials (features 36, 39 [human?], 42, 45, 47, 49); six extended burials (features 33, 35, 43, 46, 48, 50) of which features 33, 48, and 50 represent postcranial burials; two cremations¹³ (features 37, 44) and two finds of crania (features 32, 51). Several of the extended skeletons were too poorly preserved for detailed study. Feature 48 lay at the feet of its neighboring burial, feature 50. There were no flexed burials. Some of the noncremated bones had blackened areas or spots, which may have been due to one or two causes—extraneous conditions imposed by the nature of the soil or the possibility that they had been coated with some foreign matter at the time of interment. Osseous fragments preserved by copper verdigris were also encountered. All of the adult teeth showed indications of heavy attrition. The presence of so-called "dental pearls" (Webb and Funkhouser, 1930, pp. 215-216), a type of enamel nodule deposited near the junction of the roots and crown, was observed on three molars from feature 36 and one from feature 43.

The cremated remains may represent communal deposits of the dead while the other burials may have been accorded the honor of separate interment. Whether the cremated bones are those of defleshed and dried bones or skeletons in the flesh, the writer cannot say positively. However, if checking of cremated bones is any sure indication of dried and defleshed bones (Webb and Snow, 1945, pp. 188-189), those examined appear to be defleshed, a circumstance

¹³ Five additional features (Nos. 22, 25, 34, 40, 46) were later found to have contained cremated remains. These remains, typified as lumps of whitish matter, tested physically and chemically as bone ash.

evident both in Hopewell and Adena burial customs. It is more frequently found in the former.

Mention has been made of the erection of small mounds of earth over several features. Viewed in horizontal plan, the long axes of the burials are oriented roughly parallel to the mound perimeter.

As a matter of cursory note, burial feature No. 34, containing the copper breastplate, appears to be one of the more interesting features uncovered (pl. 24*h*). It was one of the few burials capped with a low dome of ash-gray soil. The unusual circumstance was the association of the figurelike arrangement of the copper beads. They were undoubtedly draped over the burial in some kind of zoomorphic figure which had symbolic meaning. Parallels to this find are not known to the writer, although we can draw on similarities from effigy mounds, pictographs, etc. The breastplate was apparently one of the dominant items in this burial. The textile, a fragment of which was preserved under the copper plate, probably extended over the whole burial originally. A single piece of copper verdigris-preserved human bone and a small patch of bone ashes represent the total osseous remains. There appeared to have been a bark mantle covering the entire feature. There was no evidence of a prepared tomb construction of any kind present.

THE ARTIFACTS

INTRODUCTION

A trait list of the artifacts recovered from Natrium Mound is given below and is followed by a description of these specimens. This section is divided into five categories. These groupings with the included number of specimens are: Polished stone artifacts, 51; rough stone artifacts, 66; chipped stone artifacts, 263; copper artifacts, 709; and miscellaneous artifacts, 152. The latter grouping is a kind of catchall. Under these categories are grouped various subdivisions. The total artifacts (counting the beads, of which copper beads alone number 708 items) amount to 1,241 specimens. No mention can be made here of the artifacts supposedly recovered at an earlier date from Natrium Mound and in possession of the Arrick family. The writer examined several Indian relics which were reputed to have been unearthed from the top and side of the mound; but positive identification could not be made by the owner. Because of this uncertainty, these specimens are not included in the itemization.

Following the artifact descriptions is a summary of this section.

ARTIFACTS TRAIT LIST

Polished stone artifacts:

| | |
|--------------------------------|---|
| Ax, $\frac{3}{4}$ grooved..... | 1 |
| Balls, round stone..... | 2 |
| Birdstone..... | 1 |
| Boatstone, excavated..... | 1 |

Celts:

Nonferruginous stone:

| | |
|-------------------|----|
| Oblong poll..... | 11 |
| Rounded poll..... | 3 |
| Pointed poll..... | 5 |

Hematite:

| | |
|-------------------|---|
| Oblong poll..... | 7 |
| Pointed poll..... | 1 |
| Fragmentary..... | 1 |

Total celts..... 28

Gorgetts:

| | |
|------------------|---|
| Reel-shaped..... | 1 |
| Pendant..... | 1 |
| Semikeeled..... | 1 |

Total gorgetts..... 3

Hemispheres:

| | |
|-----------------|---|
| Hematite..... | 7 |
| Barite..... | 2 |
| Limestone..... | 1 |
| Silt stone..... | 1 |

Total hemispheres..... 11

Pipes:

| | |
|---------------------------------|---|
| Modified tubular (T-shape)..... | 1 |
| Tubular..... | 3 |

Total pipes..... 4

Total polished stone artifacts..... 51

Rough stone artifacts:

| | |
|--|----|
| Abrading or sinew stones..... | 3 |
| Honing stones..... | 7 |
| Whetstones or grooved silt stones..... | 13 |
| Pestle-shaped stone..... | 1 |
| Hammerstone (?)..... | 1 |
| Faceted hematite paint stones..... | 40 |
| Hematite cupstone..... | 1 |

Total rough stone artifacts..... 66

ARTIFACTS TRAIT LIST—continued

Chipped stone artifacts:

Blades:

| | |
|---|------------|
| Ovate base..... | 139 |
| Flat base..... | 57 |
| Stemmed rectangular base..... | 9 |
| Stemmed ovate base..... | 8 |
| Fragmentary blades, not classifiable..... | 5 |
| Total blades..... | 218 |

Projectile points:

| | |
|-------------------------------------|-----------|
| Flat-stemmed base..... | 17 |
| Ovate-stemmed base..... | 3 |
| Side-notched base..... | 2 |
| Base notched on one side..... | 2 |
| Ovate base..... | 2 |
| Triangular, crude (reject?)..... | 1 |
| Fragmentary specimens..... | 4 |
| Total projectile points..... | 31 |

| | |
|---------------|---|
| Scrapers..... | 1 |
|---------------|---|

Drills:

| | |
|----------------------------|-----------|
| Flat base..... | 4 |
| Pointed base..... | 2 |
| Rounded base..... | 1 |
| Rounded-stemmed base..... | 1 |
| Fragmentary specimens..... | 5 |
| Total drills..... | 13 |

| | |
|---|------------|
| Total chipped stone artifacts..... | 263 |
|---|------------|

Copper artifacts:

| | |
|------------------------------------|------------|
| Copper gorget, reel-shaped..... | 1 |
| Copper beads..... | 708 |
| Total copper artifacts..... | 709 |

Miscellaneous artifacts:

Beads:

| | |
|-------------------|-----------|
| Bone..... | 33 |
| Pearl..... | 36 |
| Shell..... | 2 |
| Barite..... | 1 |
| Total..... | 72 |

| | |
|---------------------------|---|
| Worked bones..... | 2 |
| Bear canine tooth..... | 1 |
| Worked piece of coal..... | 1 |

ARTIFACTS TRAIT LIST—continued

Miscellaneous artifacts—Continued

| | |
|------------------------------------|--------|
| White pebbles..... | 68 |
| Natural sandstone pendant (?)..... | 1 |
| Potsherds (Fayette Thick)..... | 2 |
| Pottery, odd fragments..... | 2 |
| Shells (worked?)..... | 2 |
| Textile remains..... | 1 |
| <hr/> | |
| Total miscellaneous artifacts..... | 152 |
| <hr/> | |
| Total artifacts..... | 1, 241 |

The artifacts in the trait list are discussed in detail under separate headings below.¹⁴ All the dimensions in the description are given in centimeters.

DESCRIPTION OF ARTIFACTS

POLISHED STONE

Grooved stone ax.—One comparatively thick $\frac{3}{4}$ -grooved ax (pl. 26g) of gabbro was recovered from feature 49. The groove is deep with prominent borders or flanges. The ax is 15.4 cm. long and about 85 percent polished. The butt is rather heavy compared to the bit which is tapered. The occurrence of a $\frac{3}{4}$ -grooved ax in an Adena Mound is interesting and appears to represent a new trait item. Webb and Haag (1947, p. 100) have listed the fully grooved ax (trait No. 230) as a new Adena trait. Griffin (1943, pp. 57-58) notes Putnam's finds of $\frac{3}{4}$ -grooved axes which the former classifies among Adena-Hopewell traits. Grooved axes are rare in Adena and in Ohio-Hopewell.

Round stone balls.—Two round balls were found associated in two Natrium features. One round or imperfectly spherical-shaped ball was found in feature 46. This ball (pl. 26e), made of dense stone, averages about 3.3 cm. in diameter. Another ball found in feature 20 is also an imperfectly shaped spheroid. It is about 4.5 cm. in diameter and similarly made of dense stone (pl. 26f).

According to Webb and Snow (1945, p. 88), stone balls are a rare Adena trait.

Effigy birdstone.—A birdstone (pl. 26d) of gray sandstone was found in feature 44 in association with cremation remains. The "bird" is a conventionalized figure showing the beak, head, and shoulders. The eyes are prominently extruded projections with flat surfaces on the ends. The diameter of the eyes is 1.1 cm. The figure has a short, thin slit 0.8 cm. long for the mouth. The base of the birdstone is a well-trimmed ovate platform measuring 7.0 by 4.1 cm. The whole

¹⁴ The artifacts are given Adena trait list numbers as compiled by Webb and Snow (1945) and Webb and Haag (1947) in the tabulation entitled "Adena Trait List, Natrium Mound" (p. 376).

bust is 4.5 cm. high. There are two conical perforations drilled at an oblique angle from the base end on the long axis. They taper from 0.8 to 0.4 cm. in diameter.

This is the first recorded instance of a birdstone, so far as the writer knows, which is definitely associated with an Adena Mound. This is one of the anomalies which places Natrium Mound out of the ordinary. A birdstone, itself considered a rarity in West Virginia, was found 200 yards north of the Beech Bottom Mound (Bache and Satterthwaite, 1930, p. 144).

A birdstone, illustrated in Moorehead (1922, ill. p. 139; text p. 136) from the Hopewell Mound area in Ross County, Ohio, bears a startling resemblance to the Natrium specimen. This poses an interesting problem of the cultural affiliations with the Hopewell complex. Birdstones are most numerous in the Ohio Valley, although they occur widely over the Northeast in general (Holmes, W. H., *in* Hodge, 1907, pt. 1, p. 148). Webb (Webb and Snow, 1945, p. 216) believes that birdstones were among a class of objects used as atlatl weights.

Boatstone.—A singular type of well-finished steatite boatstone (pl. 25*i, j*) was recovered, hollow end down, from feature 21 in association with a cache of over 100 chipped blades (pl. 24*i*). It is in the shape of a hollow bell, 4.5 by 6.7 cm. across the oval bottom and 5.5 cm. high. The walls average about 0.3 cm. thick and the depth of the hollow from rim to apex is 4.3 cm. There is a shallow groove 0.3 cm. wide running over the top of the boatstone on a longitudinal axis which terminates in two holes at either end. These holes, 0.5 cm. in diameter, are located 1.5 cm. from the base of the specimen. The upper outside periphery of these two opposing holes is smooth and there is some evidence of wear on the lower inside of these apertures. No great amount of wear is present on the sides of a central hole which is situated about midway on the lateral curving face of the boatstone. This hole, also 0.5 cm. in diameter, is 2.6 cm. from the hollow base. It is very likely that this object was suspended or tied by a string passing through the two opposite holes and fitting in the groove. No possible use for the single hole in the face of the boatstone could be determined.

True excavated boatstones do not seem to be recorded heretofore for the Adena complex, although Webb and Haag (1947, p. 100) list a copper boatstone from the Fisher site. Apparently this negates an earlier comment (Webb and Snow, 1945, p. 334) which disclaims the presence of boatstones in Adena.

Holmes and Fowke (*in* Hodge, 1907, pt. 1, p. 157) illustrate a boatstone almost identical to the Natrium Mound specimen. Tremper Mound, which Webb and Snow (1945, p. 213) list on their chart as composed of Adena and Hopewell elements—or at the bottom of

the Hopewell cultural ladder (Webb and Snow, 1945, p. 140)—contained several hollowed copper and stone boatstones (Mills, 1916, pp. 364–367). Pebbles were contained in the hollows of at least two of these objects.

Boatstones are thought to have been used as weights for atlatls or throwing sticks. However, the associated presence of pebbles in the hollowed part of these stones (at least in the Tremper Mound boatstones) would seem to pose a difficulty to their use as atlatl weights.

Celts.—Of the total of 28 celts recovered, there are 19 of nonferruginous stone, commonly gabbro—a nongranitic igneous stone—and 9 of hematite (one of the latter is broken). All except one of these specimens were found in associated features.

Nonferruginous stone celts.—The 19 nonferruginous stone celts range in length from 4.0 to 13.5 cm. or about an average of 8 cm. long. Eleven of these celts have square or oblong butt ends (pl. 26 *j* (damaged poll), *k*, *p*, *q*, *r*). Five have pointed and semipointed ends (pl. 26 *h*, *i*, *o*) and three have rounded butts (pl. 26 *l*, *m*, *n*). With the exception of three specimens, all the celts were made of diabase, principally gabbro stone. Two of the three specimens not of gabbro were made of cherty stone. One of the latter had been reworked from the midsection of a broken flaked blade (pl. 26*r*). The third specimen was made of gneissic stone which had deteriorated badly, although there are still some traces of the original polish present on some of the unrotted surfaces. Not all the celts of diabasic stone were well polished. Five specimens bore only $\frac{1}{2}$ to $\frac{3}{8}$ polish. In these cases, the butt ends were left rough-pecked (pl. 26 *j*, *k*).

Hematite celts.—One fragmentary celt, consisting of the bit end 6.5 cm. long (pl. 26*a'*), is included among the collection of nine hematite celts (pl. 26*s*–*a'*). Among these are seven rectangular and oblong polled butts and one pointed poll butt (pl. 26*z*) ranging in length from 3.0 to 12.0 cm. with an average length of 5.7 cm. The 12.0 cm. celt (pl. 26*s*) is out of the ordinary, since it is 5 cm. longer than the next longest specimen.

Hematite celts constitute nearly one-third of the total number of celts recovered, indicating that hematite was a popular material. Its strength and durability were probably much in its favor, making up in these qualities for the longer length and easier manipulability of the commoner nonferruginous stone materials.

Nonferruginous stone and hematite celts are listed by Webb (Webb and Snow, 1945, p. 88) as Adena traits Nos. 123 and 124, respectively. It is indicated that rounded pole-end celts are more common on

Adena village sites than other types. Hematite celts, while used by the Adena people, are reportedly not as numerous as celts made of other stones.

Gorget, stone.—Three gorgets of polished stone were found in Natrium Mound. These gorgets are reel-shaped, pendant-shaped, and semikeel-shaped, respectively (pl. 26 *a, b, c*). They are described in that order.

The reel-type gorget was found in situ in the general excavation of the mound-fill, unassociated with any other remains. It has concave sides and is made of banded gray slate, well polished all over. This artifact is 11.9 by 8.5 cm. across the wings at the greater dimension and 0.65 cm. thick. There are two conical holes drilled from one face only (uniconical holes). These holes are 0.7 and 0.75 cm. wide, tapering to apertures 0.25 cm. wide. They are 3.7 cm. off center.

The pendant-shape or suspension type found in feature 25 is made of banded gray slate. It is flat and trianguloid in outline with a single hole near the apex and expands to a width of 3.6 cm. at the base. Unlike the other specimens with drilled holes, these apertures (diameter 0.55 cm.) were bored from both sides (biconical holes). This gorget is 0.9 cm. thick at the central cross section, tapering toward the ends, and is well polished and smoothed all over.

The third gorget—a stray, encountered in the general mound fill (N12E2)—is the semikeel-shape gorget. This specimen is made of well-polished dark-gray banded slate with two perforations drilled from the flat underside. It has a flat rectangular base 9 cm. long by 5.1 cm. wide with a convex surface 2.9 cm. high. The holes are uniconical, tapering from a diameter of 1.05 cm. at the base to 0.35 cm. at the convex surface.

Gorget of the type described above are characteristic Adena traits listed by Webb (Webb and Snow, 1945, p. 85) as traits 112, 114, 115. The uniconical perforation is a particularly important and diagnostic Adena trait (*ibid.* p. 85, trait 116). It is suggested that the reel-shape and pendant-shape gorgets are true suspension-type ornaments, while the semikeel-shape gorget may be an atlatl weight. Webb (1941, pp. 211–212) in discussing reel-shape objects, intimates that the simpler shallowly concave-sided stone reel is the earliest of this type.

Hemispheres.—A total of 11 hemispheres were found, 7 of which were of hematite, 2 of barite, 1 of limestone, and 1 of silt stone. One possible hemisphere of soft white material also occurred. They have either rounded or ovate basal perimeters which are a little over 4 cm. in diameter. The heights of these specimens range between 2.4 and 3.0 cm.

Descriptions of the hematite and barite hemispheres follow:

Hematite hemispheres:

Feature 20.—One conical hemisphere (pl: 27*l*), well smoothed and finished. It is flat-bottomed, 4.2 cm. in diameter and 2.4 cm. high.

Feature 25.—Four ovate, flat-bottomed specimens, well finished all over. One hemisphere has charred textile remains adhering to the base. The dimensions given in the following tabulation are the heights and the maximum and minimum basal diameters, in that order:

Specimen (*a*)—3.0 by 5.2 by 4.4 cm.

Specimen (*b*)—2.8 by 5.0 by 4.3 cm.

Specimen (*c*)—3.0 by 4.5 by 3.7 cm.

Specimen (*d*)—2.8 by 5.2 by 4.2 cm.

These artifacts were found lying close together, convex side up.

Feature 40.—One specimen, 4.8 cm. in basal diameter and 2.4 cm. high. It is well finished all over (pl. 27*k*). There is a concavity on the under side 0.6 cm. deep and 3.1 cm. across. It was lying with the concave side up. This was the only concave-bottomed hemisphere recovered and the only one found with bottom up.

Feature 43.—One specimen, 4.3 cm. in basal diameter and 2.5 cm. high. It is moderately rounded at the top and well polished. The bottom is flat.

Barite hemispheres.—Two barite hemispheres (pl. 27 *h, i*) occurred in association with a burial, feature 46. The base of a chert blade was closely associated with them. The hemispheres are especially well polished and trimmed with plano-convex shapes. Both are ivory white in color, bearing a few yellowish-brown specks and discolorations. The dimensions are as follows: 4.7 cm. diameter by 2.5 cm. high; 4.2 cm. diameter by 2.7 cm. high. The former has a more circular basal perimeter and a rounded surface, while the latter's perimeter is somewhat ovate with a more pointed top.

Limestone hemisphere.—A badly rotted limestone hemisphere (pl. 27*j*), its convex side up, was found associated in the same burial above (feature 46) resting on some bones. Fragments of a flat bone, which evidently had completely covered the under side of the hemisphere, clung to its flat bottom. It is 2.5 cm. high and 3.8 cm. in diameter with a shape that is like that of half an egg.

Silt-stone hemisphere.—Another hemisphere of fragmentary, almost claylike-textured silt stone occurred in the feature 44. This hemisphere was practically disintegrated, leaving only a few measurable fragments. It originally had been 3.5 cm. in diameter and over 2 cm. high, so far as could be determined. It lay with the rounded surface up.

A white deposit of material roughly representing a flattened rounded pellet or possible hemisphere, 3.7 cm. in diameter and 1.8 cm. thick,

was found associated with the same feature. Its principal constituent appears to be a material high in calcium and phosphate.

Hemispheres occur as an Adena trait in various materials, including limestone, sandstone, barite, basalt, and hematite. The latter, according to Webb and Snow (1945, p. 89), are not very frequently found. They are considered to be rubbing or polishing stones or even abrading stones (Hermann, 1948, pp. 328, 332). Certainly all those recovered in the Natrium Mound have been considerably well polished and carefully shaped. It does not seem probable that such well-trimmed objects were used as utilitarian pieces, especially in the presence of cruder objects which could have served the same supposed purpose. However, no alternate possibility can be offered for their use.

The measurements given for the specimens above are average for this group of items. The occurrence of so many hemispheres in one mound is singularly interesting.

Pipes.—Four stone pipes, including one modified and three tubular pipes, were recovered.

Modified tubular pipe.—A light-tan, fine-grained sandstone T-shaped pipe (pl. 25*k*) was found in feature 41 associated with other burial goods. It is smoothed but not well polished. There are two parts to the pipe, a somewhat curved barrel 14 cm. long drilled for the bowl to a depth of 8 cm. where the mouthpiece—a tapered platform appendage—meets it. The mouthpiece is 3.2 cm. at the broadest width and 5.5 cm. long (the latter measurement to the bowl's center). The stem hole, of slightly ovoid shape, is 0.7 cm. in diameter. The barrel measures 1.4 cm. on the inside diameter and 2.0 cm. on the outside diameter at the mouth.

This type of pipe is commonly called the "modified tubular pipe."¹⁵ A similar modified tubular pipe with a flattened mouthpiece illustrated by Mills (1916, p. 362, fig. 89) was recovered from a Hopewell (Tremper) Mound which Webb (Webb and Snow, 1945, pp. 140, 196, 214–215) postulates as an "early" Hopewell site. It may have been partly contemporaneous with Adena sites. This mound yielded a large and important collection of typical Ohio Hopewell platform and effigy pipes, placing the finding of the lone modified tubular pipe in an anomalous position.¹⁶ According to Mills (1916, p. 362) this specimen was part of another contemporaneous culture, which he wrongly designated as Fort Ancient (Webb and Haag, 1947, pp. 89–95). The modified tubular pipe is noted by the same authors (*ibid.* p. 100, trait No. 219) as an item "not heretofore listed" as an Adena trait. The Fisher site was declared to be a late Adena site by the above

¹⁵ It seems to the writer that but little modification would be necessary to turn the modified tubular pipe into the true platform type pipe.

¹⁶ Three tubular pipes also occurred in the Tremper Mound.

authors, thus specifically indicating the relationship of the modified tubular pipe.

Tubular pipes.—Three polished-stone tubes of the flat-based or blocked-end kind were found with associated remains at Natrium. All the tubes are of gray pipestone, commonly called Ohio pipestone or Ohio fire clay. They are of varying shades of light-gray color with interspersed speckling of white. All the tubes were exceedingly well finished, and it is obvious that especial care had been taken in their manufacture. The final polish was applied longitudinally, as indicated by the finish streaks. The largest of the tubes was broken when found in place, indicating perhaps that the breakage had occurred at the time of interment. Each one of the pipes has patches of dark stains or clots which are unevenly distributed on the surfaces. These discolorations may have come about from the minerals in solution in the soil, or from the nature of the presumably associated—and since deteriorated or decayed—matter. Two of the pipes contained small pebbles about the size of large peas. It is not certain exactly how deep within the tubes these pebbles occurred, but they were originally well within the bores. Both of these pellets were of stone, one a well-worn quartz pebble; the other, of rough granular sandstone. The reason for their association is not known to the writer. The contents of each of these pipes was a dark sand containing small flecks of what proved to be burned carbonaceous matter.¹⁷ Two of the tubes are moderately blackened on the inside while a third shows little discoloration. Each of the specimens exhibits circular striae on the inside derived from the scoring action of the borer. The holes at the base end are somewhat off center, suggesting that the position of the hole at the blocked end was determined by the course of the boring from the mouth to the base. The finishing touch of these apertures was performed at the base end once the barrel hole had been pierced through.

The pipe measurements are as follows: Specimen from feature 43 (pl. 25*f*) is 14.5 cm. long, 2.5 cm. in diameter at the mouth, 2.4 cm. in diameter at the middle and 3.3 cm. in diameter at the base. On the inside dimensions it is 1.8 cm. in diameter at the mouth and 0.65 cm. in diameter at the basal hole. There is approximately a 0.15-cm. thickness of brown crust at the basal end. This pipe had a quartz stone pellet (pl. 25*g*) in it. The exact positioning of the pellet within the tube was uncertain upon discovery. It seemed to have come from well inside the pipe, associated with the sand and carbon particles.

The large tube from feature 46 is 31.0 cm. long (pl. 25*h*). Its outside diameters at the mouth, middle, and basal sections are 2.8, 3.0,

¹⁷ Tests made on samples of this matter by the Federal Bureau of Investigation did not yield any conclusive evidence (letter July 21, 1950).

and 3.8 cm. respectively. Its inside diameters are 1.8 and 0.5 cm. at the mouth and basal hole. This pipe had a burned pebble of sandstone in it. The pellet came from well within the pipe. Another tube, 22.5 cm. long, from the same feature measures 2.6, 2.0, and 3.5 cm. on the outside diameters of the mouth, middle, and basal sections. It measures 2.0 and 0.7 cm. on the inside diameters at the mouth and basal holes. No foreign matter other than charred matter and sand was found inside the bore.

The chemical composition of the stone material is presumably identical with that given by Mills (1916, pp. 290-291) for the Ohio fire-clay tubes.

The writer is inclined to accept Bache and Satterthwaite's (1930, pp. 152-154) conclusions that these pipes were probably used for ceremonial smoking. Kercher (1949, p. 62) also believes that at least one of the tubular clay pipes which he reports was used for smoking. Webb (Webb and Snow, 1945, pp. 86, 334) casts doubt upon the use of stone tubes for smoking purposes, seeming more inclined to accept them as shaman medicine tubes.

The tubes for Kentucky illustrated by Webb (1940, fig. 34, p. 56) have tapered or beveled mouthpieces, quite unlike the majority of those found at the Beech Bottom Mound (Bache and Satterthwaite, 1930, pls. 8, 9, 10, 16, 17), which are like the Natrium Mound finds. These pipes have flat-based mouth ends, of which some are flared. The materials used are also Ohio pipestone. The technique of manufacture of the Natrium Mound tubes agrees with that described by Bache and Satterthwaite (1930, p. 152).

ROUGH STONE

Honing stones and abrading or sinew stones.—Seven stones which may be classified as honing stones (pl. 27 *c, d, e*) were recovered from feature 46 and three sinew stones or abrading stones were found in features 35, 40, and 46 (one in each). The honing stones are handy-sized flat pieces of natural sandstone, which exhibit signs of attrition or wear on one or more surfaces and on the ends. These stones are not to be confused with the whetstones, since they do not bear the grooves of the latter. Neither are they of the same composition, since the honing stones are of more gritty sandstone while the whetstones are of finer silt stone. Although honing stones are not unusual as a class of utilitarian artifacts, their occurrence in a mound associated with a burial is apparently out of the ordinary.

The abrading or sinew stones are of light-tan-colored, fine sandstone. Edges of the sinew stone from feature 35 (pl. 27*a*) bears especially deep cuts, one of which cuts the long axis of the specimen on both sides. The stones from features 35 and 40 have cut marks

on both surfaces while the abrading stone from feature 46 (pl. 27*b*) is cut on one side only. These marks are especially deep at the perimeters.

Documentation of finds of these objects is poorly represented. It is probable that many of these artifacts were lumped in the whetstone category. Webb and Snow (1945, p. 89) list trait No. 127 as "abrading stones," which presumably includes the objects described above.

Whetstones or grooved silt stones.—Thirteen so-called whetstones or grooved tablets were found associated with other featural material in the mound. Broken or fragmentary whetstones are the rule rather than the exception. All the tablets, which are made of silt stone, are flat, and approximately palm-size, apparently for easy handling. They have one or more grooves worn on either one or both faces. The grooves average about 5.0 cm. long by 0.8 cm. wide by 0.15 cm. deep. They are shaped like shallow troughs.

Experiment with some of the smaller hematite celts showed that they fitted in the grooves very well when held sideways on the long axis. This suggested the possibility that these silt stones may have been used as shaping stones for hematite celts. Further examination of the shallow troughs disclosed that some of them had at least one end which is prowlike in shape. This may have come about from the bit end of the celt breaking the softer edge of the silt stone as the ferrous stone was rubbed back and forth in the groove. One specimen (pl. 27*f*) found in feature 35 throws additional light on the use of these grooved silt stones. This artifact was recovered with an associated faceted hematite stone in situ in one of the grooves. Not only does this piece of hematite (3.8 cm. long by 0.9 cm. wide) fit its groove, but it may be juxtaposed into the four other grooves on the same face of the stone. The facets of this oblong hematite piece may be fitted equally well into the four grooves on the opposite side of the silt stone. There are traces of brown hematite rubbings on the latter artifact. The origin of these rubbings is obvious enough. However, in addition there are some red ochre stains on the stone (none in the grooves) which seems significant. Trial shows that the hematite when rubbed on the silt stone gives a brownish deposit, not the bright red of the ochre powder so abundant throughout the mound (see red ochre under Analyses of Soil Samples and Mineral Materials in Appendix 1).

A grooved silt-stone tablet which occurred in feature 46 was partially covered on one side with a thick coating of sulfur-colored, claylike material. This material had a lumpy texture, and looked as though it had been once of pastelike consistency. It is possible that it had been worked on the grooved stone. Two other grooved silt stones bear an association to other foreign material in this category.

One from feature 32 (pl. 27*g*) is partially encrusted on its top surface with about a 0.1 cm. thickness of black granular matter, an organic residue, which seems to be a product of combustion. Another grooved silt stone found in feature 40, was recovered also in situ partially covered with a heavy thickness of crumbly white substance. This coating, which showed the effects of intense heat, proved to be very high in phosphate content, indicating that it was probably bone ash or cremation residue. Microscopic examination showing particles and casts of boney spicules confirmed this.

Grooved tablets¹⁸ are supposed to have been commonly used in the manufacture of bone implements like bone awls, and in the shaping or sharpening of heavier stone items. The functional possibilities for this class of objects other than as whetstones should not be overlooked. The fortunate discovery of the faceted hematite stone associated with the grooved silt stone suggests that other similarly grooved stones may also have been used in the reduction of paints.

Pecking stones and hammer stones.—One large burned sandstone cobble found in the mound fill (square N10E1) shows evidence of battering on the ends, which may indicate its former use as a hammer stone. Feature 7 yielded one interesting sandstone pebble with a pestlelike shape. It is 11.7 cm. long, 3.5 cm. thick, and has somewhat pointed ends. Indications of wear by abrasion and attrition are not very conspicuously marked on this specimen.

These stones are listed by Webb and Snow (1945, pp. 88, 89) as Adena trait No. 126.

Faceted hematite stones.¹—Forty pieces of worked and faceted hematite stones were found in eight of the mound features. These specimens are identified by provenience and are described as follows:

Feature 25.—Two faceted lumps of hematite.

Feature 35.—One roughly worked piece of hematite, two irregularly faceted lumps, and one oblong-faceted piece of hematite. The latter was found in one of the grooves of a whetstone.

Feature 37.—One angular-faceted lump of hematite.

Feature 41.—Sixteen angular and irregular pieces of hematite, all showing usage on one or more surfaces in weak to moderate amounts.

Feature 43.—Eleven angular fragments of hematite showing slight to moderate wear by rubbing and three lumps of ferruginous stone which have been battered and worn by attrition.

Feature 44.—One faceted piece of hematite.

Feature 46.—One faceted chunk of hematite.

Feature 48.—One faceted piece of hematite.

Inspection reveals that these ferruginous stone fragments may be roughly grouped into four categories, depending on the amount and

¹⁸ These tablets should not be confused with engraved tablets (Webb and Snow, 1945, pp. 91-96).

kind of usage. Two of the more heavily rubbed stones are illustrated (pl. 27 *f*, *m*).¹⁹ The next in order (pl. 27*o*), are angular specimens showing heavy rubbing on only one side. Rectangular chunks of hematite with fair to moderate amounts of usage (pl. 27*p*) are followed by irregular lumps (pl. 27*q*), which shows marks of hammer blows. One specimen (not illustrated) seems to have been blocked out as a hemisphere.

These faceted and battered hematite stones were undoubtedly used for the derivation of powder for paint. Mention already has been made of the oblong-faceted stone found directly associated with a grooved silt stone. Hematite hemispheres, which are well-finished objects, are apparently in a class by themselves, and should not be included in the same category as these purely utilitarian rubbing stones. The latter are certainly not as specialized in form as the hemispheres, which may have been nonutilitarian in function, although this cannot be proved.

As a matter of cursory interest, these ferruginous stone objects fall well within the range of Moorehead's (1912, p. 69, fig. 1) distribution of hematite artifacts. Triangular and irregular fragments of worked hematite are generally found throughout the Ohio Valley. Hematite does not appear to be an abundant trait of the Hopewell culture, as pointed out by Moorehead (1912, p. 92). Webb and Snow (1945) do not mention these artifacts anywhere in their list of Adena traits other than referring to the hematite hemispheres (*ibid.*, p. 89).

Cupstones.—One limonite cupstone (pl. 27*r*) was recovered in feature 46. This specimen is of natural origin, with no observable marks other than a slight smoothing of the lip to indicate further adaptation. Other naturally formed stones of ferruginous origin were recovered in features 4, 48, and 50.

CHIPPED STONE

In the chipped-stone category, there are 263 whole and fragmentary specimens, including 218 blades or knives, 31 projectile points, 13 drills, and 1 scraper. All except 12 of these artifacts were found in association with the various mound features. The materials range in color from a light-tan chert through degrees of browns, grays, and greens to black. The typical material represented is a rather dull, light-tan-colored chert.

Knives or blades.—The workmanship of this group seems to fall into two categories of finish and flaking perfection. The preponderant number, probably blanks, seem to have been almost carelessly chipped with no especial excellence to be noted. A minority of the blades, the larger ones, exhibit more perfection and care in the chipping technique.

¹⁹ Plate 27, figures *m*, *n*, illustrates the obverse and reverse sides of the same object.

The greater majority of the former blades appear to be almost uniform in shape, size, and material. Even the workmanship has a degree of sameness about it. A cache of 109 blades recovered from feature 21 is an example. Apparently they were manufactured, perhaps in haste, solely for the occasion, since the primary and secondary flaking is of an unusually crude quality (pl. 28 *h, j-o*). The under side of many of the cruder specimens exhibits the curvature and imperfections of the original spall.

Four types of bases may be differentiated among the blades, serving as distinguishing criteria for comparison purposes. The type bases are: (1) The round or ovate base, which gives the blade a leaf-shape or ovate appearance (pl. 28 *a-j, n, o*), (2) the flat base which gives the blade a trianguloid effect (pl. 28 *k-m*), (3) blades with flat-based, straight-sided stems (pl. 28 *p, q*), and (4) blades with round or ovate-based stems (pl. 28 *r-w*). An examination of blade types discloses that 139 of the total have rounded bases or an oval-leaf shape. In decreasing frequency there are 57 flat-based or trianguloid-shape blades, 9 flat-based stemmed blades, and 8 round or ovate-based stemmed blades. Fragmentary specimens such as midsections naturally could not be included in this typological analysis.

The blades range in length from 6.8 to 22 cm. (pl. 28*u*). The average length is closer to the lower figure, between 9 or 10 cm. long. Thirty-eight blades are over 12 cm. long, and of these, 14 are about 14 cm. in length (the latter blades occurred in one cache in feature 22). Maximum blade breadths vary from 2.5 to 5 cm., with an average close to 4 cm. wide. They are lenticular in cross section, ranging from 0.6 to 1.4 cm. thick, with an average of about 1.0 cm. thickness.

As noted in the descriptions of the mound features, many of the associated blades and knives show evidence of having been subjected to fire. Physical changes resulting from the burning are shown by some discoloration of the specimens, such as chalky areas on an otherwise tough brittle surface, and surface patches of black tarlike organic matter up to 0.1 cm. thick. This latter substance is characterized by a series of linear impressions like that left by bark or similar material, perhaps part of a covering. Several of the blades have been fractured, evidently by intense heat.

Blades were found heavily coated with red ochre in three features (features 4, 22, 25). In feature 4 these artifacts were lying in such a thick deposit of red ochre that it had to be brushed away in order to expose the blades.

Leaf-shape blades or knives are very abundant in the Adena complex and blade caches are not out of the ordinary (Webb and Snow, 1945, pp. 82-83). Leaf- or ovate-shape blades are most common at Natrium, which conforms with a typical Adena trait. It is interesting

to compare the large group of blades found at Beech Bottom Mound with the Natrium Mound specimens. Representatives of every one of the blades illustrated in the Beech Bottom report (Bache and Satterthwaite, 1930) may be found in the Natrium collection. In addition, there are some flaked specimens from the Natrium Mound which are not duplicated at Beech Bottom. The characteristic blade type at both sites is the leaf or ovate shape. However, the rounded-stemmed base blade, which is the second type in frequency at Beech Bottom, is poorly represented at Natrium. The trianguloid (flat-base type) blade is not represented at Beech Bottom. The significance of this is not known. The Beech Bottom Mound was only partially dug, which could allow for this difference in artifactual representation.

Projectile points.—There are 31 flaked artifacts classified as projectile points in the collection. Six specimens of the total are fragmentary or broken. With the exception of three projectile points, all were found in association with other aboriginal remains. Of the three specimens mentioned, one is fragmentary and the other (triangular) is of extremely crude workmanship.

The projectile points range in lengths from 3.6 cm. to 7.8 cm., the majority falling between 4.5 to 6.0 cm. long. In the order of their frequency, 27 of the points may be categorized in the following types: Flat-stemmed base, 17 (pl. 28*b'-f'*); ovate-stemmed base, 3 (pl. 28*x, y*); side-notched stem, 2 (pl. 28*g'*); stem notched on one side, 2 (pl. 28*z*); ovate, 2 (pl. 28*a'*); triangular (crude), 1 (pl. 28*h'*). They are lenticular in cross section, averaging about 0.8 cm. at the maximum thickness. The crude triangular point and the points notched on one side are probably accidents of workmanship.

The material is of the same range of cherts used in the manufacture of the blades. The colors are dull, varying from light tan through browns and grays, to black.

There is nothing unusual in these types (disregarding the probable accidents of workmanship) since they are well represented in the Adena complex. The stemmed (parallel sides) projectile point is recognized as the most common Adena point. It is usually large and heavy.

Scrapers.—Only one stone scraper, associated with other goods in feature 20, was found in Natrium Mound. It is 6.3 cm. long and 2.4 cm. wide, and of light-colored chert similar to Flint Ridge flint. This specimen was originally a large flake with approximately parallel sides tapering toward the butt end. Inspection shows that the distal end was use-retouched. The scraper is somewhat discolored by traces of clinging red ochre which originally covered it.

This type of flaked implement is a common Adena trait.

Stone drills.—In the collection there are a total of 13 chipped-stone drills of which 5 are broken or fragmentary. The colors of these chert specimens range from light milky-pink to black. They range in length from 4.7 to 19.8 cm. The drills may be classified according to four distinctive base types, viz: (1) Flat base—4 specimens (pl. 28 *j'*, *l'*, *m'*); (2) pointed base—2 specimens (pl. 28 *n'*, *o'*); (3) rounded-stem base—1 specimen (pl. 28 *k'*); (4) rounded base—1 specimen (pl. 28 *i'*). With the exception of the two pointed-base specimens which are almost rhomboidal when viewed endwise, all the drills are lenticular in cross section.

Three of the drills show decided wear and polish from attrition to the point end. Presumably these drills were used for the boring of the tubular pipes and other stone objects.

Stone drills of the types described above may be duplicated from other Adena sites.

COPPER

Copper reel gorget or breastplate.—A copper reel-shaped gorget (pl. 25*a*) was found associated with a piece of woven fabric (pl. 25*b*) in feature 34. The textile remains were discovered under the gorget, preserved by the copper salts. It is described under the category, "Textile Remains."

The copper gorget is slightly convex with two holes bored near the center. The convex side was found facing upward. It is 14.2 by 10.1 cm. across the wings and averages a little over 0.1 cm. thick. The two center holes—0.4 cm. in diameter and 3.7 cm. apart—were drilled from the convex surface only. These holes do not show any wear at the edges, such as one would expect if the gorget had been suspended by the holes for any length of time.

Webb and Haag (1947, p. 100) list copper gorgets as a trait (No. 221) not heretofore acknowledged as belonging to Adena.

In the diagrammatic representation of the outline forms of the reels by Webb (1941, p. 208), this copper reel falls in the simplest category. It is likely that this particular reel shape was copied after the earlier stone pattern (Webb, 1941, pp. 213–215).

Copper beads.—All the 708 copper beads were found in strings associated with other remains in nine of the mound features. Frequently the string holding the beads together was preserved by the salts emanating from the copper. Some of the beads were badly corroded and cemented together. Occasionally a fragment of bone from a burial was also preserved in a feature otherwise barren of skeletal material.

On the basis of dimensional sizes, at least nine size types (pl. 25*e*, *upper*) may be segregated. As many as three bead sizes occurred in a feature. The beads ranged from 0.2 to 2.1 cm. in length and from 0.2

to 1.0 cm. in width (outside diameter). The holes ranged from 0.1 cm. in diameter to 0.5 cm. The largest and heaviest beads recovered were found in feature 34, represented by 60 beads of a string of 169. These beads were quite thick and solid with somewhat bulged sides. They average 1.0 cm. wide with holes of 0.5 cm. in inside diameter, and 0.6 cm. in length. The smallest beads were recovered in a string of 61 beads from feature 38. These average 0.2 cm. wide with holes of 0.1 cm. in diameter. They were 0.2 cm. in length. With the exception of some long beads, the rest of these artifacts range between these extremes, width and length matching within 0.1 cm. and the wall thickness measuring from 0.05 to 0.1 cm. The exceptional beads mentioned are from a string of long beads recovered from feature 41. They are 2.1 cm. long, with an outside diameter of 0.65 cm. and a hole diameter of 0.4 cm. The ends, viewed in cross section, are well overlapped; the sides are flat and the orifices are oblong or somewhat squared.

The copper beads in the Natrium collection show as much as a quarter circumference of overlap. Each bead apparently had been smoothed and the rough edges had been ground down. As a final touch, the beads were placed on an anvil with the hole flat and beaten just enough to bulge the sides. Naturally, since the aboriginal copper worker did not have any stamp or die from which to blueprint and reproduce his bead, each of these had to be individually and painstakingly manufactured.

Webb and Snow (1945, pp. 99-100), who list copper beads as Adena trait No. 181, claim that sheet copper was rolled into hollow cylinders and cut into varying bead lengths from "0.25 inch to 1.5 inches." Presumably the bead sections were cut with stone saws, evidence of which was not found in the mound. While this process of manufacture from large, rolled sheets may have been used in some cases, the writer, after a study of the Natrium beads, is inclined to accept Bache and Satterthwaite's (1930, p. 14) assumption that in this case the beads were made ". . . by rolling strips of thin copper of the desired size."

The copper beads, according to a sample study made by Dr. George Ellinger of the National Bureau of Standards,²⁰ were not cold-worked as commonly supposed. They were manufactured over a range of moderately elevated temperatures, as indicated by metallographic and metallurgical study. That the archeologist will have to reorient his thinking about primitive American copper work is a conclusion also drawn previously by Wilson and Sayre (1935, pp. 109-112).

²⁰ Dr. Ellinger's report is given in Appendix 2.

MISCELLANEOUS

Beads:

Bone beads.—Bone beads, relatively scarce in the Adena complex, are represented from Natrium Mound by a string of 33 disk beads (pl. 25c) recovered from across the knees of a burial in feature 46. These beads, very crumbly and poorly preserved, were made of flat, smoothed bone, presumably of mammal. The average bead is 1.6 cm. in diameter and 0.3 cm. thick. The circumferences are not perfectly circular, and the thicknesses range between 0.2 and 0.4 cm. The holes, which are often slightly ovoid in shape, appear to have been bored from both sides. Their diameters are slightly over 0.4 cm. and less than 0.5 cm.

Bone beads are an Adena trait (No. 160) according to Webb and Snow (1945, p. 96).

Pearl and shell beads.—Thirty-six pearl and two shell beads were found draped over a Natrium Mound burial (feature 40). These beads are represented by six dimensional sizes as listed below. All were drilled from both sides. These beads were strung on the same cord with copper beads (pl. 25e, lower). The copper salts from the latter stained the outer surfaces of these beads.

TABLE 1.—Beads from a Natrium Mound burial

| Number of beads | Outside diameter | Diameter of holes | Thickness or median length |
|-----------------|------------------|-------------------|----------------------------|
| | <i>Cm.</i> | <i>Cm.</i> | <i>Cm.</i> |
| 3 | 0.9 | 0.4 | 0.8 |
| 10 | .8 | .3 | .6 |
| 6 | .8 | .4 | .4 |
| 12 | .5 | .2 | .5 |
| 5 | .4 | .25 | .45 |
| 2 | .7 | .4 | 2.4 |
| 38 | | | |

The first five dimensional sizes of beads, round and flattened-round beads, were apparently made from fresh-water *Unio* pearls. They present a range of diameters from 0.4 to 0.9 cm. with a thickness of 0.4 to 0.8 cm. The last group of 2 beads of the tubular type were made from the columella of large, unidentified marine gastropod shells. All the beads are fair in preservation, although a few are badly exfoliated and partially disintegrated.

Pearl beads are quite rare in the Adena complex. Columnar or tubular shell beads made from the columella of large gastropods are more frequently encountered in burial associations (Webb and Snow, 1945, p. 99).

Barite bead.—One barite bead (pl. 25*d*) was recovered from feature 51. This bead is a flat circular disk perforated from both sides. Its diameter is 1.7 cm. It is of uneven thickness, varying between extremes of 0.2 and 0.7 cm. The hole, imperfectly drilled and centered, is 0.5 cm. in diameter. Barite beads are apparently a new Adena trait, although Webb and Snow (1945, p. 90, trait No. 136) note that there have been aboriginal attempts to make beads of barite.

Worked bones.—A fragment 10.3 cm. long and 2.4 cm. wide of worked mammal bone was found associated with feature 46, a burial. This piece, 0.6 cm. thick, is plano-convex in cross section. Both ends of this object have been broken. One end narrows somewhat, as though for a point. Despite the checks and condition of poor preservation, it is evident that the bone had been well finished, judging from the polish on the surfaces. There is a small area of red ochrelike stain on the flat undersurface. An over-all patchy discoloration of black matter is also present. The origin of the latter was not ascertained.

Another worked-bone artifact, represented by a small handful of extremely brittle bone fragments, was found in association with feature 35, a burial. Three sections of the specimen total 10 cm. in length when pieced together. Two fragments show polish. Since the condition of the specimen is so fragmentary, there is some question regarding its form and probable use.

Bear canine tooth.—One fragmentary bear canine tooth was found associated with a cache of blades in feature 21. This tooth fragment, a little over 2 cm. long, represents the crown only. Unfortunately, no evidence of work can be discerned on it. However, its presence is significant since Webb and Snow (1945, p. 334) claim that no perforated or cut animal teeth are found in the Adena complex.

Worked coal.—A rectangular piece of hard coal, 1.5 by 1.3 by 0.4 cm., was found in the center of one of the bead strings associated with a copper reel in feature 34 (fig. 24*h*). The coal seems to have been carefully trimmed. There was no way of determining exactly how this object could have been tied to the string of copper beads, since holes for suspension or other indications of fastening are absent.

White pebbles.—Sixty-eight white quartz pebbles were found associated with a burial in feature 47. These pebbles were found in a little area about 1½ inches in diameter, as though they had been contained in a bag. The pebbles do not appear to be of any distinctive kind, being very similar to those gathered on any beach or stream bank. With the exception of two larger pebbles, they measure about 0.9 cm. long with proportionate widths and thicknesses. The two larger pebbles are 2.0 cm. long. It is highly probable that these pebbles may have been contained in a bag of some kind as had been men-

tioned, or perhaps in some more solid container equally vulnerable to decay. William C. Mills (1916, pp. 366-369) reports the finding of pebbles about the same size, which were recovered in the hollow of copper boatstones and copper cones at Tremper Mound. The use of the pebbles is problematical. They may have formed part of a set of appurtenances, such as fetishes, for promoting the personal welfare of the owner.

Natural sandstone pendant.—A single-holed flat, ovate stone was found unassociated in the mound fill. This specimen is quite smooth and lacking in sharp and abrupt edges, as though it had been water-worn. A hole, 1.1 cm. wide, was perforated from one side only, tapering to a diameter of 0.9 cm. on the reverse side. There is some doubt regarding the origin of the hole, since its inner dimensions are slightly belled out, a phenomenon not usually encountered in drilled holes. Even the striae one normally finds in drilled holes are absent. Considering this piece of sandstone from all points, it appears that it may have been a naturally perforated, water-worn pebble which either may have attracted the curiosity of the mound builder or was casually included in the mound fill.

Pottery.—Fragments of what were originally two small sherds identified by James B. Griffin²¹ as Fayette Thick ware were found in square N13E2 at an elevation of 2.2 feet from datum. These sherds were not associated with other artifacts or feature data, and may have been accidentally included in the mound fill. The pottery is reddish brown in color, 1.3 cm. thick, heavily tempered with coarse fragmentary stone particles and very friable. The outer surface bears cord-marked impressions while the inner surface shows a slight roughening. Griffin (*in* Webb and Snow, 1945, p. 244) suggests that Fayette Thick pottery, an Adena trait (*ibid.*, p. 102, No. 200), may be equated with an early manifestation of the Adena complex.

Pottery, odd fragments.—A small fillet of grit-tempered pottery was found in the excavation spoils. This fillet, 2.5 cm. long, was evidently finger-modeled. It is dark red in color, rather coarse in texture, and does not seem to have been subjected to firing, judging by its softness.

Another larger piece of hand-modeled light-brown clay, fashioned into an oblong shape, was found in the mound fill. It is unfired and coarsely sand-tempered. The specimen is 6.0 cm. long, 3.5 cm. wide, and 2.0 cm. thick. The surfaces which have not been broken or otherwise eroded are rudely smoothed as though this artifact had been consciously modeled into shape. Since this object was found in the mound fill, nothing definite can be said concerning it, except that it

²¹ Director, Museum of Anthropology, University of Michigan, Ann Arbor, Mich.

seems to belong to the class of so-called Poverty Point type problematical clay objects found to range in time from Tchefuncte to the Coles Creek stage in Louisiana (Ford and Quimby, 1945, pp. 31-32). These, however, were fired.

Shells.—One large piece of shell was found in feature 46. This shell is a fresh-water mussel shell of local origin.

Several other fragments of local fresh-water mussel shells were found in mound features and in the mound fill.

These shells may have been worked, although they are so fragmentary that certain identification cannot be made.

Textile remains.—One solitary fragment of woven textile (pl. 25b) was preserved by the copper salts from a copper gorget found in feature 34. This bit of fabric, 8 by 12 cm., presumably the remnant of a larger example of textile art, lay under the gorget, assuming the outline shape of the latter in its preservation. The warp and weft cords are both distinct enough to make the identification of the weave. The warp cord was the poorer preserved of the two cords. The type of weave is called "plain twining" according to Miner (1936, p. 186, fig. 3) and "single twined weave" according to Webb and Funkhouser (1931, p. 383, fig. 84). It is a very simple weave. Single heavy warp cords are held in parallel position by lighter paired weft cords which pass at right angles to the warp, one cord on either side. The warp cords are bound close together by the weft cords, which in this example are 0.3 cm. apart from center to center. The weft cord, a little less than 0.1 cm. in diameter, is composed of two strands which are twisted in a clockwise direction. The coarser warp cord, about 0.15 cm. in diameter, seems to have been made from one strand twisted slightly in a counterclockwise direction. The weft cord is the stronger and more flexible of the two cords. This pliant cord may have been made from the silky fibers of a species of milkweed (Carey, *in* Webb, 1941, p. 187), although this is purely conjectural thinking, since no analysis of the cord was made. The coarser structure of the warp strands indicates that another kind of material was used, although it is also unidentified.

There is a small 3-by-6-cm. patch or impression of light furlike material extending along the width edge of this piece of textile. It is of parchment thinness. It may have been a bit of the hide of some small furred mammal.

One of the cords of the heavier copper beads is especially noteworthy, since it represents a deviation from the commoner cordage type found at Natrium Mound. It is composed of two strands of vegetal material twisted together in a counterclockwise direction, forming a cord 0.15 cm. thick. A third single strand (0.10 cm. thick) of the same fibrous material is wound around the heavier cord in a clockwise

direction. The strands of the cord are twisted approximately five turns to the centimeter, while the single outside strand is wound approximately one and a half turns to the centimeter.

Fragments of cords of another kind of material were found preserved by the copper beads. These cords, up to approximately 0.4 cm. thick, appear to have been made of single strips of hide, laterally compressed and rolled to form rounded thongs. The identification of the cord substance is not certain, since unfortunately it has not been analyzed by a specialist at this writing.

SUMMARY OF THE ARTIFACTS

Some of the artifacts are especially significant since they represent new classes of objects to be added to the material trait list of the Adena complex. This seems to be the first recorded instance of an effigy birdstone from an Adena mound. True excavated boatstones were also not heretofore recorded for Adena. Several of the recovered objects are rarely mentioned for this culture, such as pearl beads and the copper reel gorget. For a mound of this size, there appeared to be a comparative wealth of artifactual remains.

An unusual number of celts and hemispheres were recovered. The celts, of which a good proportion were of hematite, were largely of the rectangular or oblong-poll type, in contrast to the rounded "pole end" celts more commonly found on Adena village sites. The majority of the hemispheres were of hematite of which one had a concavity on the flat surface.

Three tubular pipes and one modified tubular pipe were recovered, which strengthen the cultural link probabilities and possible temporal coincidence of Natrium Mound with an early Hopewell culture (Tremper Mound in Ohio), as Webb and Haag (1947, p. 93) have similarly suggested for the Fisher site. There are indications that the tubular pipes were smoking pipes.

Of note also is the grooved silt-stone tablet which was found in direct association with an oblong piece of faceted hematite. This poses another more probable usage of these grooved tablets which have been commonly called whetstones, bone awl sharpeners, etc.

Metallurgical analysis of one of the copper beads shows that a kind of metallurgy was practiced by the prehistoric Indians at Natrium. The metal was worked hot which runs counter to common supposition.

In comparing the "selected developmental traits" from Natrium Mound with Webb's (Webb and Snow, 1945, p. 213) chronological bar chart, it is seen that eight of the Natrium Mound material culture traits cover a wide span ranging from early Adena to middle Hopewell. Two traits (grooved axes and flat subrectangular stone celts) are listed as artifacts of early Adena; cones, reels of stone and copper, are listed

as artifacts of early Hopewell and Adena; and three traits, including a bear canine tooth, use of copper objects and effigy atlatl weights, are categorized as artifacts of middle Hopewell. Tubular pipes are also listed as early Adena artifacts, but they are of the constricted mouth-piece type, while the Natrium Mound specimens are of the blocked-end type. However, considering the total assemblage, as exemplified by the Fortney Mound on the same chart, Natrium Mound is certainly an Adena site. There is a lack of the more typically Hopewellian traits, such as ear spools, obsidian, human effigies, mica, etc.

Likewise, the finding of cones and boatstones on the Fisher site (Webb and Haag, 1947, pp. 88-89),²² like the stone pipes, points to probable contemporaneity of Natrium Mound with this late Adena site and to possible close cultural association with the Tremper Mound, an early Hopewell site.

In short, so far as can be ascertained from the artifacts themselves, following the established precedent of comparing link traits and associations, we must deduce from the evidence that Natrium Mound is a late temporal manifestation of the Adena culture.

SUMMARY

The following trait list summarizes, in tabular form, the Adena cultural traits²³ for Natrium Mound. These traits have been mentioned above in the course of describing the explorations, features, and artifacts. The place of their occurrence in the mound is given following the trait item.

Seventy-four of the traits correspond, in general, to those already published. Natrium Mound has contributed 11 new traits which have been provisionally appended to the list. It is evident that Webb and Haag (1947), in adding new material to the rather comprehensive tabulation drawn up by Webb and Snow (1945), realized that the addition of new traits to an already compiled and classified list complicated it. It is to be expected that at some future time these additional data will have to be incorporated under their rightful places in the various subheadings of the Adena summary.

ADENA TRAIT LIST, NATRIUM MOUND

MOUND AND BURIAL TRAITS

No.

7. Mound conical.
9. Mound in circular enclosure.
13. Mound shows stratigraphy.
14. Primary mound contains midden.
15. Secondary and later sections of mound built of sterile gravelly earth.
18. Mound shows individual loads of earth.

²² It is suggested by Webb and Haag (1947) that boatstones have an origin earlier than Adena.

²³ Compiled from the trait list for the Adena complex drawn up by Webb and Snow (1945) and Webb and Haag (1947).

No.

21. Fired areas on mound surface.
22. Primary purpose of mound to cover burials.
23. Mound built by increments as burials were added.
24. Constructional(?) use of stone. Feature 8.
25. Horizontal log tombs built on bark-covered clay floor. Feature 43(?).
26. Single log rectangle about body. Features 41(?), 43.
27. Subfloor pit dug below earth surface. Feature 28.
28. Earth embankment around subfloor pit. Feature 28.
40. Mound erected over subfloor pit.
54. Circular fire basins.
55. Fire basins with burned stones. Features 13, 19, 46.
63. Cremations, total, left in situ. Features 37, 44.
70. Cremated remains redeposited with burials. Features 34, 40, 46.
72. Communal deposit of cremated remains. Feature 37.
73. Artifacts burned with the body. Features 21(?), 32, 41, 44, 46(?).
74. Unburned artifacts placed with redeposited cremations.
75. Artifacts intentionally mutilated(?) when deposited with cremations. Features 21, 46.
76. Cremated remains accompanied by red ochre. Features 37, 40, 44.
77. Body extended burial. Features 45, 48, 50.
79. Body extended in log tomb, singly. Feature 43.
81. Multiple extended burials in same grave. Features 33, 35, 46.
82. Important central graves. Feature 28(?).
83. Use of bark in graves. Features 5, 34, 40, 41, 46.
84. Use of puddled clay in graves. Feature 49.
85. Red ochre on skeleton(?). Feature 46.
86. Red ochre, lumps or granules in mound. Features 7, 12, 14, 15, 21, 22, 25, 26, 28, 34, 35, 37, 38, 40, 41, 43, 44, 46, 49.
87. Red ochre on artifacts. Features 4, 22, 25, 49.
89. Graphite in graves. Features 20, 46.
92. Burial of isolated skull. Features 32, 36, 51.
96. Skeletons bundled. Features 39, 42, 47, 49.

ARTIFACT TRAITS

97. Blanks, flint. Features 25, 34, 41, 43, unassociated find.
98. Celts, flint. Feature 51.
101. Leaf-shaped blades or knives. Features 4, 12(?), 20, 21, 34, 35, 40, 41, 43, 51, unassociated finds.
102. Leaf-shaped blades deposited in cache. Features 4, 17, 21, 22, 32, 40.
103. Stemmed projectile points deposited in cache. Features 4, 25, 40.
104. Projectile points, stem with parallel sides. Features 4, 21, 25, 28, 34, 35, 41, 43, 51.
106. Projectile points, side notched. Features 20, 41.
107. Drills and reamers. Features 21, 35, 38, 40, 46, 51.
110. Scrapers, side, flint, flake. Feature 20.
112. Gorget, reel shaped. Unassociated find.
114. Gorget, semikeeled, rectangular base. Unassociated find.
115. Gorget, flat (triangular). Feature 25.
116. Gorgets conically perforated from one side only. Unassociated finds and Feature 21.
117. Pipes, tubular (blocked end). Features 43, 46.
122. Stone balls. Features 20, 46.

No.

123. Celts, granite and other igneous rock. Features 20, 25, 35, 40, 43, 44, 46, 51.
 124. Celts, hematite. Features 6, 20, 21, 35, 41, 43, 46, 49.
 126. Hammerstones, flint concretions and sandstones. Features 38, 41, 46, 49, unassociated finds.
 127. Abrading stones. Features 35, 40, 46.
 130. Hemispheres, limestone, sandstone. Features 44, 46.
 131. Hemispheres, barite. Feature 46.
 132. Hemispheres, hematite. Features 20, 21, 25, 40, 43.
 134. Pestle (?). Feature 7.
 137. Concretions or fossils. Unassociated finds, Feature 4.
 139. Geodes, cuplike. Features 4, 46, 48, 50.
 142. Tablets, rectangular (see trait No. 229).
 160. Beads, bone. Feature 46.
 163. Teeth, animal. Feature 21.
 167. Spatula, flat bone sections. Features 35, 46.
 173. Shell spoons (?). Features 12, 20, 35, 46.
 177. Pearl beads. Feature 40.
 178. Cylindrical shell beads. Feature 40.
 181. Beads, rolled copper. Features 5, 15, 16, 22, 32, 34, 38, 40, 41, 46, 49.
 200. Fayette Thick pottery. Unassociated find.
 210. Plain twining (textile). Feature 34.
 219. Pipe, modified tubular. Feature 41.
 221. Copper gorget or breastplate. Feature 34.
 229. Whetstones, sandstone (see also trait No. 142). Features 7, 32, 35, 40, 46, 43.

NEW ARTIFACT TRAITS

The following artifact traits recovered from Natrium Mound were not heretofore listed as Adena traits. They are provisionally added to the end of Webb and Haag's (1947, p. 100) list. New mound and burial traits are also included.

- Three-quarter grooved ax. Feature 49.
 Boatstone, perforated and excavated. Feature 21.
 Birdstone. Feature 44.
 Barite bead. Feature 51.
 Worked-coal object. Feature 34.
 White quartz pebbles associated in burial. Feature 47.
 Battered or faceted lumps and pieces of hematite. Features 25, 32, 35, 37, 41, 43, 44, 46, 48.
 Deposit of manganese dioxide. Feature 44.
 Zoomorphic figure. Feature 34.
 Pellet in tubular pipe. Features 43, 46.
 Mound situated on terrace not subject to overflow.

Naturally the traits enumerated above are only representative of the burial complex, since there were certainly hosts of other more destructible items now lost to us. The burial complex, in turn, can be only selectively representative of the total cultural complex.

CONCLUSION

This mound is but one of the many tumuli originally found on the West Virginia side of the Ohio River. It is feared that with the

increasing encroachment of industry on the shores of this river, the remaining evidences of aboriginal occupation will be destroyed there. Unfortunately our record of aboriginal earthworks in West Virginia, like the rest of the archeological record in the State, is very meager and wanting in detail. None of the earthworks recorded by Cyrus Thomas (1894) for West Virginia comprise an adequate fount of information. They are characterized by terse and brief comments which only serve to whet the appetite of the research worker and interested student. In truth, many of the earthworks described in the nineteenth century seem scarcely to deserve the distinction of being even partly explored.²⁴ Even if the data from Natrium Mound were unimportant, we could at least remark that these data, as well as the exploration, were reasonably complete.

Natrium Mound was on one of the greatest highways in the East, the Ohio River. The latter offered to the prehistoric aborigines an easy route of access into the more distant regions. Webb recognizes two centers of Adena occupation, the main concentration on the Scioto River in lower Ohio and the other, the lesser known, on the Kanawha River near Charleston, W. Va. (Webb and Snow, 1945). There seems to have been another concentration, albeit a minor one if the body of evidence is conclusive, at Moundsville or Grave Creek in West Virginia. Some 47 tumuli and evidences of an earthen wall have been located there by De Hass (n. d.) and Hennen (1909, p. 12).

On the basis of the evidence, Natrium Mound represents a single cultural occupation. The few unassociated finds (pottery, gorgets, etc.) in the mound fill do not represent strong exceptions to this statement. Grounding our evidence on comparative cultural traits, we deduce that this earthwork is related to the group of sites classified by Webb (Webb and Snow, 1945, p. 219) as late Adena. In this group are represented, among others, the Beech Bottom Mound, the Fortney Mound, the classic Adena Mound, and the Fisher site (Webb and Haag, 1947). Unfortunately, the aboriginal dwelling place at Natrium could not be located.

Webb (Webb and Snow, 1945, p. 219) asserts that there appear to be sites of both early and late Adena in Ohio and Kentucky, while West Virginia sites appear to be late Adena. To the hypothesis that West Virginia mound sites seem to be late in terms of Webb's analysis, we offer Natrium Mound as further corroboration. It sounds plausible to assume that Natrium Mound may have been a culturally peripheral structure, both figuratively and literally. A cultural lag seems to have carried it well into early Hopewell times. This is reflected in the presence of such Hopewellian traits as the birdstone

²⁴ Natrium Mound and Beech Bottom Mound (Bache and Satterthwaite, 1930) are the only mounds in West Virginia described in the literature since Cyrus Thomas' (1894) work.

and the excavated boatstone, occurring apparently contemporaneously with objects of patently Adena type. On the other hand, artifactual remains of what has been called early Adena type (e. g., flat subrectangular stone celts, grooved stones) are also included in the list of traits from Natrium. Granting that these may have been survival traits, we are confronted here with the fact that we have a curious assemblage of mixed items, all presumably within one temporal horizon. It is hoped that in the future we will be able to make further assessments of this problem with more archeological exploration of the upper Ohio drainage.

In terms of chronologies, Willey (1949, fig. 9) places the date of the Adena horizon roughly about A. D. 400 succeeded by Hopewell.²⁵ Natrium Mound represents a culture status (Burial Mound 1 Stage) that was midway between the first springings of an agricultural and ceramic-using aboriginal plane and one that was agricultural and ceramic-using of more complex cultural order.

Apparently the practice of erecting tumuli over the dead was already well established by the time Natrium Mound was built. We assume that the construction of such earthworks had a religious and ceremonial significance. The erection of burial mounds necessitated social cooperation and a dependable means of food supply necessary for a sedentary population. The varied disposition of the dead at Natrium Mound does not speak for any strict uniformity. This may have arisen from the possibility that modes of burial accorded the deceased differed with the place of the individual in his society. Even with the paucity of skeletal evidence, there are indications from the remains that the individuals represented must have been largely part of the adult population. The few remains that could be identified as to sex were male. The highly specialized burial equipage, including weapons of the hunt, warfare, and ceremonial objects, also strongly suggest masculine activities. We infer from this that there was probably some kind of social, religious, and/or military hierarchy among the Natrium Mound aborigines. Apparently such institutionalized practices were not out of the ordinary for people of the Adena culture.

The construction of Natrium Mound was undoubtedly premeditated and planned well in advance. Following the apparent stripping of the topsoil, there was laid down a stratum of yellow loamy earth. In the approximate center of the area was dug a subfloor pit over which a primary mound was erected. The latter contained the

²⁵ According to one of the findings of the recent carbon-14 tests (Arnold and Libby, 1951, pp. 114-115), the order of temporal sequence for Hopewell and Adena is reversed. Even with the high order of accuracy attained by these chronological tests (Arnold and Libby, 1949), an early Hopewell date preceding that of Adena is viewed with some skepticism by specialists in the light of what is known at present about Adena and Hopewell cultures.

greater portion of the features found in the mound. One of the distinguishing criteria of this inner mound was the presence of gray-soil heaps of rather loose texture resembling mixed ash deposits. These deposits were invariably hummock-shaped in profile. They were conceivably the product of cremations and fires at the mound site. Over the top of the primary mound was added another heaping of earth, called in this report the secondary mound. The latter did not add much materially to our data, other than the inference that the soil seems to have been collected from immediately around the tumulus creating a kind of moat or ditch of appreciable width.

No aboriginal earth quarries were observed in the near vicinity, although a portion of the present modern gravel pit could have been used. No noticeable rise in elevation was present at the site above the general terrace level which could have been taken advantage of in the erection of Natrium Mound. The latter was located on the terrace above the flood bottom, apparently in keeping with a recognized custom. The aborigines must have realized that the occasional river floods inundating the bottom terraces would have destroyed or damaged their funerary structures. This phenomenon of mound location on the second or third river terraces seems to be quite general. Cyrus Thomas (1894, p. 436) has made reference to this practice on the Kanawha River in West Virginia.

The excavation technique and equipment employed at Natrium Mound proved to be unusually satisfactory. The bulldozer, substituted for the horse and scoop shovel ordinarily used, was certainly the most expedient piece of equipment available. To carry on an excavation of this earthwork with only four regular workmen in the number of 20 days allotted for the job would certainly not have netted the results obtained by slower methods. Indeed, the time would surely have run out long before the completion of the excavation.

Once the features—of which 51 are recorded—were exposed, they were carefully examined, charted, and photographed. Particular attention was paid to changes in soil composition and soil samples were taken of each range of demarcation. Laboratory examination of the soil samples yielded pertinent information which otherwise would have gone undetected. Especially revealing were the analyses for the available bone phosphate, disclosing that there were more burials than originally accounted for by osseous material alone.

No elaborate structural tombs, or indications of post molds suggesting houses, were found. Although it was expected that there may have been post molds in the basal layer, the search for them proved fruitless.

Salvaged from the possibility of total loss to archeology, Natrium Mound represents a further contribution to our knowledge of the

burial phase of the Adena culture. The archeological evidence presented in this report permits us to enlarge the scope of our understanding relative to what must have been a highly dynamic order of cultural change in the life of late Adena man.

APPENDIX 1

ANALYSES OF SOIL SAMPLES AND MINERAL MATERIALS

Soil samples.—Thirty soil samples from various parts of Natrium Mound were sent to the Department of Agriculture for examination and analysis. These samples were checked for the available phosphate present, the pH value, and the textural terminology as recognized by the soil specialists. The available phosphates tested for are the bone or calcium phosphates which were graded according to the amount present in each sample in five degrees of concentration. They were *very low, low, medium, high, and very high*. Since the preservation of artifactual and skeletal material depended, in large part, upon whether or not the soil was acid or basic (acid soil is a notoriously poor medium for the preservation of organic material), it was determined to get an analysis of the pH factor or the hydrogen ion value. Remembering that a pH value of 7.0 is neutral, values above this figure constitute a basic or alkaline medium, while values below pH 7.0 are acid. For the sake of uniformity, it was decided to have a soil expert's identification of the textural quality of the samples. The archeological importance of the analysis for bone phosphate has been demonstrated with great success in northern Europe (Clark, 1936, pp. 19–22).²⁶

What appeared to be the more important featural data were sampled for soil analysis. All the red and yellow ochre, white lumps of material, and similar anomolous and extraordinary soils were saved for laboratory examination. These are more fully described later.

The whole of the mound fill was acidic to a moderate degree, ranging in hydrogen ion concentrations from values of pH 4.5 to pH 6.3. The general level of acidity falls closer to the lower figure, or higher acidity.²⁷ One check sample of sterile soil taken outside the mound at a depth of 3.0 feet below stake N2–0 gives a pH value of 5.6. It

²⁶ The method depends on the fact that in areas of intense human settlement, the phosphate content of the soil, owing to the decay of discarded bones, tends to be considerably higher than in areas merely contiguous to such settlement, and much higher than in those areas completely beyond the bounds of settlement. It has been found, in fact, that the soil of an area of intensive settlement may contain easily as much as 50 times the proportion of phosphate as ordinary soil. There is a specific unit of testing for phosphate content called a phosphate degree which is equivalent to a yield of $\frac{1}{1000}$ percent of phosphate under the action of citric acid at a strength of 2 percent. The writer did not use this method of degree measurement, since he did not perform the tests himself.

Two Swedish scientists, O. Arrhenius (1930), who evolved the method, and Ivar Schnell (1932), who applied it successfully, are credited with introducing this technique to archeology.

²⁷ Attention is drawn to the fact that a solution with a pH of 4 is 10 times as acid as one with a pH of 5 and 100 times as acid as one with a pH of 6.

indicates *very low* in available phosphate. This soil had a loam texture.

Three samples were taken of basal deposits in features 14, 28, and 43. All three were *very high* in phosphate content, the pH's being 4.5, 4.7, and 6.4, respectively. The soils were classified texturally as loam and silt loam. Only feature 43 in this group was a burial with observable skeletal material. The others were a lens of red burned earth (feature 14) and the central pit (feature 28). The test for phosphate would seem to indicate whether or not skeletal material had been present in a feature, making allowances for contamination from extraneous sources. Presumably features 14 and 28 also represent burials, shown by the very high amount of phosphate present, undoubtedly the result of disintegrated and decayed bones.

No doubt the majority of, if not all the rest of the features lacking skeletal material, were also burials. Frequently all that remained of the osseous matter in undoubted burials were a few bones fortuitously preserved by copper salts.

Gray-soil samples.—Encountered in the course of excavations were pockets and lenses of grayish soil which seemed to have been purposely deposited (fig. 19 A).

The soil color ranged from gray to light brown, and was quite loose or light-textured, unlike the more compact soil of the mound fill surrounding it. It had the characteristics of mixed ashes and loamy earth with some included pebbles. It was obviously not natural earth, such as that encountered in sterile soil zones.

Beginning at a depth of 4 feet from the top of the mound in the center, the gray soil was found occurring in a series of isolated and contiguous lenses down to base level. It capped several features (Nos. 20, 30, 34, 40, 41, 43). The greatest concentration lay in the eastern and northern areas. It is not known how much of the gray soil had been disturbed by Wells' intrusive excavation on the southern side of the mound. Although the demarcations between lenses could be distinguished since the gray soil was easily recognizable, the rapid nature of the exploration forestalled any attempts to follow them out at leisure. The largest body of gray soil observed covered feature 41. The soil was superimposed as a sort of blanket over a greater part of the yellow loam layer, the prepared basal layer of Natrium Mound. In no case did the loam lie above the gray soil. The latter soil, for some inexplicable reason, cut through the loam in a portion of the east-central part of the mound base.

Laboratory examination and analysis of four samples of gray soil showed that it was *very high* in available phosphate, indicating that it was heavily contaminated with this matter. All the specimen samples were acidic, the pH values ranging from a pH 6.0 to pH 4.7.

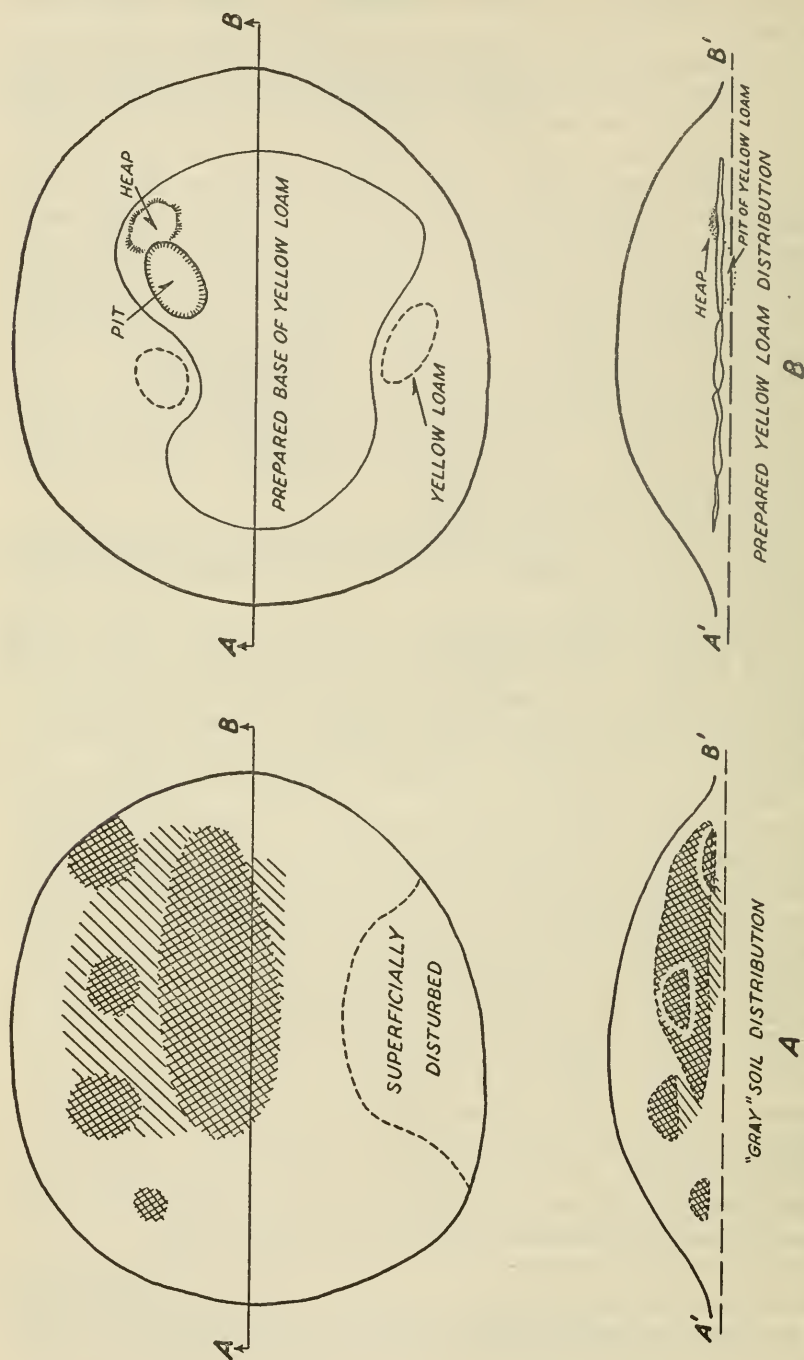


FIGURE 19.—The gray-soil and yellow-loam distribution in Natrium Mound.

The textures were those technically described as either coarse sandy loam, or coarse loamy sand. We infer from the high phosphate content that this soil probably may have been part of cremation hearth sweepings, or the product of some kind of combustion in which bony matter played a part. It is interesting to note that a sample of soil, not gray soil, found directly beneath one of the gray-soil layers, contained 1 degree less phosphate content (*high*) (pH 4.6). We may surmise that there was some natural percolation of mineral-bearing water in the mound. Root tendrils, which were plainly visible during the course of the excavation, probably had much to do with the course of the water's percolation.

The prepared mound base.—A layer of yellow soil (fig. 19 B), a kind of almost impervious sterile loam, was uncovered at the base of the mound, lying directly beneath the gray-soil bed and the dark soil. The yellow soil was most frequently associated with the gray soil. The former, like the latter, was intentionally deposited for some purpose by the aborigines. Apparently it had been brought to the spot from elsewhere, probably from the riverbank, since it did not occur naturally in the immediate vicinity. Almost claylike in composition, the yellow soil was mixed with a moderate amount of pebbles. This deposit, outlined in the course of the excavation, averaged about 8 inches thick. Its over-all thickness ranged from 6 to 10 inches with an extreme thickness of 2 feet in a pit. Its elevation above the datum line was approximately 1.3 feet, or ranging from 10 inches to 2 feet above datum. Viewed in ground plan, the bed, which occupied the central portion of the mound, was shaped like a constricted ovate, with two outliers of small lenses to the north and south of the main body. The latter measured about 40 by 35 feet, the longer measurement being on the E-W axis. There was an oval-shaped pocket of yellow loam 10 feet long and 5.5 feet wide in the northeast part of the mound. This pocket or pit, which was basin-shaped in vertical section, extended into the subsoil for a depth of 2 feet. There was a small heap of the same yellow soil 1.5 feet high to the immediate northeast of this pit. Underlying the prepared floor was sterile subsoil consisting of loose sandy and gravelly soil mixed with inclusions of black shale. This soil is evidently part of the Ohio River terrace gravels. No intervening layer of humus or sod was visible between the yellow soil and the subsoil. From this it may be inferred that the sod or humus was stripped from the mound area before the floor was laid down.

Laboratory examination indicates that the yellow loam (one sample) had a low phosphate content, and a pH of 4.5. It was texturally classed as coarse sandy loam. The fact that the loam lacks phosphate to any degree is not surprising, since it appears to be

relatively pure and uncontaminated soil. The sterile and undisturbed gravelly soil beneath the loam layer had even a lesser amount of phosphate, or *very low* content according to analysis of one sample. It was classed as coarse loamy sand. Since clay soil such as the yellow loam is less permeable than a sand, it follows that the hardpan of yellow loam must have acted as a kind of hindrance to permeable solutions in the mound, sealing off the more permeable subsoil from the mound proper.

The reason for the occurrence of the pit and heap of yellow soil on the mound periphery, as noted above, is not certain. The soil was not naturally deposited, that much we are sure of. Vertical sections were carefully checked. It may be that the earth was dumped there originally, to be redeposited later over the mound area. Speculating further, the pit may have been a kind of mixing trough where the loam was made more plastic for the preparation.

MINERAL MATERIALS

Graphite.—Approximately three-quarters of a teacupful of black graphite granules was recovered from the mound (feature 46). These lumps vary from approximately 0.7 cm. in size to the consistency of powder. Another small patch of graphite occurred in feature 44. Graphite is one of the Adena traits (Webb and Snow, 1945, p. 79). The closest recorded instance of the occurrence of this mineral in a related Adena mound is at Beech Bottom, where graphite was found as small grains or pebbles, the largest diameters varying between 0.5 and 1.0 cm.

Manganese dioxide.—A small deposit of bluish matter and associated discolored earth, comprising about 2 tablespoonfuls, was recovered from square N9E2, feature 44. This bluish deposit, upon examination, proved to yield a manganese dioxide stain, apparently accounting for its color. The occurrence of manganese dioxide from other related mounds is not recorded to the writer's knowledge. Presumably this mineral was intentionally placed in association with other funerary material. It was probably a paint derivative.

Red and yellow ochre.—Red and yellow ochre were found in relatively great abundance in Natrium Mound. At least 18 pounds of red ochre, and about 6 ounces of yellow ochre were recovered from burials and other features. Red ochre seems to have been a favorite mineral among the Natrium Mound builders because traces as well as fairly large deposits were found throughout the tumulus. One of the heaviest deposits of this mineral was exposed in feature 4 (pl. 24g), where it covered a cache of flint blades.

Three samples of red ochre were tested from Natrium Mound by the soil specialists for phosphate content, acidity, and texture. The

red ochre was found to be *very high* in phosphate content, on the acid side ranging from pH values of 4.5 to 6.3, and loamy in texture. It was not immediately determined by the analysis why the red ochre was so high in phosphate content. The possibility that it may have become contaminated from association with the phosphates of the feature should not be overlooked. However, in view of the fact that other small deposits of earth (yellow ochre and whitish matter), not red ochre, found in similar situations lacked such appreciable amounts of phosphates, leads to suspicion that the phosphate was an introduced ingredient.

The composition of ochres in their natural conditions include Fe_2O_3 , Al_2O_3 , SiO_2 , H_2O , and small amounts of alkalis, but no phosphate. A significant statement by a geologist is:

The term "red ochre" as commonly used applies to earthy and pulverulent forms of the minerals, hematite and limonite, but which are almost invariably more or less impure through the presence of other metallic oxides and argillaceous matter. In nature the material rarely occurs in a suitable condition for immediate use, but needs first to be prepared by washing and grinding, and perhaps roasting. (Merrill, 1905, p. 100.)

In addition, Merrill (1905) states that the colors of the ochres are dependent on the degree of hydration and oxidation of the material and the kind and amount of impurities. The colors are intensified or otherwise varied by roasting.

It is entirely plausible that the intense heat, as indicated by many of the features, probably contributed to color changes in the ochre. On the other hand, we are not sure whether or not the Adena people practiced ochre roasting consciously, introducing into the mixture other materials. The problem of red ochre should be elucidated further.

We know that the prehistoric Indians laboriously mined red and yellow ochre and white kaolin—at least we have one well-honeycombed mine on record near Leslie, Mo. (Holmes, 1919, pp. 266–270; Holmes *in* Moorehead, 1912, pp. 59–64).

A simple test was made by the writer to determine if red ochre could have been derived from hematite. Upon rubbing a small fragment of this stone upon a streak plate, it became obvious that the hematite streak, a dark brown color, was different from the color of the ochre, a bright red. This test was suggested by the recovery of grooved silt stones and faceted hematite stones in Natrium Mound. One particular grooved silt-stone artifact was found in situ with an oblong-faceted piece of hematite in one of the grooves (p. 341). It is entirely possible that the powder or hematite rubbings could have been converted to red ochre by roasting it, driving off the water con-

tent. Such necessary temperatures were well within the reach of the aborigine.

Yellow ochre is less commonly found on Adena sites than red ochre. A thickness of hard, lumpy, impure yellow-ochre material was found coating a grooved silt stone in feature 46. Other small deposits of the stuff were found in association with other features. Analysis of five samples of yellowish earth or yellow ochre reveals that they all lacked the high amount of phosphates found in the red ochre. Two of the analyses showed *very low*, two *low*, and one *medium* phosphate content. The texture was "coarse sandy loam" in three samples, and "loam" in two of the samples. The acidity ranged from values of pH 4.2 to pH 5.2. The yellow ochre seemed to be in its natural state, or, at least, naturally lacking in phosphates, except for a slight possible contamination.

It is evident from this brief appraisal that the question of the aboriginal usage of ochre, especially red ochre, should be studied at length in all its technical and chemical aspects. It seems apparent that we should no longer accept red ochre as a final entity in itself when describing it as a trait, but we should examine it critically in an effort to learn more about its nature and qualities. In this wise we may learn more about the people who used this pigment. It is very likely that there may be certain earmarks contained in the consistency of the ochre, such as the phosphate occurrence noted above, which may give us cultural information which we have heretofore unsuspected.

White powder deposits.—Some white powdery material was found partially coating a grooved silt stone (feature 40). This white deposit had a *very high* phosphate content and a pH of 4.7. It was classified as coarse loamy sand according to the soil experts. Another small deposit of white powder near some beads in feature 34 also had a *very high* phosphate content. It had a pH value of 6.1 and was classified texturally as coarse sandy loam.

However, not all white deposits appeared to be the same chemically. A white powdery deposit resembling ashes was discovered to the west of a flint in feature 34. This deposit had a *low* phosphate content and a pH value of 4.8. It was classified as coarse sandy loam. Another similarly textured lump of whitish material from feature 46 had a *very low* phosphate content with a pH value of 5.0. A white deposit from the same feature gave a *very high* test for phosphate. Some of the fragments showed cortical bone structure under magnification, adding conclusive proof.

The appearance of these deposits of white material in the mound suggested burned or cremated bones which were reduced to the end product, bone ash. Since bone ash is high in available bone phos-

phate, we can eliminate the two deposits containing little phosphate from this category at once. The first two of the deposits examined above, which are very high in phosphate, are probably cremation remains. The other two earthy materials may have been paint pigments of mineral origin.

CONCLUSIONS: SOILS AND MINERALS

The study of soils and minerals in relation to archeology is very illuminating, in that much can be learned to supplement the total picture of a prehistoric culture. In this regard, analysis for phosphate bears an especially interesting relationship. Positive evidence was found indicating that there were more burials in Natrium Mound than originally had been enumerated. The latter were based on skeletal evidence, some of which was exceedingly meager. Phosphate analysis, revealing very high concentrations of bone phosphate in apparently nonburial features, actually proved the usefulness of this check.

Wider applications of soil analysis for phosphate are foreseen, especially when there is doubt of whether osseous matter, specifically burials,²⁸ had been present in a given area or not.

The situation regarding the pH of the mound soils is less revealing. Other than that the average of the soil samples within the mound is slightly more acid than the soil outside the mound, the writer is not certain what deductions might be drawn. Cook and Treganza (1947, pp. 140-141)²⁹ who made a quantitative investigation of two aboriginal habitation mounds in California, have indicated that mounds containing a measurable amount of calcium carbonate give a basic reaction, such as one might guess. Natrium Mound, in the absence of shells and other lime-producing materials, was acid. The terrace on which this earthwork was situated is composed of an acid soil called Wheeling gravelly loam (Hennen, 1909, pp. 620-621).

Soil specialists (Kellogg, 1941, 1948) have shown that soil is an intimate part of our economy today and in the future, as much as it had been in the past. Needless to say, the latter also includes prehistoric civilizations as well. Application of the geochemistry of soil scientists, one phase of their study, can be profitably employed in conjunction with archeological studies. Undoubtedly many of the soil phenomena and factors of soil chemistry which perplex the archeologist, may be explained in terms of the soil scientist. The study of soils is already a thoroughly functioning study—there remains but the direct application of this knowledge to archeological work. The writer feels that

²⁸ Naturally the check for bone phosphate does not show whether or not the results are nonhuman or human phosphates. However, one can reasonably expect that burial furniture will accompany a human interment, and that a burial mound will contain human remains.

²⁹ These authors made three types of analyses: For hydrogen ion concentration, for lime as CaCO_3 , and for organic carbon. No phosphate analyses were made.

the soil study made here is only an exploratory measure in the light of what can be done in future archeological soils research.

Some investigations have been made on human bones in the belief that chemical changes which take place in human burials in the soil may be utilized as a criterion for determining the age of the bone. Although the results of the experiments are encouraging, success of the methodology has not yet been complete (Cook and Heizer, 1947; Heizer and Cook, 1949).

APPENDIX 2

MICROSTRUCTURE OF COPPER BEAD FROM NATRIUM MOUND

"A copper bead from an ancient Indian burial mound at Natrium, West Virginia was badly corroded, the metal being less than 0.02 inches thick at any place. There was not enough metal for chemical analysis, but there was little evidence of oxide in the interior indicating that it probably was made from native copper. Two photomicrographs (pl. 29 *a*, *b*) show the grain structure on opposite sides of the bead. There is no significant difference in structure in the two areas. The bead was formed hot by hammering as indicated by a few twins and by the more or less equiaxed grains. The material was not annealed following hot working since the grains differ considerably in size. There is no evidence of any cold working. Several small discontinuities resembling cracks, one of which is shown in plate 29*b*, were observed in the bead. While these generally marked the boundaries of grains, they could not be pulled apart readily, indicating that they had been partly welded together. This would have been possible only in hot-worked material. These discontinuities probably resulted from the hammering of folds or overlaps in the original piece of copper from which the bead was made." (Report submitted by Dr. George Ellinger, National Bureau of Standards, Washington, D. C.)

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EXPLANATION OF PLATES

PLATE 24

- a*, Natrium Mound at the start of the excavation.
- b*, First exploratory trench. The reference profile is at the right of the trench.
- c*, Test trenching the upper sector of the western side of the mound.
- d*, Cutting away of the overburden and backfill earth with a bulldozer.
- e*, Operations during a snowstorm.
- f*, Slicing below the base of the mound in the final stage.
- g*, Feature 4: Cache of chert blades covered with red ochre.
- h*, Feature 34: Copper breastplate and other artifacts associated with a burial.
The bead strings in the lower group appear to be arranged in a zoomorphic pattern.
- i*, Feature 21: Part of a group of 109 chert blades and associated artifacts. The object above No. 1 is an excavated boatstone lying in situ.

PLATE 25

- a*, Feature 34: Copper breastplate.
- b*, Feature 34: Textile directly associated with copper breastplate.
- c*, Feature 46: Disk beads of bone associated with a burial.
- d*, Feature 51: Disk bead of barite.
- e*, Copper and shell beads with associated cordage found in various features.
- f, g*, Feature 43: Tubular stone pipe and associated stone pellet.
- h*, Feature 46: Long stone tube pipe.
- i, j*, Feature 21: Two views of an excavated steatite boatstone found associated with a cache of blades.
- k*, Feature 41: Modified tubular sandstone pipe.

PLATE 26

- a*, Unassociated find of slate reel-shaped gorget.
- b*, Feature 25: Slate pendant.
- c*, Unassociated find of slate, semikeel-shaped gorget.
- d*, Feature 44: Sandstone birdstone.
- e*, Feature 46: Round stone ball.
- f*, Feature 20: Round stone ball.
- g*, Feature 49: Three-quarter grooved stone ax.
- h*, Feature 44: Celt of diabase with deposit of white matter adhering to the upper surface. Semipointed poll.
- i*, Feature 46: Well-polished celt of green stone. Pointed poll.
- j*, Feature 46: Celt of diabase, two-thirds polished. Oblong poll.
- k*, Feature 25: Celt of diabase, one-quarter polished. Oblong poll.
- l*, Feature 43: Celt of diabase. Rounded poll.
- m*, Feature 43: Celt of diabase. Rounded poll.
- n*, Feature 43: Celt of diabase. Rounded poll.
- o*, Feature 43: Celt of diabase. Pointed poll.
- p*, Feature 25: Celt of diabase. Oblong poll.
- q*, Feature 20: Celt of diabase. Oblong poll. Thin coating of graphite adhering to the poll.

- r*, Feature 51: Celt made from a flaked blade. Oblong poll.
s, Feature 43: Hematite celt. Oblong poll.
t, Feature 46: Hematite celt. Oblong poll.
u, Feature 49: Hematite celt. Oblong poll.
v, Feature 46: Hematite celt. Oblong poll.
w, Feature 43: Hematite celt. Oblong poll.
x, Feature 43: Hematite celt. Oblong poll.
y, Feature 41: Hematite celt. Oblong poll.
z, Feature 6: Hematite celt. Pointed poll.
a', Feature 21: Bit end of massive hematite celt associated with group of blades.

PLATE 27

- a*, Feature 35: Abrading or sinew stone.
b, Feature 46: Abrading or sinew stone.
c, d, e, Feature 46: Part of a group of honing stones found in a burial.
f, Feature 35: Grooved silt stone with associated piece of oblong, faceted hematite.
g, Feature 32: Grooved silt-stone tablet with deposit of burned organic matter on surface.
h, i, Feature 46: Two well-polished plano-convex barite hemispheres found together. Top and profile view.
j, Feature 46: Plano-convex limestone hemisphere with fragment of bone adhering to flat surface. Top view.
k, Feature 40: Plano-convex hematite hemisphere with hollow base. Profile view.
l, Feature 20: Plano-convex hematite hemisphere with flat base. Top view.
m, n, Feature 46: Two views of faceted piece of hematite showing heavy attrition.
o, Feature 41: Two worked pieces of hematite.
p, Feature 41: Part of a group of worked fragments of hematite.
q, Features 35 and 41: Group of hammered and faceted hematite stones.
r, Feature 46: Natural ferruginous cupstone showing aboriginal adaptation to use.

PLATE 28

- a*, Feature 40: Leaf-shaped blade of light-gray chert.
b, Feature 40: Leaf-shaped blade of black chert.
c, Feature 22: Leaf-shaped blade of dark-gray chert.
d, Feature 22: Leaf-shaped blade of banded dark chert.
e, Feature 40: Leaf-shaped blade of light-gray chert.
f, Feature 22: Leaf-shaped blade of dark-gray chert.
g, Feature 22: Leaf-shaped blade of dark-gray chert.
h, Feature 21: Leaf-shaped blade of tan chert.
i, Feature 41: Leaf-shaped blade of gray chert.
j, Feature 21: Leaf-shaped blade of tan chert.
k, l, m, Feature 21: Trianguloid-shaped blades of tan chert.
n, o, Feature 21: Leaf-shaped blades of tan chert.
p, Feature 35: Flat-base, parallel-sided stemmed blade of dark chert.
q, Feature 21: Flat-base, parallel-sided stemmed blade of light-tan chert.
r, Feature 4: Round-base stemmed blade of dark-gray chert.
s, Feature 40: Round-base stemmed blade of pink chert.
t, Feature 40: Round-base stemmed blade of dark-green chert.
u, Feature 40: Round-base stemmed blade of light-green chert.
v, Feature 20: Round-base stemmed blade of gray chert.
w, Feature 40: Round-base stemmed blade of light-gray chert.

- x*, Feature 51: Projectile point of black chert with rounded stemmed base.
- y*, Feature 51: Projectile point of light-green chert with rounded stemmed base.
- z*, Feature 25: Projectile point of light-tan chert with one side notched.
- a'*, Feature 51: Projectile point of dark-green chert with ovate base.
- b'*, Feature 25: Projectile point of gray chert with flat-stemmed base.
- c'*, Feature 25: Projectile point of light-gray chert with flat-stemmed base.
- d'*, Feature 25: Projectile point of light grayish-tan chert with flat-stemmed base.
- e'*, Feature 25: Projectile point of grayish-tan chert with flat-stemmed base.
- f'*, Unassociated find: Projectile point of dark-gray chert with flat-stemmed base.
- g'*, Feature 41: Side-notched light-buff projectile point.
- h'*, Unassociated find: Crude triangular projectile point.
- i'*, Feature 40: Rounded-base drill showing polish from attrition on the point.
- j'*, Feature 46: Flat-base stemmed drill of light-tan chert.
- k'*, Feature 46: Rounded-base stemmed drill of light-tan chert.
- l'*, Feature 46: Flat-base stemmed drill of light-gray chert.
- m'*, Feature 46: Flat-base stemmed drill of light-tan chert.
- n'*, Feature 51: Pointed-base drill of dark chert.
- o'*, Feature 35: Pointed-base drill of dark chert.

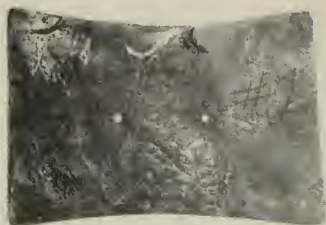
PLATE 29

- a*, Microstructure of cross section of bead ($\times 100$). The piece is badly corroded and is quite thin in places. There is no evidence of cold work.
- b*, Microstructure of cross section of bead opposite that shown in *a* ($\times 100$). There are a few twins, the grains are generally equiaxed, and differ considerably in size. There is a discontinuity resembling a crack which has been partially welded together.

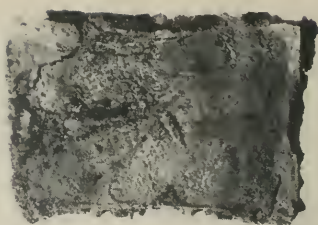


STAGES IN THE EXPLORATION OF NATRIUM MOUND AND REPRESENTATIVE MOUND FEATURES WITH ASSOCIATED ARTIFACTS.

(For explanation, see p. 393.)



a



b



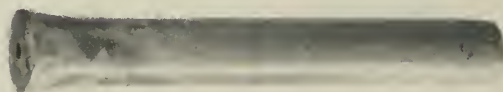
c



d



e



f



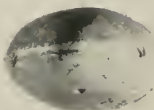
g



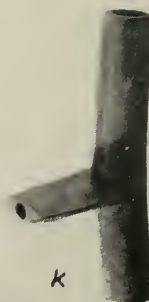
h



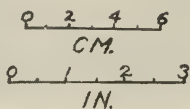
i



j



k



NATRIUM MOUND ARTIFACTS.

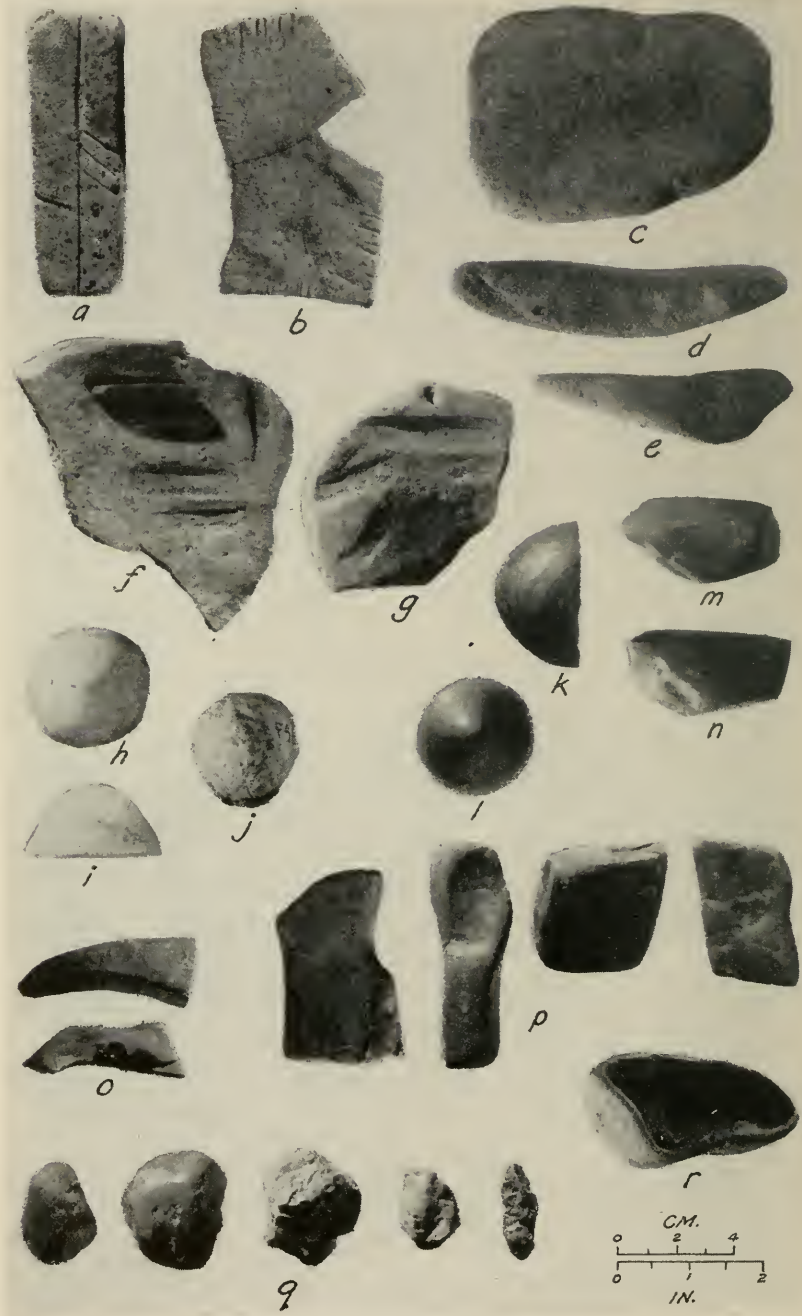
(For explanation, see p. 393.)



NATRIUM_MOUND ARTIFACTS.

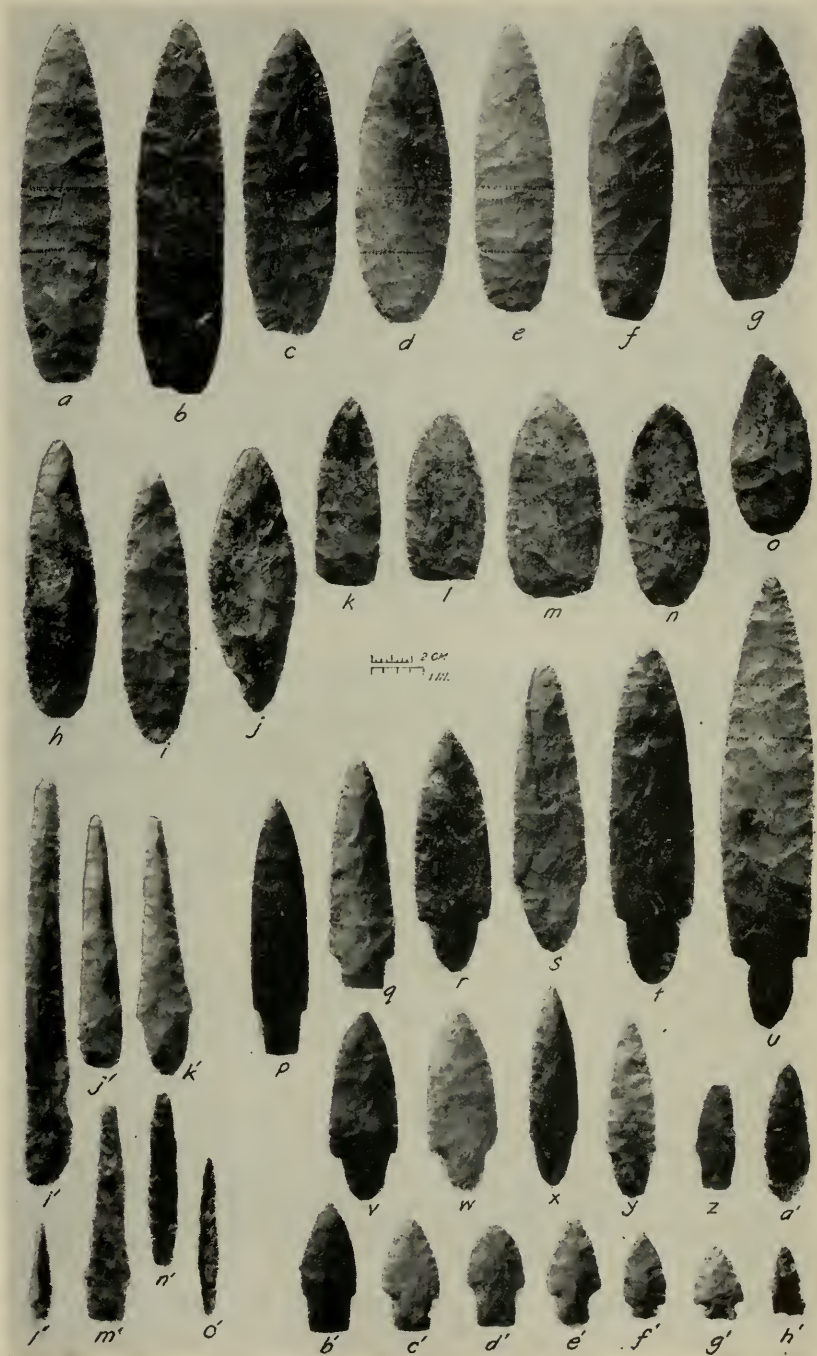
(For explanation, see pp. 393-394.)

[[[[



NATRIUM MOUND ARTIFACTS.

(For explanation, see p. 394.)



NATRIUM MOUND ARTIFACTS.

(For explanation, see pp 394-395.)



a



b

MICROSTRUCTURE OF CROSS SECTIONS OF BEAD.

Photographs by National Bureau of Standards.

(For explanation, see p. 395.)