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Archeological Investigations at the Tuttle Creek Dam,
Kansas

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ARCHEOLOGICAL INVESTIGATIONS AT THE TUTTLE CREEK DAM, KANSAS¹

BY ROBERT B. CUMMING, JR.

INTRODUCTION

The Missouri Basin Project of the Smithsonian Institution River Basin Surveys, conducted archeological excavations in the construction area of the Tuttle Creek Dam site from June 10 to June 30, 1953. These field activities and the present report resulting from them were a part of the Inter-Agency Archeological Salvage Program. This program combines the cooperative efforts of the Smithsonian Institution, the National Park Service, the Corps of Engineers, the Bureau of Reclamation, and various State and local agencies. Details of the organization, background, and accomplishments of this program are published elsewhere (e. g., Brew and others, 1947; Wedel, 1947; Roberts, 1952) and need not be detailed here. Lack of funds prevented extensive fieldwork in the season of 1953 in any of the localities of the Missouri River Basin. However, some money was available and this was diverted to the areas of most critical salvage needs. Tuttle Creek was one of these.

Previous archeological investigations in the area to be flooded by the Tuttle Creek Reservoir had located upward of 119 sites, 9 of which were situated in the immediate construction area of the dam (Solecki, 1953 a, p. 6). Of these, 5 would not be destroyed until the later phases of dam construction but 3 were already partially destroyed and the fourth was in imminent danger of destruction from dam-building activities. The field party, limited by funds to only 3 weeks, selected 1 site (14PO14) for complete excavation and conducted sampling tests in the other 3. The field party was under the direction of the writer and James M. Shippee, of the Smithsonian Institution, River Basin Surveys staff. Linwood L. Hodgdon, assistant professor of Anthropology at Kansas State College, acted as field assistant. Marvin Carlson, Randall Weeks, Alfred Johnson, and John Hennes made up the remainder of the crew. The writer wishes to express sincere appreciation for the splendid work of the entire crew during the field season. Long range direction of the project was given by Dr. Frank H. H.

¹ Manuscript submitted April 1954; some revision July 1956.

Roberts, Jr., Director of the River Basin Surveys, and Robert L. Stephenson, acting chief of the Missouri Basin Project. The assistance given the field party by Burney V. Reany, project engineer, Corps of Engineers, and by the many others who so generously volunteered their help is gratefully acknowledged. The writer also wishes to express his appreciation to Dr. John L. Champe, of the University of Nebraska, for his assistance and advice; to Dr. G. Neumann, of the University of Indiana; and to Dr. T. D. Stewart, of the National Museum, for their criticisms and suggestions; and to Roy W. Drier, of the Michigan College of Mining and Technology, for the metallographic examination of the copper specimens.

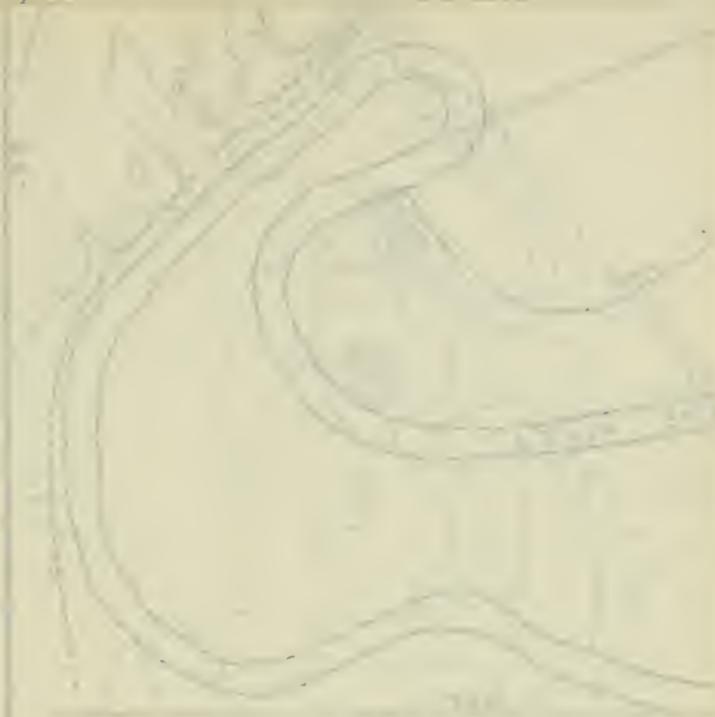
At the termination of work on site 14RY10, evidence of a dwelling structure had been found, but time limitations did not permit excavation of the structure. Subsequent investigations at this site were made possible by a volunteer party organized by Dr. Linwood L. Hodgdon and consisting of himself, John Hennes, Warren Shaw, and James Tuback of Kansas State College; Dr. John L. Champe, Mary Kiehl, and Raymond Wood of the Laboratory of Anthropology, University of Nebraska; Harold A. Huscher of Columbia University; and Dr. Theodore E. White, Lee Madison, and Francis Brown of the Missouri Basin Project. This volunteer party worked at the site for about a week in July 1953. It is contemplated that Dr. Hodgdon and others will cooperate on a separate report of the overall activities at this site in the near future. Consequently only a brief account of the testing accomplished here in June 1953 by the Smithsonian Institution party will be included in the present report.

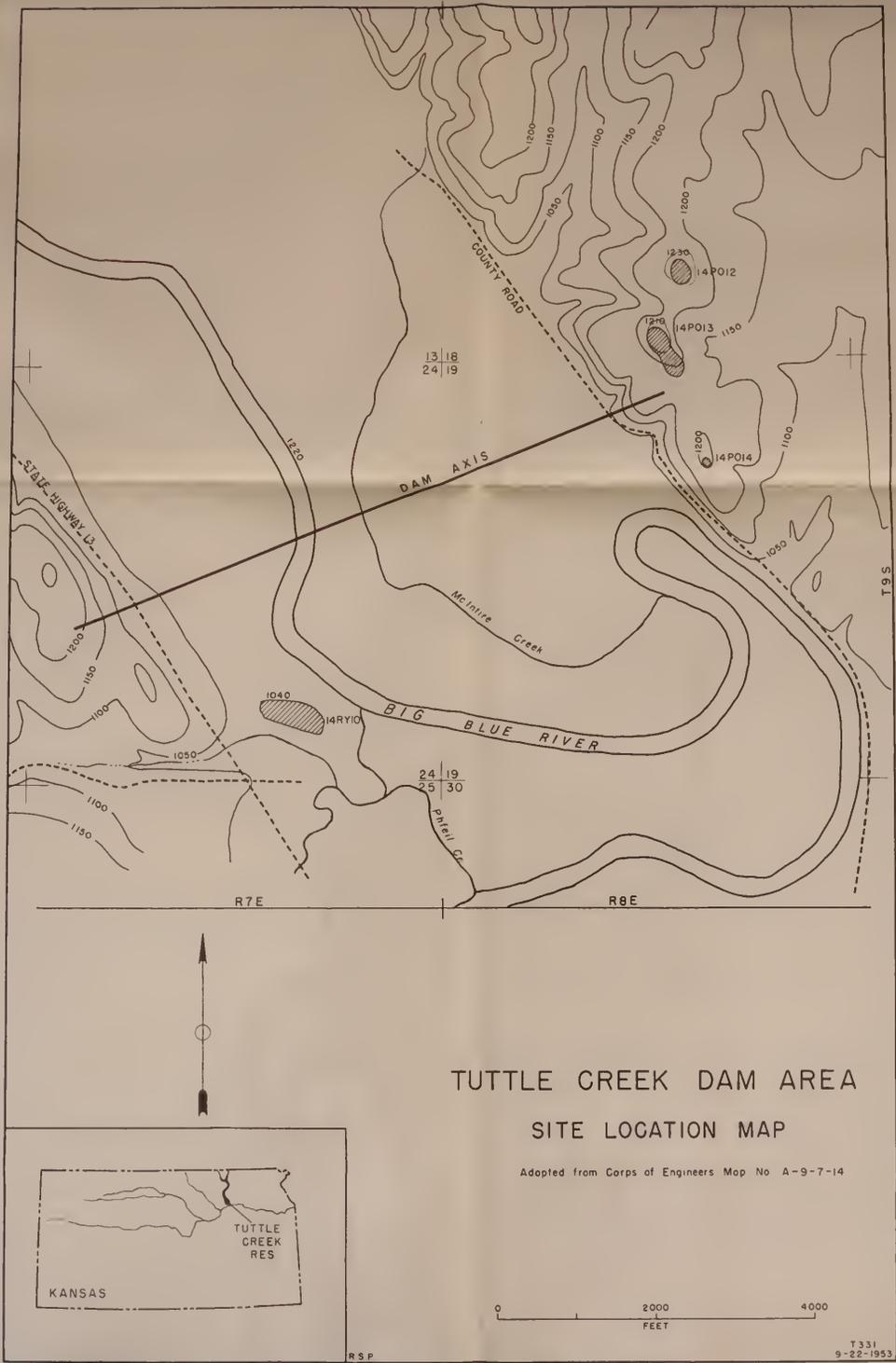
SITUATION AND ENVIRONMENT

The proposed Tuttle Creek Reservoir area is located in the Big Blue River basin in northeastern Kansas (map 3). The dam site is located approximately 12 river miles upstream from the junction of the Big Blue River and the Kansas River, or about 6 miles north of the town of Manhattan, Kans. The Tuttle Creek Dam, a Corps of Engineers project, is to be an earthfill structure 7,350 feet long and 136 feet high. Its purpose is the storage of flood waters from the 9,550 square miles of drainage area of the Big Blue River, above the dam.

The Tuttle Creek area lies within the Interior Plains physiographic division, Central Lowland province, dissected till Plains section (Fenneman, 1931), and within the Tall Grass, Prairie Grassland vegetation area of Shantz and Zon (Kroeber, 1947). Locally the Big Blue River flows through a flat alluvial valley, a little over a mile in width, with the dissected tableland bluffs rising several hundred feet above the flood plain. In the area as a whole, dark brown silty soils underlain by a yellowish brown subsoil are characteristic. The rich, alluvial soil

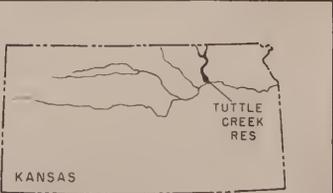
LITTLE CREEK DAM AREA
SITE LOCATION MAP





TUTTLE CREEK DAM AREA SITE LOCATION MAP

Adopted from Corps of Engineers Map No A-9-7-14



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MAP 3.—Site location map of the Tuttle Creek Dam area.

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of the flood plain is excellent for farming, and the bottom lands are and have been under cultivation for many years. The upland slopes are, for the most part, in pasture. On the top of the bluffs a shallow soil cover is underlain by the limestone and shales of the Wolf Cap group of the Permian.

The climate throughout the general region is characterized by warm summers, with an average temperature of 70° to 80°, and cold winters. Temperatures are very changeable and show a wide range of variation. Maximum temperatures as high as 121° and minimum temperatures as low as 40° below zero have been recorded (Kansas Agr. Exp. Sta., 1937, p. 5). The prevailing winds are from the south in summer and from the north in winter. The growing season averages 170 to 180 days. Average annual precipitation is from 32 to 34 inches, with about 70 percent falling within the warm season (U. S. Dept. Agr., 1941), thus making the region quite suitable for primitive horticulture.

There is an abundant growth of trees and shrubs along the river valley. The following have been observed within the reservoir area: cottonwood, elm, burr oak, walnut, hard maple, sycamore, willow, linden, ironwood, box elder, buckeye, hackberry, juniper, honey locust, pignut, redbud, dogwood, buck brush, and sumac. Food-bearing plants native to this area include mulberry, plum, hazelnut, elderberry, gooseberry, chokecherry, and grape.

Game formerly abundant throughout this area included elk, deer, antelope, bison, bear, wolf, cougar, wildcat, otter, and turkey. At the present time mink, muskrat, red squirrel, gray squirrel, woodchuck, beaver, opossum, raccoon, coyote, and rabbit may all be found. Quail and prairie chicken inhabit the uplands and ducks and geese are and were plentiful during the migratory season.

The valley of the Big Blue River, in northeastern Kansas, provided excellent resources for hunting and gathering cultures, and an extensive utilization of long duration of these resources is indicated by the Survey's location of approximately one hundred nonceramic sites in the Tuttle Creek Reservoir area alone.

ETHNOLOGICAL AND ARCHEOLOGICAL BACKGROUND

During the historic period the Tuttle Creek Dam area was well within the habitat of the Kansa Indians. To the north of their range, near the Nebraska border, were the Pawnee, to the south and southeast the Osage, to the east across the Missouri the hunting range of various tribes such as the Iowa and Sac, and to the west, in the high plains, the hunting ground of the Apache, Comanche, Sioux, Cheyenne, and others. During the beginning of the historic period the Wichita inhabited the area about the great bend of the Arkansas River.

According to Kansa tradition, the Kansa moved upstream along the Missouri River as far as the Nebraska border and were then forced

southward (Wedel, 1946, p. 6); however, this has not as yet been verified by archeological investigations. The distribution of identified Kansa village sites, recorded by Wedel (*ibid.*, p. 2), shows the Kansa to have been along the Missouri River, at the Doniphan site, near the town of Doniphan in 1724; along the Kansas River, at the Salt Creek site, about 6 miles from the town of Leavenworth in 1757; at the "Old Kansas village" reported by Lewis and Clark, between the junction of Soldier Creek and Cross Creek with the Kansas River in 1804; and at the Blue River site, about 2 miles east of the town of Manhattan, and about 6 miles downstream from the Tuttle Creek Dam from about 1800 to 1830. Three known village sites, between the junctions of Cross Creek and Soldier Creek with the Kansas River, were inhabited during the period of 1830 to 1846. From 1847 to 1873 the Kansa lived in three villages below the town of Council Grove on the Neosho River. From there they were removed to Indian Territory.

The section of the Big Blue River valley to be inundated by the Tuttle Creek Reservoir was virtually unknown archeologically until the summer of 1952. At that time a Smithsonian Institution reconnaissance party consisting of Ralph S. Solecki and James M. Shippee examined most of the area. The reconnaissance of the area, even yet incomplete, yielded evidence of 119 archeological sites. The only excavated site near this area was the Blue River site, the historic Kansa village, 2 miles east of the town of Manhattan (Wedel, 1946, p. 2). The abundance of archeological remains that have been and are being found in this area clearly indicate that northeastern Kansas has been inhabited from very early prehistoric to historic times. Suggestions of Paleo-Indian occupation are found here as evidenced by occasional artifacts identified with the Folsom and Plainview groups (Solecki, 1953 b, p. 52-53, and Shippee, 1953, p. 54). Sites of other preceramic or nonceramic groups are abundant. Cultural manifestations of Woodland, Upper Republican, and Nebraska cultures have been found, and it is quite probable that further investigation will also disclose elements of the Oneota and Hopewellian cultures.

SWEAT BEE MOUND (14PO14)

FIELDWORK

This site is located in Pottawatomie County, Kans., in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, R8E T9S. It consists of a rock mound situated on a prominent elevation along the top of the ridge bordering the east side of the Big Blue River flood plain (pl. 13, *a*). Site 14PO13 is about 500 yards farther north along the same ridge. From the mound, which is about 180 feet above the Big Blue River, a fine view may be had of the valley below. The slopes of the ridge are wooded, and the top sparsely covered with grass and brush, and studded with limestone

rocks. Beneath a shallow, dark, soil zone at the surface is a gravel stratum underlain by bedrock limestone and shale.

The method of excavation consisted of first clearing the mound of grass and brush (pl. 13, *b*), laying out a grid of 10-foot squares, and establishing a site datum. The partial dirt cover over and between the rocks was then removed, outlining the entire extent of the mound. Surface elevations were taken and the mound was mapped (pl. 15, *a*). The rock-slab covering was then removed, leaving a small profile section in place until excavation of all else was completed. The entire mound fill was screened (pl. 14, *b*).

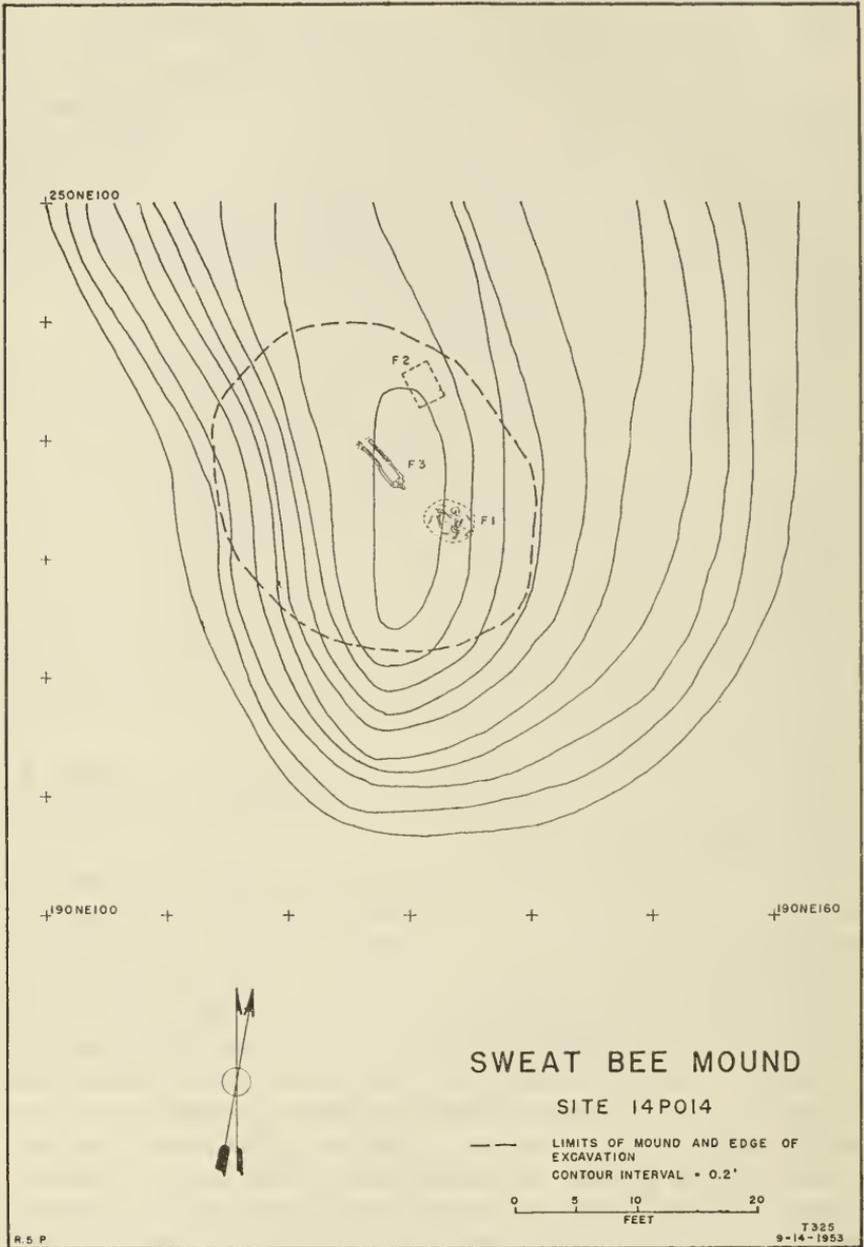
Before excavation the mound appeared as a small, circular, earth and stone hummock, grass-covered between the rocks with a clump of brush near the south side. After clearing off the brush, grass, and dirt, above and between the stones, the mound was found to be irregularly circular in shape, 26 feet in diameter and 1½ feet high (map 4). The mound structure consisted of a pile of irregularly shaped limestone slabs, placed without any semblance of order, but in sufficient quantity to completely cover and protect that which lay beneath. The covering rocks ranged from small fragments to slabs 3 feet long, 1½ feet wide, and nearly a foot thick (pl. 14, *a*). It seems most probable that the dirt over and about the stones had blown in during later years, and that the mound, as originally built, was a stone-slab mound.

The remains of 7 individuals were found within the mound, 6 of whom were in 1 pit (Feature 1) and 1 (Feature 3) on top of the gravel underlying the mound.

After the mound had been cleared off and some of the upper stones removed, a basinlike pocket was found in the rock covering, 7 feet in from the east edge and 3 feet south of the center of the mound. This proved to be the location of Feature 1. Feature 1 was an oval-shaped pit 3 feet in north-south diameter, 3¾ feet in east-west diameter, and 2 feet in depth from the surface of the gravel underlying the mound. Limestone slabs had been placed around the perimeter of the pit and rocks thrown within it, covering a group of three burials that lay within the pit at the level of the base of the surrounding slabs.

Two distinct groups of burials were found within Feature 1. Burials 1, 2, and 3 were at the level of the gravel base of the mound, and were surrounded by the rock slabs (pl. 15, *b*). Burials 4, 5, and 6 were within the pit below the base of the mound (pl. 16, *a*). The upper-level burials were mixed with soil and stones and covered over by a foot of stone rubble. The bones were crushed, badly weathered, and, to a considerable extent, jumbled together.

Burial No. 1, in the center of the pit, was a semiflexed, primary burial. A large rock slab had settled through the midsection of the skeleton, that of an old adult female, crushing the bones beneath. The



MAP 4.—Site map of Sweat Bee Mound (14P014).

burial was oriented along a north-south axis, with the head to the north, facing east, and rested on its left side. The manner of displacement of the bones of the other upper-level burials in the pit indicated that burial No. 1 was the last to be placed in the pit, and that the other burials had been pushed aside to make room for it.

Burial No. 2 was the remains of an old adult male. The right side of the skull was completely crushed and the skull was no longer in articulation with the spinal column. The state of preservation of the bones, combined with the fact that they had been somewhat displaced, made it difficult to determine the original manner of deposition. It appears to have been a primary semiflexed burial, oriented north-south, with the head to the north.

Burial No. 3, the bones of which are crushed and disintegrated, was that of an old adult male. It appears to have been a primary fully flexed burial, oriented southeast-northwest, with the head to the southeast.

Many of the bones of the lower burials were badly disintegrated and jumbled. Burial No. 4, the central one, was that of a middle-aged adult male. It was a primary, semiflexed burial, oriented approximately southwest-northeast, with the head to the southwest, facing north. The skeleton was on its left side. Burial No. 4 had evidently been placed in the pit at a later date than burials 5 and 6, for the latter appear to have been pushed to either side of the pit in order to make room for it. A group of 4 circular copper beads (14PO14-116), 1 large and 3 small, were found resting on the right mandibular condyle, and 2 more (14PO14-118) were located beneath the left temporal. An additional pair of the same type of bead was found while screening fill from the area immediately about the skull. Both the right and left mastoid process of the skull were stained green from the copper. The beads had apparently been attached to the ears at the time of burial. A small disk shell bead (14PO14-117) was also found close to the skull. Fragmentary bits of copper and a tubular conch shell bead (14PO14-119) were found close to one wrist of the skeleton.

Burial No. 5, a semiflexed primary burial, was that of a middle-aged adult male. It was oriented approximately east-west, with the head to the west, facing to the north. Several of the long bones of this skeleton are unusually large. An ovate stone scraper (14PO14-131) was found directly over one of the scapulae.

Burial No. 6 was the badly disintegrated remains of a middle-aged adult female. The outline in the soil indicated that it was probably semiflexed, with the head to the west.

Two stone scrapers (14PO14-123 and 124) were found in the fill about the lower burials.

A group of 4 chert nodules and 1 piece of hematite (Feature 2) were found in the gravel beneath the mound fill, 11 feet north of Feature 1.

In addition to the burials of Feature 1, the fragmentary remains of an extended, supine, adult burial (Feature 3), burial No. 7, were found lying directly on the gravel deposit under the mound, and

about 5 feet north and 5 feet west of Feature 1. The lower leg and foot bones were present and in articulation but crushed by the overlying rocks. A section of the right radius and ulna, and several phalanges indicated that the arm had been extended along side of the body, which was oriented northwest-southeast, with the head to the southeast. The remainder of the body bones were missing or fragmentary. The outline of a pit was evident in the reference block of the mound profile at the spot where the skull should have been; hence the skull may have originally been present. No associated artifacts were found.

Burial No. 7 appears to have been intrusive and to have no connection with the other burials in the mound. Individual extended burials, placed beneath piles of rocks, were customary among the Kansa, and it is quite possible that the nearby site, 14PO13, is a Kansa site; however, there was no certain evidence to indicate that the burial was intrusive.

ARTIFACTS

A total of 47 artifacts was recovered from the mound. No pottery was found. Thirty-five stone artifacts, mostly scrapers, cutters, and choppers, were recovered from the dirt between or below the rock-slab covering, and a few specimens were found in association with the burials.

Four chert projectile points (pl. 18)² and the base of a point were found in the mound fill. Specimen No. 4 is a small, delicately chipped, straight-based and straight-sided triangular point with two small side notches and one base notch, all of the same size. The tip of the point is missing. Specimen No. 31 is a medium-sized point with sides slightly convex in outline, is flat on one side, and has an expanded stem containing a small, shallow notch. Point No. 29 is double convex in cross section, apparently straight based, and evenly chipped. Half of the stem and the lower portion of the blade is missing. No. 5 is a rather small, evenly chipped point, convex sided and concave based in outline. No. 37 is the base of a straight-based projectile point. Table 1 gives data on the projectile points.

TABLE 1.—*Projectile point data*

Cat. No.	Length	Width	Thick-ness	Descrip-tion ¹	Provenience
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>		
14PO14-4.....	² 23	11	2	NBa2	Grass roots on mound.
14PO14-31.....	32	22	6	SCa2	Mound fill, 1.1 feet below surface.
14PO14-29.....	² 39	23	5	SCa2	Base of mound fill.
14PO14-5.....	25	17	3	NBb	Mound fill, 0.7 foot below surface.
14PO14-37.....		21			Mound fill.

¹ A descriptive codification of projectile points formulated by Strong, given as an aid for the comparison of 14PO14 points with projectile point data recorded elsewhere from the Plains area (Strong, 1935, p. 88).

² Estimated.

² Artifacts are identified in plates 18, 19, 21, 23, and 24 by their specimen catalog numbers.

The point end of a chert blade (No. 38) was found in the mound fill (pl. 18). The fragment, 33 mm. long and 26 mm. wide, is double convex in cross section and is neatly chipped.

Two small end scrapers were found (pl. 18). Specimen No. 9, from the mound fill, is a snub-nosed scraper with an expanded bit, flat on both sides, and retouched on the end and part of one side. It is 25 mm. long, 16 mm. wide, and 6 mm. thick. Number 131, a small flat ovate scraper, is retouched on both sides and one end, and is 29 mm. long, 23 mm. wide, and 7 mm. thick. It was found directly over the scapula of a lower burial of Feature 1.

Thirteen of the 35 chipped stone artifacts are scrapers (pl. 19). They are made from irregularly shaped chert spalls, and show a minimum of modification. The ventral surface is a single cleavage plane. One or more of the edges are retouched. No. 32 is a high-backed, subelliptical scraper with a concave ventral surface. The entire dorsal surface is flaked, and one edge is retouched. No. 1, found on the surface, is a nearly circular scraper. Its dorsal surface is convex, and the ventral surface has a prominent medial ridge. No. 3, also from the mound surface, is an ovate, stemmed scraper, and is flat ventrally and convex but unmodified dorsally. It is retouched around the entire edge. Two scrapers were found associated with the lower burials in Feature 1, Nos. 123 and 124. No. 123 has a broad blade that is more or less oval and tapers toward one end. The ventral surface is moderately convex, the dorsal surface beveled, with the maximum thickness close to the left edge. The broad end and one side are retouched. No. 124 is a rather small subelliptical scraper, concave ventrally, beveled dorsally, with the maximum thickness close to the left edge. It is retouched on both ends and on one side. Table 2 follows.

TABLE 2.—*Measurements of scrapers*¹

Cat. No.	Length	Width	Thickness
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
32.....	59	33	14
1.....	44	40	20
3.....	47	44	7
123.....	71	54	12
124.....	52	27	9
Range.....	34-76	24-55	7-29
Average.....	52.5	36.6	12.6

¹ Measurements are given for 5 of the scrapers illustrated (pl. 19), but the range and average are given for the total of 13 specimens.

Five specimens are a type of cutting or scraping tool (pl. 19). They are of the spall variety, medium sized, generally ovate in shape, and bifacially flaked without secondary retouching. The flaking is coarse. The cutting edge extends all the way around or on two sides and one end. The implements range from 69 to 80 mm. in length, 40 to 54 mm. in width, and 17 to 23 mm. in thickness. No. 48 is of chert, oval in out-

line, double convex in cross section, with a depression in the center of one side. It is edged on both ends and one side, and measures 68 mm. in length, 47 mm. in width, and 19 mm. in thickness. This was found in association with the upper burials of Feature 1; the others all came from the mound fill.

Five roughly modified cores show some evidence of use. Specimen No. 46 (pl. 19) is a large, coarsely flaked bladelike chopper, flaked on both ends and on one side. It is 102 mm. long, 76 mm. wide, and 25 mm. thick, and was found in association with the upper burials.

A rectangular piece of reddish quartzite, 117 mm. long, 100 mm. wide, and 68 mm. thick, was found in the mound fill (pl. 19). The rock is smooth and the corners well rounded. It might have served as a hammerstone or as a small anvil; however, there is no clear-cut evidence of battering.

A pendantlike object of catlinite (pl. 18) came from the mound fill. The specimen (No. 28) is subrectangular with one end having a small stem or projection 3 mm. long and 4 mm. wide. The object is 33 mm. long, 26 mm. wide, and 2 mm. thick.

The two pieces of worked shell recovered were associated with the lower burials of Feature 1. One is a disk shell bead (No. 117) 6 mm. in diameter, and the other a cylindrical conch shell bead (No. 119) 27 mm. long and 11 mm. in diameter (pl. 18). A notch has been worn into the same side of each end of the bead.

Feature 2 yielded a piece of worked hematite (No. 130). In outline it resembles half of a cross-sectioned elliptical object. The ventral and dorsal surfaces are flat, and the edges are rounded at the tapered end. The piece is 55 mm. long, 43 mm. wide, and 23 mm. thick.

Eight copper disk beads (pl. 18) were associated with the lower burials of Feature 1. The beads, made by rolling copper strips 5 to 7 mm. wide and 2 to 3 mm. thick, range from 9 to 12 mm. in diameter, with a hole 4 mm. wide. Metallographic examination of the beads showed them to be of native copper.

CONCLUSIONS

The cultural identity of the mound is, as is so often the case with burial mounds, difficult or impossible to definitely determine. There is however, some reason to believe that the mound belongs to the Woodland Complex. Two of the five points (Nos. 29 and 31), found well within the mound fill, resemble Woodland points attributable to the Valley Focus. The other three points do not resemble conventional Woodland types, however; one of these occurred at grass-root level and hence may be unassociated with the mound.

Burial mounds of earth and stone construction are numerous and widespread in Missouri, and are associated with the Woodland Pattern. The burials are sometimes in a pit dug into subsoil beneath the

mound, on a stone platform with or without a stone covering, in stone chambers or vaults, or in cists (Chapman, 1948, pp. 110-125). A group of stone vault mounds, ascribed to the Hopewellian Complex, is situated at Kansas City, Mo., and stone vault mounds have also been found in Kansas, in the northern part of Doniphan County (Wedel, 1943, p. 159).

The Younkin Mound, a rock and earth mound with a stone-slab floor, located about 6 miles northwest of Junction City, Kans., has been excavated, and is ascribed to the Hopewellian Complex (Spaulding, 1949, p. 106). Its only resemblance to site 14PO14 consists of rock-covered burials and a highland location.

Stone-slab mounds at site 14EW18, 10 to 30 feet in diameter and 2 to 3 feet in height, have been found on the high bluffs near the mouth of Bluff Creek, Kanopolis Reservoir, Ellsworth County, Kans. (Kivett, 1947, p. 9). These mounds are similar in external appearance to the Sweat Bee mound; however, they are unexcavated and their cultural identity is unknown.

Burial cairns, excavated at site 14EW24, on the bluffs above the Smoky Hill River in Ellsworth County, are somewhat similar but considerably smaller than 14PO14. In one cairn, 12 feet in diameter, a flexed skeleton, crushed by the overlying rocks, was found in rectangular cist (Smith, 1949, p. 229).

Subsurface burial pits, covered by an extensive layer of rocks, have been found in Nebraska. An example of this is the Lindsey site (25CC29) in Cass County, 1½ miles west of the town of Weeping Water. Primary burials were found in five pits or cists, dug into the subsoil of the base of a rock-slab-covered area 30 feet in diameter. The site belongs to the Woodland Pattern (Kivet, Marvin F., personal communication. Data on file at Nebraska State Historical Society).

Turtle Mound, one of a series of mounds along the Missouri River bluff near the town of Rock Bluff, Nebr., proved upon excavation to be a 24-foot circular limestone slab-covered mound with one concentration of human bones close to the eastern border of the mound (Gilmore, 1932, pp. 167-169).

A rock-covered burial pit containing four individuals in an oval-shaped pit was found at site 25NC201, 5½ miles northwest of the town of Fullerton, Nance County, Nebr. This was on a high ridge overlooking Timber Creek. The few sherds found in the pit indicated that the burial was Woodland (Cumming, 1953, pp. 8 and 9).

A characteristic of the Woodland burial complex is the wide range of variation of the burial pattern. In Missouri both semiflexed and extended burials have been found within the same mound. Multiple, semiflexed, or flexed primary burials within mounds or pits in mounds, as at 14PO14, fall within the Woodland burial pattern.

Although the Kansa, no doubt, frequented the region in which site 14PO14 is located, it is doubtful that the mound burials are Kansa, with the possible exception of burial 7, which may be intrusive. While the Kansa often used bluff and hilltop locations for their burials, and usually covered the graves with rocks, they customarily buried their dead in individual graves and in an extended or semireclining position (Wedel, 1946, p. 27).

The nearest known habitation site to 14PO14 is site 14RY10, a nearby village site adjacent to the west end of the dam axis. It is improbable that the mound burials are associated with this village, for preliminary investigations indicate that 14RY10 belongs to the Table Rock Focus of the Nebraska Aspect, and so far as is known, the Nebraska Aspect burial pattern is that of secondary burials in ossuary pits.

It seems quite possible that the rock mounds and rock-covered pits containing multiple burials, and always placed on a highland location, found in northeastern Kansas and parts of Nebraska, may represent an attenuated form of the Woodland burial mound building complex of Missouri. There seems to be a reasonable probability that site 14PO14 is a manifestation of this complex.

THE SPILLWAY SITE (14PO12)

FIELDWORK

After completing work at the Sweat Bee Mound, 2 sites about 500 yards to the south, in the spillway area of the dam, were sampled. Site 14PO12 was the least promising of the two, and little time was allotted to it.

The Spillway site (14PO12) is located in Pottawatomie County, Kans., in the SW $\frac{1}{4}$ sec. 18, R8E T9S. The site is on the northeast side of the spillway of the Tuttle Creek Dam (pl. 20, *a*). Spillway excavation had, at the time of the investigation, destroyed over half of the site. The occupational area is situated on a relatively flat-topped ridge about 200 feet above the Big Blue River, and commands an excellent view of the river valley and of the hills bordering the tableland to the east. The soil about the area is rocky and sparsely covered with grass and sunac. The underlying bedrock of limestone and shale is covered with a gravel deposit containing many chert inclusions. Over this is a thin covering of darker soil. Cultural materials are spread over an area of about 1 acre and occur from the surface down to a depth of 0.6 to 0.8 foot. In the short time available, surface examination and the digging of one 3- by 4-foot test pit, 1 foot deep, were all that could be accomplished. From the surface, which was littered with chert chips, and from the test pit, a few sherds and chipped-stone artifacts were obtained.

ARTIFACTS

A total of 25 artifacts were obtained. The pottery sample consists of 12 small body sherds, all from the surface. These sherds are tempered with finely pulverized shell, their outer and inner surfaces are smooth but have a chalky feel, and the cores consist of a dark-gray paste. Colors range from light brown to buff, with the exception of one sherd which has an orange sliplike finish both inside and out. The ware is relatively thin, sherd thicknesses varying between 4 and 5 mm. Hardness ranges from 4 to 5. On all of the sherds the surface finish is plain, and three have narrow, sharply incised lines across them. The sample is too limited to permit making a cultural identification; however, the sherds are suggestive of Glen Elder Focus material.

The chipped-stone sample consists of 4 end scrapers, 7 side scrapers, 1 utilized core, and 1 blade or knife. All of the specimens are of gray or banded chert. Of the end scrapers (pl. 21), all found on the surface, 3 are medium sized and 1 is small. They are roughly rectangular, with the snub end rounded on two of the specimens. The under surface is unmodified and slightly concave; the upper surface fairly flat. Two of the scrapers are retouched on the front end and two retouched along the front and right side. The end scrapers range from 26 to 38 mm. in length, 21 to 31 mm. in width, and 5 to 11 mm. in thickness.

The side scrapers (pl. 21) are of the spall variety. The chert chips from which they have been made are unmodified on one surface and retouched along one edge. A patinated portion, from the nodule from which the chips have been struck off, is present in three of the scrapers. The shapes are irregular, but tend to be somewhat rectangular. One specimen (14PO12-5 (pl. 21)) is roughly semicircular and retouched along the working edge. A semicircular notch, 19 mm. wide, along one side, indicates that the scraper may also have been used as a bow-shave. Side scrapers range from 45 to 71 mm. in length, 29 to 47 mm. in width, and 10 to 15 mm. in thickness.

One flat-bottomed, high keeled core shows evidence of use but no retouching on its work edges.

The one blade or knife (14PO12-2) has a curved cutting edge and is coarsely flaked with the upper edge thickened and smoothed. It is 55 mm. long, 30 mm. wide, and 9 mm. thick.

CONCLUSIONS

The artifact sample is too limited and nondiagnostic to make a cultural identification of the site. The sherds are suggestive of, but certainly not identical to, material from the Glen Elder site (14ML1) in Mitchell County, and the White Rock site (14JW1) in Jewell County, Kans. It has been suggested that these latter two sites be assigned to the Glen Elder Focus of the White Rock Aspect (Kiehl, 1953, p. 4).

Sites 14PO12 and 14PO13 are adjacent to each other and may be 1 site rather than 2. Scrapers are the most numerous of the stone artifacts at both of the sites and are similar in style. On the basis of the pottery recovered, sites 14PO12 and 14PO13 are different sites; this may, however, be a reflection of unavoidable but admittedly inadequate sampling.

THE REANY SITE (14PO13)

FIELDWORK

The Reany site (14PO13) is located on the southwest side of the spillway, about 800 feet west of site 14PO12 (pl. 22, *a*). It is in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 18 and NW $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 19, R8E T9S. The site originally covered an area of about 1 $\frac{1}{2}$ acres; however, at the time of investigation the north third of the site had been destroyed by construction operations. A day and a half was spent testing the remaining portion of the site. During this time the surface was intensively examined and nine test pits were dug in the area of the greatest surface artifact concentrations. Here, as at 14PO12, the surface was covered with chert chips, but sherds and chipped stone implements were more numerous than at the former site.

ARTIFACTS

A total of 244 artifacts was recovered. Potsherds were found on the surface and in the test pits, at depths of 0.1 to 0.6 foot. The pottery sample totals 177 body sherds (pl. 23) and 1 rim sherd. The ware is tempered with rather finely pulverized shell. The exterior surface texture is smooth, the interior slick or imperfectly polished, and the core consists of a dark gray to black paste, compact, and often laminated. The exterior surface, ranging from light brown to buff in color, is plain, with seven sherds having small punctate impressions made with a sharp pointed instrument held at an acute angle to the pot. Body sherd thickness ranges from 4 to 7 mm. and averages 5.8 mm. Hardness ranges from 4 to 5 in Mohs' scale. The one rim sherd (14PO13-86) (pl. 23), a surface find, is straight. Shallow diagonal notches, about 2 mm. in width, encircle the top of the lip. The rim is 7 mm. thick and 3.6 mm. high, and once had either a lug or strap handle riveted to it. The slight amount of curvature of the rim suggests that it is from a wide-mouthed pot. One small strap handle (pl. 23) was found in test pit No. 4.

All of the 65 stone artifacts found were of chipped stone. These include projectile points, scrapers, blades, and one chopper. Of the 6 projectile points found (pl. 23), all from the test pits, 2 are complete, and 4 consist of the shoulder and about half of the blade. The points, made from chert, are small, triangular, straight sided, and del-

icately chipped. Five of them have a straight base and one a slightly concave base. Specimen 14PO13-61 (pl. 23) resembles a point but is concave near the tip, and may be a small scraper or knife. The projectile points range in length from 19 mm. to an estimated 30 mm., in width from 10 mm. to 15 mm., and in thickness from 2 mm. to 2.5 mm. Table 3 gives projectile point measurements.

TABLE 3.—*Measurements of projectile points*

Cat. No.	Length	Width	Thickness	Description ¹
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>	
49.....	19	10	2.5	NBa
60.....	20	13	2.5	NBa
50.....		12	2.5	NBa
72.....		15	2.0	NBa
73.....			2.0	NBa
80.....		10	2.5	NBb

¹ See Strong, 1935.

The most abundant artifact found at the site is a chipped scraper of gray or banded chert. Of the 58 recovered, 21 came from the test pits. The scrapers are of the spall variety and as a rule show a minimum of modification. Most of the scrapers are a variety of end scraper, and for convenience of description they have been lumped into three groups. Group 1 end scrapers (pl. 24), 27 in number, are subrectangular in outline and triangular in cross section. They are characterized by having a dorsal ridge off center, with a steep bevel on one side, a base that is either flat or slightly concave, and a bit that is abrupt and retouched. Either one or both of the sides may be retouched. Group 2 scrapers (pl. 24), 11 in number, are shorter and wider and more irregularly shaped than group 1 scrapers, and are characterized by a flat upper surface, unmodified or with the dorsal ridge removed; otherwise, they are similar to those of group 1. Two of the scrapers are small, and resemble the familiar "thumb-nail" scraper. Group 3 scrapers (pl. 24) are small, ovate, flat to slightly concave ventrally, and have a low dorsal ridge that is approximately medial. Two specimens are retouched along the end and one side, and one on the end and both sides.

Five specimens are classed as miscellaneous end scrapers (pl. 24). No. 37 is an elongate, coarsely flaked, keeled scraper. The bottom surface is slightly concave, and the upper surface has a low bevel at the bit end. The maximum width is at the bit end. No. 34 is a subrectangular end scraper, flat on the ventral surface, and concave on the dorsal surface. The working edge, which is abruptly beveled, is on the end and one side, with the corner rounded. Specimen 11 is a jagged piece of chert, roughly triangular, with the apex rounded and retouched. Maximum thickness is at the bit end, and the bevel is steep. No. 56 is a flat scraper with a right-angled corner and

the remainder rounded. The ventral surface is flat, and the working edge on the dorsal surface is retouched on all but a small portion of one side. The scraper is made of chert.

Twelve specimens, four of which are incomplete, have been classed as side scrapers (pl. 24). They consist of irregularly shaped chert flakes, one side of which is flat and unmodified and one edge retouched. Table 4 gives measurements of scrapers.

TABLE 4.—*Measurements of scrapers*

	Number	Length	Width	Thickness
		<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
End scrapers, group 1	27			
Range		29-84	19-44	6-25
Mean		49.7	26.8	11.5
End scrapers, group 2	11			
Range		25-63	18-46	4-15
Mean		41.5	32.1	9.2
End scrapers, group 3	3			
Range		26-33	20-27	6-7
Mean		29.6	24.3	6.3
End scrapers, miscellaneous:				
Cat. No. 37		64	35	18
Cat. No. 34		85	42	19
Cat. No. 11		65	72	31
Cat. No. 56		37	30	12
Side scrapers (complete)	8			
Range		41-62	18-35	7-11
Mean		49.3	25.3	9.1

Two blades or knives were found. Specimen 5 (pl. 24), found on the surface, is the end of a chert blade. It is convex on both sides, with a medial ridge on one surface. The tip is slightly rounded. The piece measures 49 mm. in length, 31 mm. in width, and 10 mm. in thickness. No. 74 (pl. 24) is an elliptical-shaped flat blade or knife, found in test pit 3. The tip of one end is broken off, the other tip is thickened and retouched like an end scraper bit. The edges of the blade are retouched on both surfaces. The blade is 105 mm. long, 48 mm. wide, and 7 mm. thick.

One oval-shaped chopper (pl. 24) coarsely flaked, and made of quartzite, was found on the surface. It measures 90 mm. in length, 61 mm. in width, and 22 mm. in thickness.

Four small pieces of metal were found. One small piece of thin sheet copper came from the surface and one from test 3. Test 2 yielded a small, thin fragment of iron, and test 1 a copper jingle or cone (pl. 23) which measures 18 mm. in height, 13 mm. in width at the base, and 1 mm. in thickness.

CONCLUSIONS

The artifact sample obtained at 14PO13 is too small to permit the making of a positive cultural identification of the site, nevertheless the range of probabilities can be limited. The copper jingle and fragments of copper and iron found in the test pits indicate a protohistoric or early historic date, and we know that the site is well within the terri-

tory of the historic Kansa, and do not know of other tribes in this immediate area at that time. Unfortunately, little is known archeologically of the Kansa. Ethnological data indicate that there were many similarities between the cultures of the Kansa and of the Osage, and it is interesting to note that the shell-tempered pottery and triangular points found at 14PO13 fall within the range of that described for the Osage (Chapman, 1946, pp. 22-23). It seems quite probable that the Reany site is a protohistoric or early historic Kansa site. The occurrence of chert all along the ridge, and the abundance of chert chips covering the surface of the site indicate that stone-chipping was a major occupation at this spot.

SITE 14RY10

Site 14RY10 is a village site located 2,500 feet south of the southwest end of the Tuttle Creek Dam, in an area of construction activity (pl. 20, *b*). The site is in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 24 T9S R7E. It is situated on a low terrace in the bottom lands, several hundred feet west of the right bank of the Big Blue River. To the south a small creek, the bed of which is 30 feet below the terrace surface, limits the occupational area. The relatively flat surface of the terrace has an elevation of 1,040 feet, 20 feet above stream level. The whole area, covered with a clayey loam topsoil, has been under cultivation for almost 100 years.

Surface indications consisted of a sparse scattering of occupational refuse. Dr. Linwood Hodgdon had previously made an intensive surface survey of the site and had marked the areas of major refuse concentrations. A north-south base line was established immediately east of one of these areas and a grid system, based on 10-foot squares, was laid out.

The first test, excavation unit 1, was dug 150 feet east of the base line. Here a 30-foot-long, 4-foot-wide trench was dug to subsoil, with a deeper pit at one end to check for possible stratification. The topsoil covering in this section of the site was 0.6 foot in depth and underlain by a sterile yellow clay subsoil. The cultural materials all occurred within the first 0.3 foot from the surface. No subsurface features were found.

Work next proceeded on excavation unit 2, a 70-foot-long, 4-foot-wide trench, dug along the west side of the base line. The excavation was extended by digging a 100-foot-long and 3-foot-wide east-west lateral at line N310, a 35-foot lateral at N330, and 15 feet of trench along a third lateral at line N360. All trenches were dug to sterile subsoil with intermittent pits dug deeper. No subsurface features were encountered and artifacts were sparse. A large concentration of wattle was found just west and north of the N310 lateral trench indicating a possible house location. Lack of funds prevented further

work by the Missouri Basin Project unit, but volunteer units continued working and uncovered the remains of one dwelling. Observation of the artifacts obtained indicates that the site may be assigned to the Table Rock Focus of the Nebraska Aspect.

SUMMARY

During the field season of 1953, a Smithsonian Institution party excavated 1 site and tested 3 others in the construction area of the Tuttle Creek Dam, northeastern Kansas. None of the sites may be positively identified with any specific cultural group but indications point to some tentative identifications. The Sweat Bee Mound (14PO14) was excavated and it is suggested that this is a Woodland burial mound. Seven burials (one intrusive) were found here in a stone-slab mound. The Spillway site (14PO12) was briefly tested and few artifacts were recovered. Ceramically it is suggestive of the Glen Elder Focus. The lithic materials indicate that it may be a continuation of site 14PO13. The Reany site (14PO13) was briefly tested and it is suggested, on the basis of the pottery and the metal artifacts, that this might be a protohistoric or early historic Kansa campsite. Site 14RY10 was tested briefly and such indications as could be determined here suggest that this may be a village site of the Table Rock Focus of the Nebraska Aspect.

It is felt that the potentialities of sites 14PO12, 13, and 14 have been exploited to the limits of practicability under the circumstances. These sites, at best, could yield but little additional information. Site 14RY10, which, for the most part, has been investigated by volunteer groups under Linwood Hodgdon and under John L. Champe, merits further work. The urgent need in this area now in order to begin to clarify the picture of the prehistory of this area is for excavation of a number of additional sites here. These additional sites have been suggested by Solecki (Solecki, 1953 a) and are here heartily endorsed.

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APPENDIX

SKELETAL REMAINS OF THE SWEAT BEE MOUND SITE (14PO14)

INTRODUCTION

The skeletal remains to be described consist of the remains of six adult burials, all from Feature 1, in a slab-rock mound. Feature 1 consists of an unlined pit, containing the lower burials, Nos. 4-6 (pl. 16, *a*), dug into the base of the mound, and a circle of rock slabs placed on edge just above and around the pit, containing the three upper burials, Nos. 1-3 (pl. 15, *b*). Apparently the pit had been reopened from time to time and burials added. In the lower group of burials the manner in which the bones were mixed indicated that the third burial had been added at a later date than the other two and that the bones of the first two had been pushed, each to one side, to make room for it. Many of the bones were poorly preserved. The same procedure seems to have been followed with the upper burials. Many of the bones of these were crushed by overlying rocks. Because of the fragmentary nature of many of the bones, and their displacement caused by forcing a third burial into each of the two groups, it was possible to definitely associate the skull and body bones of one individual only, burial No. 1, cat. No. 49. With this exception, the burial numbers apply only to the crania.

METHODS

The crania were sexed without further supporting evidence except for specimen No. 49. Aging is based on endocranial closure and tooth-wear. Observations of the long bones supported the conclusion that the total series consisted of 6 individuals, 4 male and 2 female. Measurements are taken in accordance with Martin (1928) unless otherwise indicated.

CRANIAL DATA

Condition of specimens.—Specimen No. 47 (burial 3) consists of large portions of the occipital, right and left parietal, and frontal bones. The petromastoid and the tympanic portion of the left temporal is also present. The articulations between the parietal, frontal, and temporal bones are tenuous.

Cranium No. 49 (burial 1) lacks the sphenoid, a portion of the base, and the processes of the maxillae. The ascending portion of the right mandibular ramus is missing.

Specimen No. 50 (burial 2) consists of the cranial vault minus most of the right side and face, and all of the base. A portion of the left zygomatic and part of the maxillae are present.

Specimen No. 65 (burial 5) consists of the left parietal and most of the right parietal bone, the squamus portion of the right temporal, the left half of the frontal and most of the left half of the maxilla and mandible.

Cranium No. 66 (burial 4) consists of the cranial vault with the temporal bones, but minus the sphenoid, face, and base. The left zygomatic, the glabellar portion of the frontal, together with the upper part of the nasal bones, and a portion of the body and alveolar border of the maxillae are also present. The mandible is complete except for the right ascending ramus. A severe warping of the cranial bones prevented restoration of the skull.

Specimen No. 73 (burial 6) consists of fragments of the left half of the mandible.

Measurements and indices.—Archeological considerations suggest that site 14PO14 belongs to the Woodland Complex. There is a possibility that it represents an attenuated form of the mound building complex to the east. In order to see what inferences may be gained from the physical types involved, a skeletal series from the Kansas City vault mounds, Hopewellian Woodland, located about 129 miles east of the Sweat Bee Mound site, has been chosen for comparative purposes. Stewart (in Wedel, 1943, pp. 245–265) has demonstrated the similarity of the Kansas City Mound series to that of an Ohio Hopewell series from the Turner site.

The measurements and indices of the 14PO14 crania and a comparison of these with the series from the Kansas City vault mounds (Stewart, in Wedel, 1943, pp. 250–254, 268) are given in table 5.

Only 2 skulls from 14PO14, 1 male, No. 50 (pl. 16, *b*), and 1 female, No. 49 (pl. 17), are complete enough to yield comparative metrical data. Neither these nor any of the others, so far as could be observed, were artificially deformed. The skulls are dolichocranic, with the cranial indices falling close to those given for the Kansas City series.

Head height is noticeably lower in the 14PO14 group than it is in the Kansas City series. The basion-bregma height in both crania No. 50 and No. 49 was estimated and hence it and the indices derived therefrom are only approximate. The male skull is chamaekran or low according to the length-height index and the auricular height index, and low as judged by the mean height index. It is akrokran according to the breadth-height index. The female skull is in the medium height range of the various height indices. Head height of both the male and female crania of the Kansas City series is high.

General head size, as indicated by the cranial module, is medium in the male and comparable to the Kansas City Hopewell. None of the 14PO14 crania is thick walled.

The unusually small minimum frontal diameter of the Kansas City skulls is not present; 92 mm. as against 96 mm. for the 14PO14 skulls.

Observations of facial structure had to be made, for the most part, from one female skull. The upper face height falls within the range of the Kansas City female series, but the face width is considerably less, resulting in a leptene face rather than the mesene one of the Kansas City series.

Orbital shape is similar to that of the Kansas City series, hypsiconch, but a marked difference is indicated by the nasal index which is hyperchamaerrhine in the 14PO14 skull and messorrhine in the Kansas City series.

The upper alveolar arch is greater in length than width (maxillo-alveolar index 93.22) in female skull No. 49, while in the Kansas City series the reverse is true (maxillo-alveolar index 117.5).

From this comparison of the two series it is apparent that although there are similarities, there are also distinct differences.

Morphological observations.—Observations of the individual crania are given in table 6. The following summary indicates the general characteristics of the 14PO14 series.

Skull vault and base:

- Ovoid head form
- Divided type brow ridges of small to medium size
- Small to medium-sized glabella
- Low frontal height and small frontal breadth
- Medium frontal slope
- Small postorbital constriction
- Small frontal bosses
- Absent to small median crest
- Slight sagittal elevation
- Lack of postcoronal depression
- Medium parietal bosses
- Flat temporal region
- Medium to large mastoids
- Medium to large supramastoid crest
- Medium to pronounced occipital curve
- Slight to medium amount of lambdoid flattening
- Lack of occipital torus
- Small inion
- Lack of platybasia
- Shallow to deep glenoid fossa depth
- Small postglenoid processes
- Thin tympanic plate
- Elliptical-shaped auditory meatuses

Facial skeleton :

- Square-shaped orbits of slight inclination
- Absent to shallow suborbital fossae
- Small to large-sized malars with slight lateral projection
- Slight nasion depression
- Medium nasal root height and breadth
- Medium to sharp nasal sills
- Slight amount of alveolar prognathism
- Medium palate vault height
- Medium to large mandible
- Bilateral chin form with slight chin projection
- Medium-sized genal spines
- Lack of mandibular torus
- Neutral to slightly everted gonians

Dentition.—The general condition of the teeth is good even though tooth wear varies from pronounced to very pronounced. The crowns of the teeth are worn off markedly and in some cases the roots are exposed. Of a total of 74 teeth, some in place and others not, 2 cases of apical caries occur. Abscesses and other pathological conditions are not apparent, and the teeth were retained into late middle age and old age in spite of excessive wear. Pronounced tooth wear with a retention of teeth late in life, and a minimal number of abscesses and caries is characteristic of skeletal material from the Turner Mounds (Ohio Hopewellian) and from the Kansas City Mound series (Hopewellian) (Stewart, in Wedel, 1943, p. 249).

Pathology and anomalies.—No pathological conditions in the crania are apparent. No ear exostoses are present. The tympanic plate is perforated in specimens No. 66 and No. 50, and unperforated in two unarticulated left temporals.

PHYSICAL TYPE

The identification of the physical type of as small and fragmentary a series as that of the 14PO14 crania must necessarily be considered tentative and suggestive. With little supporting metrical data available, reliance is basically on morphological observations.

The 14PO14 crania appear to fit morphologically with the eastern Early Woodland long-headed group, characterized by the Otamid variety of Neumann (Neumann, 1950), a group found from Nebraska to the east coast, and represented by such peoples as those of the Woodland Black Sand Focus in Illinois, the Coastal Focus of the Atlantic coast, and the Karankawa of the Texas coast (Neumann, 1950, p. 16).

The 14PO14 crania are a long-headed group. The cranial index of skull No. 50 is 70.47. Cranium No. 66, although not complete enough for accurate measurement, is obviously long headed. The mean cranial index of the Otamid male series is 70.66 (Neumann, 1950, p. 20).

It was possible to compare the morphological traits of the 14PO14 series with 39 of the 46 morphological traits listed by Neumann for the Karankawa series of the Otamid variety (Neumann, 1950, p. 21). Observations of the styloid processes, nasal height and breadth, nasal profile, anterior nasal spine, total prognathism, and palate shape could not be taken on the 14PO14 series. The two series differed noticeably in only four traits. Glabella and brow ridge size are considerably smaller in the 14PO14 series, the lateral projection of the zygomatics is less, and nasion depression is less in the 14PO14 series than in the Otamid series. The tendency to a small to moderate development of glabella and of the brow ridges is characteristic of Nebraska Woodland. In a series of 16 male Nebraska Woodland crania, the modal distribution of glabella size is small (10), medium (3), and large (2), and of brow ridge size small (6), medium (5), large (3), and trace (1) (Neumann, unpublished data). The 14PO14 crania show a greater morphological resemblance to the Nebraska Woodland series than to the Karankawa Otamids.

POSTCRANIAL DATA

The poor state of preservation of the skeletal material prevented the recovery of many of the body bones. Most of the long bones recovered lack one or more of the articular ends. Burial 1, cat. No. 49, is the only one in which the paired bones and the crania were definitely associated.

No pathological conditions were apparent in any of the skeletal bones.

Bones measured or observed consist of the following: 9 femora (5 male, 4 female), 6 tibiae (3 male, 3 female), 7 humeri (3 male, 4 female), 4 radii (2 male, 1 female, 1 sex ?), 3 ulnae (2 male, 1 female), and 4 fibulae (1 male, 1 female, 2 sex ?). Measurements and observations of the individual skeletal bones are given in table 7.

Of the femora, two males show a pronounced development of the pilaster, as indicated by the middle shaft index. Pilaster development in the 14PO14 female is greater than that given for the Kansas City females series, and close to that of the Turner Mound series. The subtrochanteric region is less flat than in the Kansas City series. Of nine femora, the third trochanter was pronounced in one male, submedium in another, and medium in both the left and right femora of one female. In the Turner Mound series the third trochanter occurred in some form in all of the males and 4 of 6 females (Hooton, 1922, p. 128).

In the 14PO14 series the shape of the shafts of the tibiae is predominantly the ordinary prismatic.

Of 6 humeri, 2 female pairs had large sepatal apertures, 1 male a medium-sized aperture, and 1 male no sepatal apertures.

Estimates of stature are dubious since they are based on individual long bones and very few of these. The estimates are based on Pearson's formulae (Hooton, 1947, pp. 728-729). Among the male burials there appeared to be one unusually large individual represented. Femur No. 97, with a maximum length of 515 mm., was considerably larger than the rest of the femora. The stature estimate based on this femur is 180.5 cm. (5 feet 11 inches). An unusually long left radius, 290 mm. maximum length, which probably belongs with femur No. 97, gives a stature estimate of 180.7 cm. (5 feet 11 inches). The other male long bones, if measurable, would yield shorter stature estimates. The average stature for the Kansas City male series is 160 cm. (Stewart, in Wedel, 1943, p. 259). The stature of female No. 49, based on the left humerus, is 153.5 cm. Using Manourier's tables (Hrdlička, 1947, p. 182) the stature is 155.2 cm. (61.1 inches). The stature range for the Kansas City vault mound female series is 156 to 157 cm. (Stewart, in Wedel, 1943, p. 259), and for the Turner female series 157 cm. (Hooton, 1922, p. 126).

SUMMARY AND CONCLUSIONS

The comparison of the Sweat Bee slab-rock mound crania with that of the Kansas City vault mounds has shown that although there are similarities, there are also distinct differences between the crania of the two groups. Excessive tooth wear accompanied by sound teeth relatively free of caries and retained late in life is common to the 14PO14, Kansas City vault mound, and Turner Mound groups. On the basis of the available data, it is suggested that the 14PO14 crania fit in morphologically with the early Woodland Otamids. The Otamid variety has been found, among other places, in the stone vault graves that occur along the Mississippi, Missouri, and Kansas Rivers, and is encountered in the Hopewell mounds of the Illinois valley (Neumann, 1950, p. 121).

TABLE 5.—Cranial measurements and indices of 14PO14 series with comparative measurements of Kansas City Mound series (Hopewellian).

	Cranial measurements and indices of indicated burial No., cat. No., and sex				Comparative measurements of Kansas City Mound series ¹	
	B1, 49, female	B2, 50, male	B5, 65, male	B4, 66, male	Male	Female
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>
Maximum length.....	173	193			189 (5)	178 (4)
Maximum breadth.....	128	136			137 (5)	134 (3)
Basion-bregma hgt.....	*125	130+			142 (2)	139 (3)
Auricular hgt.....	111	106+		110+	118 (6)	115 (6)
Thickness lt. parietal.....	4.0	4.0	5.0	5.0		
Minimum frontal diameter ²	89	96		*97	92 (9)	85 (6)
Ophryonic horizontal circum.....	483	510				
Frontal cord.....	105	111			114 (10)	109 (8)
Sagittal (nasion-opisthion) arc.....	352	376				
Frontal (nasion-bregma) arc.....	114	122				
Parietal (bregma-lambda) arc.....	122	129		120		
Occipital (lambda-opisthion) arc.....	116	125		112		
Transverse arc ³	276					
Gnathion-nasion hgt. ⁴						
Upper alveolar pt.-nasion hgt.....	68				72 (2)	70 (2)
Bizygomatic maximum.....	*123	*136			140 (2)	129 (2)
Orbital height, rt.....	37					
Orbital height, lt.....	34				34 M (3)	35 M (1)
Orbital breadth from dacryon, rt.....	39					
Orbital breadth from dacryon, lt.....	40	*40			38 M (3)	38 M (2)
Nasal height.....	51				49 (3)	50 (3)
Nasal breadth.....	30				26 (3)	25 (3)
Maxillo-alveolar length.....	59				53 (1)	55 (2)
Maxillo-alveolar width.....	55					64 (2)
Height of symphysis (mandible).....	34			34		
Total mandibular length ⁵	106			116		
Height of body.....	28			30		
Thickness of body ⁶	14		14	14		
Bigonial width.....	91					
Height of ramus, lt.....	58			58		
Max. width, ascending ramus, lt. ⁷	40		49	44		
Min. width, ascending ramus, lt.....	31		39	36		
Mandibular angle.....	131° lt.		112° lt.	120°		
Cranial index.....	73.99	70.47			72.4 (5)	75.4 (3)
Height-length index.....	*72.25	67.36+				
Height-breadth index.....	*97.66	*101.56				
Mean-height index.....	83.05	79.03+			88.0 (2)	90.1 (3)
Auricular height-length index.....	62.14	*55.70				
Cranial module.....	*142	153			154 (2)	147 (2)
Frontal index ⁷	84.76	86.59			80.5 (9)	77.6 (6)
Fronto-parietal index.....	79.53	71.11				
Cranio-facial index.....	*104.07					
Zygo-frontal index.....	*66.96					
Fronto-gonial index.....	102.25					
Zygo-gonial index.....	73.98					
Facial index.....						
Upper facial index.....	55.28				52.1 (1)	53.9 (1)
Orbital index, mean.....	89.74				89.6 (3)	89.7 (1)
Nasal index.....	58.82				53.5 (3)	50.3 (3)
Maxillo-alveolar index.....	93.22					117.5 (2)

*Estimated.

+Approximated.

¹ Stewart, in Wedel, 1943, p. 268. Figures in parentheses equal number of individuals represented.

² Measured at 3 points 1 cm. above the temporoparietal suture and averaged.

³ Measurement taken in accordance with Morant (1923), measurement Q¹.

⁴ No allowance made for tooth wear.

⁵ Single measurement taken with goniometer.

⁶ Measurement taken in accordance with Hrdlička (1947).

⁷ Measurement taken across top of condyles.

M = Mean.

TABLE 6.—14P014 series: morphological observations

Morphological observations of indicated cat. No., specimen, age, sex						
	50 B2, calva, 56-76 years, male	47 B3, calva, 56-76 years, male	65 B5, calva, 36-55 years, male	66 B4, mandible calvaria, 39-55 years, male (?)	49 B1, mandible calvaria, 56-76 years, female	73 B6, frag. rt. mandible 36-55 years, female
Muscularity	Pronounced	Medium	(1)	Medium	Medium	
Weight	Light	Light	Light	Light	Light	
Form	Ovoid	Ovoid ?	Ovoid	Ovoid	Ovoid	
Deformation	None	None	None	None	None	
Frontal region:						
Brow ridges, type	Divided		Divided	Divided	Divided	
Brow ridges, size	Small	Small	Medium	Trace	Small	
Glabella	do		Small	Small	do	
Height	Low	Low		Low	Low	
Breadth	Small	Small		Medium	Medium	
Slope	Medium +				Small	
Postorbital constriction	Small		Small	Small	do	
Bosses	do		Small	None	do	
Median crest	do		do		None	
Metopism	None				None	
Parietal region:						
Sagittal elevation	Slight	Absent	Slight	Slight	Slight	
Postorbital depression	Absent	do	Absent	Absent	Absent	
Bosses	Medium	Medium	Large	Medium	Medium	
Foramina	None	Small	None	None	None	
Temporal region:						
Fullness	Flat	Large	Flat	Slight	Flat	
Mastoids	do	do	do	do	do	
Supramastoid crest	do	do	do	do	do	
Sphenoid depression	do	do	do	do	do	
Occipital region:						
Occipital curve	Pronounced	Pronounced		Medium	Pronounced	
Lambdaoid flattening	Medium	Slight		Absent	Medium	
Torus	Absent	Absent		do	Absent	
Shape of torus	Small	Small		Small	Small	
Inion						
Sutures, wormian bones, pterion:						
Serration:						
Coronal	Submedium		Submedium	Submedium	Submedium	
Sagittal	(?)		do	do	Medium	
Lambdaoid	Submedium		do	do	do	
External occlusion:						
Coronal	Complete	Complete	Complete	Complete	Complete	
Sagittal	do	do	do	do	do	

Lamboid.....	do.....						
Spheno-parietal.....	do.....						
Parieto-mastoid.....	do.....						
Wormian bones:							
Lamboid.....	None.....						
Coronal.....	do.....						
Sagittal.....	do.....						
Temporo-occipital.....	do.....						
Pterion form:							
Right.....	H (narrow).....						
Left.....	do.....						
Basilar region:							
Elevation of condyles.....	None.....						
Elevation of basion.....	do.....						
Petrous depression.....	do.....						
Platybasia.....	None.....						
Median occipital fossa.....	do.....						
Glenoid fossa depth.....	Deep.....	Medium, lt.....	Medium.....				
Postglenoid process.....	Small.....						
Tympanic plate.....	Thin.....						
Auditory meatus.....	Ellipse.....						
Auditory exostoses.....	None.....						
Styloids.....	do.....						
Lacerate foramina.....	do.....						
Pharyngeal tubercle.....	do.....						
Pharyngeal fossa.....	do.....						
External pterygoid plate.....	do.....						
Internal pterygoid plate.....	Medium.....						
Internal pterygoid plate.....	do.....						
Pterygo-spinous foramen—rt.....	do.....						
Pterygo-spinous foramen—lt.....	Absent.....	do.....	do.....	do.....	do.....	do.....	do.....
Perforated tympanic plate.....	Lt. present.....	Lt. none.....	Lt. none, rt. missing.....				
Orbital region:							
Orbital shape.....	Square.....						
Orbital inclination.....	Slight.....						
Malar region:							
Size of malar.....	Medium.....	Large lt.....					
Lateral projection.....	Slight.....						
Anterior projection.....	do.....						
Marginal process.....	do.....						
Suborbital fossa.....	do.....						
Zygomatic process:							
Nasion depression.....	do.....						
Nasal root height.....	Slight.....						
Nasal root breadth.....	Medium.....						
Nasal bridge height.....	do.....						
Nasal bridge breadth.....	do.....						
Nasal profile.....	Concave-convex.....						
Nasal sills.....	do.....						
Subnasal grooves.....	do.....						
Nasal spine.....	do.....						

1 Observations could not be made.

TABLE 6.—14P014 series: *morphological observations*—Continued

Morphological observations of indicated cat. No., specimen, age, sex						
	50 B2, calva, 56-76 years, male	47 B3, calva, 56-76 years, male	65 B5, calva, 36-55 years, male	66 B4, mandible calvaria, 36-55 years, male (?)	49 B1, mandible calvaria, 56-76 years, female	73 B6, frag, rt. max- illa lt. 74 mandib- le 36-55 years, female
Promethism:						
Alveolar prognathism.....				Slight.....	Slight.....	None.
Alveolar prognathism.....					do.....	
Total prognathism.....					do.....	
Palatal region:						
Palato shape.....						
Palato vault height.....						
Torus.....				Medium +.....	U-shaped.....	High.
Torus form.....					High.....	
Transverse suture.....					Absent.....	
Poster for nasal spine.....						
Mandible:						
Mandible size.....			Large.....	Medium.....	Small.....	Medium.
Chin form.....				Bilateral.....	Medium.....	
Chin projection.....				Slight.....	Slight.....	
Genial spines.....				Medium.....	do.....	
Torus.....			Absent.....	Absent.....	Absent.....	
Eversion of gonions.....			Slight, lt.....	Neutral.....	Slight.....	Inverted.
Profile of angle.....			Obtuse, lt.....	Obtuse.....	Obtuse.....	Obtuse.
Mylo hyoid ridge.....			Medium, lt.....	Slight.....	Slight.....	
Position of mental foramina.....			Mt, lt.....	Pt.....	P2-M1.....	
Dentition:						
Eruption.....			Complete, lt.....	Complete.....	Complete.....	Complete.
Anumorten tooth loss.....			None.....	None.....	None.....	None.
Number teeth caries.....	1.....		do.....	None.....	1.....	None.
Number abscesses.....			do.....	do.....	do.....	None.
Molar cusps.....			Pronounced.....	Pronounced.....	Pronounced.....	Medium +.
Attrition.....						
Bite.....						
Shovel-shaped incisors.....						Slight.
Peg teeth.....						None.
Misplaced teeth.....						None.
Retained deciduous teeth.....						None.
Crowding.....			None.....	None.....	Slight.....	None.
General quality.....	Very poor.....		Good.....	Good.....	Good.....	Good.

TABLE 7—14P014 series: *Postcranial measurements and observations¹*

FEMUR

		Postcranial measurements and observations of indicated cat. No., sex, and side								
		97, M, lt.	99, M, rt.	98, F, rt.	82, F, lt. ¹	55, M, rt.	56, M, lt.	57, M, lt.	49/22, F, lt.	49/21, F, rt. ¹
Measurements (mm.) and indices:										
1 Max. length.....		515								
2 Bic. length.....		510								
3 Max. diam. head.....				40						40
4 Mid. shaft diam. s-p.....		38	36			31				26
5 Mid. shaft diam. lateral.....		27	25			28				23
Middle index 5X100/4.....		71.05	71.43			90.32				88.46
6 Subtrochantric diam. s-p.....		28	26	22	22	29				28
7 Subtrochantric diam. lat.....		35	35	30	29	22				21
Index of platymeria 6X100/7.....		80.00	74.29	73.33	75.86	75.86				75.00
Observations:										
Crista hypotrochanterica.....		Med	Slight	Absent	Absent	Absent				Absent.
Fossa hypotrochanterica.....		Absent	Absent	do	do	Med				Med.
Third trochanter.....		Pro ²	Submed	do	do	do				do
Middle shaft shape.....		Quad	Quad	Quad	Quad	Quad				Quad
Linea aspera.....		Pro.	Med	Submed	Submed	Med				Submed.
Degree of torsion of the upper portion.....		V. pro.	Slight	Slight	Slight	Slight				Slight.
Specimen.....		Complete.	Shaft and prox. end.	Shaft and prox. end.	Shaft	Shaft				Shaft and prox. end.

¹ Paired.
² Pronounced.

TABLE 7—14P014 series: Postcranial measurements and observations 1—Continued

TIBIA

	101, M, lt.	58, M, lt.	61, M, rt.	102, F, lt.	49/24, F, rt.	49/23, F, lt.
Measurements (mm.) and indices:						
1 Maximum length.....				28*		26*
2 Middle diam. a-p.....				19*		19*
3 Middle diam. lat.....				67.86		73.08
4 Middle index 3X/100/2.....				30		31.
5 Nutritive foram. diam. 3-p.....				21		20.
6 Nutritive foram. diam. lat.....				70.00.		64.52.
Index of platytenia 5X/100/4.....						
Observations:						
Shape of shaft at middle.....	1 3.		4.	5 s.		1.
Retroversion of head.....				Convex.		
Lateral condyle.....						
Squatting facets.....						
Specimen.....	Shaft and distal end...	Shaft and prox. end...	Shaft.....	Shaft and prox. end...	Shaft and prox. end...	Shaft.

HUMERUS

	49/14, F, rt.	49/13, F, lt.	51, M, lt.	79, M, lt.	78, M, rt.	81, F, lt.	80, F, rt.
Measurements (mm.) and indices:							
11 Max. length.....		238.					
2 Humeral head, max. diam.....		37.					
3 Middle max. diam.....		20.	24*				19*
4 Middle min. diam.....		14.	18*				16*
Index 4/100/3.....		73.68.	75.00.	70.83.			84.21.
Observations:							
Shape of shaft.....	Quad.	Quad.	Quad.	Quad.	Quad.	Prismatic.	Prismatic.
Scapular aperture.....	Large.	Large.	Large.	Med.	Large.	Large.	Large.
Supra condylar process.....	Absent.	Absent.	Shaft.....	Absent.	Absent.	Absent.	Absent.
Specimen.....	Shaft and distal end.	Complete.....	Shaft.....	Shaft and distal end.			

RADIUS

Measurements (mm.): Maximum length.....	49/17, F, rt.	89, M, lt.	84, M (?) , rt.	91, ?, lt.
Observations: Mid-shaft shape.....	External surface convex. Shaft and distal end.....	290..... External surface convex. Complete.....	External surface convex. Shaft and distal end.....	External surface convex. Shaft and distal end.

ULNA

Measurements (mm.): Maximum length.....	49/15, F, rt.	83, M, lt.	85, M, rt.
Observations: Mid-shaft shape..... Specimen.....	265..... Prismatic..... Complete.....	315..... Prismatic..... Complete.....	Prismatic. Shaft.....

FIBULA

Measurements (mm.): Maximum length.....	49/19, F, rt.	106, M, lt.	90, ?, lt.	106, ?, rt.
Observations: Mid-shaft shape.....	Quad. Shaft.....	Quad. Shaft.....	Medial surface fluted. Shaft.....	Lateral prismatic. Shaft and distal end.

*Center of shaft estimated.
 †| = paired.
 ‡ Ordinary prism.
 § Posterior surface divided in two by vertical ridge.
 ¶ Interior border indistinct, posterior half of bone oval.

In June 1956, some 2 years after this report was completed and submitted for publication, William M. Bass checked the skeletal material from 14PO14 in the Division of Physical Anthropology at the United States National Museum, Smithsonian Institution, and submitted the following comments:

The condition of the specimens, age, sex and a few measurements were checked. As a result of this study I feel that Cumming's report is well done and would recommend only the following additions and changes:

Cranium No. 66 (burial 4) showed intense copper staining on both sides of the skull, centering on the ears and right ascending ramus of the mandible. Less obvious copper staining was found on the distal end of the left radius and on both clavicles (Cumming, p. 51). There was a slight suggestion of copper staining on the left supra-orbital margin of cranium No. 65.

The three lower burials at this site, specimens Nos. 65, 66 and 73 showed a black staining on some of the bones, especially the arm and leg bones. This black staining may be due to manganese. Scrapings from the stained part of the bone yielded a positive micro-chemical test for manganese (micro-chemical test conducted by Edward P. Henderson in the Museum's chemical laboratory). Webb noted similar stains on bones from Indian Knoll and upon chemical analysis concluded that under certain conditions where a limited amount of red ocher is used on the flesh of the dead body a chemical change occurs following decomposition, which results in a black staining of the bone (Webb 1946, pp. 247-48). Webb makes no reference to having tested the bones for manganese.

The ages of all six specimens given by Cumming were too high. By careful analysis it has been possible to definitely establish the age of 2 individuals, specimens 49 and 66, and to lower the age of the remaining 4. Aging was based on tooth wear and epiphyseal union. The following are the ages assigned to each specimen:

<i>Specimen No.</i>	<i>Age</i>
50-----	40-50 ?
47-----	40-50 ?
65-----	30-40 ?
66-----	22-25
49-----	17-21
73-----	25± ?



a, A view of Sweat Bee Mound before excavation. *b*, Sweat Bee Mound after clearing off the overgrowth.



a, Sweat Bee Mound after removal of the soil fill. *b*, Excavating Sweat Bee Mound.



a, Excavating and mapping Sweat Bee Mound. *b*, View of the upper burials of feature 1 of the Sweat Bee Mound.

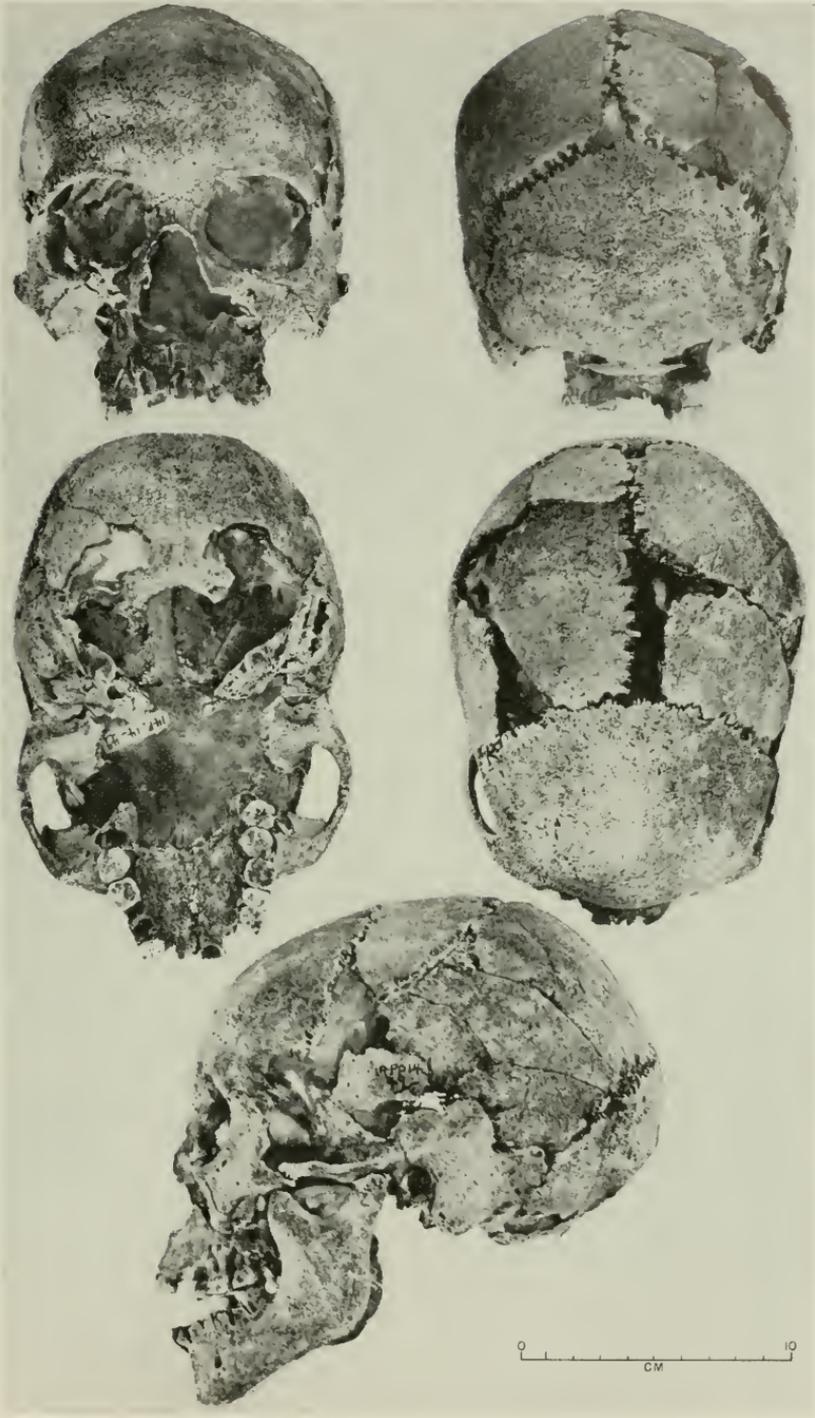


a

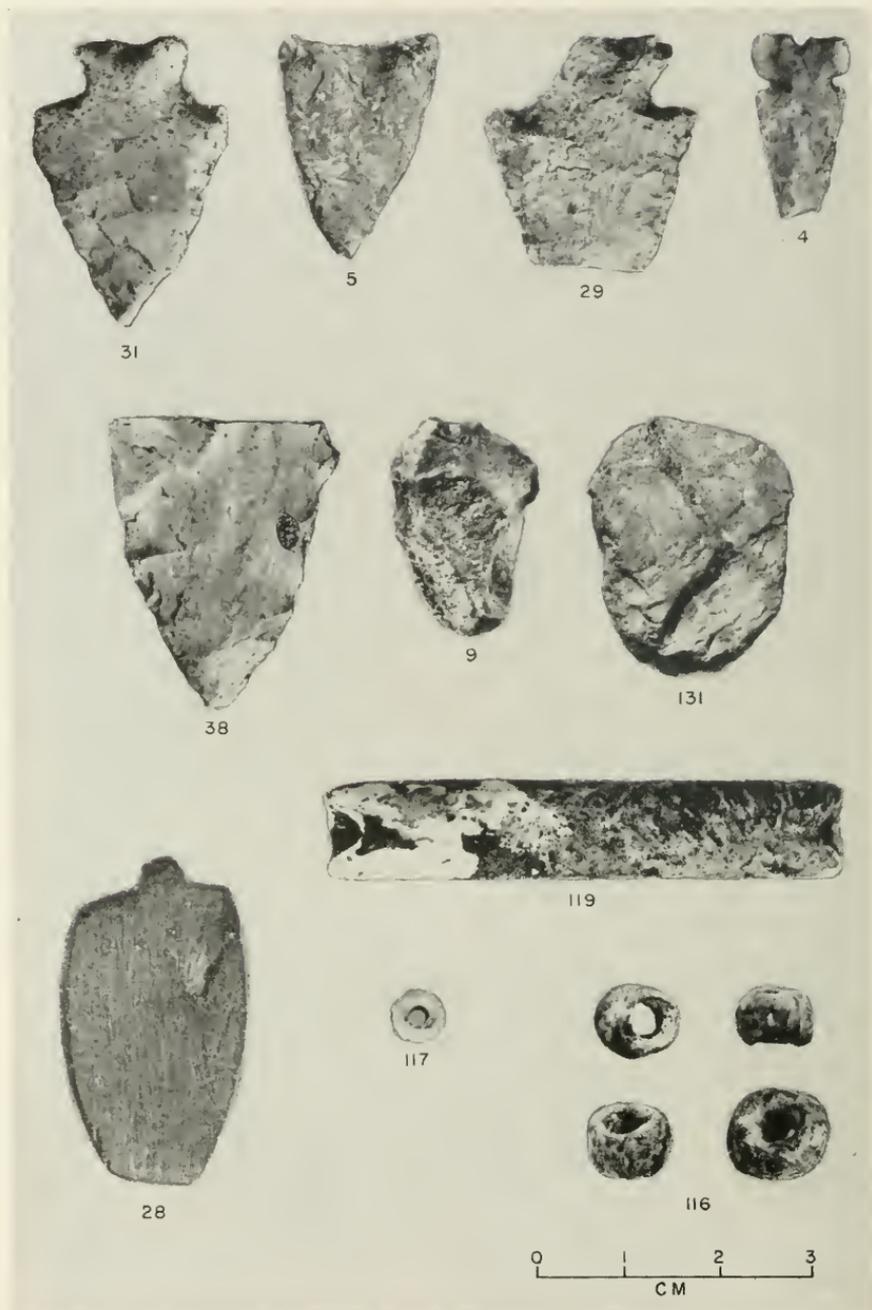


b

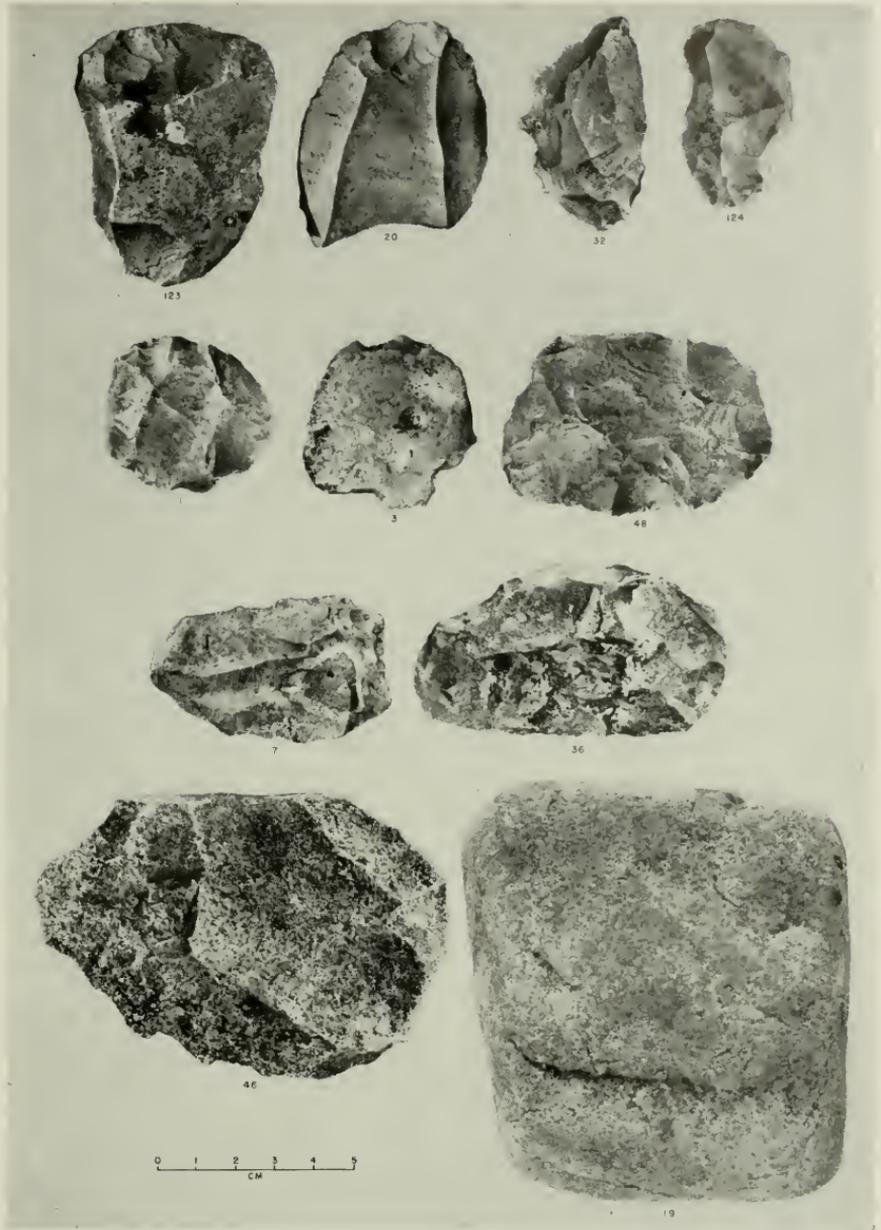
a, View of the lower burials of feature 1 of the Sweat Bee Mound. *b*, Views of the male skull of burial 2, No. 50, of the Sweat Bee Mound site.



Views of the female skull of burial 1, No. 49, of the Sweat Bee Mound site.



Sweat Bee Mound site. Projectile points: Nos. 31, 5, 29, 4. Blade: No. 38. Scrapers: Nos. 9, 131. Conch shell bead: No. 119. Catlinite object: No. 28. Disk shell bead: No. 117. Copper beads: No. 116.



Sweat Bee Mound site. Scrapers: Nos. 123, 20, 32, 124, 1, 3. Cutters: Nos. 48, 7, 36. Modified core: No. 46. Anvil: No. 19.



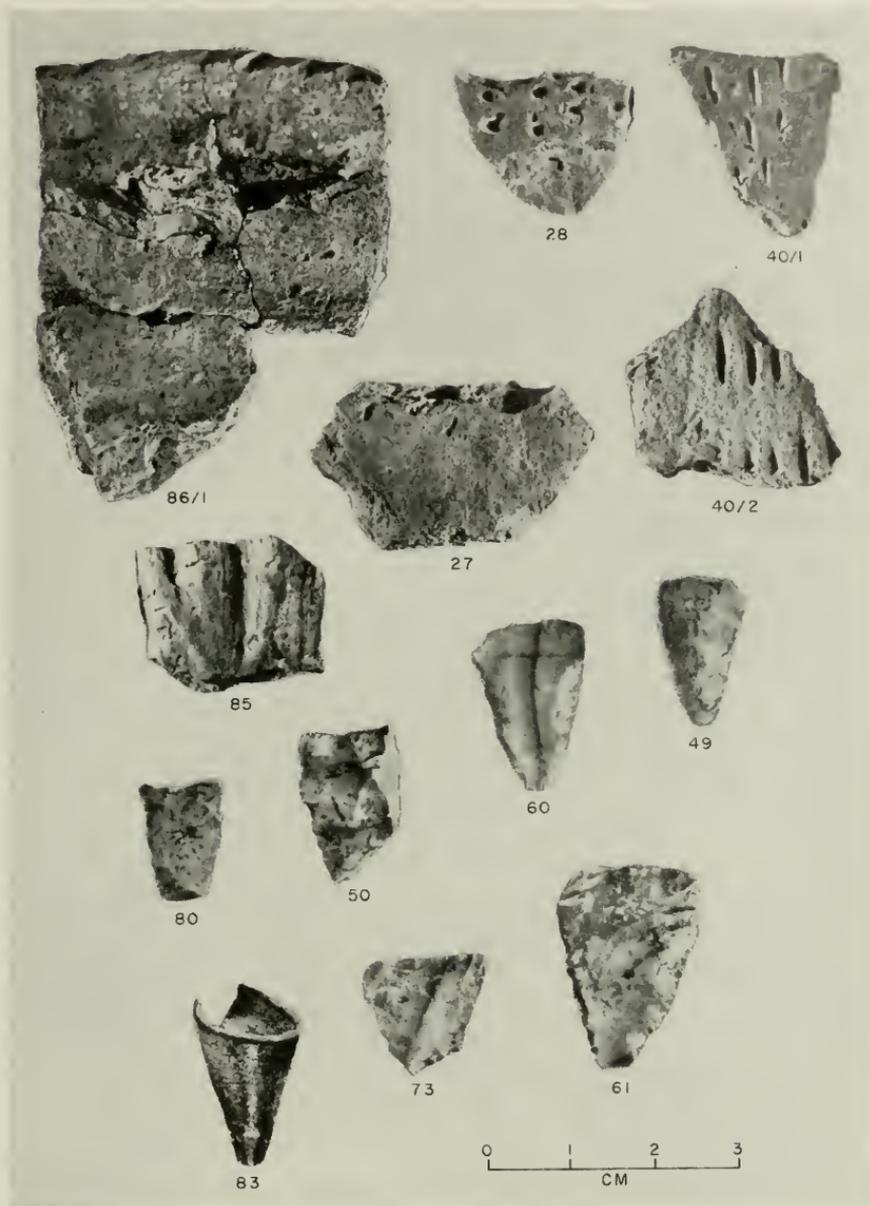
a, A view of the remaining portion of the Spillway site. *b*, Testing village site 14RY10.



Spillway site. End scrapers: Nos. 1, 3, 8. Side scrapers: Nos. 6, 9, 13, 5.



a, Testing at the Reany site. Spillway site above cut in background. *b*, The Spillway and Reany sites being destroyed by construction activities. Sweat Bee Mound in the foreground.



Reany site. Rim sherd: No. 86/1. Body sherds: Nos. 28, 40/1, 27, 40/2. Strap handle: No. 85. Projectile points: Nos. 80, 50, 60, 49, 73, 61. Copper jingle: No. 83.



Reany site. End scrapers: group 1—Nos. 19, 18, 81, 17; group 2—Nos. 68, 31, 10; group 3—Nos. 3, 66, 2; miscellaneous—Nos. 34, 4. Side scrapers: Nos. 32, 22, 65. Blade: No. 5. Chopper: No. 74.