

Volume 34

2013

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The **KANSAS** Anthropologist

Journal of the Kansas Anthropological Association

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NOTES

JETMORE MAMMOTH SITE (14HO1), HODGEMAN COUNTY, KANSAS

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The Jetmore Mammoth site (14HO1) near the Ness and Hodgeman County line contains the remains of a mammoth, possibly processed by humans. This inference is made from original site descriptions and sketches that are reproduced in this report. The recovery of chipped stone artifacts in 2010 also supports the possibility of a Clovis association with the mammoth remains. However, the majority of faunal materials recovered from the site prior to 2010 have since gone missing, leaving only the field notes from previous investigations to reconstruct prehistoric activities that possibly took place at the locality. Nevertheless, the descriptions of burned bones, stacked bone, bone with cut marks and spiral fractures, as well as the recovery of an end scraper fragment, produced of material from about 425 km away, makes a compelling case for this locality to be considered a Clovis site. Future investigations are warranted to confirm this possibility.

The Jetmore Mammoth Locality (14HO1) consists of multiple areas of bone fragments and chipped stone surface scatters in an agriculturally disturbed field in northern Hodgeman County, Kansas. The presence of chipped stone artifacts associated with mammoth bone fragments suggests a possible Clovis affiliation for the site. Limited testing was conducted in the summer of 2010 to determine the likelihood of intact subsurface deposits and provide a greater understanding of the geologic setting of the area. This report reviews past and current research conducted at the locality, reproduces the original notes and sketches from the first site investigation, and provides a description of the artifacts and bone fragments recovered from the site to date.

HISTORY OF INVESTIGATIONS

The Jetmore mammoth was originally noticed around 1940 when agricultural activities and surface erosion exposed a small scatter of proboscidean bone and ivory fragments eroding from the eastern hill slope of an ancient tributary or spring

that drains to the Pawnee River 3 km to the north (Figure 1). However, the significance of the find was not recognized until around 1950 when the landowner, through tillage, exposed a tusk section, likely the proximal end of a tusk later excavated by Lester Chilson, an avocational paleontologist and collector from Hanston, Kansas. Chilson excavated at the site in the 1960s, noting mammoth bone situated in an undisturbed residual soil of the Fairport Chalk Member of the Carlile Shale. Post rock, or Greenhorn limestone, underlies the site approximately 3.5–4 m below the modern surface and outcrops at a historic quarry some 150 m northwest of the site. Chilson (n.d.:9) mentioned the presence of a large petrified wood fragment resting on this stone outcrop layer and recorded another petrified wood fragment from approximately 90 m southwest of the bone concentration. It is uncertain if these two items exhibited cultural modification. He also noted a smooth round quartzite river cobble, approximately 20 cm in length, as well as a patinated chipped stone scraper found by the landowner 100 m southeast of the bone concentration.

Figure 1. Location of the Jetmore Mammoth site (14HO1).

The nearest source for the smooth cobble is the Pawnee River, 3 km north, suggesting that this item is a manuport. These objects, including all bone materials collected during the Chilson excavations, have since gone missing. All inferences made herein are derived from Chilson's notes and conversations with the landowners in the area. Chilson's original site sketches and notes are reproduced and discussed below.

Chilson used a metal probe to locate subsurface remains, then proceeded to excavate at least four pits (Table 1, Figures 2–5), recovering mammoth skull, tusk, vertebrae, rib, foot, and long bone fragments. One pit contained a “neat pile” of bone, including an antler tine beneath a mammoth tusk (Figure 4). Chilson noted the presence of small black flecks surrounding a few of the bones, as well as bone fragments that were burned and spiral fractured,

Table 1. Summary of Chilson's Excavations.

Dig Number	Skeletal Elements	Location	Description
One	Right Tusk	3–5 ft. South of Digs Two and Three	Right tusk, not collected. 8 ½ ft. long, 10–12 in. across, oriented east to west, ranging in depth from the tip in tillage 5–8 inches below surface on the west end to almost 3 ft. below surface on the east end.
Two	Molars, Mandible, Atlas, Phalange, Long Bone Fragments	Adjacent to Dig Three (slightly to the west and underneath)	Excavation was 2 ½ ft. deep, 3 ft. across and included broken long bone fragments that refit with fragments from Dig Three (around 3–6 ft. apart), four broken joints, one of which is described as a proximal humerus, mandible and molars broken near ascending ramus (which has not been found) with front broken as well, three pieces of an atlas, one no. 2 toe bone (phalange?), and unidentified pieces.
Three	Left Tusk, Ribs, Scapula, Long Bone Fragments, and Pelvis Fragments	Adjacent to Dig Two, 3–5 ft. North of Dig One and 13 ft. East of Dig Four	Left tusk, 7 ½ ft. long, 90 lbs., collected (although current whereabouts are unknown). The proximal end, oriented towards the south, was near the surface and hit by tillage around 1950. The distal tip end, oriented to the north, was around 3 ft. below the surface. One joint was found 12–15 in. from the tip of the tusk to the north. A "neat pile" of bone was found under the proximal end of the tusk, including eight or nine pieces of a scapula, four broken leg joints, pelvis fragment, broken ribs (6 in. long), knee caps?, and numerous unidentified bones. Near the distal end under the tusk was found a possible crotch of a deer antler with nine foot bones. Bone fragments were interpreted as being intentional deposited under the tusk.
Four	Ribs	13 ft. West of Digs Two and Three	Five or more broken ribs, black or burned, maybe charcoal, laying on what is described as an old surface (residual soil of the Fairport Chalk (bottom of Carlile Shale), approximately 10–14 inches below the surface.

Dig No. 1

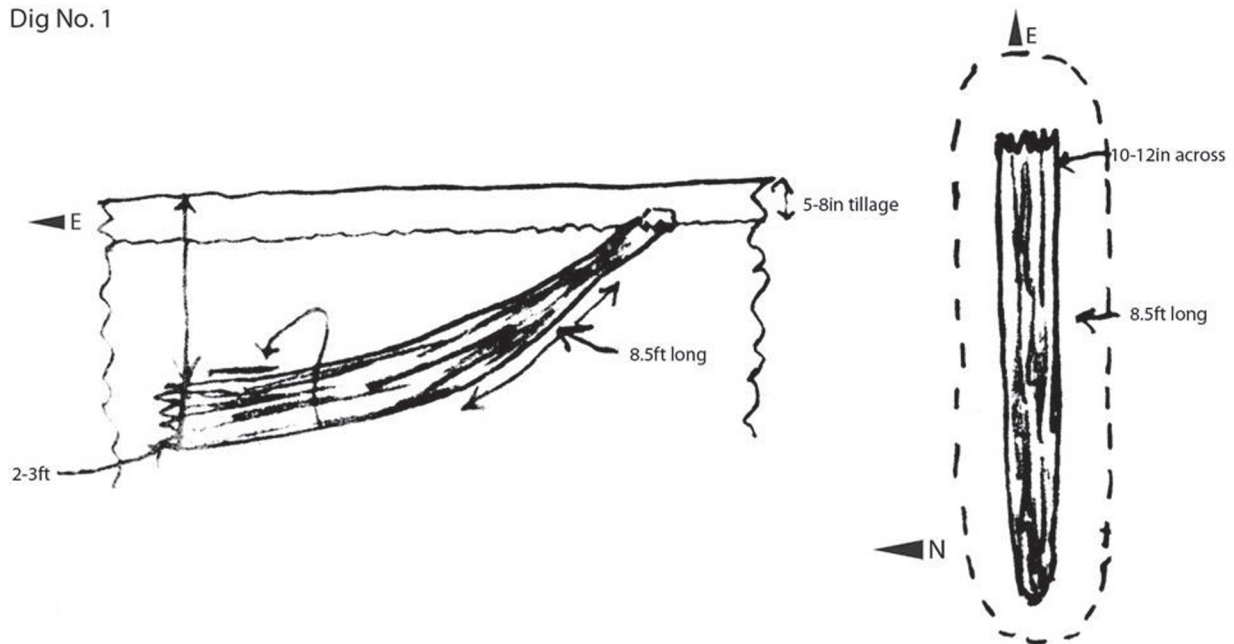


Figure 2. Chilson's sketch of Dig No. 1. Tusk reportedly left in the field.

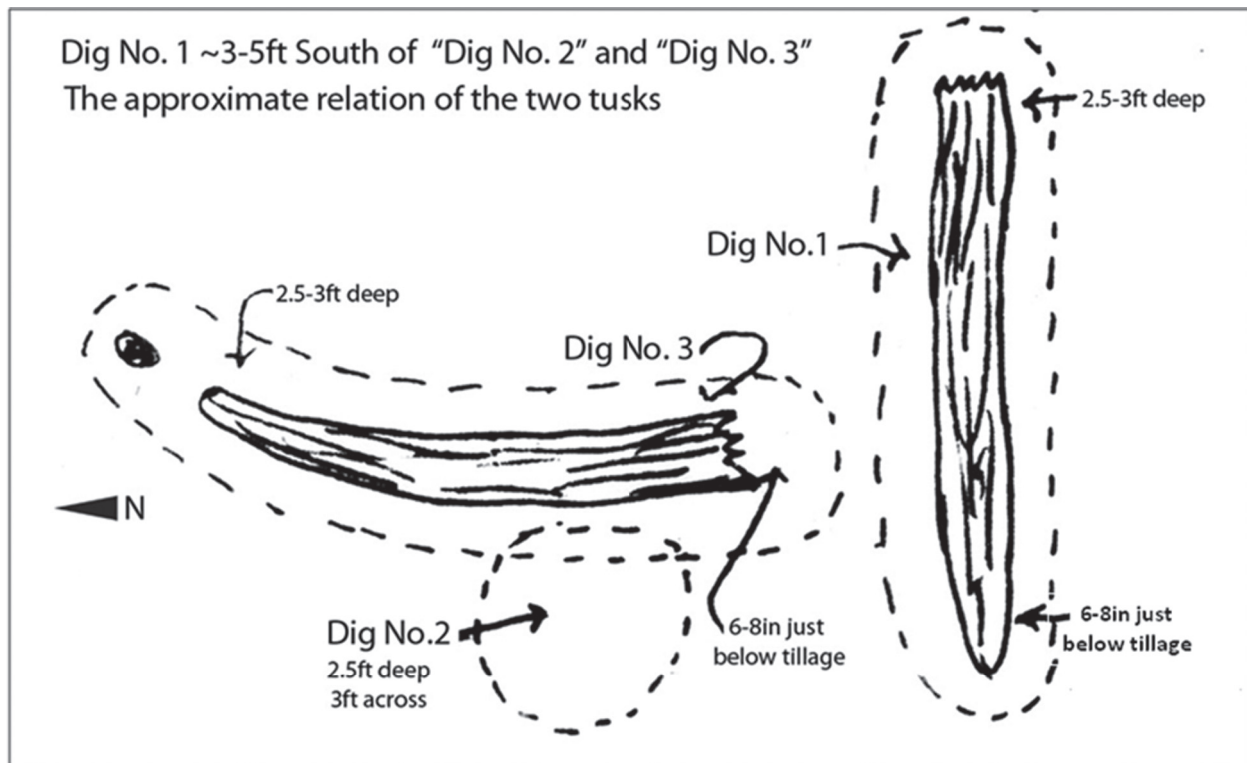


Figure 3. Chilson's sketch of Dig Nos. 1-3.

with some fragments exhibiting what he interpreted to be butcher marks. The presence of apparently burned bone, spiral fractures on bone fragments, the unusual orientation of the remains, the seemingly out-of-place stone manuport, as well as the portion of an antler tine found under one of the tusks suggests cultural activities at the site. One tusk was intentionally left in situ after sketches were made (Figure 2), and all excavation areas were lined with black plastic before backfilling. Unfortunately, none of the bone collected by Chilson is available for study today. It is speculated by adjacent property owners that the majority of the collection may have been sold at auction shortly after the discovery.

Upon completion of excavations, Chilson reported his findings to Wichita State University archaeologist Arthur Rohn with hopes of the site being "dug properly and recorded according to authority" (Chilson n.d.:8). However, lack of resources prevented further immediate investigations beyond surface collections. Rohn, designating the site 14HO501, visited in July 1970 and noted the occurrence of small mammoth bone fragments scat-

tered throughout the plow zone. No mention was made of intact subsurface deposits. A collection of 14 small bone and tooth enamel fragments were obtained from the surface and are currently curated at the Lowell D. Holmes Museum of Anthropology, Wichita State University. Rohn also noted the presence of an additional surface bone scatter approximately 90-95 m south and west of the primary bone concentration. He recorded this area as site 14HO502 and collected 45 mammoth bone and tooth enamel fragments, also presently at Wichita State University. No cultural remains were noted at either location.

In May 1984 archaeologist Ken Brown (1984:52; see Figure 6) with volunteers from the University of Kansas returned to the site and conducted limited field testing, including eight, 1 x 1-m units. Of these, only two units were excavated below the plow zone with soil samples obtained for pollen and phytolith analysis (Bozarth 1984). All soil was ¼-inch dry screened, with very little bone material found in the test units. To facilitate locating the bone deposit, a road grader was used at approximately 5-m

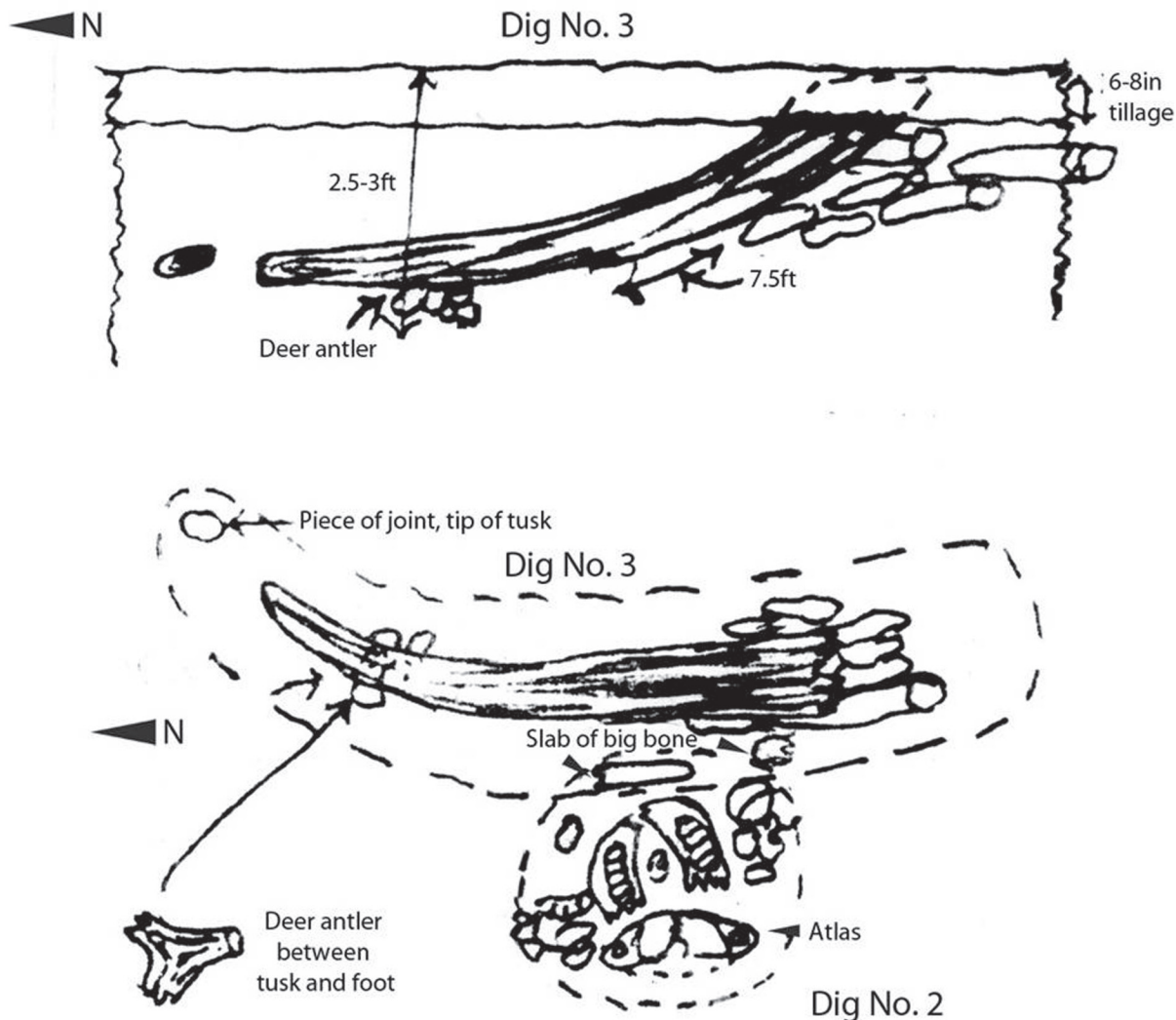


Figure 4. Chilson's sketch of Dig Nos. 2 and 3.

intervals, oriented toward magnetic north. The extent of the bone deposit was delineated, with several small pieces of burned bone observed. What were described as mammoth foot bones were collected and currently are housed at the Archaeological Research Center, University of Kansas. These include six fragments greater than 10 cm, two anterior rib fragments, and numerous small unidentifiable fragments. The current friable condition of the bone prevents positive identification of butchery or dismemberment marks, but one plausible cut mark is present. The possibility that this mark resulted from excavation or plow damage cannot be ruled out at this time.

Inclement weather prevented additional testing, but a bone sample was later submitted for radiocarbon dating. Two dates were obtained: 9235 $\pm$ 360 BP on collagen only and 6660 $\pm$ 160 BP on whole bone (Brown 1984:55). These dates are too young for mammoth, likely a result of the weathered condition of the bone sample submitted. A permanent datum was established before leaving the site; however, this datum could not be relocated in 2010. No mention was made of investigations at 14HO502.

The phytolith and pollen analysis from the site are suggestive of a climate more humid than present conditions at the time the mammoth bones were deposited. The relatively high frequency of *Chenopodium*

~13ft west of "Dig No. 2" and "Dig No. 3"

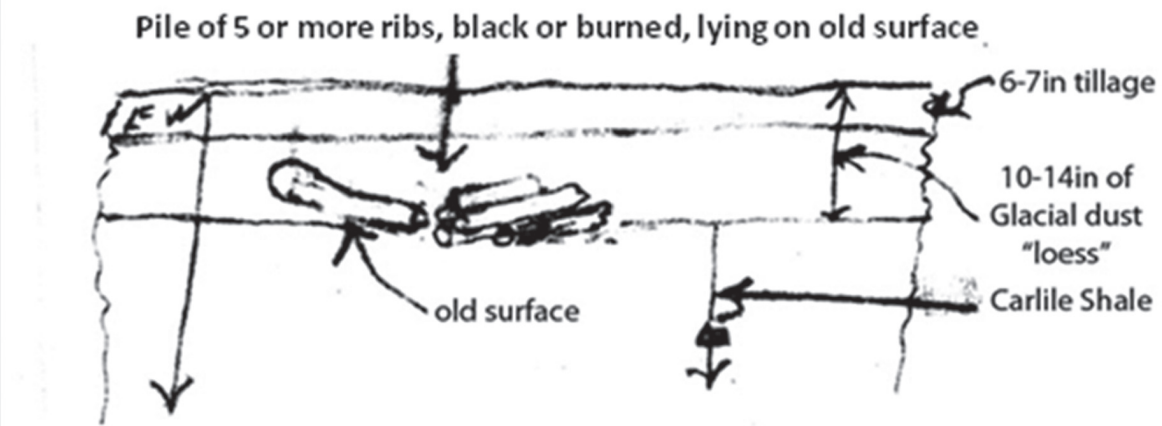


Figure 5. Chilson's sketch of rib pile from west of Dig Nos. 2 and 3.

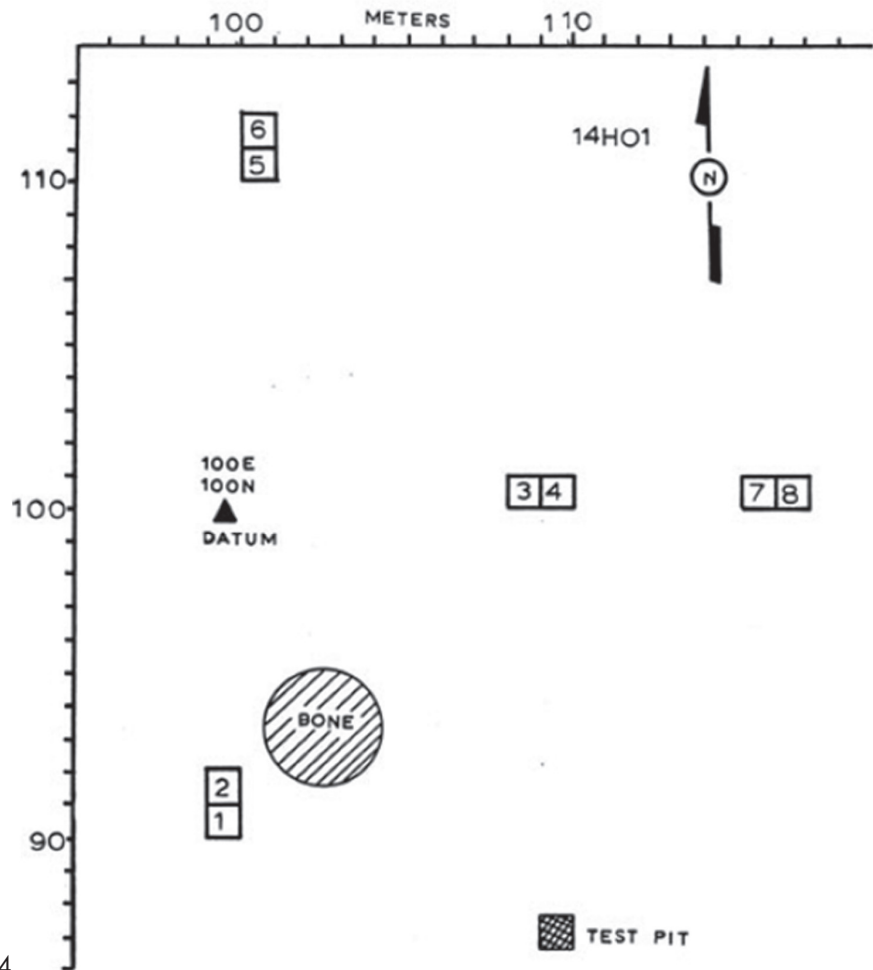


Figure 6. Map of University of Kansas excavations in Area 1, 1984.

and *Amaranthus* in the soil sample from the mammoth bone level is indicative of a primarily open habitat, but evidence for hackberry trees, which are not found in the vicinity of the site location today, was also observed (Bozarth 1984:65). The occurrence of mostly tall-grass panicoids in the mammoth sample is in direct contrast to the short-grass prairie that blankets the surrounding pastures today. The presence of sponge spicules suggests eolian loess deposition from floodplains at the site.

SUMMARY OF CURRENT RESEARCH

During summer 2010 archeologists from the University of Kansas and Denver Museum of Nature & Science returned to the locality for limited testing to assess the potential for intact subsurface deposits and to gain a greater understanding of the geologic setting of the area. Surface survey revealed the location of two large but sparse mammoth bone scatters and a third less substantial isolated bone concentration (Figure 7). Chipped stone artifacts, including an end scraper, were discovered in the bone concentration that was designated Area 2, likely the same area recorded as 14HO502 by Rohn. The relationship of these chipped stone artifacts to the mammoth bone scatter is purely speculative at this point, and mixing with later deposits is not out of the question. Work was focused on Areas 1 and 2. Surface samples only were collected from Area 3.

Initial tests were targeted at the original area of bone concentration, Area 1 of 14HO1 (Figure 8). The primary objective of these tests was to delineate the extent of past excavations and assess if more substantial future investigations are warranted. Recovery of in-situ bone suitable for radiocarbon dating was another priority. Work consisted of a series of Oakfield soil cores at .5-m intervals, moving from the upslope eastern extent of the bone concentration down slope toward a small drainage that separates 14HO1 and 14HO2. Systematic controlled excavation in standard levels was not initiated because of the numerous past excavations, the uncertainty of the exact location of these activities, and the paucity of bone material recovered in the exploratory soil cores. No intact subsurface deposits were discovered by coring.

Subsequently, six exploratory shovel tests, located in the areas of densest surface bone exposure, were

excavated. All material was ¼-inch dry screened, and any encountered bone materials collected. In all tests, with the exception of shovel test six, bone material was limited to the top 20 cm of plow zone fill. Small flecks of black plastic, perhaps from Chilson's excavations, were occasionally found in this level. Shovel test excavations ranged in depth from 45 cm to over 80 cm with no noticeable soil transitions below the plow zone. The soil below the plow zone is best described as silty with moderate clay content and small carbonates, likely a residual soil of the underlying Carlisle Shale. Evidence for colluvial movement from upslope and alluvial transport down the drainage is expressed by the occasional unweathered rock or weathered river gravel pebble.

In shovel test six, small friable decayed bone fragments and black specks were encountered in a thin carbonate-rich lens at 45 cm below the modern surface. Superficially, this lens is reminiscent of what may be expected with downslope sheetwash activities associated with heavy rain episodes, but further geologic assessments are required to test the validity of this statement. No bone fragments were found below this level. Throughout the plow zone, thick cancellous bone fragments, likely mammoth, were present in the shovel tests, but none was greater than 5 cm in maximum dimension. A few fragments were noticeably burned, and two thin fragments exhibited what appear to be cut marks, although the possibility of the bone being nicked by farm machinery cannot be ruled out.

A seventh shovel test was excavated in a dark stain noticeable in aerial photographs and on the modern field surface north of the primary bone concentration. This location is an anomaly on the ground surface, with a shovel test revealing no noticeable change to a depth of 1 m below surface. This location contains more clay content than any other location tested, perhaps indicating an association with a former spring or ground seep. No bone fragments were found in the shovel test. A soil sample was collected before backfilling.

Investigations in Area 1 failed to establish the perimeters of past excavations or to find in-situ bone deposits. All bone recovered was weathered and unsuitable for radiocarbon dating. However, surface survey to the east and south of Area 1 resulted in the recovery of three chipped stone bifacial

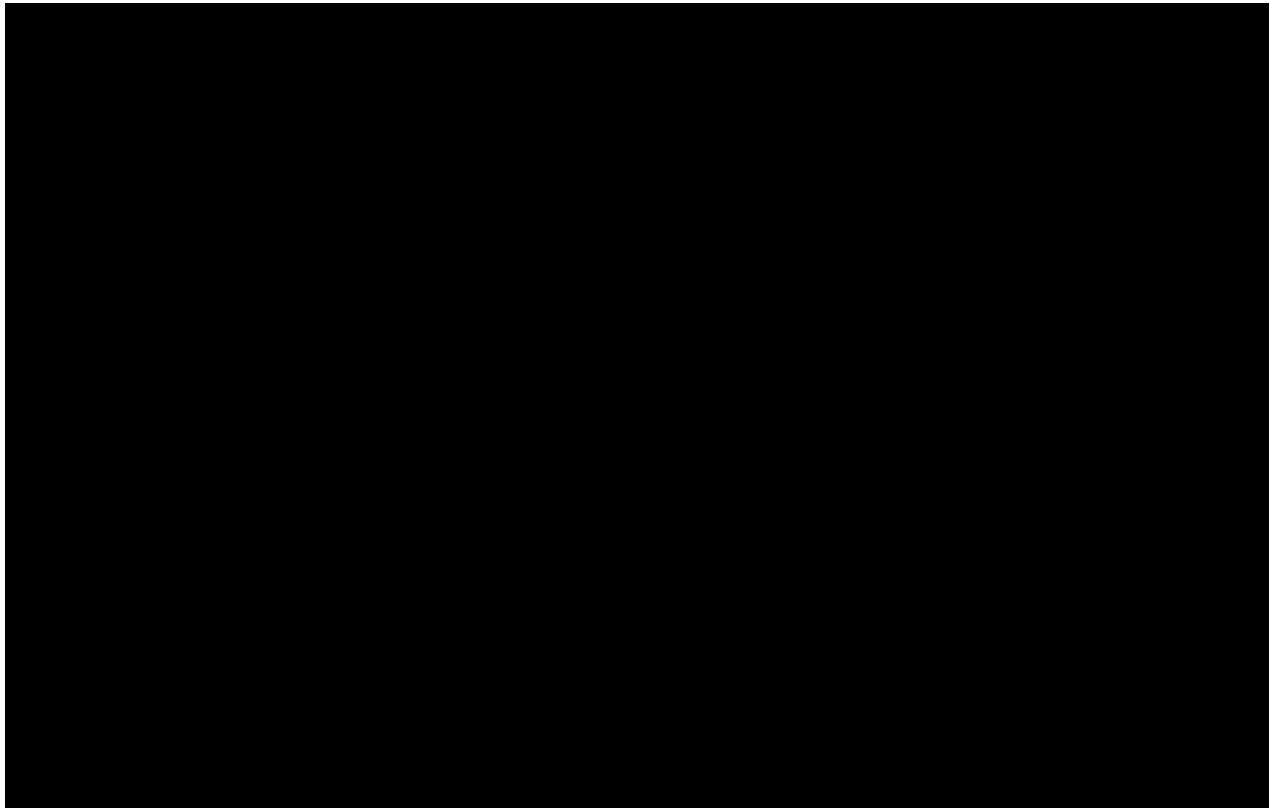


Figure 7. Aerial view of the Jetmore Mammoth locality.

thinning flakes, all of Smoky Hill jasper from the Smoky Hill chalk member of the Niobrara formation of Cretaceous-age silicified chalk in northwestern Kansas (Hofman 1991:341; Stein 2006:275; Wedel 1986:28). The relationship of these flakes to the mammoth bone scatter is uncertain. All bone fragments visible on the Area 1 surface were collected. Any future investigations in Area 1 would best be approached by systematically removing the plow zone with heavy machinery to expose the location of all past disturbances.

Limited work was also conducted at Area 2 (14HO502) on the opposite slope west of the draw (Figure 9). This area expresses greater potential for intact cultural deposits because chipped stone artifacts are present on the surface within the bone scatter. Also, the area is relatively undisturbed, with no evidence of previous investigations beyond surface collecting. The only known recorded collection from this area was acquired by Rohn in 1970, amounting to 45 small mammoth bone and enamel fragments currently housed at Wichita State University.

Chipped stone collected from the Area 2 surface represents a range of lithic material types from four different source areas: a biface thinning flake of Smoky Hill jasper that exhibits a possible graver spur that is broken off, a jasper end scraper probably made from a cobble, a fine-grained possible Dakota quartzite biface thinning flake fragment that is heavily utilized along two faces, and the bit end of a worn out end scraper produced of White River Group chalcedony. These material types are often expressed in Clovis toolkits.

Lithic procurement data at the Jetmore Mammoth site, Area 2 is limited to four pieces of lithic material from four different sources (see Table 2 for measurements). The Smoky Hill jasper flake is derived from sources to the north, the closest of which are in Gove and Trego Counties along the Smoky Hill River. The jasper end scraper is not Smoky Hill jasper but a variety of high-quality brown jasper commonly found in cobbles in the High Plains of Kansas and Colorado. The source of this material cannot be calculated because it is found over a wide area. The quartzite utilized flake

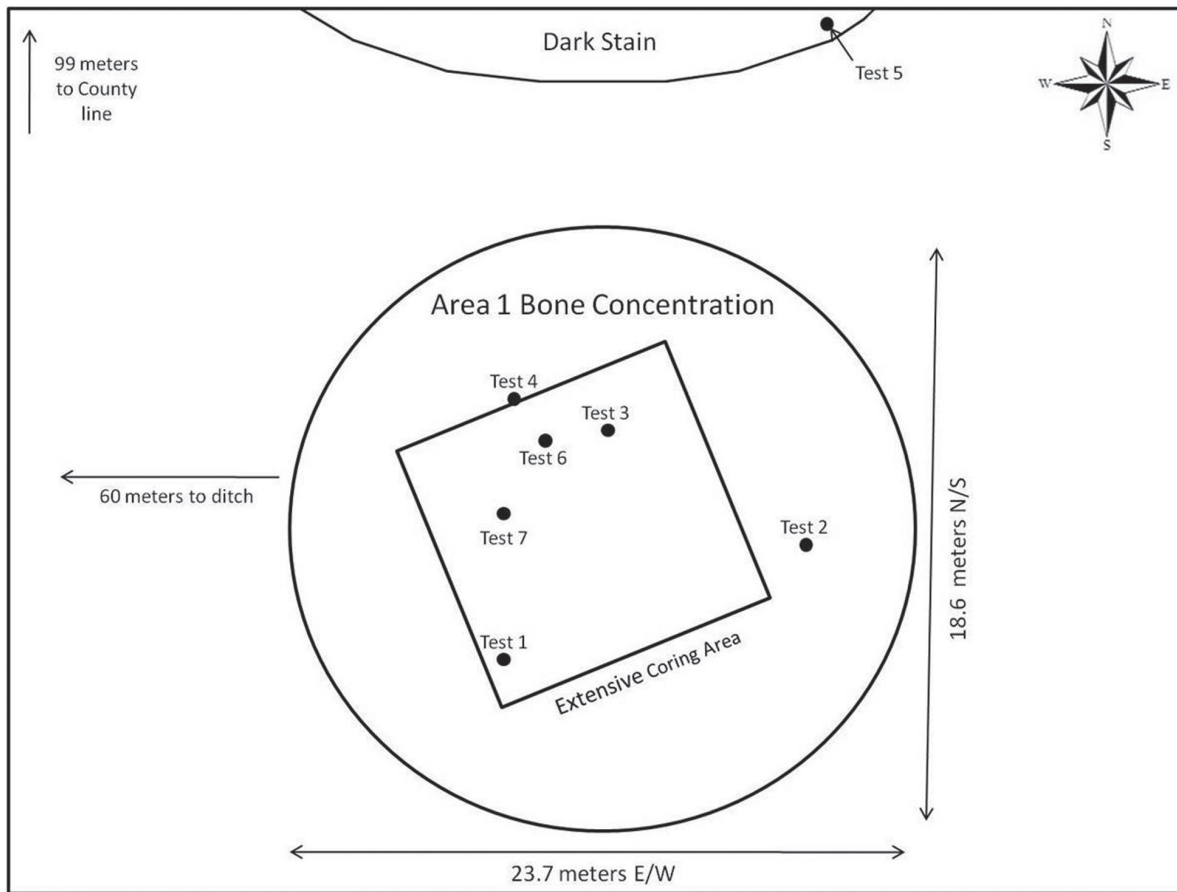


Figure 8. Test excavations in Area 1, 2010.

may be Dakota quartzite, which occurs as localized cobbles in the sandstone matrix of the Cretaceous-age Dakota Formation (Banks 1990:94; Mandel 2006:16; Stein 2006:275) in Kearney and Morton Counties southwest of the site in Kansas and in southeast Colorado. Also recovered was the bit of an end scraper made of White River Group chalcedony from the Chadron Formation of the Oligocene-age White River Group in northeastern Colorado, southwestern South Dakota, and western Nebraska (Grieser 1983:6; Hoard et al. 1993:698; Hofman, Todd, and Collins 1991:302; Holen 2001). This piece is considered the most interesting for lithic procurement evidence. The material has been transported about 425 km from the closest source at Flattop Butte in northeastern Colorado. The only group known to transport White River Group chalcedony this distance into Kansas is the late Pleistocene Clovis culture (Holen 2001, 2010, 2014). Late Prehistoric groups transported this material long

distances, as much as 250 km on the High Plains of Colorado and western Nebraska (Basham and Holen 2006:10), but there is no evidence that they transported the material as far as 425 km.

The presence of these chipped stone artifacts warranted additional subsurface investigation at Area 2. A 10-m grid, oriented toward magnetic north, was established over and slightly upslope of the densest surface bone scatter. Systematic coring along this grid at 2-m intervals revealed a possible paleosol, truncated by the natural slope of the field, at about the same level as surface bone exposure. However, no subsurface bone was found through coring. In efforts to locate a cultural horizon, an arbitrary 40 x 40-cm square unit was excavated 4 m west and slightly upslope of the core grid. All fill was ¼-inch dry screened. At 60 cm below the modern surface, a bone fragment was encountered in place. In order to fully extract this fragment, the unit was expanded to 1 m square. The unit was excavated in 10-cm

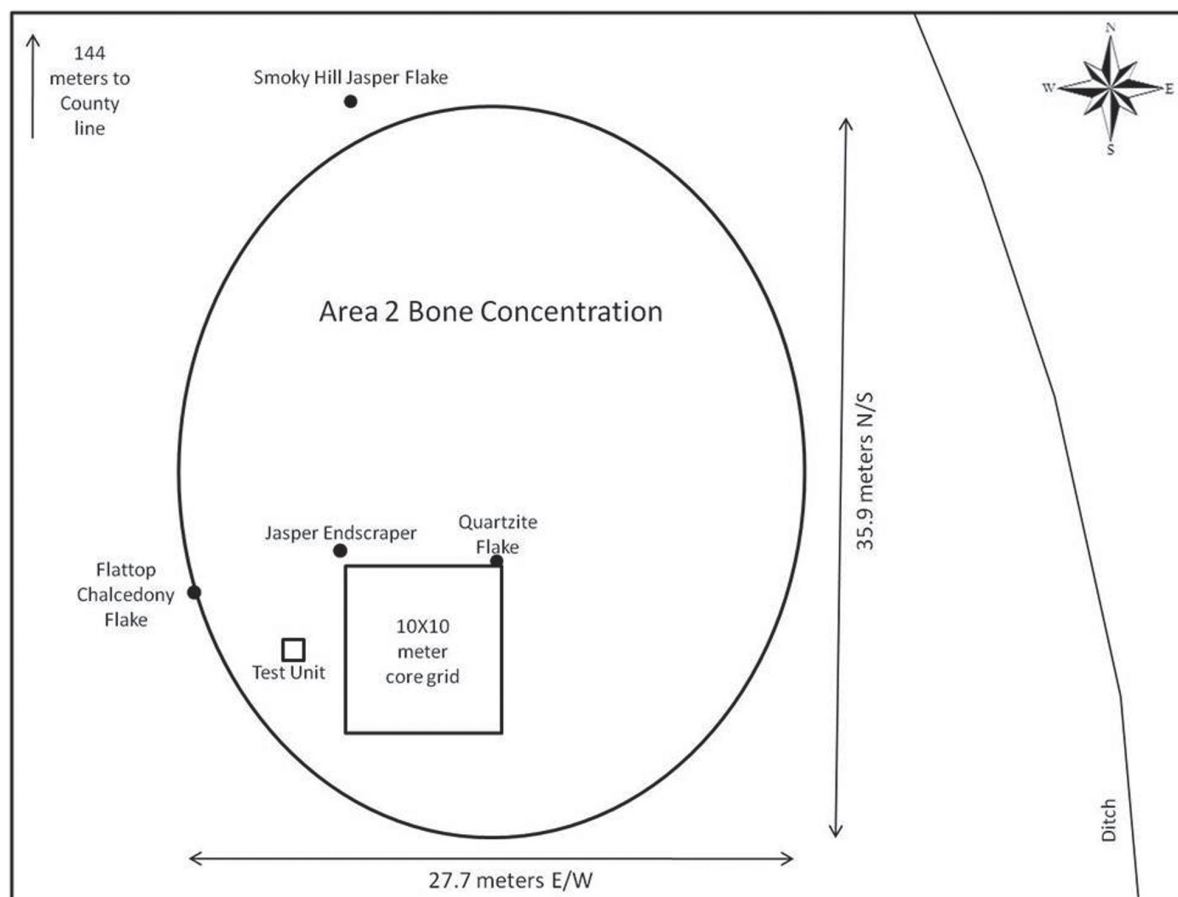


Figure 9. Test excavations in Area 2, 2010. The Flattop chalcedony flake depicted in the figure is the White River Group and scraper fragment discussed in the text.

Table 2. Measurements of the Lithic Artifacts from Area 2.

Description/Lithic Material	Length (mm)	Width (mm)	Thickness (mm)	Weight (gms)
Smoky Hill Jasper Flake	14.6	19.7	2.8	1
Quartzite Utilized Flake	21.6	16.2	7.4	2
Jasper (Cobble) Endscraper	39.3	23.1	13.5	15.2
WRG Endscraper Bit	15	24	14.3	6.1

levels after plow zone removal. Small bone fragments of a large ungulate, possibly deer, were found in the expanded unit excavation between 40 and 50 cm below surface and were photographed in place. These remains were cast in carapace wrap and removed. It was determined that the weakly developed buried A horizon observed in the soil cores was at this level. The unit was excavated to 70 cm

below surface. The initial in-place bone discovery, a badger humerus, was photographed, cast in carapace wrap, and removed. The unit was backfilled at this level. No cultural remains were recorded. Due to the somewhat arbitrary “needle in a haystack” placement of a single 1 x 1-m unit and the recovery of in situ bone within, it is highly probable that intact subsurface remains exist elsewhere at Area 2.

CONCLUSIONS

The Jetmore Mammoth Locality has experienced a long history of investigation, but relatively little attention has been given to the potential significance of the discoveries. This is in large part due to the sad reality that the majority of site collections have since gone missing. Beyond surface collections from a neighboring landowner, few bones exist from this site, and the majority of bone encountered has come from the plow zone. All bone collected is highly fragmentary and not suitable for radiocarbon dating, and no substantial documentation exists as to the location of the in situ intact subsurface discoveries. However, the descriptions of the mammoth bones provided by Lester Chilson are suggestive of a cultural association at the site. Burned bone fragments, possibly mammoth, were recovered during the 2010 investigations. The fragmentary nature of these precludes positive species identification at this time. The presence of the bit portion of an end scraper of White River Group chalcedony suggests that Area 2 may represent a Clovis cultural component, as Clovis peoples are the most likely to have moved White River Group chalcedony 425 km from the source. The exact relationship of the mammoth bone and lithic artifacts on the surface is not known, but a Clovis occupation certainly could be associated with the mammoth bone. Future investigations at Area 2 may reveal materials suitable for radiocarbon dating or an associated cultural horizon in this area. Unfortunately, Area 1 has experienced a great deal of past disturbance, and few intact deposits may remain. Future investigations at the site should target the locality designated Area 2 in this report.

ACKNOWLEDGMENTS

We would like to thank the Frusher family, Larry, Kathy, Russ, and Tom, for allowing access to the site and associated collections, as well as providing useful background information on past excavations. Paulette Steeves participated in the fieldwork at the site. Eric Parrish produced the electronic version of Chilson's sketches contained in this report. David T. Hughes and the Anthropology Department staff at the University of Wichita allowed access to the collections housed at the Lowell D. Holmes Museum of Anthropology. Mary Adair provided

access to collections and reports at the University of Kansas. Brad Logan, Bob Hoard, Jack Hofman, and Art Rohn all assisted in tracking down past reports and pertinent information for this report.

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CLOVIS ARCHEOLOGY IN THE CENTRAL PLAINS, REPUBLIC COUNTY, KANSAS

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This paper documents current evidence from five sites in Republic County, Kansas, which have evidence of Clovis activity. These sites are situated in the upland portion of the county in the upper reaches of tributaries of the Republican and Little Blue rivers. The potential is high for buried deposits that may contain intact Clovis-period cultural material and paleo-environmental evidence at four of the known sites. Other Clovis evidence from the region is also summarized. The apparent intensity of Clovis activity in this area is thought to be associated with the salt marshes, seeps, and springs that are common here and would have attracted animals and provided diverse resources during Clovis time.

Many Clovis artifacts from Kansas and Nebraska have been recovered from active stream deposits (Brown and Logan 1987; Hofman and Gottsfield 2010; Hofman and Hesse 2002; Holen 2001; O'Brien 1972; Rogers and Martin 1982), but two Clovis sites in northern Kansas, Diskau (14RY303) and Eckles (14JW4), provide important exceptions. These sites are focal points in the known distribution of Clovis evidence in Central Plains (Figure 1). For the majority of counties in Kansas, there are no recorded Clovis artifacts. This certainly reflects the limitations of the currently documented Clovis sample but makes the known concentrations extremely important and key to ongoing studies of early human occupation of the region. The lack of reported Clovis sites or artifacts in most counties in central Kansas is assumed to reflect modern sample bias, which can result from many factors and probably does not reflect a lack of Clovis activity throughout this large region. Although one cannot assume that the present sample is adequate or an accurate reflection of the intensity of Clovis people's activities across Kansas, the presence of a cluster of Clovis sites in a limited area provides important evidence that deserves further consideration. The Clovis archeological evidence in the region between the Diskau and Eckles sites, in conjunction with these two key sites, provides one of our best known target areas for study of Clovis

activity in Kansas. The cluster of Clovis finds in the upland region between Diskau and Eckles (Figure 2) is the focus of this paper.

The Diskau site (Schmits 1987) is located on a high ridge overlooking the Big Blue River valley on the upland divide between the Big Blue and Republican rivers in Riley County. This multi-component site has a significant Clovis assemblage, dominated by projectile points (Figure 3), end scrapers, and a few other tools. Lithic materials represented at 14RY303 include Smoky Hill jasper (SHJ) from sources in northwestern Kansas and southwestern Nebraska (Stein 2006) and White River Group chalcedony from sources located farther west, probably including the Flattop source area northwest of Sterling, Colorado (Greiser 1983). Archaic materials from the Diskau site include early Plains side-notched points (Witty 1969), made from locally available Permian chert from the Flint Hills (Stein 2006). Some of the Permian chert debitage and tools also may represent Clovis activity at the site.

The Eckles site (Holen 2001, 2010) is 130 km northwest of 14RY303 on a high loess-filled terrace of White Rock Creek, a major tributary that enters the Republican River from the west. This Clovis assemblage includes projectile points (Figure 4), preforms, and a variety of tools, including scrapers, graters, and flaking debris. The 14JW4 artifact assemblage is made almost entirely from

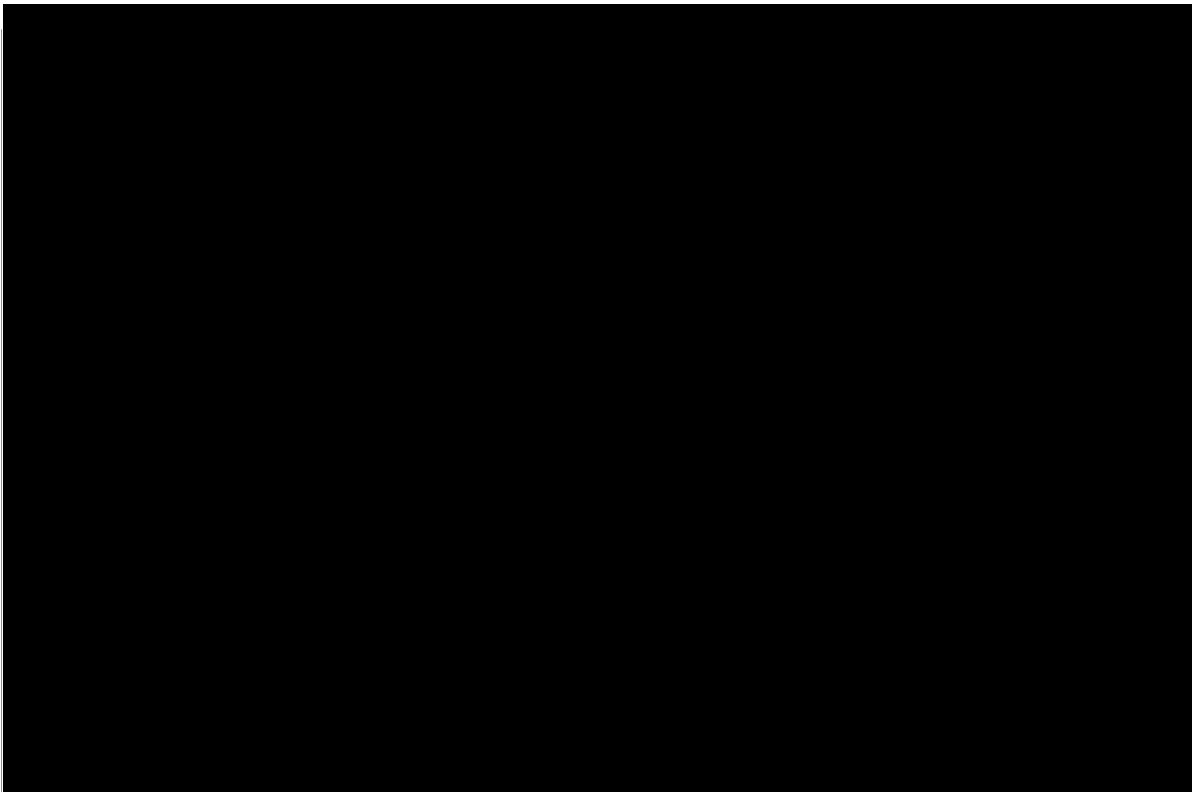


Figure 1. Distribution of Clovis points in Kansas by county.

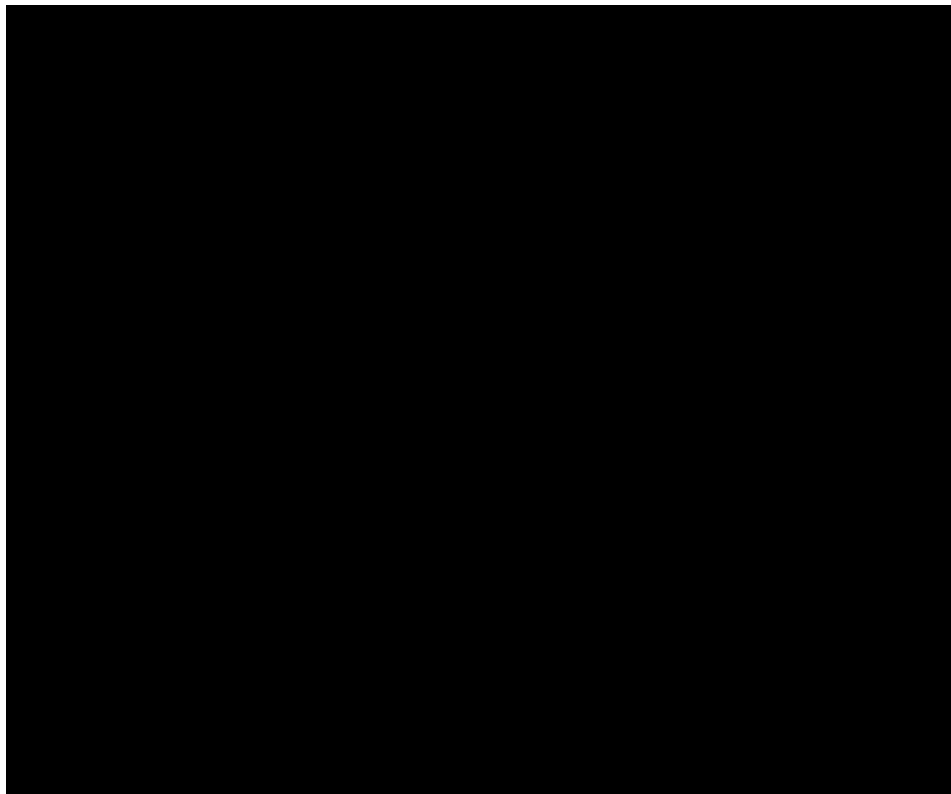


Figure 2. North-central Kansas, including Clovis sites in Republic County.



Figure 3a and b. Clovis points from the Diskau site (14RY303).

White River Group chalcedony, probably derived from the source area at Flattop Butte in northeastern Colorado, some 475 km (295 miles) to the west (Greiser 1983; Hoard et al. 1992; Hoard et al. 1993; Holen 2010). Access to Flattop Butte was likely not by straight-line travel. From the mouth of White Rock Creek, one can travel west through southern Nebraska, following the Republican River. The Republican River also can be reached from the Eckles site area by traveling north from the White Rock Creek valley for about 10 miles. West of McCook, Nebraska, the Republican River forks, and the South Fork continues to the southwest across the northwest corner of Kansas and then into Colorado east of Limon. The Frenchman Fork, however, continues west and heads to just east of Sterling, Colorado, within 16 km (10 miles) of the South Platte River. From the head of the Frenchman Fork, it is less than 45 km (25 miles) to the Flattop



Figure 4. Clovis points from the Eckles site (14JW4).



Figure 5. Clovis point from the Larson-Walter site (14RP11).

Butte source. Detailed knowledge of the regional drainage systems was probably a key element of Clovis people's geographic knowledge base and would have aided their navigation among key resource areas.

The Diskau and Eckles sites provide good reference points for the study of Clovis archeology in



Figure 6a. Larson-Walter site area and salt spring, view west.



Figure 6b. Larson-Walter site marsh in winter, view south.

Kansas and in the region (Figures 1 and 2). Five additional Clovis sites are documented here in upland settings between the Little Blue and Republican rivers, providing further evidence of Clovis activity in the Central Plains uplands of northern Kansas. The Little Blue River is a tributary of the Big Blue, which it joins just west of Blue Rapids, Kansas. As yet these sites have not yielded unmixed assemblages of Clovis artifacts, but study and evaluation of these locations has only begun. At present only one of these localities has multiple diagnostic Clovis artifacts. In addition to these Republic County sites, a number of Clovis artifact finds have been documented between the Diskau and Eckles sites (e.g., O'Brien 1971), and information on these is reviewed below.

The Larson-Walter site (14RP11) yielded a Clovis point (Figure 5), found with two broken bifaces during terracing of a central Republic County field. The site is on the east slope of a prominent ridge or drainage divide, about 200 meters upslope from an extensive marsh on a tributary of Riley Creek (Figure 6). This seep or marsh was presumably a spring 13,000 years ago during Clovis time (Waters and Stafford 2007). The water level and nature of this marsh or spring at that time is of considerable interest. Research is planned, including stratigraphic testing and use of paleoecological proxies (the occurrence of pollen, phytoliths, diatoms, insects, and plant macrofossils will be assessed), in order to determine how the water volume and salinity varied during the Holocene, at Clovis time, and potentially earlier. The upper reaches of Riley and Salt creeks finger out across the landscape of central Republic County in the vicinity of Belleville (Figure 7a and b). Seeps or marshes are common, typically denoted by concentrations of cattails, sedges, and other aquatic loving plants, at the heads or upper reaches of the many small tributaries feeding Salt Creek. All of these water sources are saline rich in varying degrees; in fact, the water in this general area is saline enough that the community of Belleville derives its drinking water from wells in the vicinity of Chester, Nebraska. The source of the salt in the Belleville area is the Dakota sandstone formation (Fishel 1948). The upland saline-rich water sources would have provided an important resource for herbivores and so an attractive location for hunters as well. These streams drain to the south-

east into the Tuthill salt marsh, just south of the Talmo and Wayne communities (Figure 7a; Fishel 1948:16–17). The Tuthill marsh was an important surface source for salt in early historic time and would have been an important resource area for prehistoric animals, hunters, and farmers (Hofman 2012a). Earliest survey records for Republic County note the great abundance of bison bones around the salt marshes of the area (Blackburn and Cardwell 1964; Harvey 1858).

The bifaces from the Larson site were subsequently lost, and no details about them are available; however, the Clovis point was donated to the University of Kansas in 1969 (Figure 5; Hofman and Hesse 2002: Figure 1e). It is nearly complete with probable impact damage on the tip and one blade edge. The material is translucent chalcedony, probably a White River Group silicate (WRGS), though not necessarily from the northeast Colorado Flattop Butte source (Ahler 1977; Koch and Miller 1996). Much of the Clovis assemblage from the Eckles site (Hoard et al. 1992, 1993; Holen 2001, 2010) is WRGS, and this material is also present in the Diskau Clovis assemblage (Schmits 1987). The Larson point's blade margins are symmetrically convex with a slight change in angle just above the lateral edge grinding. This could reflect an episode of blade reworking or resharpening, but reworking was minimal, if it occurred. Flake scars on both faces are broad and mostly expanding with the majority terminating at about the midline. Broad transmedial preform stage flake scars are not present and were removed in the final shaping of this point. The base is concave and well ground. Two primary fluting or basal thinning flakes are evident on each face. Metric information on this point and others discussed below is provided in Table 1.

Survey of the field area around this Clovis find has been hampered by crop and vegetation cover, but a small sample of flakes and chipped stone artifacts has been documented over an extensive area of this ridge and the ridge toes leading down to the drainage. A late Archaic corner-notched dart point, flake tools, and an end scraper, all manufactured from SHJ, have been found, as well as small retouch flakes. Lithic materials represented by the flakes include Permian chert and chalcedony but are primarily SHJ. Summary information on the lithic artifacts collected from the field where the Larson



Clovis point was found is provided in Table 2. Stratigraphic testing on the marsh margin is planned, and continued survey and monitoring of the area where the Clovis point was found may lead to documentation of further evidence related to Clovis activity.

Some artifacts from the 14RP11 field are possibly, but not necessarily, related to the Clovis activity at the site. A concentration of gravels is present on the ridge toe southeast of the Clovis find area and these gravels, presumably of Ogallala or early Pleistocene age, contain cherts, quartzites, small tablets of Smoky Hill jasper, fossil wood, and other materials. A few flakes and tested cobbles or cores were found among this gravel. Importantly, the gravels that occur on high terraces across central and southern Republic County commonly contain some tabular and knappable pieces of SHJ. While these gravels may not have been readily accessi-

Figure 7a. Tuthill Salt Marsh and Salt Creek drainage in Republic County (from Fishel 1948 and from 1892 Concordia 30x30 USGS quad).



Figure 7b. Tuthill salt marsh in winter, view northwest.

Table 1. Metric and Lithic Observations for Republic County Area Clovis and Folsom Points.

Specimen:	Length	Width	Thick	Flute thick	Material	Condition	KC#
Larson	8.30	3.04	.83	.53	WRGS	CO	KC-44
Bredthauer 1	4.35	2.7	.64	.55	SHJ	CO	KC-110
Bredthauer 2	4.3+	3.36	.83	.63	SHJ	BA	KC-111
Bredthauer 3	3.27+	2.32	.57	.45	SHJ	BA	KC-112
Graham	3.73+	2.19	.62	.46	Permian	nCO	KC-113
Fisher	7.25	2.85	.89	.49	SHJ	CO	KC-32
Blue Marble	2.85+	2.61+	.75	—	WRGS	BA	KC-114
14WA330	2.99+	2.58	.52	.46	SHJ	BA	KC-138
Jewell-Eckles	5.35	2.32	.66	.46	AL	nCO	KC-108
Jewell-Wright	—	—	—	—	DQ	CO	KC-119
14PO2	1.72+	2.08	.52	.51	WRGS	BA	KC-120
Waterville	7.82	2.67	.78	—	BURL	CO	KC-27
Newell (Neb.)	5.13	2.43	.73	.51	SHJ	CO	na
14RP10 Folsom	1.79+	1.8	.38	.26	FW	BA	na
14MH333 Folsom	1.53+	2.04	.43	.29	Permian	BA	na

Site numbers are as follows: Larson 14RP11; Bredthauer 14RP327; Graham 14RP10; Fisher 14RP8; Blue Marble 14RP12. SHJ is Smoky Hill Jasper; WRGS is White River Group Chalcedony/Silicates including Flattop; DQ is Dakota Quartzite; BURL is Burlington; + indicates a measurement on a broken point; CO = complete, nCO= nearly complete, BA = base; KC# refers to the Kansas Clovis point inventory number.

Table 2. Chipped Stone Artifacts from 14RP11.

Spec #	Class	Type	Portion	Material	Length	Width	Thickness	Notes
3	Point	CN Dart	Stem Blade	SHJ	(32)	20	5.6	Stem width = 8.7, WP 390, corner-notched, broken @ stem
1	Flake Tool	Graver, Denticulate	Complete	SHJ	30	21	6.7	WP 383, PRB, Tertiary
6	Flake Scraper	End Scraper	Distal end	SHJ	(33)	26	13	WP 379, impact break ventral, Nibbling, not dry hide wear
8	Flake Knife	Thin edge	Complete	PERM	22	21	3.7	Biface Thinning Flake, WP 382, Bilateral dorsal retouch
9	Wedge	Secondary Flake	Complete	SHJ	27	22	7.8	WP 386, <20% cortex, opposing battered edges
15	Flake Knife	Thin edge NCNP	Distal	PERM	(19)	13	3.1	WP 393, non-PRB, no cortex, patina, dorsal distal use wear
2	Flake	Secondary	Complete	SHJ	19	14	3.9	WP 384, flat platform core reduction
5	Flake	Tertiary	Distal	SHJ	10.9	10.6	3.6	WP 378, NCNP
6B	Flake	Tertiary	NCNP	SHJ	5	5	1.2	WP 379, unifacial retouch
10	Flake	Tertiary	NCNP	SHJ	10	6	1.3	WP 387
11	Flake	Tertiary	Complete	SHJ	8	6	1.4	WP 388, unifacial retouch
13	Flake	Tertiary	Complete	SHJ	9	9	2.9	WP 391
14	Flake	Tertiary	Complete	SHJ	11	8	2.4	WP 392
16	Flake	Tertiary	Proximal	PERM	11	8	2	WP 86, patina
17	Flake	Secondary	Complete	UC	28	24	14	WP 88, split pebble
4	FCR	Cortex	Fragment	Qzt	24	20	12	WP 377, TRSS-like
7	Shatter	NCNP	Fragment	UC	6	4	2.6	WP 381, Small weathered piece

Material Types: SHJ = Smoky Hill Jasper; PERM = Permian Florence Chert; WRGS = White River Group Silicates including Flattop Chalcedony; DQ = Dakota Quartzite; AL = Alibates; Qzt = quartzite; TRSS = Tongue River Silicified Sediments; UC = unidentified chert; Dimensions (Length, width, thickness) in mm. NCNP = no cortex and no platform. FCR = fire-cracked rock. WP = GPS waypoint. PRB = platform remnant bearing (platform present).

ble during Clovis time, these potential secondary sources of SHJ must be acknowledged in discussing lithic material access and transport. It is assumed here that most of the SHJ used during Clovis time was high quality material, derived from primary source areas in western Nebraska or Kansas (Stein 2006; Wedel 1986). Use of distant primary sources of SHJ should result in assemblages and tools with limited cortex, as compared to those derived from local gravel sources or sites in the immediate vicinity of the source areas. The Republican River transects source areas in western Nebraska. In north-western Kansas high quality exposures of SHJ are known along the Solomon and Saline river valleys, extending as far as 320 km southwest of Republic

County (Stein 2006:Fig. 16.4). The closest bedrock sources of SHJ to the Belleville area are along the White Rock Creek drainage, about 40–50 km to the west. Gravels of the Republican River probably provided secondary sources of SHJ throughout prehistory.

The Swiercinsky-Bredthauer site (14RP327) is another multicomponent upland site in central Republic County a few kilometers south of the Larson-Walter site and in a similar terrace setting on a small tributary of Riley Creek near a marsh. Key artifacts from this location include three Clovis points, one complete with a reworked tip and two large basal fragments (Figure 8; Hofman and Asher 2011). Also from this site are blades and unifacial

Table 3. Chipped Stone Artifacts from 14RP327.

Spec #	Class	Type	Portion	Material	Length	Width	Thickness	Notes
1	Point	CN Dart	Blade	SHJ	46.8	25.4	8.5	Burinated from tip impact? Burinated across stem
2	Point	Stemmed Dart	NC	SHJ	43	15	6.7	Stem length 14.3, stem width 8.2
3	Drill	Ensiform	NC	PERM	62.3	12	7	Tip slightly broken
4	Flake Tool	Knife	Complete	SHJ	97.6	55.5	11.3	Flake from large bifacial core. Dorsal retouch, red ochre stains
5	Core	Tabular	Fragment	SHJ	56.4	53	13	Thin bifacial core with blade-like removals
6	Flake Tool	Blade	Complete	SHJ	65.6	24.6	8	Blade knife with edge use damage
7	Flake Tool	Knife & Wedge	Complete	SHJ	60.8	25.9	10.8	Blade like flake with edge retouch and bipolar damage on ends
8	Flake Tool	End Scraper	Complete	SHJ	42.9	25.5	7.5	Steep dorsal retouch distal and one edge. Flake platform flaked off. Secondary flake.
9	Flake Tool	End Scraper	Complete	PERM	29.8	19.2	8.8	Steep dorsal retouch on distal end and both edges. Secondary flake.
10	Flake Tool	Discoidal Scraper	Complete	SHJ	65.4	45.2	13.2	Steep dorsal retouch around most of edge. Dorsal surface mostly cortex.
11	Flake Tool	Utilized Flake. BT flake.	NC	SHJ	29.7	26.2	6.9	Biface thinning flake. Dorsal edge use retouch. Partial dorsal cortex.
12	Flake	BT flake NCNP	Distal	PERM?	24.3	19.2	4.9	Biface thinning flake, nick or notch in edge, fine dorsal retouch, heated

SHJ = Smoky Hill Jasper; PERM = Permian Florence Chert; NC = nearly complete; BT = biface thinning; CN = corner notched.

tools of probable Paleoindian origin. The points are manufactured from SHJ, which is well represented in the Diskau Clovis collection (Schmits 1987). A large unifacially retouched flake, two blades, and an end scraper, all of SHJ, may reflect Clovis activity at this site (Table 3). Archaic materials are also present and include stemmed and notched projectile points made of SHJ.

The complete Clovis point is made of a high quality lustrous variety of SHJ and has been heavily reworked (Figure 8a). Lateral edges are straight to convex and expand outward from an evenly concave base. Fluting on both faces is represented by single large channel flake scars. The overall length is under 5 cm, and the heavily reworked blade could not be further reworked and still leave the artifact functional as a projectile tip. It is considered an expended point that probably was discarded and replaced but may have served in cutting or other non-projectile functions. The blade edges are irregular to lightly serrated, perhaps resulting from secondary use or post-discard damage. The area where the Clovis points were found was not cultivated but saw intensive use as a sheep and livestock pen, and the trampling of hoofed animals could account for some of the edge damage on these points (cf. Knudson 1979; Lopinot and Ray 2007).

The largest Clovis point base is a brown SHJ and also has one primary channel flake on each face (Figure 8b). The second and shorter of the channel flakes ends in a hinge at its contact with a chalky impurity in the stone. The blade edges are well ground, straight, and expanding from the base. Small nicks occur on both blade edges, which could have resulted during use or as a result of post-depositional factors, such as trampling. One basal corner is broken, but the other exhibits an outward flaring ear, giving the lower blade or haft area a recurved outline. The base is concave and also well ground. The fracture across the blade is a snap and probably resulted from use. While this is a large fragment, it is just short enough that reworking of the broken blade into a new tip would have resulted in a point shorter than 5 cm. This point would originally have been 8–10 cm long, probably comparable to the 14RP11 specimen.

The third and smallest of the 14RP327 Clovis points is a heavily damaged basal fragment (Figure 8c). The point has a hinged fracture across the

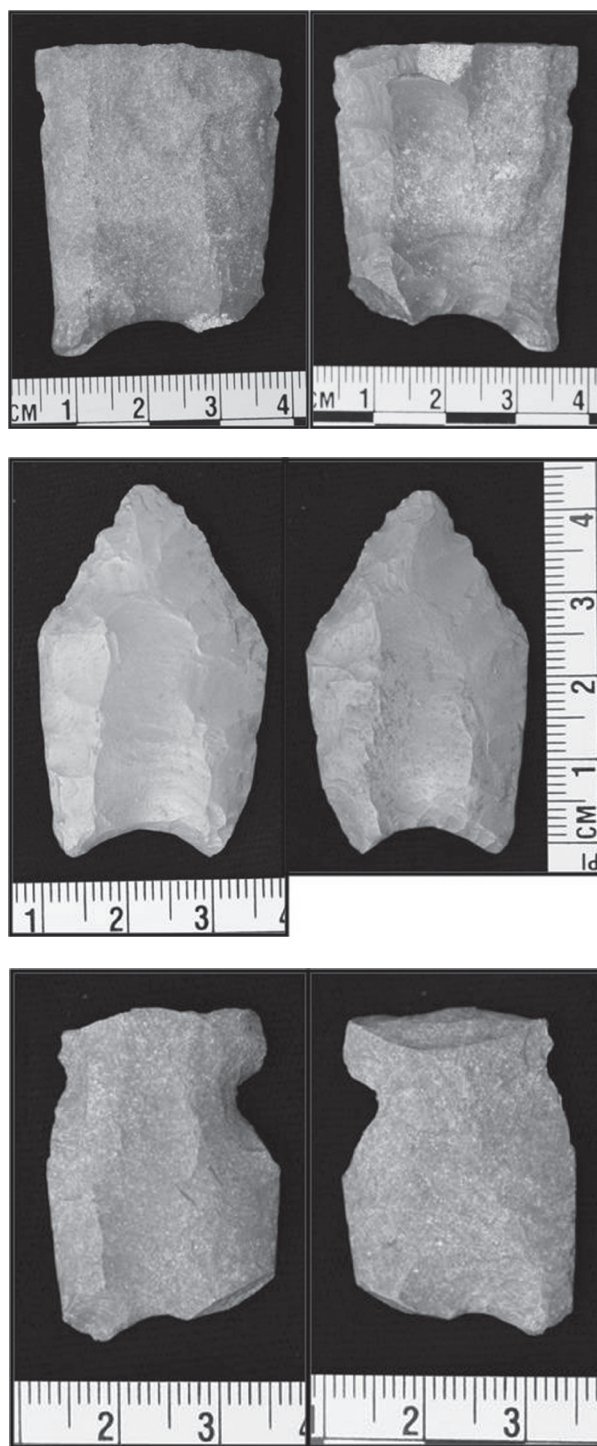


Figure 8a-c. Clovis points from the Swiercinsky-Bredthauer site (14RP327).

blade, and bending breaks removed both basal corners. These fractures are assumed to have resulted from projectile impact. A large nick in one edge and smaller nick in the opposite are unifacial removals from opposing faces. These may relate to use damage or post-depositional trampling. Blade edges are straight and slightly expanding from the base, and the point is very similar in form and size to the complete reworked specimen from the site. Fluting was completed by removal of one large primary channel flake from each face. The second of these ends in a hinge termination. Marginal flaking is relatively fine and invasive into the channel flake scars. The blade appears to have been reworked at least one time prior to this last severe damage and discard. Metric information on these points is provided in Table 1. Also from this site are blades and unifacial tools of probable Paleoindian origin.

Preliminary testing at 14RP327 in August 2012 provided initial information on the stratigraphy at this location. Two 1 x 1-m test units (TU1 and TU2) and five posthole augers were excavated, revealing a shallow stratigraphic sequence on the terrace edge near the spot where the Clovis material was collected (Figures 9 and 10). Heavy vegetation cover on the terrace and in the adjacent field limited the potential of surface survey, although a previous brief surface survey in the field area when there was somewhat better exposure did not produce any chipped stone artifacts in the site vicinity. Because of historic disturbance and erosion, the terrace surface at the site location is deflated and represents a sequence of disturbed surface soil (Ap), overlying clayey terrace fill. Historic artifacts from the late nineteenth and twentieth centuries are common in the upper 20 cm of fill above the clay. No prehistoric material was found in these initial test units. Posthole augers indicated a similar stratigraphic sequence across much of this terrace. A less disturbed area, apparently never cultivated and with the original historic soil largely intact, was identified 50–100 m south of the Clovis find area. It will be further investigated to evaluate the possibility of buried Clovis-age evidence rather than surficial finds or materials mixed with later components.

The clay-rich horizon below the surface soil has redoximorphic features (gray mottled with yellow and red), indicating common and repeated saturation and drying episodes. Whether the source of this

moisture is downslope illuviation, derived from the loess mantel covering this ridge and slope, or from flooding or previously higher water levels of the marsh area along the drainage to the east is presently unknown. Pedogenic carbonate nodules are also common in this clay unit, and the potential sources of the clay are yet to be determined. The stratigraphy at this location will be studied in detail in the near future. Presumably the age of this clay stratum is pre-Clovis because the Clovis artifacts were found on and above its surface. Its actual age is presently unknown, and it is possible that the Clovis activity occurred on or near the top of this clay stratum.

Further testing at 14RP327 was conducted during the University of Kansas archeological field school in June 2013. Several days were spent working at the site, including clearing brush and dead trees and further mapping. Some auger tests and four additional 1 x 1-m test units were excavated in three areas of the site: at the base of the terrace in the sheep pen area where Clovis artifacts had been found, in the uncultivated yard area south of the house, and in the uncultivated area east of the driveway and tree row on a high spot in the terrace. Matrix from the excavated test units was processed by water screening through 1/8-inch mesh screen. Only one chipped stone artifact, a flake from Test Unit 3, was recovered. All other artifacts represented the historic farm, which was occupied from the 1870s through the 1970s. The primary findings suggest that the historic period deposits at the base of the terrace in the sheep pen area are very deep. All fill in that area had been redeposited from historic period erosion of the terrace scarp and surface.

Notes on each of the excavated 1 x 1-m test units are provided here. All test unit locations are indicated by their southwest corner coordinate in relation to the permanent datum established at the site. The permanent datum is an aluminum cap, stamped with the site number and set in concrete.

Test Unit 1 (N131 E100) was situated near the south edge of a dense stand of small trees that have grown up during the past 30 years, during which time livestock has not present on the farm. This is believed to be some meters north of where the Clovis artifacts were found. The unit was excavated in 10-cm levels, screened through 1/4-inch dry screen to a depth of 30 cm below surface (bs). Historic materials were recovered only from the top 10 cm,



Figure 9a. Test Unit 1 at 14RP327.



Figure 9b. Test Unit 2 at 14RP327, view west.

and the base of level 2 (20 cm bs) was the dramatic contact between gray-brown silt loam (reworked loess) and the mottled gray clay unit of presumed later Pleistocene age.

Test Unit 2 (N131 E90) was located 10 m west of TU1 between the stand of trees and the old dairy barn. The sediment is dark gray brown silt below the disturbed surface layer. A historic posthole with burned post was located in the southwest portion of the unit, and historic materials were recovered

through level 3 to 30 cm bs. Below 30 cm a post-hole auger test provided stratigraphic information. A light brown silt level was encountered at 40 cm bs and extended to 65 cm bs. The gray mottled clay unit began at 70 cm bs. This area of the site has the potential for Holocene sediments to cap intact Clovis age deposits.

Test Unit 3 (N108 E121) was located at the east end of the sheep pen at the foot of the T2 terrace. (T2 is the second terrace above the flood plain of the

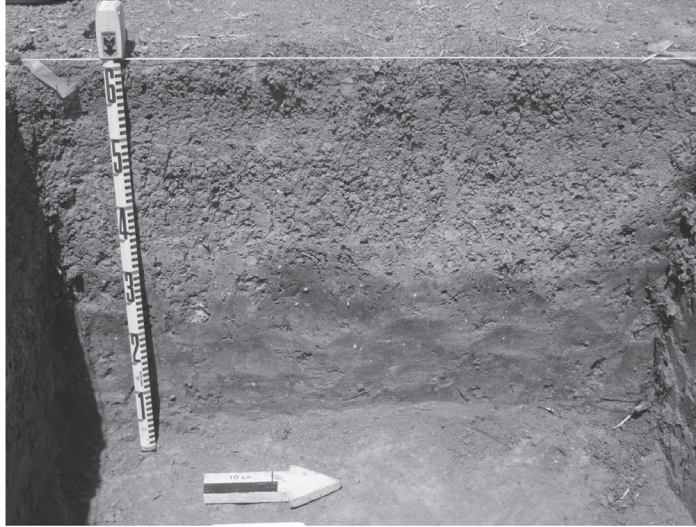


Figure 9c. West profile of Test Unit 4 at 14RP327.



Figure 9d. North profile of Test Unit 5 at 14RP327.



Figure 9e. Waterscreening at 14RP327.



Figure 9f. Test Units 3 and 4 at 14RP327, view southeast.



Figure 9g. Test Unit 5 at 14RP327, view south.



Figure 9h. 14RP327, view west. Test Unit 5 is at the white tent on the left.



Figure 10. Topographic map and location of test units at 14RP327.

creek.) Historic materials occurred in dark brown laminated silt to a depth of at least 65 cm. This material has eroded from the terrace during historic time. Posthole auger testing indicated that the brown silt continued to a depth of 125 cm bs, and light brown silt with pedogenic carbonates occurred to 130 cm bs. (Pedogenic carbonates are carbonate concretions that form in place in the soil by illuvial action or water percolation, transporting carbonates down the soil profile.) The contact with the underlying clay unit was not determined.

Test Unit 4 (N105 E121) was only 3 m south of TU3 and was excavated to 70 cm bs. Historic artifacts were found throughout this laminated fill. The fill was dark brown with common pedogenic carbonates at 70 cm bs. Auger testing indicated that the light brown silt occurred at 130 cm bs, and the top of the gray mottled clay occurred at 150 cm bs.

Test Unit 5 (N31 E132) was positioned east of the driveway and near the fence row on an eastward extending toe of the T2 terrace. This area is thought

to be uncultivated. Light brown silt overlaid the mottled clay layer that was encountered at 37 cm bs. No artifacts were recovered in this unit, which was excavated to 50 cm bs. This area had a very thin Holocene mantel overlying the clay.

Test Unit 6 (N30 E106) was positioned south of the farmhouse location, west of the driveway in an area of the yard believed not to have been cultivated. Time constraints did not allow completion of this unit, which was excavated to only 20 bs. Posthole auger testing indicated that the dark brown soil changed to light brown silt at 50 cm bs, with increasing carbonates beginning at 30 cm. The mottled gray clay sediment was encountered at 77 cm bs. This area also holds potential for intact late Pleistocene and early Holocene deposits and merits further investigation.

About 300 m northwest of 14RP327, on the ridgetop overlooking Riley Creek and with a good view of the drainage system to the southeast, is the Blue Marble site (14RP12). It appears to represent



Figure 11. Clovis preform fragment and Flattop chalcedony flake from the Blue Marble site (14RP12).

a temporary camp and perhaps a hunting overlook. Debitage is composed primarily of small retouch flakes, and artifacts include biface fragments, flake tools, and a projectile point fragment. A biface fragment of WRGC represents a Clovis preform base that broke during fluting or basal thinning (Figure 11). The 14RP12 lithic materials include Alibates, WRGC, SHJ, and Permian cherts (Table 4). Biface reduction flakes of Alibates flint are patinated and may relate to Clovis or other early activity at this site. Alibates flint is well represented in Kansas and Nebraska Clovis-age artifacts (Hofman and Gottsfield 2010; Holen 2001, 2003). The blade fragment of an obliquely flaked projectile point (possibly Allen type) made of SHJ was found at the

Table 4. Chipped Stone Artifacts from 14RP12.

Spec #	Class	Type	Portion	Material	Length	Width	Thickness	Notes
20	Point	Allen?	Tip/Blade	SHJ	21.8	21.7	4.8	WP 397, Oblique flaking, impacted tip
24	Biface	Preform	Tip	SHJ	26.2	10.1	7.7	WP 403, late stage preform
26	Biface	Reamer	Tip	SHJ	20.1	13.9	6.6	WP 404, alternate bevel, edge wear
39	Biface	Preform	Base	WRGS	28.1	25.6	7.4	WP 418, Clovis preform base frag.
66	Point	Dart Pt	Blade	SHJ	14.3	17.7	4.8	WP 51, Oblique & co-medial
8	Flake Tool	Thin	Frag	Alibates	23.6	12.1	3.9	Unifacial dorsal retouch on edge and corner. West of road.
36	Flake Tool	Thick scraper	Frag	SHJ	20.1	14.0	6.1	Edge fragment w/ unifacial dorsal retouch. West of road.
68	Flake Tool	Thin	Frag	SHJ	21.6	11.8	2.8	WP 53, fine unifacial retouch on lateral and distal edges
1	Flake	Tertiary	Complete	Alibates	16.9	16.9	6.3	Distal edge crushed. Found in road
2	Flake	NCNP	Frag	Alibates	8.4	3.4	1.2	East of Road. Retouch flake
3	Flake	Tertiary	Complete	DQ	18.1	14.9	4	East of Road. Biface Thinning flake
4	Flake	NCNP	Frag	PERM	10	8.2	2.9	Angular midsection. Found in road
9	Flake	Secondary	Distal	SHJ	22.4	13.6	3.4	Biface thinning, possible use wear
10	Flake	Tertiary	Complete	SHJ	12.3	11.6	2.3	Cortex on platform, west of road
12	Flake	NCNP	Frag	SHJ	16.8	14	5.1	Found in Road, weathered
14	Flake	NCNP	Frag	SHJ	21.4	17.7	4.3	WP 411
15	Flake	Tertiary	Complete	SHJ	26.6	19.6	5.6	WP 410, biface thinning, possible graver
16	Flake	Primary	Complete	SHJ	19.1	18.2	4.7	WP 409, gravel cortex
17	Flake	Tertiary	Complete	Alibates	12.9	10.7	2.1	WP 408, biface thinning
18	Flake	Tertiary	Complete	Alibates	7.3	6.6	1.1	WP 408, unifacial retouch, potlid
19	Flake	Secondary	Complete	SHJ	15.3	10.5	3.3	WP 394, unifacial retouch
21	Flake	Tertiary	Complete	SHJ	16.1	9.2	3.1	WP 398, biface thinning
22	Flake	Tertiary	Proximal	SHJ	12.6	9.5	2.9	WP 401, biface thinning

Table 4. continued

Spec #	Class	Type	Portion	Material	Length	Width	Thickness	Notes
23	Flake	NCNP	Distal	PERM	15.2	13.4	3.6	WP 407, biface thinning, patina
25	Flake	NCNP	Distal	PERM	19.1	14.5	4.8	WP 406, biface thinning, graver?
27	Flake	NCNP	Distal	SHJ	11	9.8	3.7	WP 405, possible radial break
28	Flake	Tertiary	Proximal	PERM	14.4	14.4	2.4	WP 402, biface thinning
29	Flake	Tertiary	Proximal	SHJ	19.1	12.6	4.3	WP 395
31	Flake	NCNP	Distal	PERM	16.1	10.8	3.5	WP 400, ventral retouch incidental?
32	Flake	Tertiary	Proximal	SHJ	15.1	14.3	3.3	WP 399, biface thinning
33	Flake	NCNP	Frag	SHJ	16.3	7.9	3.4	WP 412, radial break?
34	Flake	NCNP	Distal	PERM	9.4	6.1	1.6	WP 413, unifacial retouch, patina
35	Flake	Tertiary	Complete	SHJ	28.4	16	9.8	West of road, core rejuvenation
37	Flake	NCNP	Frag	WRGS	14.4	12.4	2.8	WP 416, biface thinning
38	Flake	Tertiary	Complete	Alibates	11.8	10.5	2.7	WP 417, unifacial retouch?
40	Flake	Tertiary	Complete	SHJ	5.4	5.4	0.9	Unifacial retouch
41	Flake	Tertiary	Complete	PERM	9.3	5.9	1.5	Unifacial retouch
42	Flake	NCNP	Frag	UC	11	6.3	1.9	White chert
43	Flake	Tertiary	Complete	PERM	6.4	5.3	0.8	Bifacial retouch
44	Flake	Tertiary	Proximal	UC	10.4	9.9	2.5	White chert, burned, biface thin?
45	Flake	Secondary	Distal	PERM	10.4	14.6	5.3	No platform
46	Flake	NCNP	Distal	SHJ	14	10.8	2.8	Biface thinning
47	Flake	NCNP	Distal	SHJ	17.1	15.3	2.5	Biface thinning, heated
48	Flake	Secondary	Complete	SHJ	10	7.1	2.2	Cobble edge
49	Flake	NCNP	Distal	SHJ	8	6.7	2.2	Unifacial retouch
50	Flake	Secondary	Distal	SHJ	24.4	12	4.1	Less than 50% cortex
51	Flake	NCNP	Distal	SHJ	11.8	9.9	3.1	heated
52	Flake	NCNP	Distal	SHJ	11.1	9.2	3	
53	Flake	NCNP	Frag	SHJ	6.6	5.1	2.4	
54	Flake	NCNP	Distal	SHJ	8.5	5	1.9	
55	Flake	NCNP	Distal	SHJ	6.3	6.1	1.2	Unifacial retouch?
56	Flake	Secondary	Complete	SHJ	9.6	5.6	3	Core platform edge
61	Flake	Secondary	Complete	SHJ	11.5	7.2	2.6	WP 46
62	Flake	Tertiary	Complete	PERM	6.9	6.5	1.4	WP 47, bifacial thinning
63	Flake	Tertiary	Complete	PERM	12.8	7.9	1.3	WP 48, bifacial thinning, material?
64	Flake	Tertiary	Complete	PERM	13.4	11.4	1.7	WP 49, bifacial thinning
65	Flake	NCNP	Distal	SHJ	13.2	11.6	2.7	WP 50
67	Flake	Tertiary	Complete	UC	18.1	12.1	5.3	WP 52, White chert
5	B D	Secondary		Quartz	12.9	10.8	4.7	Found in road
6	B D	Secondary		SHJ	26.3	17.7	12.1	Found in road
7	B D	Secondary		SHJ	15.7	8.2	5.4	Found in road
11	B D	Secondary		SHJ	10.3	6.2	3.5	Splintered piece, radial break?
13	B D	Secondary		UC	21.9	15.6	10.2	Brown mottled chert
30	B D	Tertiary		SHJ	18.8	12.3	7.8	WP 396, thermal breaks
57	B D	Secondary		SHJ	14.6	10.4	6.1	Possibly secondary flake frag
58	B D	Secondary		SHJ	23.3	17	8.5	
59	B D	Secondary		SHJ	12.9	9.8	6.3	
60	B D	Secondary		SHJ	20	12.3	10.8	WP 45

site also. The Blue Marble site probably represents an overlook, used repeatedly by various groups of prehistoric hunters, and a place where some processing, manufacturing, and retooling or repair of broken equipment occurred.

The Graham site (14RP10), located in northeastern Republic County, is on a north-sloping ridge toe near a marsh and seep on a tributary of Rose Creek, which drains east to the Little Blue River. This site has evidence of multiple Paleoindian occupations: a Folsom point base, made from tan fossil wood (similar to silicified woods from the Hahn divide in east-central Colorado) and a preform for another Paleoindian point (Figure 12). A small Clovis point of gray Permian chert (Florence B) from this site has a reworked blade and a slightly broken tip. The point is heavily patinated except for a large scar on one edge near the base that reveals the unpatinated interior. A basal corner or ear is also broken. This point was used and repaired at least once in prehistoric time and also was damaged by historic cultivation activity. The site area, where the Clovis and other points were collected, yielded a small num-

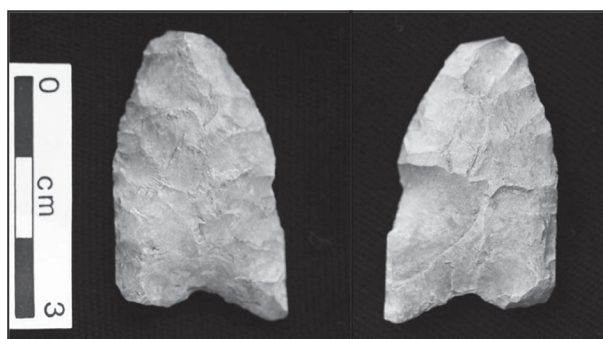


Figure 12a. Clovis point from the Graham site (14RP10).

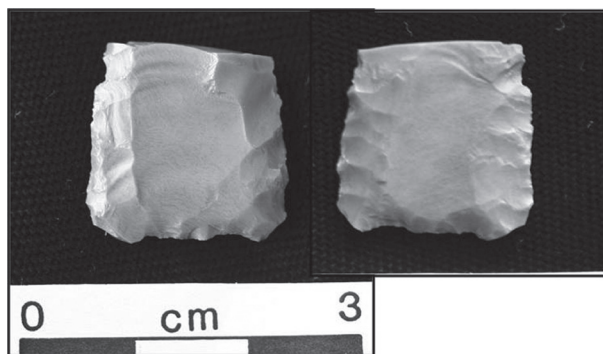


Figure 12b. Folsom point base from 14RP10.

ber of flake debitage pieces and no formal tools. It appears to represent a temporary camp or limited activity site, but stratigraphic investigation of the terrace slope between the site and spring area should reveal deposits having the potential for buried Clovis or other Paleoindian occupation levels.

The Fisher-Filipi site (14RP8) is located on Mill Creek, where an impact-damaged Clovis point of SHJ (Figure 13) was found on the north side of the stream channel, eroding from a basal clay stratum (Figure 14). Mill Creek drains east and joins the Little Blue River in Washington County. The Clovis point is well made with relatively fine marginal retouch along the blade and stem. Lower blade edges are slightly recurved, which is primarily the result of lateral edge grinding. The base is



Figure 13. Clovis point from Fisher-Filipi site (14RP8).



Figure 14. Mill Creek cut bank at 14RP8.

concave and well ground, with the corners forming prominent ears. The blade edges above the grinding are convex and irregular or coarsely serrated on both edges. The blade edges, like the tip, appear to be damaged from impact or subsequent use and not from post-depositional damage. The point does not exhibit evidence of stream (sediment) abrasion on its surfaces or edges. It may have been reworked previously and presumably was lost rather than discarded because only minimal retouch would be required to refurbish the tip and make the point serviceable again. The medial portions of the blade above the flutes exhibit broad flake scars, some with hinge terminations, which are remnants of the preform stage of the point's manufacture. The flutes are well executed with only one primary flute on each face, and both of these terminate in thin hinges. This Clovis point may represent one that was lost during hunting or one from a camp or kill location along the creek.

Only a few other chipped stone artifacts and flakes have been documented from the Mill Creek channel, but bones of bison, some of probably late Pleistocene or early Holocene age, are relatively common in the stream bed. One bison astragalus from this stream is very large and falls easily within the range of *Bison antiquus* (maximum length and width are 8.58 and 65.66 cm). A mammoth or mastodon bone was found in terrace deposits on the south side of Mill Creek in 1961, only a short distance from the Clovis find spot. The author is attempting to learn more about the nature and context of that find, but it suggests the presence of additional late Pleistocene deposits in the area.

The potential for deeply buried sites along this stream valley is high, and stratigraphic research and dating of deep deposits may confirm the presence of and aid in identifying more late Pleistocene- and early Holocene-age stratigraphic units along the creek. Prehistoric sites of various ages occur on Mill Creek terraces in this vicinity. One component of trying to learn more about this site will be to monitor the stream bed and exposed banks and try to identify more precisely where Clovis and other prehistoric cultural activity occurred. The potential for deeply buried sites along this stream valley is high. Stratigraphic study of cut bank exposures in this drainage will aid in definition of buried soils and units of later Pleistocene and early Holocene

age, and it should be possible to identify which deposits include Clovis-age fills. Paleo-ecological study of soils, snails, fauna, and wood from this valley holds considerable promise.

In addition to the Clovis sites discussed above, a Clovis point is known to have been found in easternmost Republic County near the Washington County line, only a few miles southeast of 14RP8. Relatively little is known about the point, other than it was complete and found along a small tributary of Mill Creek. Another Clovis point is documented at 14WH330 near Washington, about 17 miles farther east and also on a Mill Creek tributary. This is a multi-component site with Woodland and Central Plains tradition occupations represented in other areas of the site. The Clovis point was found on the slope of the T2 Pleistocene terrace and is represented by a basal fragment with the basal corners missing (Figure 15; Table 1). This point is made from SHJ, with one side being dark brown and the other translucent yellow. It is well fluted on both faces, with the flute extending to the end of the broken blade on both faces. There is a good possibility that other Clovis evidence may be preserved in or on this terrace.

Collectively these finds provide supportive evidence for fairly intensive use of upland settings by Clovis people in this portion of the Central Plains. The abundance of seeps, springs, and salt marshes along upland tributaries in the area probably attracted animals and the Clovis people who hunted them to this region. A diverse array of other animal and plant resources would have been available in the vicinity of these marshes. Additional Clovis point finds are known for the region between the

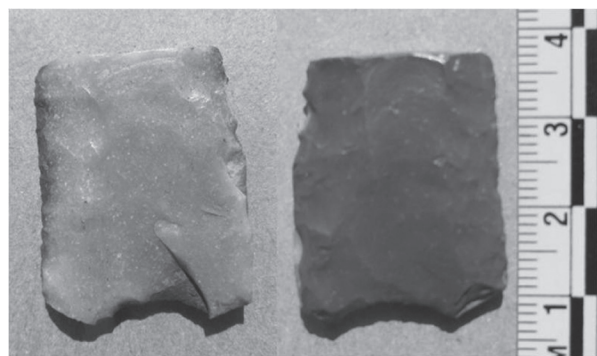


Figure 15. Clovis point of Smoky Hill jasper from 14WH330.

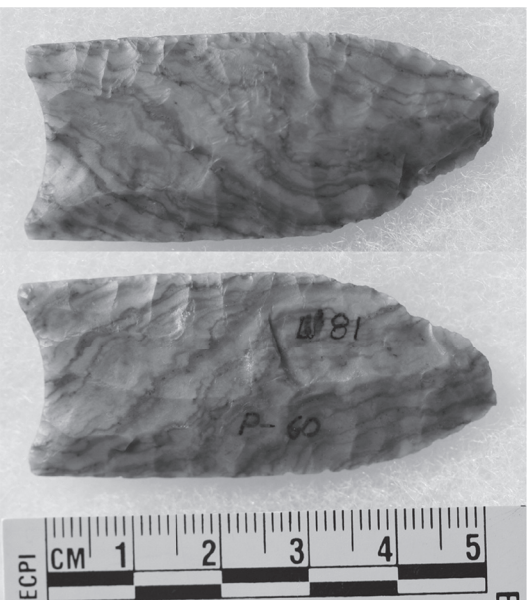


Figure 16. Eckles Alibates Clovis point from Jewell County, Kansas.

Diskau and Eckles sites. These include finds fairly close to the Eckles site in the Lovewell Reservoir area along White Rock Creek (Figure 16). Point KC-108 was found on the north side of White Rock Creek in Jewell County. This point is manufactured from a red and white banded Alibates flint with primary source areas in the Texas Panhandle north of the Canadian River (Banks 1990; Wyckoff 1993). Alibates is commonly represented in Clovis artifacts from Colorado (Stanford and Jodry 1988), Nebraska (Holen 2001, 2003), and elsewhere in Kansas (Hofman and Gottsfeld 2010). The point has slight tip damage with a reverse impact flute but is otherwise complete. It is finely retouched, and the flutes were well executed and end in hinges. A second Clovis point (KC-119) from the vicinity, but just downstream from Lovewell Reservoir, was found by Carl Wright. This point was manufactured from gray-white Dakota quartzite and is complete (Figure 17). No information is available about whether other materials were found with the point, and no metric information is available. The base of a Clovis point (KC-120), manufactured from WRGS probably from the Flatop source area, was found at 14PO2 during a survey by the 2011 Kansas Archeology Training Program field school. This relatively small point is lightly patinated on both faces and was broken across the blade near the base, probably in the haft (Figure 18a). It was found on a second terrace at an elevation that has yielded



Figure 17. Wright quartzite Clovis point from Jewell County Kansas (no scale).

other Paleoindian materials, including a Folsom point base made from Florence B chert (Figure 18b) found at 14MH333.

A Clovis point also was found near the Randolph area, about 13 km north of the Diskau site, but further details about this point are not available at present. The Clovis point (KC-27) reported by O'Brien (1971) from the Little Blue River channel near Waterville is of special note because of the material. It apparently was made from Burlington chert, which has source areas in Missouri (Ray 2007). Other Clovis artifacts from Kansas and Nebraska also are made from this material (Holen 2001;

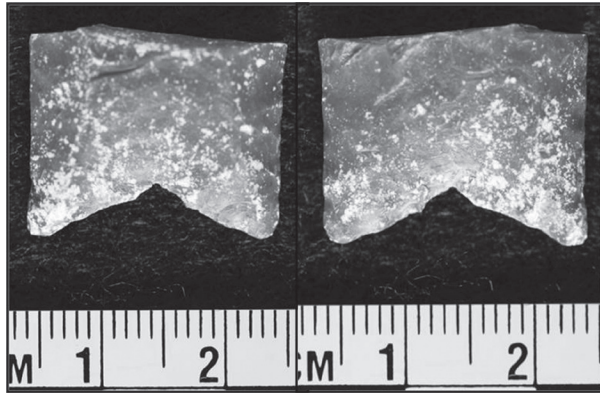


Figure 18a. Clovis point base from 14PO2.



Figure 18b. Folsom point base from 14MH322.

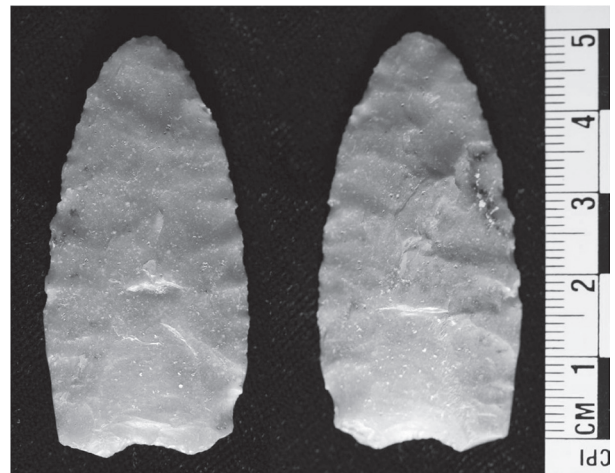


Figure 19. Newell Clovis point, Thayer County, Nebraska.

McLean and Peter 2004). A Clovis point made of Permian chert on display in the Pawnee Indian Museum State Historic Site (Kansas Monument site, 14RP1), may be from Republic County but is of uncertain provenance. Clovis points are documented in Nuckolls, Thayer, and Jefferson counties, Nebraska (Hofman 2012b; Holen 2003; Figure 19) just north of the study area. That area lacks the salt springs and marshes that are common in Republic County, but the Republican, Little Blue, and Big Blue rivers, which transect that part of southern Nebraska, were important resource areas and probably routes of travel during Clovis time.

At present the documented Clovis artifacts and sites in the upland drainages of the Republican, Little Blue, and Big Blue rivers of north-central Kansas represent our best documented concentration of Clovis evidence in the state. Refining our understanding of Clovis activities in these sites and documenting the local environmental conditions during Clovis time stand as important challenges for future work.

ACKNOWLEDGMENTS

This paper is dedicated to the memories of Glen Fisher and William Graham whose interest and passion for archeology and willingness to aid in recording Republic County archeological sites have made a lasting contribution. For their help in various ways I thank Robert Hoard, Virginia Wulfkuhle, Steve Holen, Dick Eckles, Brendon

Asher, Andrew Gottsfield, Al Johnson, Mike Fosha, Richard Gould, Mary Adair, Rolfe Mandel, William Graham, Annette Bredthauer, John Swiercinsky, Todd Filipi, Glen Fisher and family, Larry and Pat Walter, Mike Henry, Wilma, Greg, and Kay Mikesell, James Levendofsky, Daniel Hansen, Kenny Resser, Darrell Wilson, Edward Larson, Clyde Sylvester, Elsie Toone, Jim Nelson, Vinton and Lance Visser, Paul Smith, Delbert Hoffman, Victor Hellbush, and anthropology students at the University of Kansas. Special thanks to Debi Aaron for help in testing and mapping 14RP327 and for aid in surveying 14RP11, 14RP12, and 14RP8 and in recording collections. Thanks to Rolfe Mandel for inspecting the soil profiles exposed in test units 1 and 2. Thank you to Andrew Gottsfield for preparing the map used in Figure 10. This work was supported in part by a University of Kansas General Research Fund Grant (#2301664).

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THE DOUGLASS COMPLEX AND TABLE ROCK POINTS: NEW LIGHT ON OLD PROBLEMS

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Ever since they were first defined, there has been confusion regarding the relationships between Table Rock and Bottleneck projectile points. There also has been prolonged debate about their ages, with some claiming that they are Middle Archaic and others asserting a Late Archaic affiliation. With few exceptions these points have not been found in clear enough contexts to begin to understand what other sorts of tools belong with them. This paper addresses these questions, using a very large assemblage from a nearly pure Table Rock component. It demonstrates the existence of two similar but distinct types, one of Middle Archaic age and one from the Late Archaic. In addition, a knife form is recognized that is a larger and more robust version of the earlier type. Finally, the axes, knives, scrapers, and drills associated with the early point type are described. Together they form the Douglass complex.

THE PROBLEMS

Point Morphology

The projectile point types called Table Rock and Bottleneck are quite similar to one another and share a number of previously unresolved and interrelated issues. They are found over roughly the same area of the Midwest, typically not in large numbers and most often as isolated finds in upland contexts. In excavated sites they usually have been found mixed with other point types. As a result, their ages have remained in dispute, and the nature of other tools made by their manufacturers is unknown. This paper attempts to resolve some of these issues, using a very large assemblage from a single site.

The Bottleneck type was first illustrated but not defined by Leon Kramer (1947) in his *Prehistoric Flint Types of Ohio*. The first definition was in a descendant volume, *Ohio Flint Types*, by Robert Converse (1973). In the meantime, however, Robert Bray (1956) described the Table Rock type, giving that name priority in the professional literature. Converse (1973:43) stated the following.

Large round notches which constrict the stem are characteristic. The bases and notches are heavily ground. Fine percussion and pressure flaking are always evident and although these points are always heavy and thick, they rarely are crudely made. The

blade edges are always convex and never straight. In most instances they are around two inches long. One to three inches seem to be the extremes in size.

Bray (1956) based his definition on a sample of 10 Table Rock specimens from the Rice Rockshelter site (23SN200) in Stone County, Missouri. Of the 10 only 4 were complete enough to measure length, width, and thickness (Bray 1956:75). He illustrated three examples, only one of which is complete (Bray 1956:Figure 23, Row 3). His description (Bray 1956:87) was as follows.

This is a relatively small but quite thick point. The base is straight to slightly convex, and the stem is square to very slightly flaring. The shoulder area is rounded and barbs are never present. The edges of the blade are convex. The specimens are all well finished by primary and secondary flaking. A majority of specimens have ground stems and bases, and on the five complete specimens, this grinding extends from the base completely to the upper part of the shoulder area.

The similarity between the two point types gradually led many archeologists to abandon the Bottleneck type name and to use either only Table Rock or the two terms in combination. Some collectors have retained both type names, assuming

that the larger artifacts, which they call Table Rock, functioned as knives instead of dart points. Noel Justice's (1987:124) careful descriptions of the two types and the distinction he made between them could be taken as justifying this point of view.

As a rule, Table Rock points are larger, more thickly biconvex or plano convex than the closely similar Bottleneck type. Table Rock Stemmed points exhibit wider haft dimensions relative to shoulder width than Bottleneck. In addition, Bottleneck points are finished using a delicate pressure flaking technique which commonly covers the blade with numerous minute and lengthy flake scars.

The spatial distributions of the types, as illustrated by Justice, are nearly identical (Figure 1). Thus, one might suppose that there is a single continuum of variation and that those people who continue to use both names are subdividing it with the preconceived notion that two types exist. Alternatively, those who have abandoned the Bottleneck term may have done so prematurely. Without an assemblage of sufficient size to demonstrate the range of variation within a single type, it is not possible to choose between the two interpretations.

Another issue is whether the current definition of the Table Rock type matches Bray's original conception or whether the meaning of the term has shifted somewhat over time. Thus, Nolan and Fischel (2009:441) wrote, "... the type, as used today, bears little resemblance to the original examples described and illustrated from the Table Rock Reservoir in Missouri." Not only did Bray use a very small sample of specimens as a basis for his definition, but his three illustrations did not match terribly well with his verbal description. Table Rock is not the only type for which an inadequate original sample generated confusion about the range of variation to be expected. Another example is Pelican Lake, the original sample of which had only two intact bases. Today archeologists hold widely varying images of what that type is supposed to look like.

Heretofore, a series of questions have remained unanswered: 1. Are there two types or one? 2. Is Bray's original definition, based on a small sample, adequate? 3. Are the apparent differences between the types a reflection of different amounts of

breakage, attrition, and re-use? 4. Were the larger and more robust items intended as knives and the smaller ones as dart points?

Some distinction between Bottleneck and Table Rock points might reflect maintenance. Points can be manufactured with very fine pressure retouch, but after they have been used, broken, and repaired several times, the original flaking pattern may be erased. Isolated points lost during hunting show the effects of extended maintenance less frequently than points found in base camps. Adding the complication that some "points" originally may have been fashioned for use as knives, with different considerations for blade and stem size and flaking, results in a muddle that only close analysis of a large assemblage might untangle.

Age

After more than 50 years the age of Table Rock points remains in dispute. Opinion is divided, with many archeologists asserting a Late Archaic affiliation, some declaring a Middle Archaic one, and a few maintaining that the type lasted from Middle to Late Archaic times. The Late Archaic estimate is based on the fact that Table Rock points have been found at a number of sites in association with Late Archaic types, such as Brewerton corner notched, Brewerton side notched, Etley, Karnak, Ledbetter, Matanzas, McWhinney, Merom, Saratoga, Sedalia, Smith, and Tipton (Benn and Thompson 2009:505, 519, 553; Buchner et al. 2003:467-468; Ray et al. 2009:189; Reynolds and Lees 2004:20; Schmits 1987:159; Stafford and Cantin 2009:299, 305; Wyckoff 1984:147).

Only a few direct dates are available from assemblages at a handful of sites (Benn and Thompson 2009:519, 553; Fishel et al. 2003; Lensink 1986:178; Schmits 1987:159; Stafford and Cantin 2009:305; Whittaker et al. 2007). Of these, the dates from 14CF330, reported by Schmits, cannot be considered trustworthy, as the Gakushuin laboratory was generating unreliable assays at the time the tests were run (Blakeslee 1994). The rest of the dates fall between 680 B.C. and older than 3000 B.C. with a slight concentration between 1650 and 1880 B.C.

A smaller number of archeologists consider Table Rock points to be Middle Archaic in age. Indeed, that was Bray's (1956) original assessment. In a

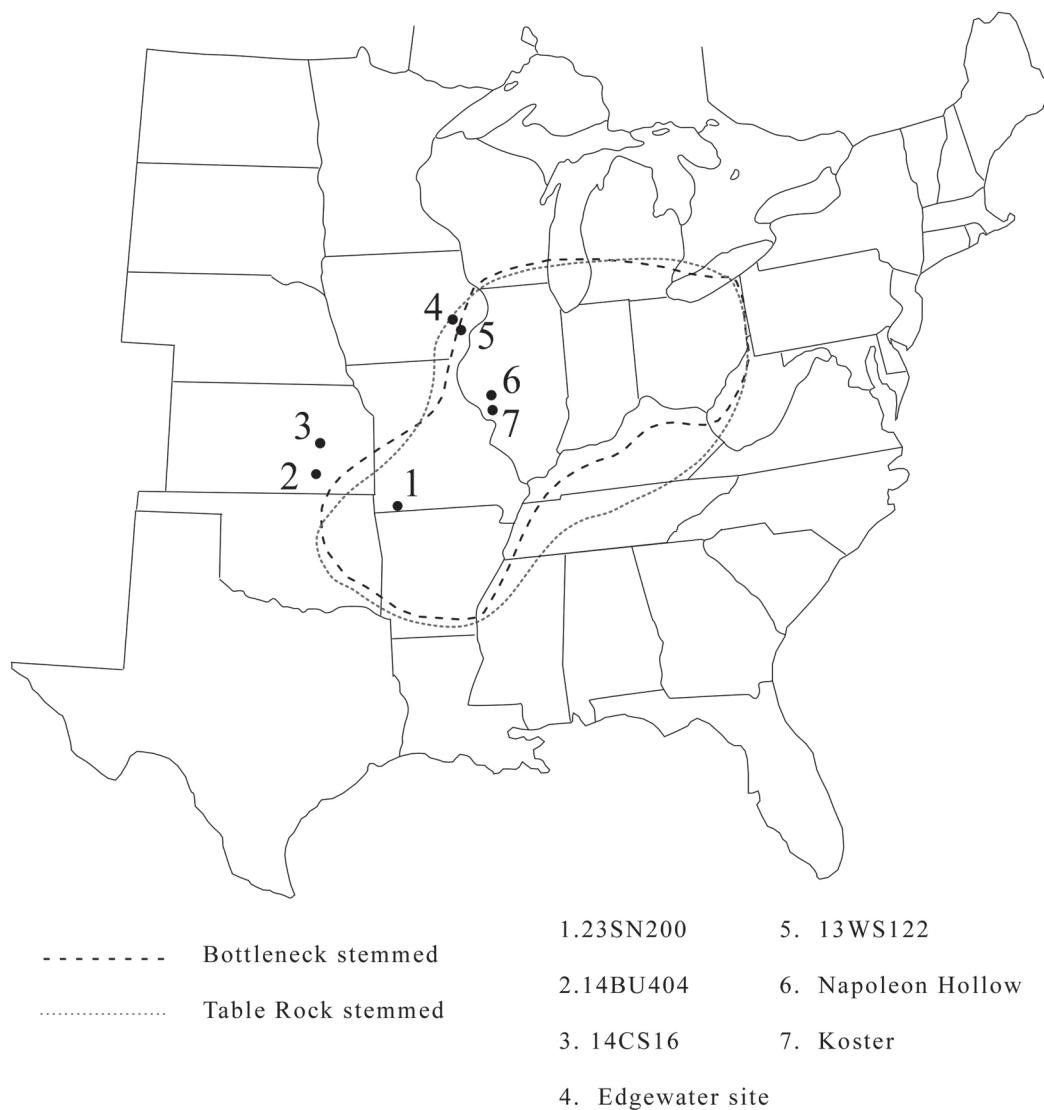


Figure 1. Point type distributions and sites discussed. Distributions and base map after Justice 1987:maps 53 and 54.

summary of the Archaic in the Lower Illinois River basin, Wiant et al. (2009: 251) associated Table Rock points with the Napoleon phase (6140–5310 B.C.). Harl (2009:383) placed them in the latter half of the Middle Archaic (i.e., after 4500 B.C.).

Of all the summary articles in a recent volume on the Archaic period in the Midwest (Emerson et al. 2009), that by Nolan and Fishel contained the most detailed argument for a Middle Archaic age for Table Rock points because the two authors disagree. Fishel suspects that Table Rock is Late Archaic, while Nolan believes it is Middle Archaic. Perhaps as a result of their disagreement, Nolan (Nolan and Fishel 2009:441) presented an expanded argument.

Table Rocks are commonly believed to be a product of the Sub-Boreal–Sub-Atlantic small-point traditions like the Riverton, Durst and Lamoka complexes . . . but western Illinois examples are typically manufactured from bifacial preforms rather than flake blanks and can be 7.5 to 10+ cm long in a pristine state; they only take on a diminutive appearance as a result of various forms of attrition, damage, and rejuvenation.

Further, Nolan argued that in Illinois Table Rock points have been found in clear context only in Horizon 8B at the Koster Site. He (Nolan and Fishel 2009:441) attributed the Table Rock specimen in

Horizon 6 and those found with Late Archaic types at other sites to mixing and/or scavenging and re-use of old points. Finally, he noted similarities between Campbell Hollow points (ca. 6650–5700 B.C.) and Table Rocks, suggesting an age of 5750 to 5500 B.C. for the Table Rock type.

Thus, the three distinct possibilities with regard to the age of Table Rock points are Middle Archaic, Late Archaic, or beginning in the Middle Archaic and lasting into the Late Archaic. The last alternative implies duration on the order of 4,000 years.

Spatial Distributions

The overall distribution of Table Rock points can be judged from Figure 1, which illustrates Justice's (1987) estimates before he extended his studies of point types west into the Plains and beyond. Two sites discussed here (2 and 3 in Figure 1) extend its range into the Flint Hills region of eastern Kansas, where Table Rocks are not rare. In the western part of the state, similar points occur (Janice McClain, personal communication), but their stems are always alternately beveled, and they might better be assigned to another type.

In the Midwest, Table Rock points tend to be found as isolates in upland contexts, while in excavated contexts they are found mixed with other point types and usually in small numbers. Conrad (1981:133), in his study of collections along the FAP 407 route in western Illinois, found Table Rock points to be one of the most common types in collections from upland areas. Isolated finds made up over 60 percent of the reported Table Rock specimens in the Route 336 study in western Illinois. In southeastern Iowa a review of surface collections from the upland route of the F518 highway project found Table Rock points to be the most common type (Jacobs and Perry 1986:26).

In contrast lowland sites that produce Table Rock finds have been scarce in well-studied areas. McElrath et al. (2009:342) reported that Table Rock is the only point type from Koldehoff's (2006) upland survey that is missing in the American Bottom Late Archaic phases. Nolan and Fishel (2009:443) concluded that "the primary residences of Table Rock peoples must have been situated low on the landscape and are now subsumed by alluvial or colluvial deposits that effectively mask their locations."

On the other hand, two Table Rock sites in eastern Iowa are neither especially low in the landscape nor buried very deeply (Lensink 1986:Chapter 9; Whittaker et al. 2007).

In the absence of large pure components, few other artifact types have been associated with Table Rock points. Bifaces from the Davis Creek and Edgewater Park sites in Iowa (Lensink 1986; Whittaker et al. 2007) are the only substantial exceptions.

SITE 14BU404

Site 14BU404 lies in the Walnut River drainage south of the town of Douglass in Butler County, Kansas. The Walnut River is a tributary of the Arkansas that runs south along the western edge of the Flint Hills physiographic region. Essentially it drains the western half of the Flint Hills below the point where they are interrupted by the Cottonwood River. The stream was well timbered at the beginning of the historic period, and as the name implies, lithic sources are common in the Flint Hills. Not surprisingly, the Walnut River basin is extremely rich in archeological sites. Those with surface expressions range in age from Early Archaic to historic, and subsurface testing indicates the presence of many buried Archaic sites (Mandel in press).

From 14BU404 south to the Oklahoma state line, early sites have surface expressions on low terraces. For example, there is a plow zone exposure of a Calf Creek component in a site 200 m south of 14BU404. In a study of the terraces in the vicinity of Augusta about 12 miles upstream from 14BU404, Rolfe Mandel (personal communication 2010) noted an exposure of the T-2 at approximately the same elevation as the T-1 terrace. It is likely that the early near-surface sites found in the lower Walnut River drainage are being eroded from remnants of the older terrace.

The site lies in a plowed field between the Walnut River and Eightmile Creek (Figure 2). It covers about 1.4 hectares adjacent to an old stream channel visible on aerial photographs. The channel forms the northern border of the site and probably was active when the site was occupied. The maximum width of the site, as measured at right angles to the channel, is 75 m, and it extends along the channel for about 250 m.

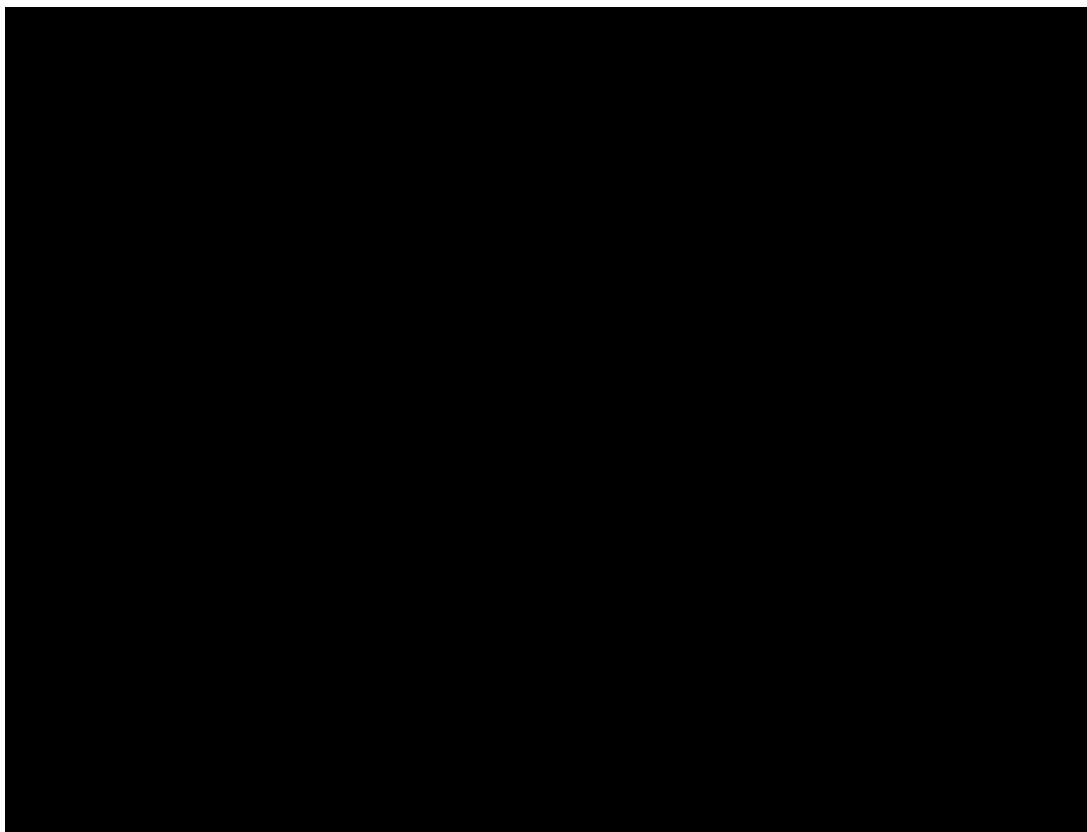


Figure 2. Site 14BU404.

The sediments originally were completely free of rock, making collecting easy for many years. Flooding of adjacent streams results in sheet wash that episodically removes some plow zone sediments. The landowners built a low east-west berm across the northern end of the field to reduce this erosion, but the occasional larger flood has washed some of it away.

THE COLLECTIONS

The site has been known to local collectors for at least 70 years. (None of the men whose collections were examined wants to be identified. Their collections are distinguished here simply as C, E, and G. Their generous assistance with this research is gratefully acknowledged.) One man began collecting at 14BU404 with his father, and the other began collecting there with his grandfather. The site has continued to be productive, reflecting the gradual sheet erosion brought on by a combination of plowing and flooding. During the entire time that the living informants have been collecting from the site, the nature of the materials that it has yielded has not changed significantly; Table Rock points

have constituted the vast majority of the diagnostic artifacts.

The number of specimens obtained from the surface is impressive. The two collections include 461 points, 228 bifaces, 329 scrapers, and smaller numbers of other kinds of chipped stone tools (Table 1). Missing are flakes, cores, and tested cobbles. Collector E said that usually neither he nor Collector C picked up such items or flakes. He also remarked that he was less likely to pick up a broken biface than the other collector, a fact reflected in the frequencies of such items in their collections. Both have very experienced eyes, however, and many of the artifacts in the collections are quite small.

Most of the artifacts are made of regionally available lithic types. Almost all are gray to tan cherts from Permian deposits. The most common is the local Florence B chert, which ranges considerably in its quality and color. It tends to be somewhat chalky near the cortex but very well silicified and glossy and ranges in color from caramel or tan through gray to (rarely) black in the interior. Many of the small artifacts retain cortex on one face and sometimes on both, indicating that they were made from small flat stream cobbles. Also present are Florence

Table 1. The Collections from 14BU404.

Tool Type	Collection			Components	
	C	E	Total	Table Rock*	Other*
Axes	9	6	15	15	0
Bifaces	164	64	228	215	13
Drills	21	24	45	34	11
Flake tools	19	3	22	—	—
Ground stone	9	2	11	—	11
Round-tipped knives	5	5	10	10	0
Eightmile knives**	8	6	14	14	0
Points**	241	207	448	393	55
Scrapers	221	109	330	301	29
Totals	697	426	1123	982***	119***

*The precise numbers for artifacts from other-than-Table Rock components are estimates based on form and other considerations.

** Three drills made on Eightmile knives and one made on a Table Rock point are listed twice.

*** Site totals are only for those categories where tentative assignment to component was possible.

A chert, identifiable by a pattern of banding and the presence of fusulinid fossils, and Florence C chert, which is gray and often rich in fossil fragments. Gray Wreford chert is represented; it outcrops in some of the same exposures as Florence C. Far less common is Foraker chert, which is rather grainy and poorly silicified with numerous fusulinid fossils.

What makes 14BU404 unique is the very large assemblage of a nearly pure Table Rock component, which probably indicates a locality that was used as a base camp for a considerable period of time. A few diagnostic artifacts from other components also are discussed in more detail below. Collector C noticed that he found some Late Woodland items toward the northeastern part of the field. He believes that they eroded from the earthen berm that the landowners built with soil borrowed from a bluff that yields some artifacts. Thus at least some of the non-Table Rock material seems to be intrusive, while the rest reflects very short-term use of the site by a variety of groups over a long period of time.

In the absence of excavation, it is extremely difficult to determine which artifacts are from the same component. Fortunately, the large assemblage provides a context of sorts for the interpretation of the items in it. The presence of hundreds of Table Rock points and very few of any other type implies that

other items occurring in large numbers are apt to be derived from the Table Rock component. This is true for most of the bifaces, scrapers, axes, and drills in the collections examined. Relatively rare items are harder to assign, as they simply could be rare in the Table Rock assemblage or relatively common within one of the other small components at the site.

This assemblage, then, provides the first opportunity to describe the kinds of artifacts associated with Table Rock points. They include bifaces, knives, drills, scrapers, and axes. They comprise what this author calls the Douglass complex. Together they provide insights into the age of Table Rock points and the nature of the occupation that formed the site.

Points (Figure 3)

The points in this assemblage start with rather long and fairly narrow blades. The greatest width is at or slightly above the shoulders. Severe breakage of the upper blade early in the use cycle could produce a repaired blade that is fairly triangular. Maintenance was never unifacial, and alternately beveled and serrated edges are not present. Some points have a plano-convex cross section, which also can be seen

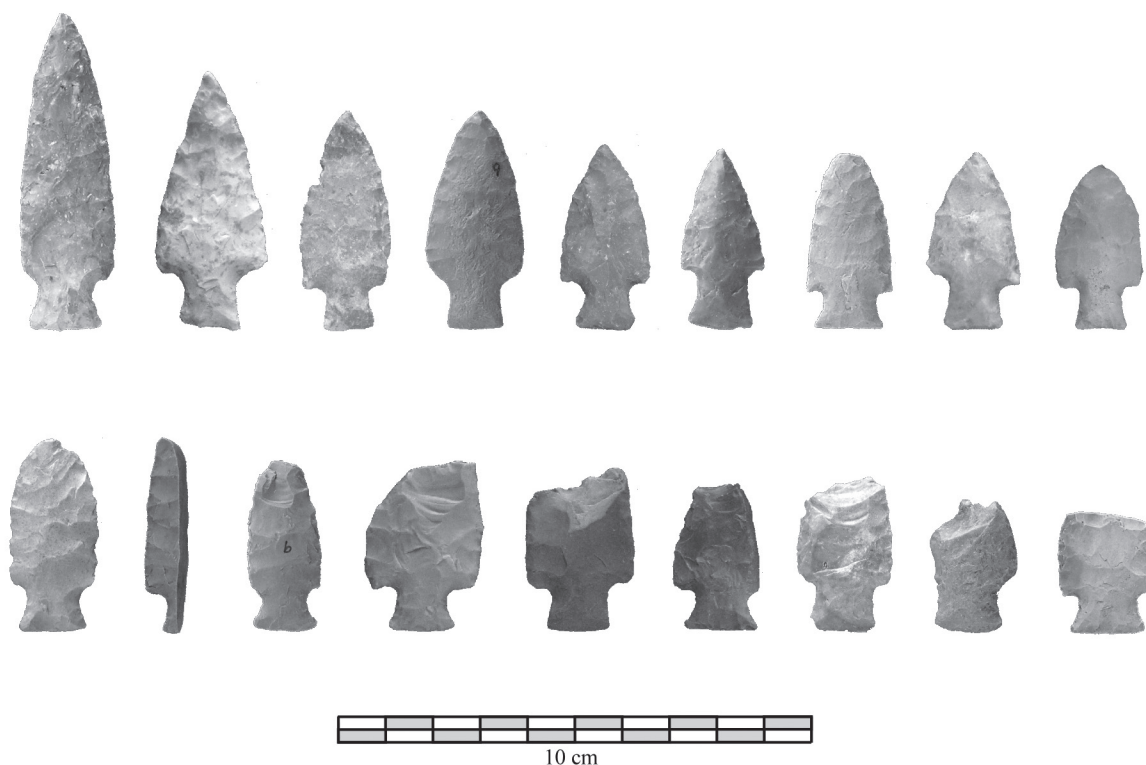


Figure 3. Table Rock points. Specimens in the lower row exhibit impact fractures.

in early stage bifaces, but the flat side almost always has been flaked. Only one point in the assemblage was made by trimming the edges of a thin flake; all the rest were produced by bifacial reduction.

A few specimens have very small barbs at the shoulders. This pattern contradicts Bray's original description, but his small sample was limited to only four fairly complete points. A single repair episode in which flaking was carried down to the shoulders would have been sufficient to remove the barbs.

Most stems expand somewhat from their minimum width to the base, but breakage occasionally yielded specimens that are fairly parallel sided. Shoulders are usually an extension of the graceful curve that forms the sides of the stem, but reworking or occasional poor original flaking produced some examples that change direction a bit more sharply. Bases vary from slightly convex to straight. The occasional slightly concave base appears to reflect breakage and repair.

In this large assemblage several patterns of variance can be discerned (Figure 4). One is flaking patterns on the blades. Some of the points exhibit fine pressure flaking, while a larger number are more

crudely flaked. The latter include points that clearly were broken and reworked, and the flake scars from reworking sometimes cover the whole surface of the blade. The proportion of reworked specimens is very high in this base camp as opposed to that among points collected as isolates in upland situations. In the latter case a larger number of relatively pristine specimens apparently were lost during hunting. Also present are some large, relatively crudely flaked knives. They have been separated from the points, based on details of their stem morphology.

There can be no doubt that the majority of the specimens were made to be used as projectile points. Impact fractures are very common. In addition to flakes driven from the tip, some bases suffered breakage. When repaired, attrition at the very base yielded a point with a short stem, while damage up one or both sides resulted in a narrow and asymmetrical stem.

Regular maintenance of points resulted in shortening of the blades. The tip of a chipped stone point was apt to break with every use, but in cases where the breakage was minimal, the remaining tip was re-sharpened bifacially. This maintenance accounts

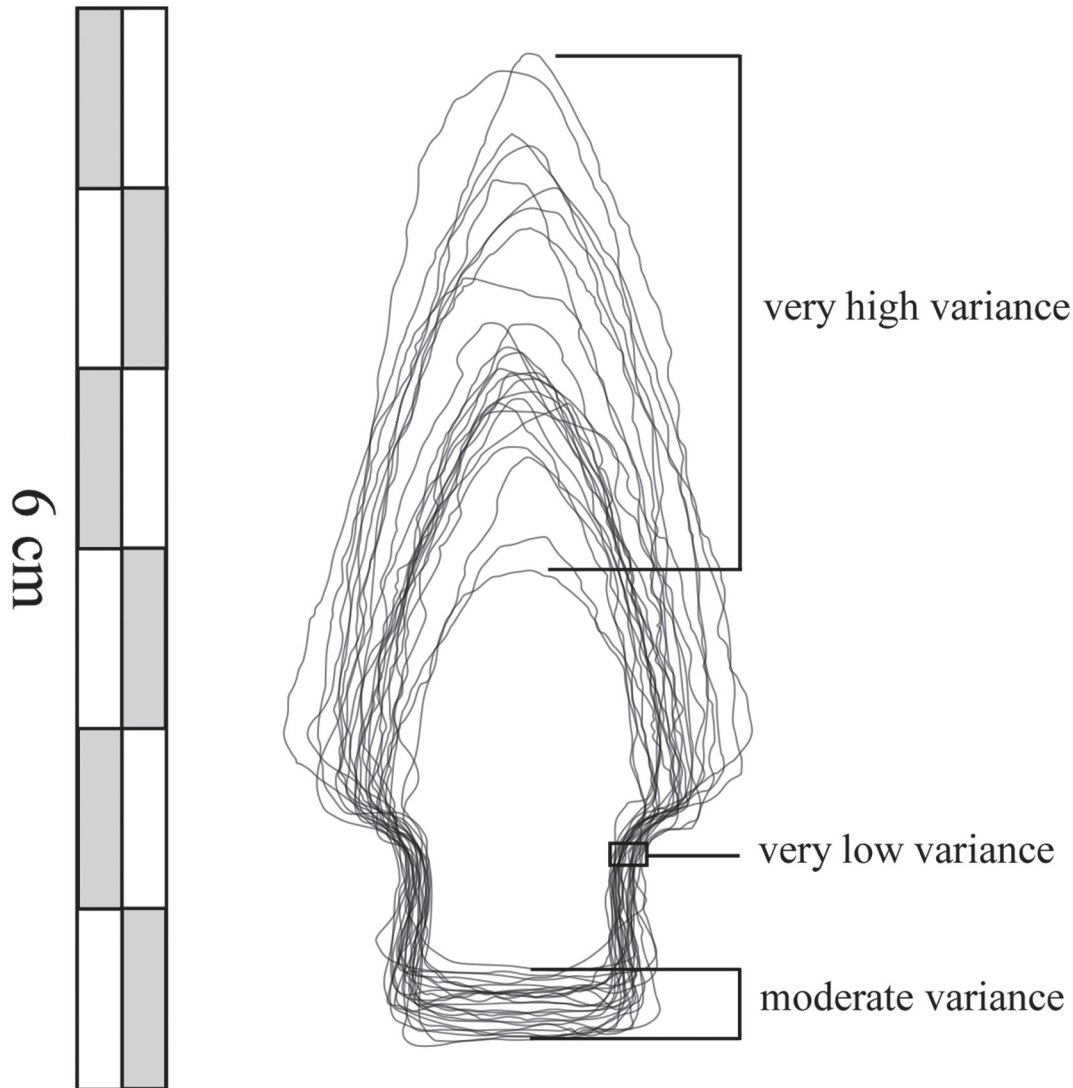


Figure 4. Stacked outlines of Table Rock points from 14BU404 showing the reduction of blade and stem resulting from point maintenance and the consistency in stem width.

for most of the variance within the type. There also appears to have been some repair of broken stems, which resulted in shortening and perhaps some narrowing of the stems. The same process may explain the rather low number of ground stems and bases in the collection.

Overall the proportion of points that exhibit purposeful heat treatment is far less than is true for Table Rock points in Iowa and Illinois. Some of the difference can be attributed to the fact that the pure gray Permian cherts do not change color when heated. Furthermore, some varieties of Florence B are quite glossy in their unaltered states, making

detection of heat treatment difficult. In addition, Florence B chert that is tan to yellow in color and would be expected to become reddish during heat treatment hardly ever shows such evidence, regardless of the age of the assemblage in which it occurs.

Bifaces (Figure 5)

The collections of bifaces from the site are not an accurate reflection of the original assemblage. Neither of the men who allowed me to analyze their collections picks up very early stage bifaces, with the result that there is only one such specimen in the

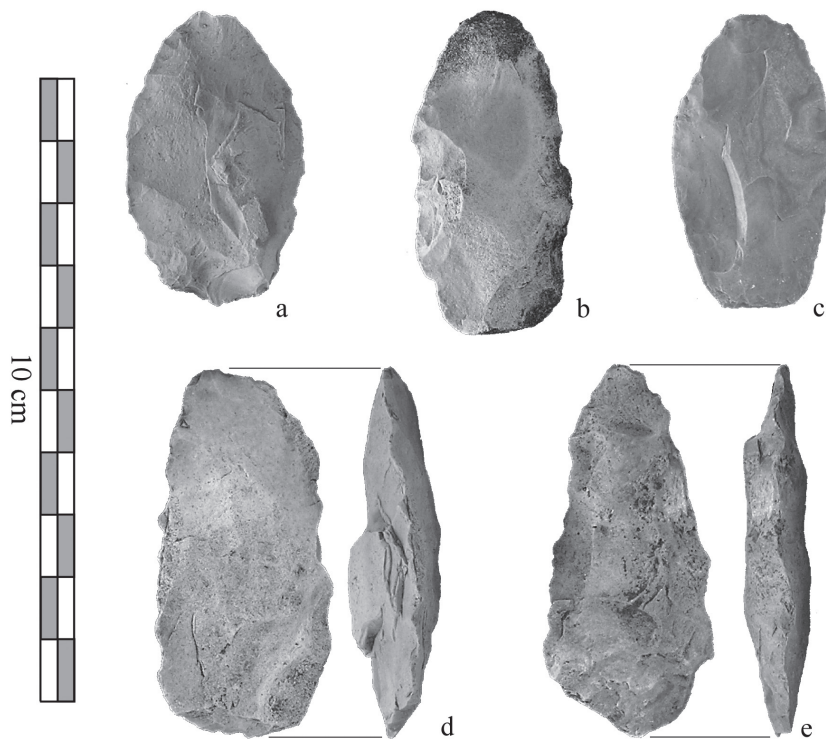


Figure 5. Bifaces from the Douglass component.

collection. In addition, Collector C collects broken bifaces far more often than Collector E. Even so, it is possible to outline the biface reduction process that generated Table Rock points and knives and to separate the bulk of non-Table Rock bifaces from those that belong to the primary component. There is a definite uniformity to the vast majority of bifaces, while a small number differ significantly from the larger set. There are 210 specimens that appear to be rejects from the reduction process that led to Table Rock points, while only 13 bifaces appear to be from other components. Most of the bifaces from the Table Rock component were abandoned either because they broke or because of other failures in the reduction process. They are bifaces that were never going to yield a thin point of adequate size (Figure 5d and e).

Knives (Figures 6 and 7)

The assemblage includes two types of knives that have stems similar to Table Rock points. Ten of the Table Rock points have been reflaked bifacially to produce rounded tips (Figure 6). This may have happened after the points broke during impact, but only one specimen retains portions of the impact

fracture scar. These round-tipped knives have stem proportions that fall entirely within the range of other Table Rock points.

The same is not true of specimens that were made to be used as knives (Figure 7). They have the same general outline as the Table Rock points but are larger, and their stem proportions differ from the rest. This is most readily seen in scattergrams that depict stem length versus width (Figure 20). Independent of stem grinding, the complete haft elements of the Table Rock points in the assemblage fall into two distinct but slightly overlapping distributions: a large number of relatively small specimens and a smaller set of specimens with somewhat wider and often much longer stems. Most of the larger specimens appear to have been made for use as knives; they lack the frequent impact fractures seen among the smaller specimens. The proposed name for this tool type is Eightmile knife.

Axes (Figure 8)

There are 15 chipped stone axes in the assemblage. Most are large with lateral notches formed by battering. A variety of stone types are represented, but most are made from a poorly silicified and rather

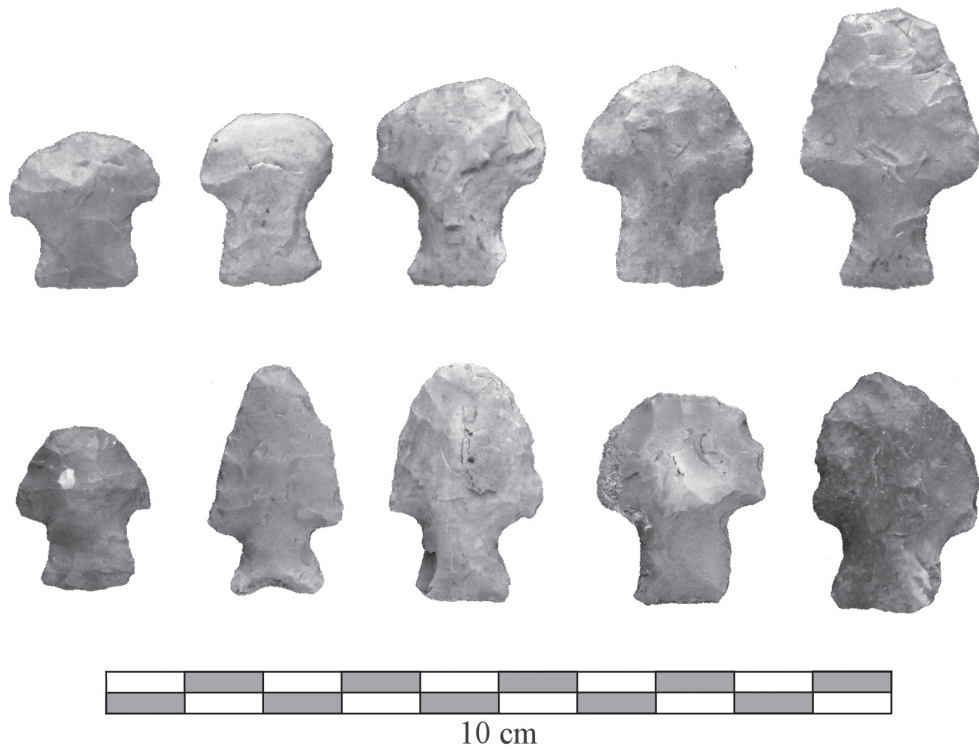


Figure 6. Round-tipped knives.

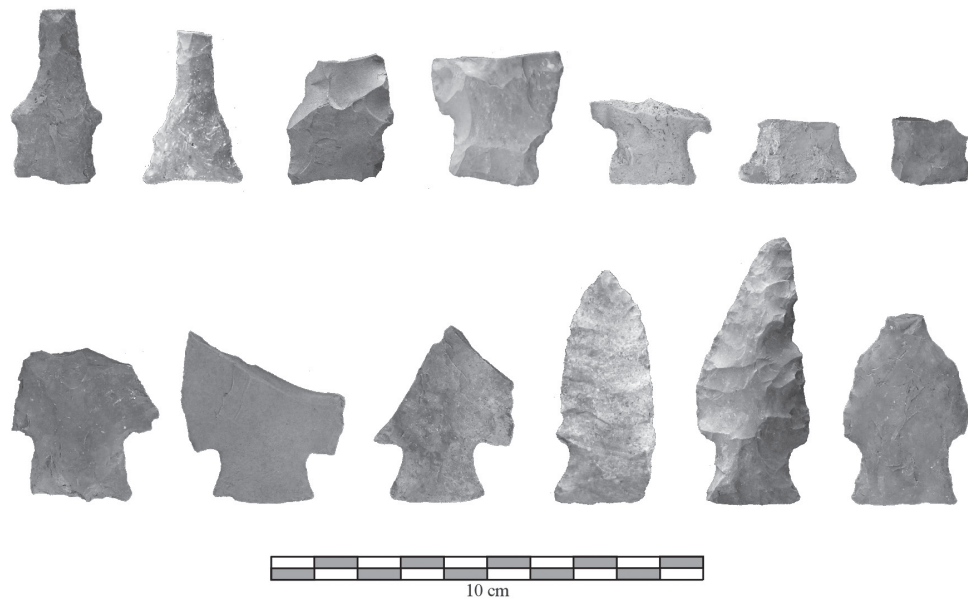


Figure 7. Eightmile knives.

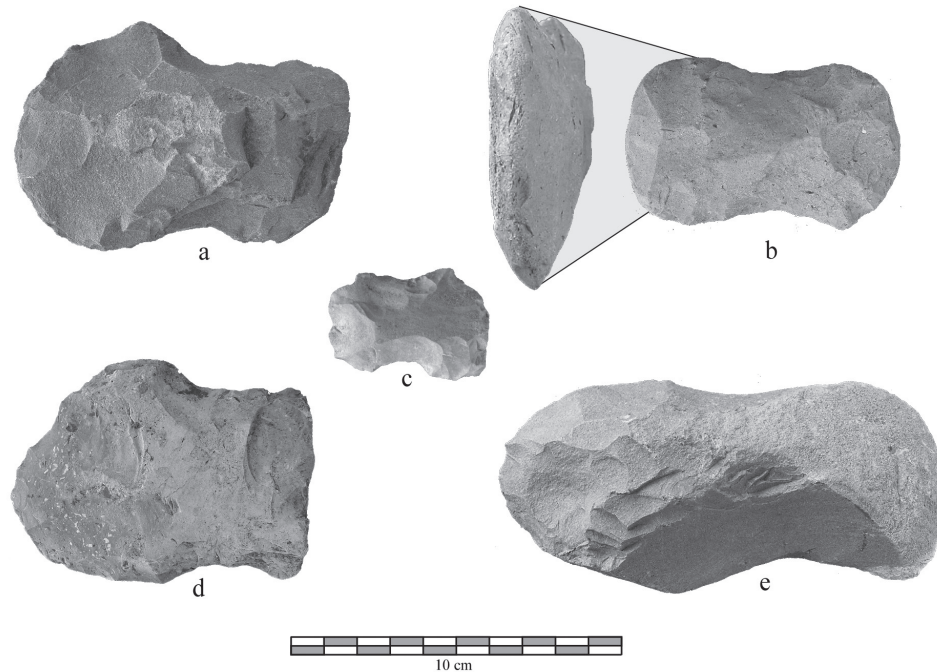


Figure 8. Axes from 14BU404. Specimen b has a bluntly ground bit. Specimen c is a miniature.

Table 2. Comparison of Two Chipped Stone Axes with Small Bits.

Site	Material	Length	Width	Notch width	Thickness
14BU404	chalky gray chert	81.8	50.2	41.2	18.2
14CS16	chalky brown chert	83.8	49.1	44.7	23

soft granular gray chert. Some of the polls are flat and exhibit either cortex or a natural facet in the stone. Lengths of the blade in front of the notches vary considerably, probably reflecting differing amounts of use and resharpening.

With two exceptions, discussed below, the axes range in length from 67 to 124 mm and measure from 38 to 68 mm across the notches. They vary from 18 to 53 mm in maximum thickness. Most show some blunting of the bit from use, and some of the polls exhibit evidence of pounding.

Two specimens stand out from the rest. One has ground facets on the bit that extend onto the forward part of the sides of the tool (Figure 8b). The facets meet at a blunt angle; hence, they do not reflect purposeful sharpening of the blade. Their purpose is obscure. A very similar specimen was found on the

surface of a site in Chase County (14CS16). It also is made from a very chalky, barely silicified chert, but it is brown rather than gray. The bit was ground, producing a flat facet across the bit and down the front portion of each side. While this specimen does not have the two facets seen on the 14BU404 specimen, the angle of the single facet changes fairly abruptly twice as it extends across the highly convex bit. Table 2 reports the dimensions of the two axes, demonstrating how remarkably similar they are.

The collection from 14CS16 does not have any Table Rock points, but two broken preforms and two small scrapers are quite similar to those from 14BU404. Some of the 14CS16 points resemble the Munkers Creek type, but other components are also present. Thus, the specimen from 14BU404 could come from the Table Rock component or from a

smaller Munkers Creek component, reflected in both the points and knife.

The other unusual specimen is a miniature axe (Figure 8c). It is only 48 mm long with a width of 25.5 mm across the notches and a maximum thickness of 14 mm. In form it is like the rest of the assemblage. The notches are clearly defined, and part of the poll consists of a blunt surface. It is far too light to have functioned as an axe head, however.

Scrapers (Figure 9)

Scrapers are plentiful in the site and are far more varied in shape than the points, bifaces, drills, and axes. At the same time the overall sizes of most scrapers are distinctive. The vast majority are quite small (mean length and width are 25.6 and 20.3 mm, respectively). There are some larger specimens, and most are probably from other components. One clear example of a Middle Woodland scraper and

some possible later specimens comprise a small minority.

No uniformity is evident in the shapes of the small scrapers. Many expand in width toward the bit, but some are parallel sided, and a few are oval to circular. Most have the bit on the distal end of the flake and are worked unifacially on the dorsal surface. Others are atypical in one or more ways. A few are double-bitted (Figure 9k), while others are reversed from the normal pattern with the bit at the proximal end of the flake and flaking on the ventral face. Figure 9j has the bit on the proximal end of the dorsal surface. Still others were made from a variety of flake fragments rather than whole flakes, including a small group that are oriented transversely on fragments from the distal ends of large flakes. One specimen has a distally oriented ear or barb on one side and a break on the other side where a similar barb may have been (Figure 9f). However, this tool is not bifacially flaked and clearly was not made from a broken point.

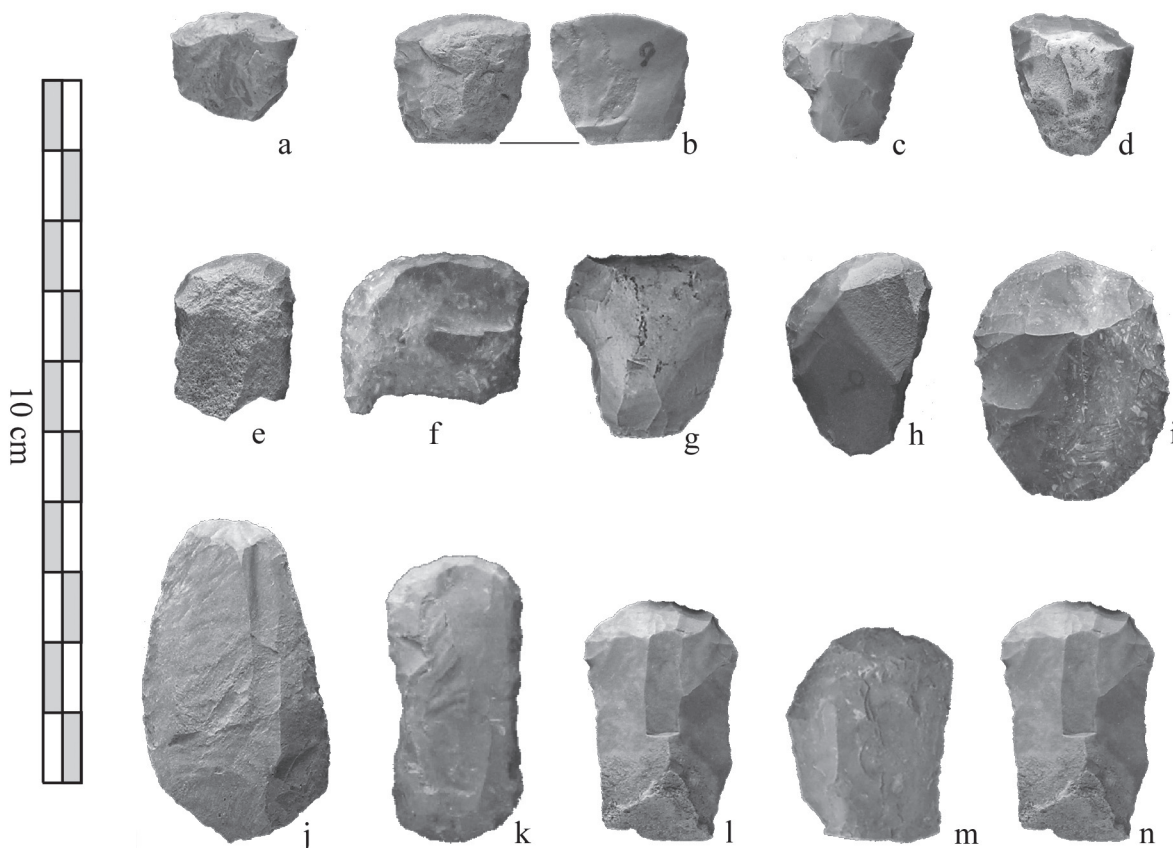


Figure 9. Douglass complex scrapers.

Bits vary both in shape and orientation. Curvatures range from straight (Figure 9g) to highly convex (Figure 9l-n). Most are oriented normally to the long axis of the specimen, but others (Figure 9h) are set at an oblique angle. Bits are normally near the thickest part of the tool, but this is not always the case, and thicknesses are variable (2–11.5 mm; mean 5.7 mm).

The proximal ends of these tools are even more variable in both shape and thickness. Some are pointed; others are round or flat. In spite of the fact that many are quite thin, scrapers seldom exhibit snap fractures. This fact, along with the variable poll shape and the lack of any haft wear, indicates that they were hand-held rather than hafted.

In fact, many of the specimens exhibit evidence of being used while held in a variety of positions. Wear, when macroscopically detectable, consists of light crushing or nibbling, rounding, or a combination of nibbling and rounding. Wear sometimes extends down one or both lateral edges and even onto the proximal ends in a few cases. Some lateral edges are coarsely trimmed on the ventral surface (Figure 9b). Other specimens have slightly to markedly concave sides and were probably used as spokeshaves (Figure 9g, k, and n). Wear from use on stone is also present but quite rare.

A large proportion of the small scrapers exhibit patches of cortex on their dorsal surfaces, indicating that they were flaked from pebbles. However, the size of the scrapers is far smaller than those of other time periods made from the same local cherts. They lack the thickness of many Late Archaic to Middle Woodland scrapers and the length of the Middle Ceramic scrapers in the region. And, as mentioned above, they also lack the haft wear seen on the often small protohistoric end scrapers from this portion of the Plains. The intent of the makers was to create small scrapers, even though small size meant that the tools would have a shorter use life than a larger specimen and that far less pressure could be applied to the objects being scraped.

Drills (Figures 10 and 11)

There are 45 drills in the two collections. There is a good deal of variety in basal attributes but some uniformity in bit diameters (Figure 10). Drill forms that appear to derive from the Douglass complex

are labeled a,b,d, and e in Figure 11. Those in set “a” include three drills made from Eightmile knives and two that were made from Table Rock points. The four specimens in set 10b have bases similar to, but smaller than, the average on Table Rock points, while the specimens in 10e have even smaller stems with concave sides. With the exception of the drills made from Eightmile knives, all of the specimens discussed so far have quite narrow bit diameters. The same is true for the majority of the broken bits, shown in Figure 11d. Therefore, it is likely that the bulk of them (all except the three on the right) also derive from the Douglass component. Note that the right-hand specimen in 11b has an unfinished bit; it could be considered a drill preform.

The contracting stem drills shown in 10c and the eight expanded base drills in 10f with the widest bits (all but the left-most three) cannot be assigned to the Douglass component. A few of the expanded base drills have bits that are even wider than those on the reworked Eightmile knives, and they probably derive from other components. Expanded base drills are fairly common in Kansas prehistory and could derive from Late Archaic through Woodland occupations. However, those with fairly narrow bits cannot be excluded from the Douglass component.

Artifacts from Other Components

Diagnostic points that do not belong with the Table Rock component (Figure 12) vary in age from Early Archaic (Graham Cave, Big Sandy, Logan Creek), through Middle Archaic (Calf Creek, Jakie), Late Archaic (Raddatz, Walnut Valley) to Early, Middle, and Late Woodland (Dickson, Fairland, Snyders, Scallorn). As mentioned above, the Late Woodland material may have washed onto the site from a recently constructed earthen berm. Interestingly, many of the points other than Table Rocks cannot be assigned to named types (Figure 13), even though most of them are complete enough for typing. This contrasts in this author’s experience with points from other surface collections in which very few unidentifiable points occur. The unidentified points at 14BU404 may derive from a time period that seldom yields surface collections in this part of the Plains.

Also present are a few bifaces that do not fit the Table Rock pattern. Their outlines are shown in

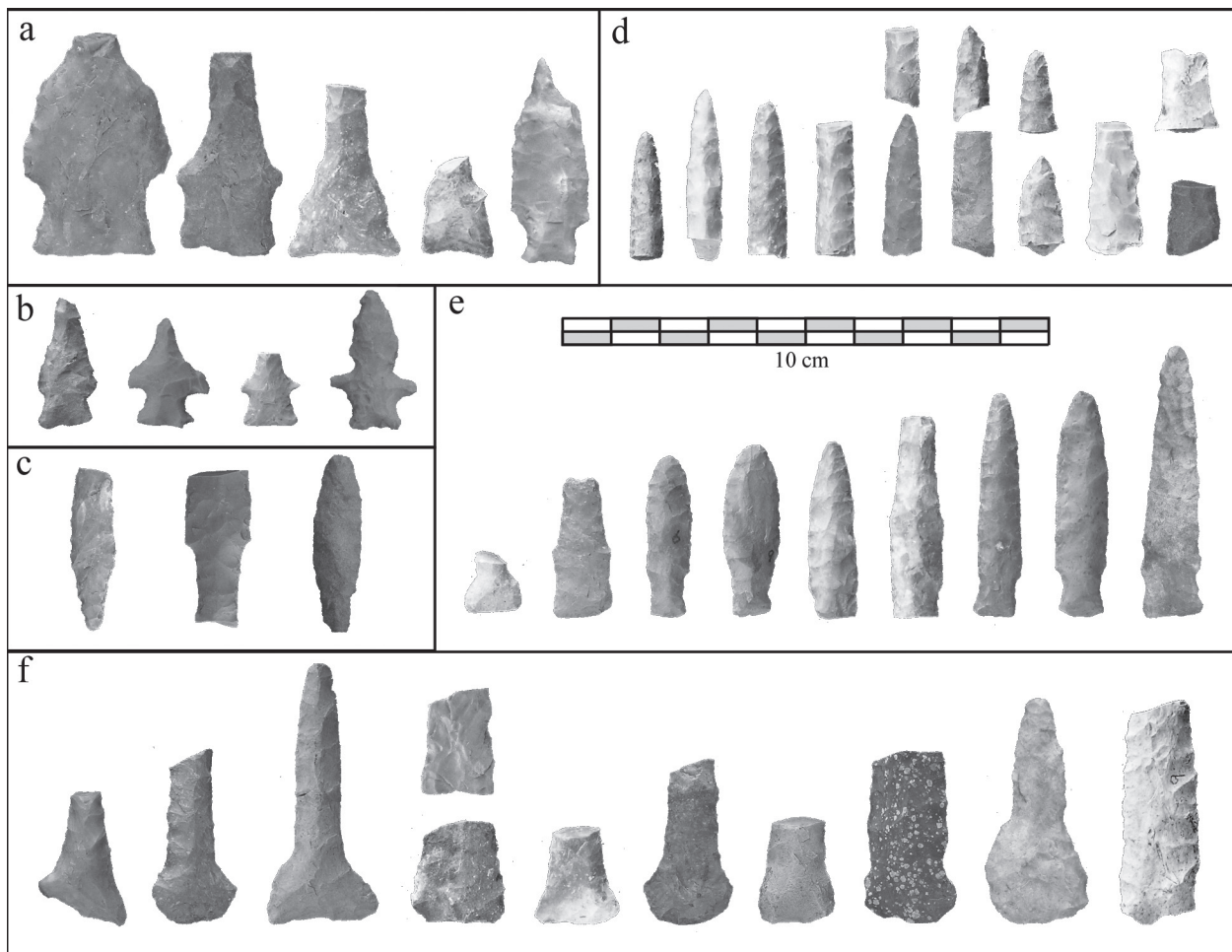


Figure 10. Drills from 14BU404. All except those with the widest bits in set f and possibly the three in set c are from the Douglass complex.

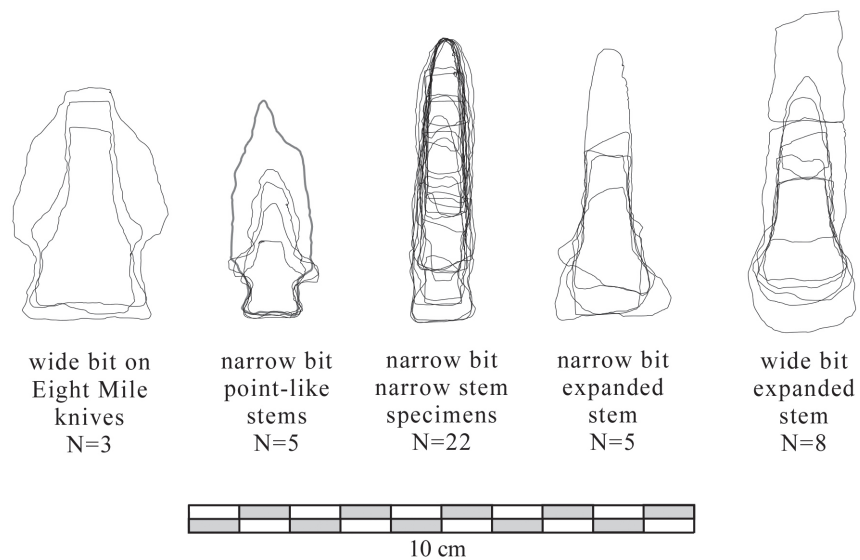


Figure 11. Drill bit varieties.

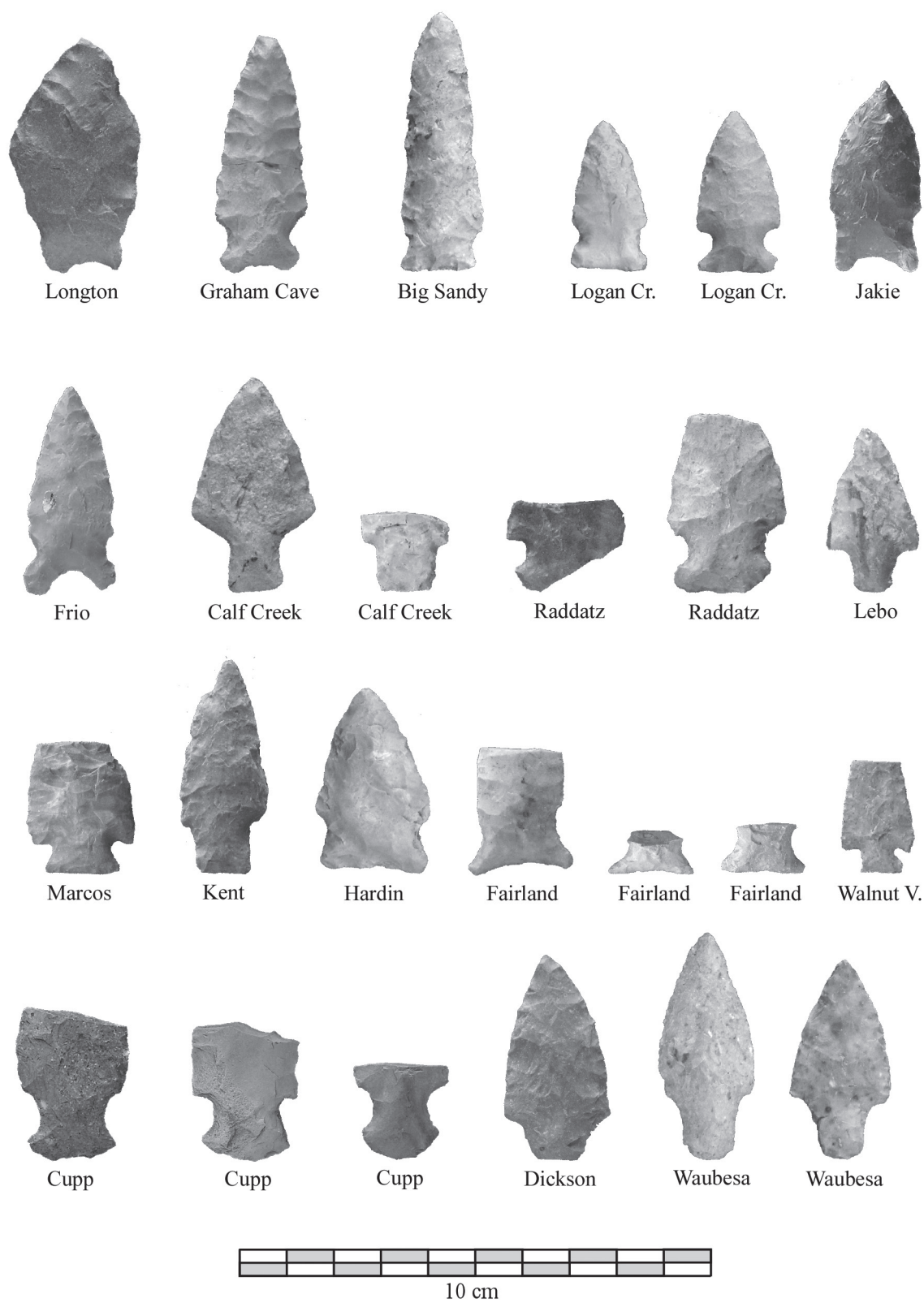


Figure 12. Identifiable points other than Table Rock.

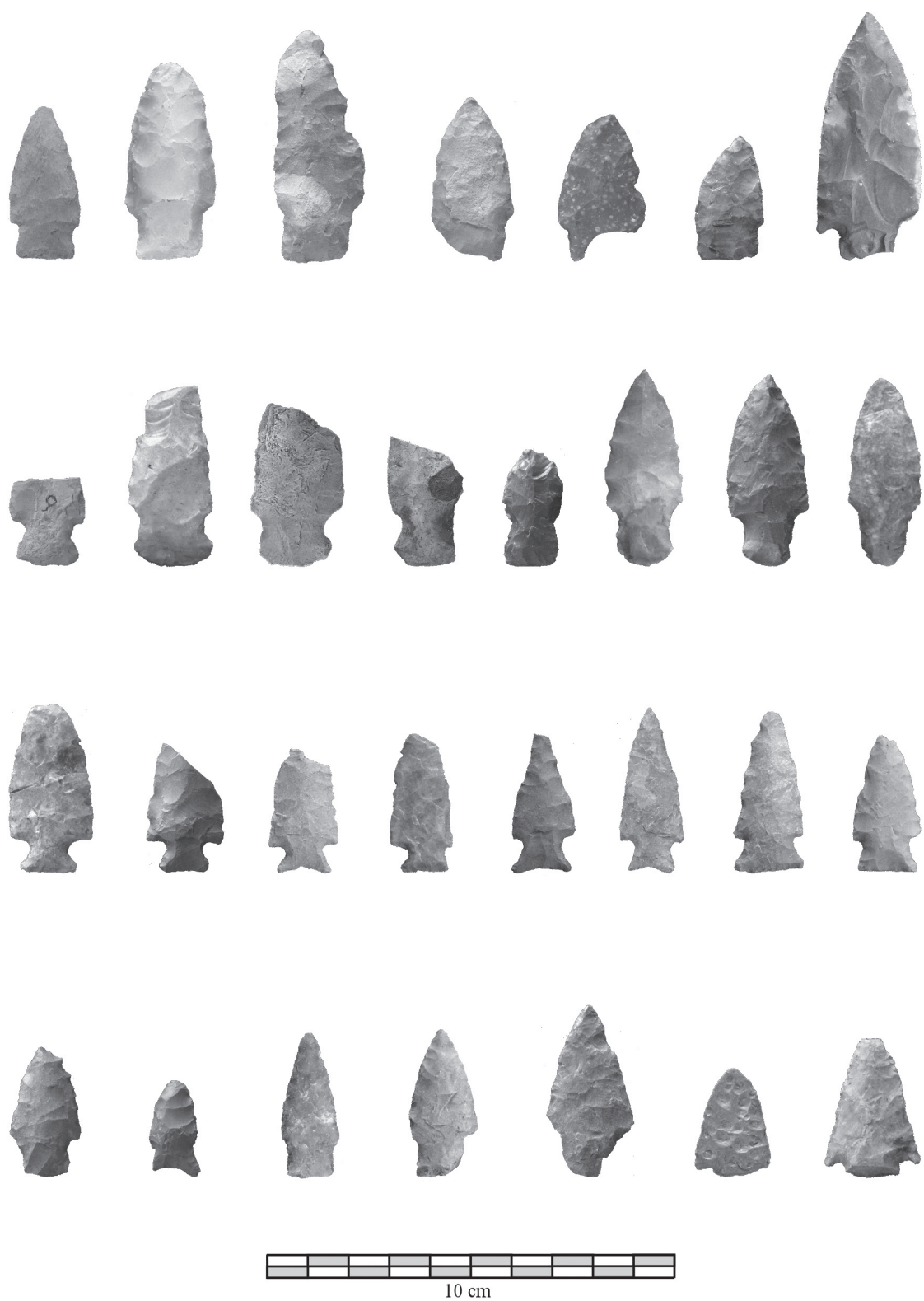


Figure 13. Unidentified points from 14BU404.

Figure 14. Other tools that occur in low frequencies are gravers (Figure 15a and b), awls (Figure 15c and d), a burin on a point base (Figure 15e), and expanded base drills (Figure 15f–k). The awls are both on thin, curved flakes, and they taper to thin, sharp points. They are far too thin to have served effectively as either gravers or drills. More robust stone awls are

common after A.D. 1100 in many complexes on the Southern Plains, but these two appear to be different from the later ones. Unfortunately, the type of point on which the burin was made cannot be identified; however, judging from the triangular blade with straight edges, it is not a Table Rock point. Expanded base drills are common in Late Archaic

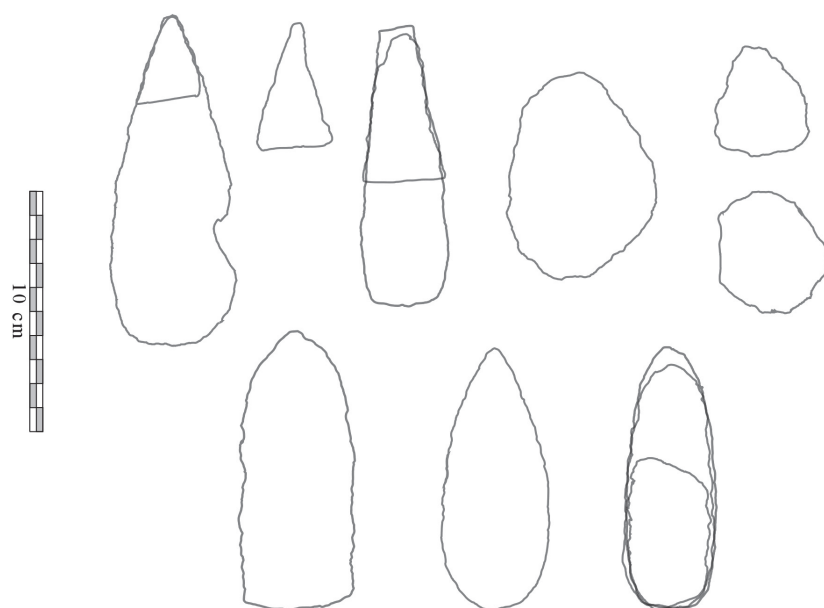


Figure 14. Outlines of all non-Douglas complex bifaces.

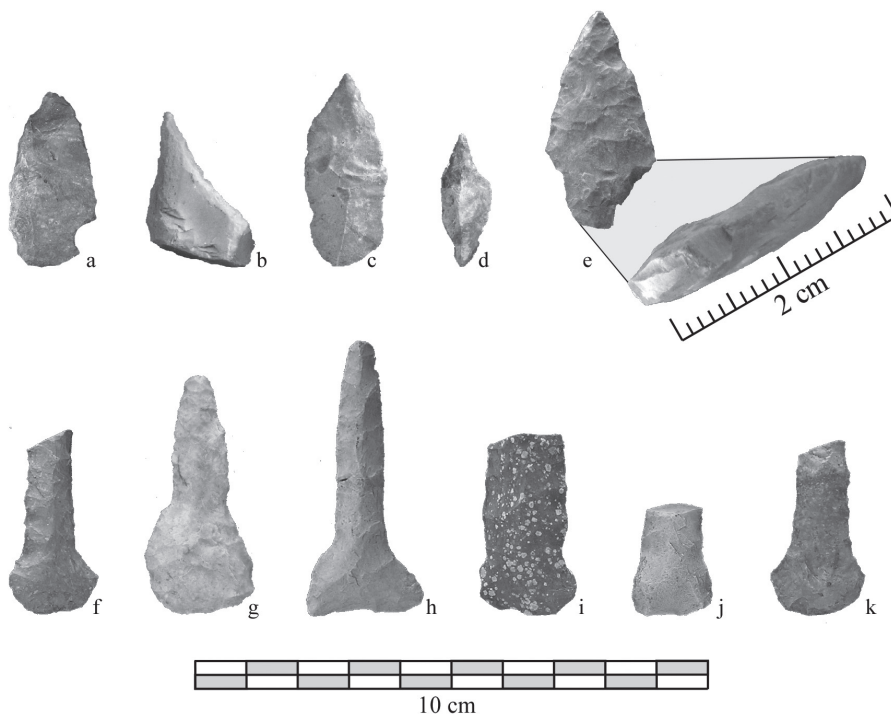


Figure 15. Other non-Douglas complex tools.

and Woodland assemblages. The six widest bits in this set are wider than those on any of the drills that can be assigned to the Douglass complex.

Flake tools in the assemblage (not illustrated) include 15 flake knives, all but 2 of which are from collection C. They vary in size, shape, and number of worked edges. As Collector E seldom picked up worked flakes and there is no way to tell what proportion of them Collector C kept, the number of flake tools in the two collections is not apt to reflect their actual frequency among artifacts on the surface.

Only 11 pieces of ground stone are recognized in the assemblage. Two are quartzite pebbles that were used as hammerstones. Another is a chert pebble from a lag gravel deposit that was used as a pecking hammer. Also present are one small quartz crystal and a small, fairly flat pebble of white quartzite. It is not native to the site but bears no obvious signs of use-wear.

A milling stone was made from a thick unshaped slab of highly fossiliferous limestone. It measures 170 mm long and 120 mm wide with a shallow milling basin that covers one face. The remaining five specimens are handstones. No two of these specimens are much alike in terms of overall shape and form of the working surfaces. One of brown sandstone is irregular in outline and has been used but not purposely shaped. It exhibits slightly convex wear patches on high spots on both faces. Another odd specimen is of a silty limestone, made from a split cobble, with a slightly convex broken surface. Most of the accumulated wear is in the form of polish at opposite ends of the specimen, which is rectangular with rounded ends. Another unshaped specimen is of highly fossiliferous limestone. It has one dome-shaped worked surface, but the opposite face has a cylindrically convex working surface of the sort seen on specimens used with a back-and-forth motion. The domed face could have been used with the milling basin from the site, but the opposite face could not. Another specimen of the same fossiliferous limestone, oval in outline, has a single domed working face. The last specimen, of brown sandstone, is rectanguloid with one markedly convex long side. Both faces exhibit grinding surfaces that are convex along the long axis of the tool (133 mm) and straight across the short axis (71 mm).

In summary, no two of the grinding stones are

much alike. Those with dome-shaped working surfaces might have been used as hide-graining stones or with milling basins of the form seen in the single example from 14BU404. Under these circumstances, none can be assigned to either the Douglass component or to any other of the site components. They show the need for a comparative study of grinding stones from the region.

ACTIVITIES REFLECTED IN THE DOUGLASS COMPONENT

Although a large number of artifacts can be assigned confidently to the Table Rock component, they reflect a limited number of activities. One is the production of Table Rock points. Of the 228 bifaces from the site, 213 reflect the single reduction sequence illustrated in Figure 16, which arranges the complete bifaces and large biface fragments into a sequence from left to right, with early stage bifaces on the left and point preforms on the right. The subdivisions from left to right in each row are arbitrary, as various bifaces were abandoned more or less at random, either because they broke or because it became evident that the knapper would not be able to thin the pieces successfully (compare Figure 5d and e). The complete bifaces are in the middle row with the tips in the top row and the bases in the bottom row. The numbers of specimens in each stack are indicated.

The single specimen at the far right is a special case. It appears to be a successfully thinned preform suitable for finishing as a point. Instead, the flintknapper removed three or four large flakes from each edge, turning the biface over to access the second edge. The flaking, unlike any other in the Douglass complex assemblage, suggests that the final series of blows that spoiled the preform were done in a fit of anger.

No purposeful heat treatment is visible in the biface assemblage, most of which is the local Florence B chert. With the exception of the broken stems discussed below, the finished points of Florence B also were not heat treated. This seems to be an adaptation to the material available locally, as most of the Table Rock points of Florence A chert, which responds very well to heat treatment, show clear evidence of heating.

Another set of activities centered on the maintenance and replacement of broken points. The most

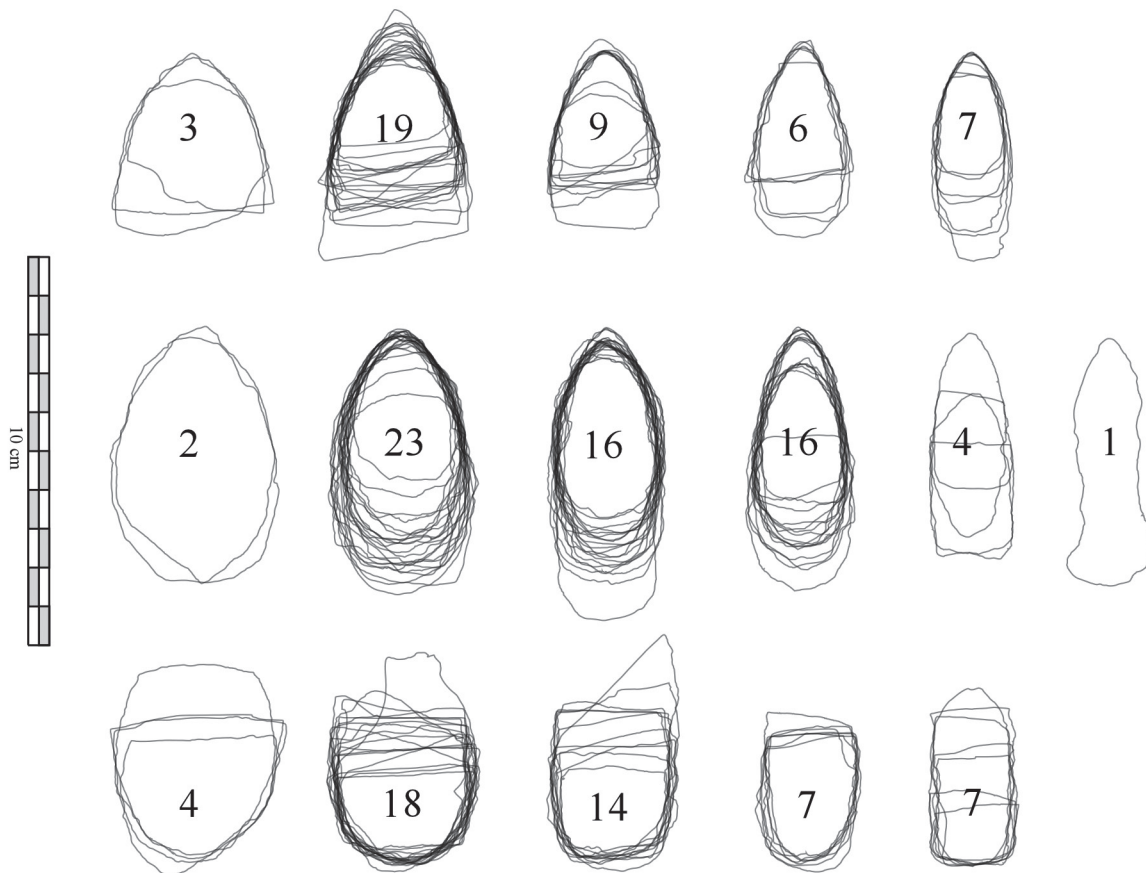


Figure 16. The biface reduction sequence at 14BU404.

common form of breakage, after minor tip damage that cannot be seen readily in the surface-collected material, is a break across the narrow part of the stem. This shows up as a dark band in the left-hand stack of outlines in Figure 17. As that figure indicates, the 14BU404 collections include 189 specimens on which the bases are essentially intact, but the blades are either missing or badly broken. At the site the broken points usually were removed from the foreshafts and replaced with new points. That process must have involved heating pieces over a fire, as a large proportion of the broken bases exhibit uncontrolled exposure to heat, often on one face only, as if they had fallen into a fire. The damage takes the form of potlid fractures and discoloration of the stone.

Another 20 points had severe fractures of both blades and stems. These were removed from the foreshafts and presumably replaced with new points. Only 23 blades were returned to the site

essentially intact. Of these 18 retain the uppermost portions of the stems. Likely the material that bound them to the foreshafts extended beyond the breaks, so they were still attached to the foreshafts, albeit loosely. Five specimens differ from the rest in that the remaining portions of the stems were removed, and the bases of the blades were straightened with unifacial beveled flaking. These specimens do not show any macroscopic traces of wear on the beveled ends, although they conceivably could have been used as lightweight chisels.

Another possibility is shown in Figure 18. The smaller Table Rock points fit readily into the large intact blades that were returned to the site. Some of the blades might have been refashioned into new points, and the first step in that process was unifacial flaking to remove the flat broken edges at the blade-stem junctions. The new stems do not appear to have been ground at the same rate as the original stems. Evidence for this is discussed below.

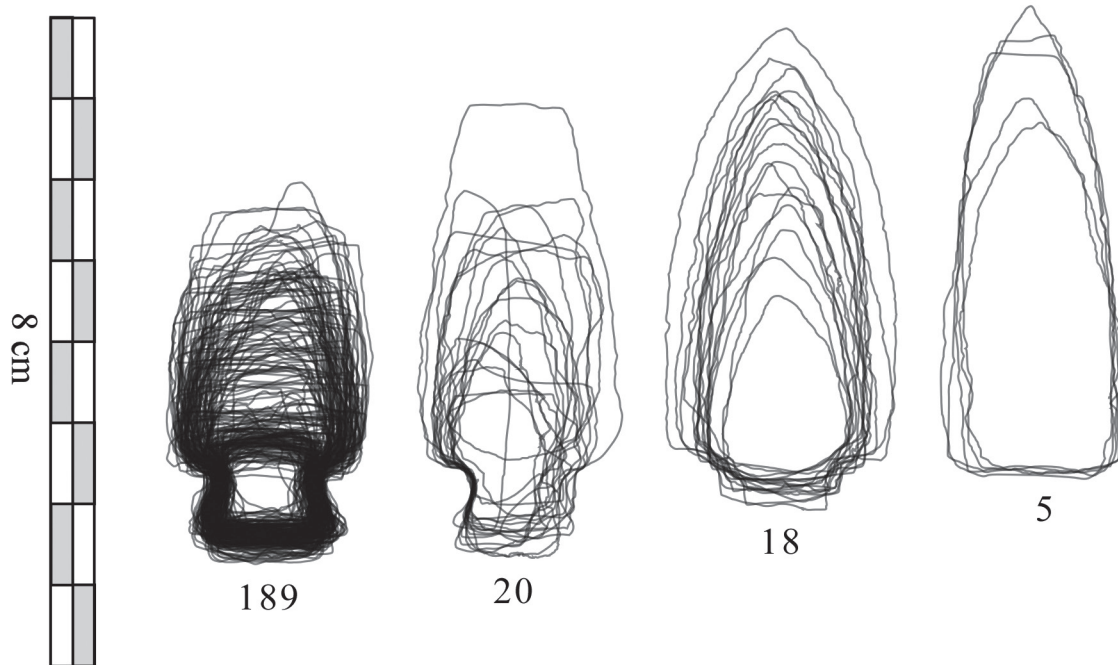


Figure 17. Broken points returned to base camp.

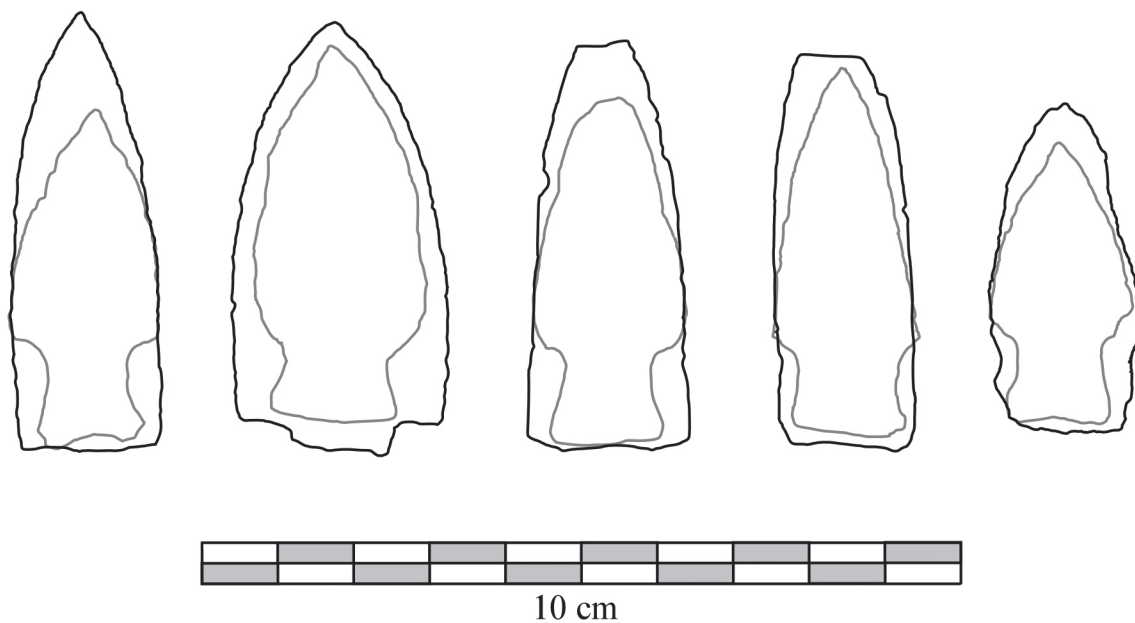


Figure 18. Possible recycling of blades to points.

Some other points appear to have been returned to the site with minor breakage on the stem bases. Such breakage might have loosened the seating of the point in the foreshaft, requiring repair and rehafting. Repair of a stem with minor breakage would have shortened it and sometimes narrowed it, creating the pattern of variance in the stem shape seen in Figure 4.

A distinct pattern in the distribution of stem and base grinding may reflect these trajectories of maintenance. Whole Table Rock points and those missing only the tip exhibit grinding in just over a third of the cases. Of the specimens that consist only of the stem, however, nearly twice as many are ground. The exact numbers are shown in Table 3. Clearly, a very large proportion of the original points (perhaps 100 percent) were ground on the sides and stem base. When a point broke, stem-only sections were discarded, usually at the site because the shafts or foreshafts were returned for reuse. This is the set with the relatively high proportion of grinding, even though some of the stems already had been through one or more of the refurbishing sequences just described. A small proportion of the replacement stems were ground (perhaps zero percent), even though the original stems were.

Another way of checking this account is to compare the presence or absence of stem grinding against stem dimensions. If unground stems are replacements for the originals, either through repair of a slightly broken stem or through flaking a new stem from the lower end of what had been a point blade, one would expect the ground and unground stems to differ in overall size, with the ground stems larger than the unground specimens. Given that the stems were intended for use in foreshafts, the differences should not be large, and the differences might be on the fringes of the distribution with a large area of overlap.

This is precisely what is seen in the measurements, which is complicated by the presence of

both points and Eightmile knives with similar bases. The first pattern noticeable in Figure 20 is the very small overlap in size and shape among the stems of points and knives. In part this is guesswork, as some of the specimens typed as points have wide stems and might have been used as knives. What is relevant to the discussion at hand is the tendency for both the narrowest point stems and the shortest point stems to lack grinding. Only 2 of the 16 narrowest point stems are ground, and only another 2 of the 24 shortest stems are ground. This pattern is explained if grinding were not part of the process used to make new (smaller) stems from intact point blades or in the process of repairing point stems with minor damage or both. If this account is correct, it suggests that stem grinding had more significance than merely reducing the rate at which stems broke when in use. If it were entirely utilitarian, one would expect that replacement stems would be as carefully ground as the originals, if not more so.

Another pattern among the complete Table Rock points and point fragments is that a higher proportion of the stem fragments were exposed to heat (37 percent) than is true for blades and complete points (21 percent). Some stems are extensively pitted or show ragged breaks from heat-induced decrepitation. Others simply are discolored on one surface only. That is, many were clearly exposed to heat in an uncontrolled, apparently accidental fashion. Given the low frequency of purposeful heat treatment in the assemblage of bifaces and complete points, the frequency of such damage is striking. The proportions suggest that work on broken points often took place immediately adjacent to fires. It may be that heat was required to soften the glue used to hold points in the foreshafts.

Still another form of recycling is evident in the stacked outlines. The 10 round-tipped knives in the collections fit readily within the outlines of broken points with intact stems but badly broken blades. In Figure 19 the left-hand stack of outlines is of specimens with broken blades and intact stems, while the central stack consists of the outlines of all round-tipped knives. The right hand stack superimposes the knives on the broken specimens to show that it is likely that all the knives were made from this variety of broken point. The numbers of each kind of specimen make it clear that only a minority (18.5 percent) of such broken points were refashioned

Table 3. Frequencies of Ground Stems.

	% ground base	% ground stem edges	N
Stem only	71.7	69.6	92
Complete points	36.4	37.7	151

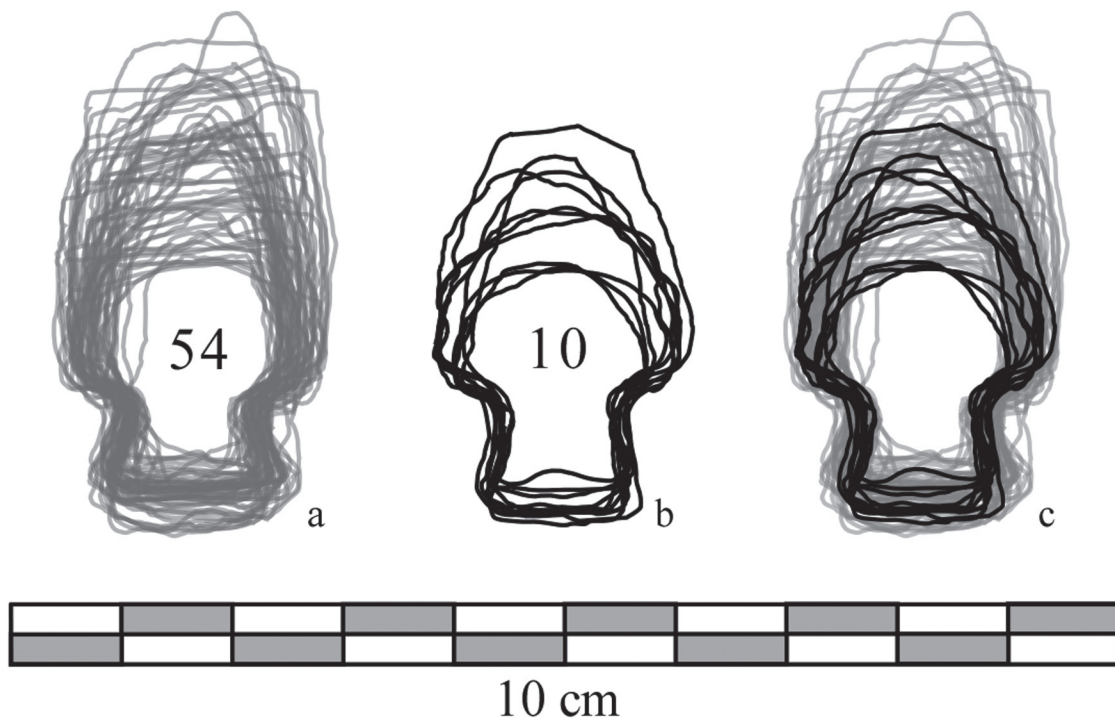


Figure 19. Recycling broken points into round-tipped knives.

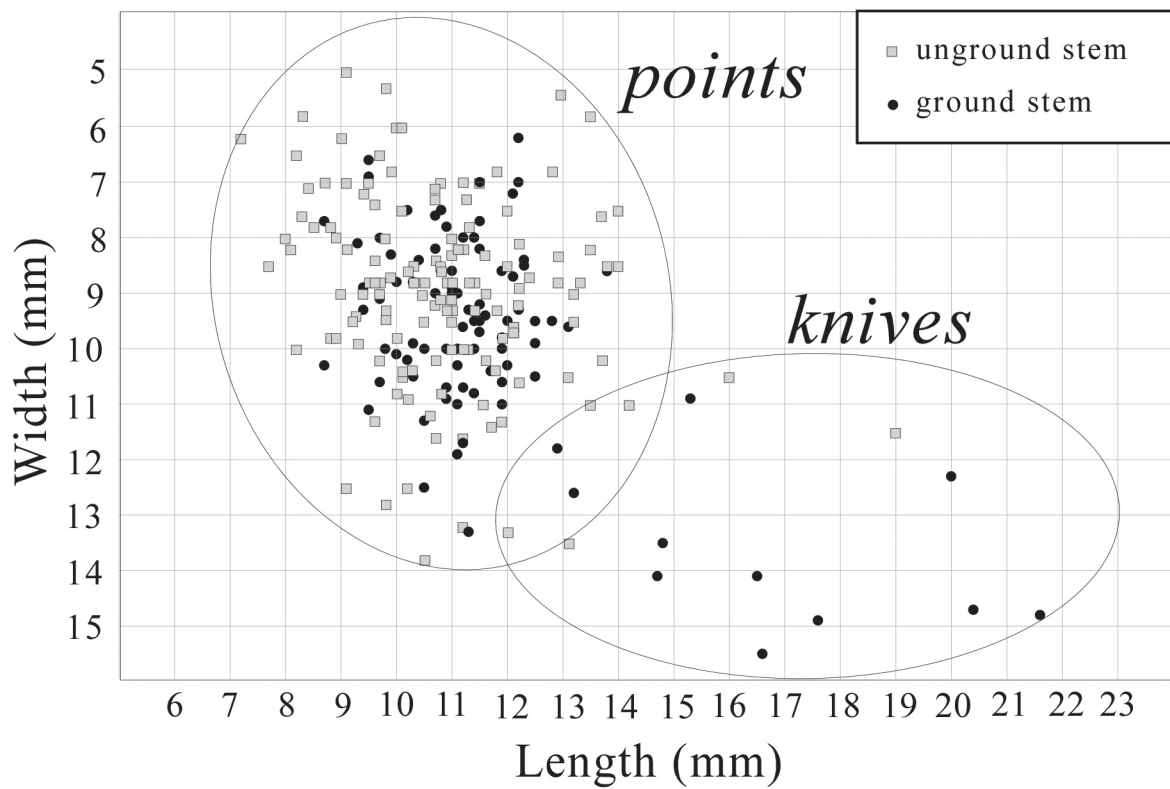


Figure 20. Length versus width plots for Table Rock points and Eightmile knives.

into knives. That process would not have entailed removing the broken point from the foreshaft. Two other Table Rock points were made into drills, as were three Eightmile knives (Figure 7 upper left). None was fashioned into scrapers.

The recycling described here has implications for the patterning of point attributes in space. The points discarded at a base camp such as 14BU404 were at the end of their use lives. They tend to have much shorter blades than newly made specimens, and some of them have shorter or narrower stems, the edges of which lack grinding. The flaking patterns on the blades also differ. Points that were lost during hunts tend to have longer blades and larger stems with edge grinding. Because points lost during hunting are most apt to be found in upland environments where they did not become deeply buried, the assemblages of Table Rock points from collections made in the uplands will have different metric and non-metric attributes than those from lowland base camps like 14BU404.

The activities at the site included biface reduction, primarily to make Table Rock points and Eightmile knives; repair and replacement of broken points; recycling of points and Eightmile knives into drills and of Table Rock points into rounded end knives; and scraping and drilling of materials that usually did not include fine-grained stone.

AGE OF THE DOUGLASS COMPLEX

No organic material has been recovered from 14BU404, so the controversy about the age of Table Rock points cannot be resolved using radiocarbon dating. The other identifiable point types from the site are not useful either, as they include a scatter of Early, Middle, and Late Archaic types along with some of Woodland age.

Arguments in favor of a Middle Archaic age are based on two forms of negative evidence: Late Archaic traits that are absent at 14BU404 and traits of the Douglass complex that are absent in Late Archaic assemblages. The site has yielded no burned rock and no pecked and ground stone axes or celts. Indeed, it contains very little ground stone of any sort. (One broken Table Rock point was used to scrape some sort of soft stone, however.) By the Late Archaic ground stone axes and celts were common in the eastern half of Kansas, but none is

present at 14BU404. Only a single pecking stone is included in the collections. Rock-filled hearths and burned rock middens also were widespread in Kansas by the latter part of the Middle Archaic, and all three collectors stated that 14BU404 does not have any burned rock at all. Ground stone tools, common in Late Archaic base camps, are rare here, and the few that are present are not diagnostic of age. In all likelihood they derive from a component other than the one that produced the Table Rock points.

Distinctive elements of the Douglass complex, other than Table Rock points, are not found in Late Archaic assemblages in this region. They are the small scrapers and the hafted drills with narrow bits. The scrapers from regional Late Archaic assemblages tend to be very large, and that pattern continues into Middle Woodland times. Drills are common finds in Late Archaic sites, but they lack the neat haft elements of those in the Douglass complex, and they have much wider bits than the majority of the drills from 14BU404.

The chipped stone axes provide positive evidence in favor of a Middle Archaic assignment for 14BU404. Identical axes are found in the Munkers Creek phase, currently dated at about 4800 to 3800 B.C. (Banks and Wigand 2005:Figure 1). The Munkers Creek phase is located in the Flint Hills and is marked by the presence of stemmed and lanceolate points, knives that exhibit silica polish from harvesting grasses, and the oldest ceramic objects on the Plains (Witty 1982). Figure 21 compares the outlines of the axes from 14BU404 to those from the William Young site, the type site for the Munkers Creek phase. At both sites the axes were made by notching crude bifaces in such a way as to blunt the edges within the notches. In addition, the axes at both sites include some that are flaked bifacially around the whole circumference and others that have polls that consist of flat facets. Although chipped stone axes continue in use after the Middle Archaic, the later ones are thinner and lack the flat polls. At the William Young site a few Table Rock points were found stratigraphically above the Munkers Creek deposit. Hence a time frame shortly after Munkers Creek is likely for the Douglass complex.

Assigning the Douglass complex to the Middle Archaic does not completely resolve the age

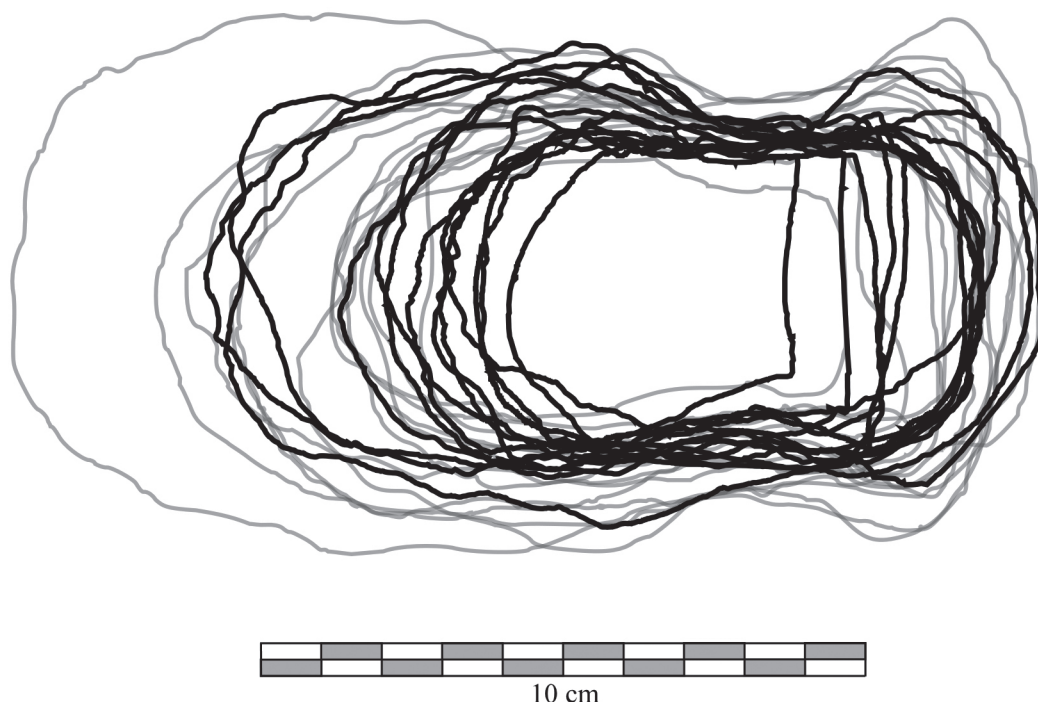


Figure 21. Comparison of Douglass complex (black) and Munkers Creek axes (gray).

controversy. Points that have been called Table Rocks have been found in clear contexts that date to the Late Archaic at several sites. They include the Davis Creek and Edgewater sites and a component in the Allen Fan in eastern Iowa (Fishel et al. 2003; Lensink 1986; Whittaker et al. 2007). Interestingly these sites do not fit the distributional pattern suggested by Nolan for his Middle Archaic Table Rock; they are neither especially low in the landscape nor very deeply buried. There are also differences between the points from the three Iowa sites and those from 14BU404. While all three of the Iowa sites appear to be campsites, in which similar sets of points might be expected, the artifacts differ in a number of ways. All but one of the points from Davis Creek were heat treated, compared to a minority of those from 14BU404. Percentages of stem grinding also differ widely, with a high proportion of those from Davis Creek and Edgewater Park exhibiting this attribute, compared to a minority at 14BU404. Furthermore, 39 percent of the point bases from Davis Creek retain flake platforms compared to none from 14BU404. When point and biface outlines are compared (Figure 22), it is clear that the points from the Iowa sites differ in both

blade and stem proportions from those at 14BU404. The Davis Creek and Edgewater Park site points have wider stems and wider blades that are more highly convex in their lower sections, with the maximum width well above the shoulders. The biface reduction sequence also differs from that evident at 14BU404, so it is clear that the whole manufacturing trajectory differed and not just the final assemblage of broken and refurbished points. Thus, the Iowa sites provide evidence for the use of a point type in the Late Archaic that is similar to but distinct from the Table Rock points at 14BU404. As these points fit Converse's description of the Bottleneck type, use of that name for them would be appropriate. Figure 23 illustrates a few that have been found in Kansas.

CONCLUSIONS

The issues surrounding Table Rock points include whether it is the same point type as the one called Bottleneck, whether the difference between the two might be the difference between points and knives, and whether the Table Rock type is Middle or Late Archaic in age. Part of the problem originated in

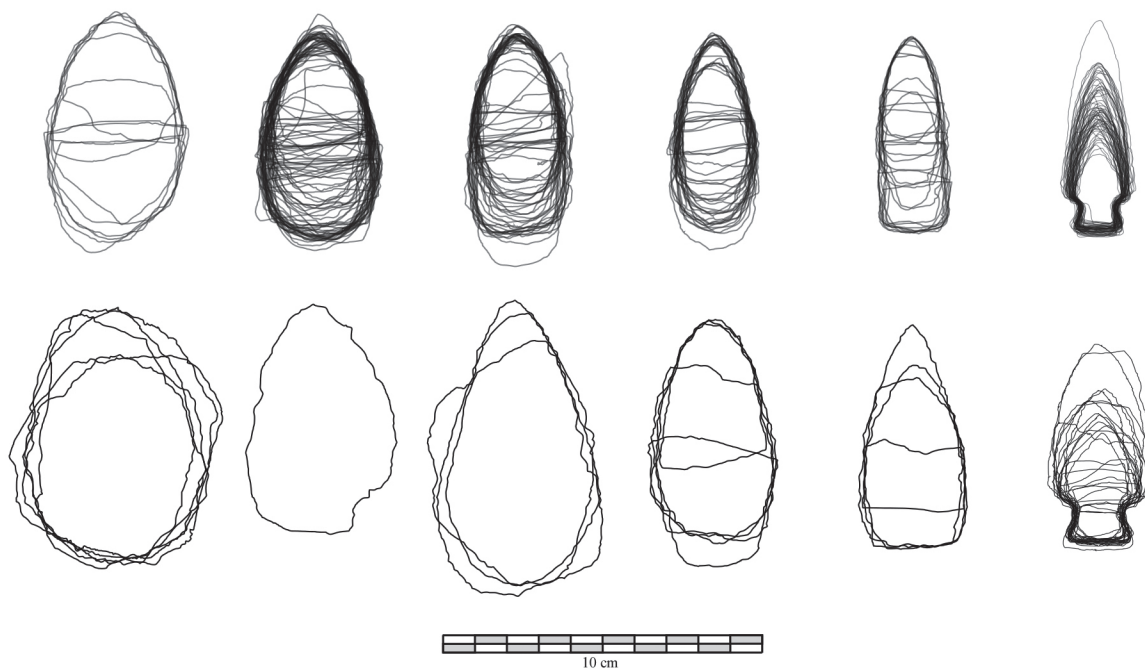


Figure 22. Biface reduction to Table Rock points at 14BU404 (top) compared to that for Bottleneck points at three sites in Iowa (bottom).

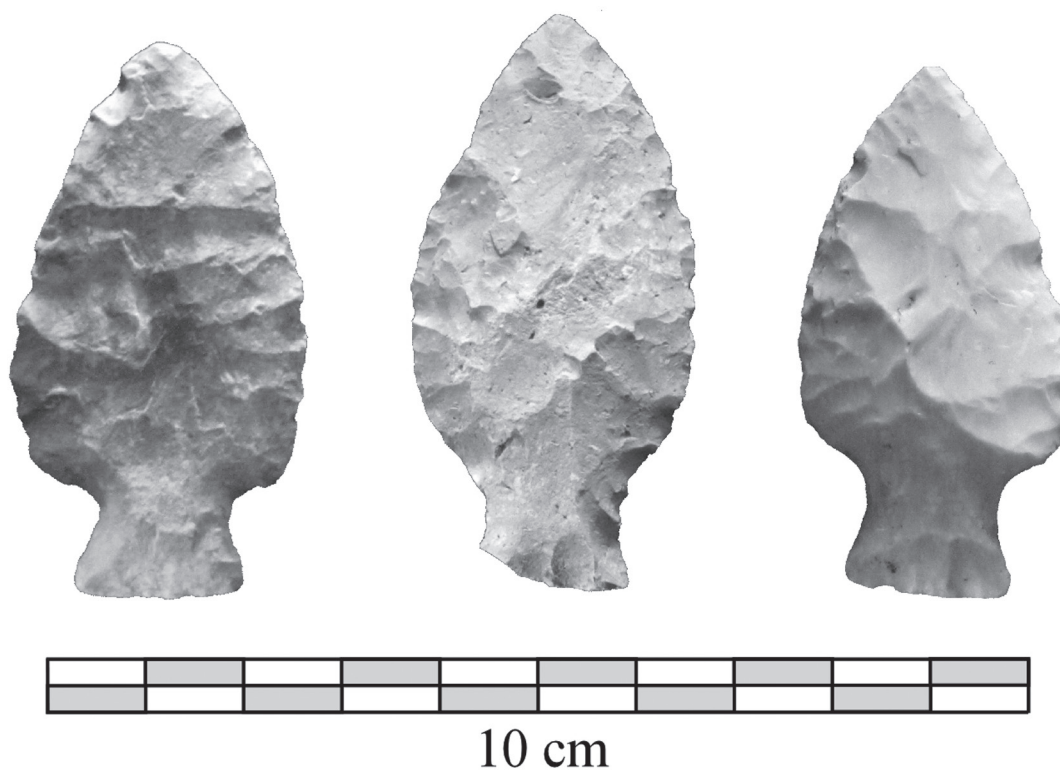


Figure 23. Examples of Bottleneck points.

an inadequate sample for the Table Rock type and a written description that did not match the illustrated specimens very well. In contrast, the description that accompanied the Bottleneck definition was relatively clear. Over the decades most professional archeologists in the Midwest abandoned the Bottleneck name, assuming that only one point type (and perhaps a knife type) was present.

The 14BU404 assemblage brings clarity to some of these issues. Yes, there is a knife form, but it is merely a larger and sturdier version of one of the point types. The large assemblage from 14BU404 contrasts strongly with Late Archaic assemblages and has an axe form in common with the Middle Archaic Munkers Creek complex. A second point type is clearly Late Archaic in age. As that one quite nicely fits the original definition of the Bottleneck type, the Bottleneck name is applied to it, which leaves the Table Rock name for the Middle Archaic type from 14BU404. Thus, people on both sides of the age controversy are correct. There is a Late Archaic point, and there is a Middle Archaic point; they are similar but distinct.

The largest component at 14BU404 consists of points, bifaces, small scrapers, chipped stone axes, and distinctive drills. The site apparently was a low-land base camp in a broad river valley, and the large assemblage suggests long-term use. Intensive reuse of broken points and accidental burning of point fragments may indicate a cold weather occupation. An alternative explanation of the burned point stem fragments is that heat was required to soften the glue that held points in foreshafts. Comparative data is needed before that alternative can be assessed.

Also present in the assemblage are large knives that clearly were made by the same Middle Archaic people. They differ from the points in the original quality of the flaking, the size of the blade, and the width and proportions of the stem. They are as diagnostic as the points, and the name Eightmile knives is proposed. Some of the drills and most of the scrapers from 14BU404 are also distinctive.

In the absence of other assemblages, it seems most appropriate to designate a Douglass complex rather than a phase. While the large assemblage from 14BU404 is pure enough to allow determination of the kinds and relative proportions of artifacts associated with Table Rock points, it is not a sufficient basis for the definition of a phase. There

is no reason to imagine that the assemblage from 14BU404 is representative of the yet-to-be-discovered assemblages in other sites that contain Table Rock points, either in the Walnut River basin or elsewhere. The point type is very widely distributed, and it clearly reflects a technological system shared among many contemporaneous populations rather than an ethnic marker. In the absence of more complete evidence regarding the settlement pattern, subsistence system, and the like, definition of a phase must be postponed.

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SHAMANS OF THE BLUFFS: A CRITICAL EXAMINATION OF CAUSAL RELATIONSHIPS WITH KANSAS PETROGLYPHS

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This paper presents several petroglyph sites located in Rice County, Kansas (14RC11, 14RC10, and 14RC333) and examines the possibility for shamanic causal relationships. The history of the complicated term "shaman" is reviewed, and a new definition is proposed. Also included are reviews of the topic as it has been applied in rock art studies and of formally defined rock art traditions in the Plains. Evidence suggests that shamanic behavior may have been responsible for the petroglyphs in Rice County, but causality is not argued for without considering alternatives. Additionally, but in limited capacity, this study also highlights the effectiveness of the free image-editing software Inkscape for enhancing retrievable data from petroglyph photographs.

Around the world and dating back in time to the Upper Paleolithic (36,000 B.C.), people have inscribed petroglyphs or painted pictographs, designs known as rock art, on rock outcrops and in caves. The state of Kansas, located in the Great Plains of North America, contains abundant rock art sites with the inscribed variety. The petroglyphs were carved into the sandstone bluffs of central Kansas and also occur on sporadic outcrops in other portions of the state.

Nearly every petroglyph site known in Kansas has inscriptions that may have been created by people belonging to Siouan, Algonquin, Caddoan, Tanoan, Uto-Aztecan, or Na-Dene language families (Sturdevant and U.S. Geological Survey 1991), with graffiti of Spanish, English, and people of other European language families inscribed over them. Therefore, the sites have become palimpsests over time. However, inscriptions made by inhabitants of North America prior to European colonization can be discerned from European graffiti in most cases. Archeologists and the general public encounter these rock art sites and are amazed by the inscriptions. At one time they meant something to someone. The modern focus of intrigue and great mystery centers on the question, "What do they mean?" This is not an easy question to answer, but ethnographic documentation and pictograph studies reveal that shamanism might have played a role in their creation. However, defining the term "shaman" is not

easy, and other causal factors behind the creation of the Kansas petroglyphs are just as likely.

This paper will examine the possibility for shamanic causal relationships at several petroglyph sites located in Rice County, Kansas. In developing a methodology for interpreting behavior behind the creation of rock art and its possible meanings, a number of topics must be considered in addition to causality. It is important to have a solid grasp of what a shaman is and how this term has evolved in religious and anthropological studies. Supporting and opposing views that identify shamans as the creators of rock art must be weighed equally. Ethnographic documentation, regardless of possible subjectivity, must be considered. A review of the people known to have inhabited a region where rock art was produced and examples of pictographic works by these groups must be reviewed and compared. This paper incorporates these aspects into the study of a sample of Kansas petroglyph sites. In a limited capacity, it also examines the effectiveness of *Inkscape*, a free image-editing software for enhancing the amount of retrievable data from petroglyph photographs.

DEFINING A SHAMAN

First it is necessary to review the definition of a shaman and the works of researchers, some of whom argue for shamanic causality in rock art, while others oppose it or remain critical. The term "shaman"

comes from the Tungus, a Siberian population of reindeer herders. Boekhoven (2011:32) noted that the first time the word shaman appeared in western writing was in 1698, when Adam Brand, a member of an expedition from Moscow to Beijing, led by the Dutch merchant Evert Ysbrants Ydes, used the term in his travel accounts. During the eighteenth and nineteenth centuries explorers and ethnographers produced additional studies of Siberian shamans, and their work became the infrastructure for Mircea Eliade's empirical definitions.

What is a shaman? Possibly the most influential and popular definition comes from Eliade's *Shamanism: Archaic Techniques of Ecstasy*. Eliade's title itself reveals his basic definition of a shaman as a master of ecstasy, more commonly known as the ability to enter an altered state of consciousness in which a shaman travels to different realms (Eliade 1964:4). These realms are considered to be manifestations of a primordial, spiritual, cosmic, or celestial reality. Spiritual flight is considered to take place during the ecstasy. Animal and human spirits become a shaman's tutors and helpers. A shaman is associated with characteristic material aspects, such as the costume, hat, and drum, but more than any of these trappings it is the capacity for the ecstatic experience that sets a shaman apart from others in a community (Eliade 1964:107).

Another important element in Eliade's definition is the belief in an Axis Mundi, a tiered cosmos in which four directions meet in the center, where a symbolic pole or cosmic world tree connects earth with the upper and lower cosmic realms. This concept is remarkably similar to Abrahamic religious beliefs about Earth, Heaven, and Hell. In addition, Eliade noted that symbolism for death and rebirth are metaphors in initiation and the ecstatic technique of shamans, which also hold similarities with Christian themes. In ecstatic consciousness a shaman has the ability to travel the cosmos by going to either the upper or lower tier, but symbolically a shaman will always travel to the center of the cosmic Axis Mundi (Eliade 1964:120).

Through the ecstatic technique a shaman accesses the sacred and gains tutelary and helper spirits that assist him/her in healing. Eliade used the terms shaman and medicine man interchangeably. However, he (Eliade 1964:314) stated that anyone

in a religious context has access to everything a shaman does in regard to vision questing in pursuit of supernatural favor, guardian spirits, and other spiritual endeavors. Therefore, it might be possible to distinguish a medicine man from a shaman, based on ecstatic techniques and activities performed.

In contrast, one nineteenth-century ethnologist considered it absurd to equate a shaman and a medicine man. Putting aside for the moment his diatribe regarding religious advancement of superior Europeans compared to inferior American Indians, Garrick Mallery (1886:190–191) clearly considered a shaman to be different from a medicine man because a shaman works with fetishes and spirits.

The term Shamanism is a corrupted form of the Sanskrit word for ascetic. Its original application was to the religion of certain tribes of northern Asia, but in general it expresses the worship of fetish-practices. The Shaman or priest pretends to control by incantations and ceremonies the evil spirits to whom death, sickness, and other misfortunes are ascribed. This form or stage of religion is so prevalent among North American Indians that the adoption of the term Shaman is substantially correct, and it avoids both the stupid expression "medicine man" of current literature and the indefinite title of priest, the associations with which are not appropriate to the Indian religious practitioner.

In addition, Mallery pointed to references of Dakota (Lakota) Winter Counts, which contain specific pictographic examples of "making medicine" that are different from those of a shaman working with spirits, or as Mallery (1886:191) stated, "graphic expressions regarding magic." However, as a surge in researching shamanism in rock art occurred in the twentieth century, Mallery's distinct definitions of shaman and medicine man were not shared by Eliade and many others.

Eliade provided the first popular universal definition of a shaman. His work has been criticized as inaccurate for its generalizations that perpetuate western colonial-era depictions of primitive "others" in cultural studies and for formulating shamans' cosmological system to reflect themes familiar in western religion for the sake of popularity (Jones 2006; Kehoe 2000; Leach 1966; Sidky 2010). If

Eliade's definition of shamanism is too general for the variety that exists across cultures, then what is an appropriate definition?

Attempts by other scholars to define shamanism have resulted in variability laced with some consistency. In an attempt to blend Eliade's definition with several others (Beyer 2009; Harner 1980; Jones 2006; Kehoe 2000; Lewis-Williams 2002; Mallery 1886; Scott 2002), this author has reached the following conclusion. Shamans are individuals who hold specific positions in their cultures as the masters of the non-material dimension. A shaman can enter this dimension by altering his or her state of consciousness—what Eliade described as the trance or ecstatic technique. The trance state can be induced naturally through a combination of meditation, sleep deprivation, and fasting or with the aid of psychedelic substances.

A shaman is a master of the non-material dimension, able to communicate with the most common non-material entities: spirits. In doing so, a shaman gains knowledge from them. Access to this knowledge is restricted to a shaman and translates as power in socio-political contexts. A shaman's power allows him/her to manifest as a healer, magician, psychopomp, sorcerer, doctor, witch, shape shifter, medium, etc. A shaman is a diverse manifestation across cultures. The term and its definition are surrounded by confusion because shamans are emic entities that vary across cultures. Attempts to define the term have spawned multiple studies devoted to reviewing the history of its variability (Boekhoven 2011; 12). This study proposes a focus on two traits: 1) the altered state of consciousness and 2) the communication and power drawn from spirits, regardless if used for healing or hurting others.

SHAMANS AND ROCK ART

Theories about shamanic behavior as the causal relationship in rock art are not new. Bahn (2002: 89–90) noted that shamanism frequently was referred to in rock art interpretation in the early and mid-twentieth century. Half human/half animal creatures were interpreted as sorcerers, gods, or masked shamans. In the last quarter of the twentieth century, shamanism rose to the forefront of rock art interpretation, culminating in David Lewis-Williams' (2002)

publication, *The Mind in the Cave: Consciousness and the Origins of Art*. Unlike earlier theories that focused on man-animal hybrids, Lewis-Williams and T. A. Dowson (1988) argued for a neuropsychological model based on entoptic phenomena. The premise is that certain universal visual patterns can be projected inside human eyes during trance states or simply by pushing on the eyeball for a moment. These patterns also can be visualized through the ingestion of psychedelic substances. Entoptic patterns that can be seen by any individual are basic geometric shapes, such as zigzag lines, nested curved lines, cross-hatched grids, and dots.

The neuropsychological model consists of three stages of visual imagery, associated with altered states of consciousness (Lewis-Williams and Dowson 1988:203–204; Lewis-Williams 2002: 126–130). In the first stage, the most important for universal implications, hypnagogic consciousness takes hold. At the moment when one becomes drowsy and enters a limbo state of being both awake and asleep, entoptic phenomena occur. In neurological terms entoptic phenomena are composed of phosphenes. Neurons between the retina and striate cortex cause geometric shapes to appear in visual sight, although the patterns are phosphenes being projected from the internal structure of the optic nerve system (Lewis-Williams 2002:126–127). The entoptic phenomena may be colored in greens and purples; they may flicker, expand, contract, and combine into one another (Lewis-Williams 2002:126). The entoptic phenomena of the first stage of altered consciousness are strictly biological, originating in the nervous system. Therefore, they are biologically universal across cultures and devoid of cultural conditioning influences. In stage two cultural conditioning becomes a factor as individuals try to mold the entoptic phenomena into iconic forms with which they are familiar in everyday life (Lewis-Williams 2002:127). In stage three full iconic hallucinations occur, and images are drawn from deep emotional memories and can be mixed with entoptic designs (Lewis-Williams 2002:127).

Lewis-Williams (2002:165–179) referred to ethnographic accounts of North American Chumash, Shoshoni, Yokuts, and other American Indian tribes of the Pacific Coast, Great Basin, Rocky Mountains, and Great Plains physical regions. These accounts

claimed that rock bluffs were the territory of shamans. Shamans lived there in seclusion and were secretive about the powers that they gained from spirit helpers. They had houses in the bluffs, stored their caches of shamanic tools (costumes and other instruments) there, inscribed their visions on the rocks, and entered cavities in the rocks when they ascended/descended to the non-material realm through altered states of consciousness. While performing their ecstatic techniques, they aimed to communicate with spirits to gain more knowledge and power. Often they encountered malevolent underworld or water spirits as a test before those were cast aside by visions of benevolent spirits. The latter were often associated with birds and/or other animals. They even can be a shaman who has shapeshifted, physically or spiritually, into the spirit during ecstatic ascension. The secret knowledge obtained from the spirits was combined with supernatural rock art motifs to cause specific emotional responses of fear in viewers (Lewis-Williams 2002:178). Ultimately, this system of secret knowledge was used by a shaman for personal gains and maintenance of social power relations.

Based on the above accounts, Lewis-Williams (2002:168) found the “link between North American shamans and rock art indisputable.” This view and his universal entoptic phenomena theory were received with mixed criticism. Paul Bahn (2002) and Alice Beck Kehoe (2000) have referred to problems with this model, namely that other causal factors must be considered for rock art production: marking territory, recording events for historical or educational purposes, and children drawing on rocks during leisure time. They (Bahn 2002:91; Kehoe 2004:79) also pointed out that Lewis-Williams’ use of the term shaman has been incorrect or too broad in scope. Other researchers, most notably prominent North American rock art researchers James D. Keyser, Lawrence L. Loendorf, and David S. Whitley, have embraced the idea of entoptic phenomena and shamans as factors in the causal mechanisms behind rock art production. Lewis-Williams (2002:166–179) extensively cited Keyser and Whitley to support his arguments about shamans in North American rock art.

In the Great Plains region the rock art researchers mentioned above and others have divided formal traits of pictographs and petroglyphs into distinct

art traditions. In regard to shamans, one of the most important is the Ceremonial Tradition (CT). Formal traits of the CT include full frontal view anthropomorphs with arms raised up and bent at the elbows, shield motifs, and side profile animals with boat-shaped bodies (Figure 1; Keyser 2004:58; Keyser and Klassen 2001:191). CT anthropomorphs occur with isolated figures or small groups of juxtaposed figures, including animals and other anthropomorphs. Shamanic interpretations are promising with CT rock art because the juxtaposition of anthropomorphs and animals in combination with the supplication stance (upraised arms bent at the elbows) are characteristic of altered states of consciousness in order to communicate with spirits. This documented shamanic behavior shares affinities with secret societies and whole communities that regularly participate in vision questing and group ceremonial activities that involve fasting and ingesting substances to enter altered states of consciousness. Shamanic activities do not make groups of individuals into shamans. Therefore, a shaman’s activities may not be depicted, but instead the activities of a group of non-shamanic individuals. However, the ceremonial aspect is present and the reason why the formal traits of this tradition hold that name (Keyser 2004:59–61; Keyser and Klassen 2001:191). The CT is noted as the most common and widespread tradition in the northern Great Plains (Keyser and Klassen 2001:191). In addition, its presence has been acknowledged in the central and southern plains, including Kansas (Keyser 2004).

The CT anthropomorphs have rectangular bodies with or without v-shaped forms at the neck. They occasionally contain details of body organs or possibly stylized garments (Keyser 2004; Keyser and Klassen 2001). Mixtures of human and animal traits occur, as well as lines radiating from the tops and sides of heads, which are considered to be symbolic of power or wisdom. Both of these traits suggest supernatural themes. Material objects such as weapons, headdresses, eagle feather fans, medicine bags, and other functional or ceremonial items may occur with the anthropomorphs. Weapons are common, usually held in upraised hands. These include spears, bows and arrows, hatchets, and in later times flintlock guns (Keyser 2004; Keyser and Klassen 2001).

Shield motifs are full frontal and circular. They

often contain unique designs, sometimes entoptic. Anthropomorphs usually accompany the shields in two ways: 1) behind shields that only cover their midsections and may be transparent and 2) covered by the shields so that only parts of spears, tips of hair or helmets, and feet show from behind the shield. The shields may also be depicted with no anthropomorphs directly associated (Figure 1).

Animals are common and depicted in side profile with boat-shaped bodies. These include bear,

beaver, birds, bison, horse, deer, otter, serpent, turtle, and mythical or chimeric figures (Figure 1). One shield motif anthropomorph with an atlatl led Keyser and Klassen (2001:206–208) to remark that the CT might date to the “late archaic period before 250 AD” or “more than 1700 years ago,” which would be considered Middle Woodland (1–500 AD) in the central plains. However, based on the presence of shields and flintlock guns, they conservatively place the span of the CT between AD 1100

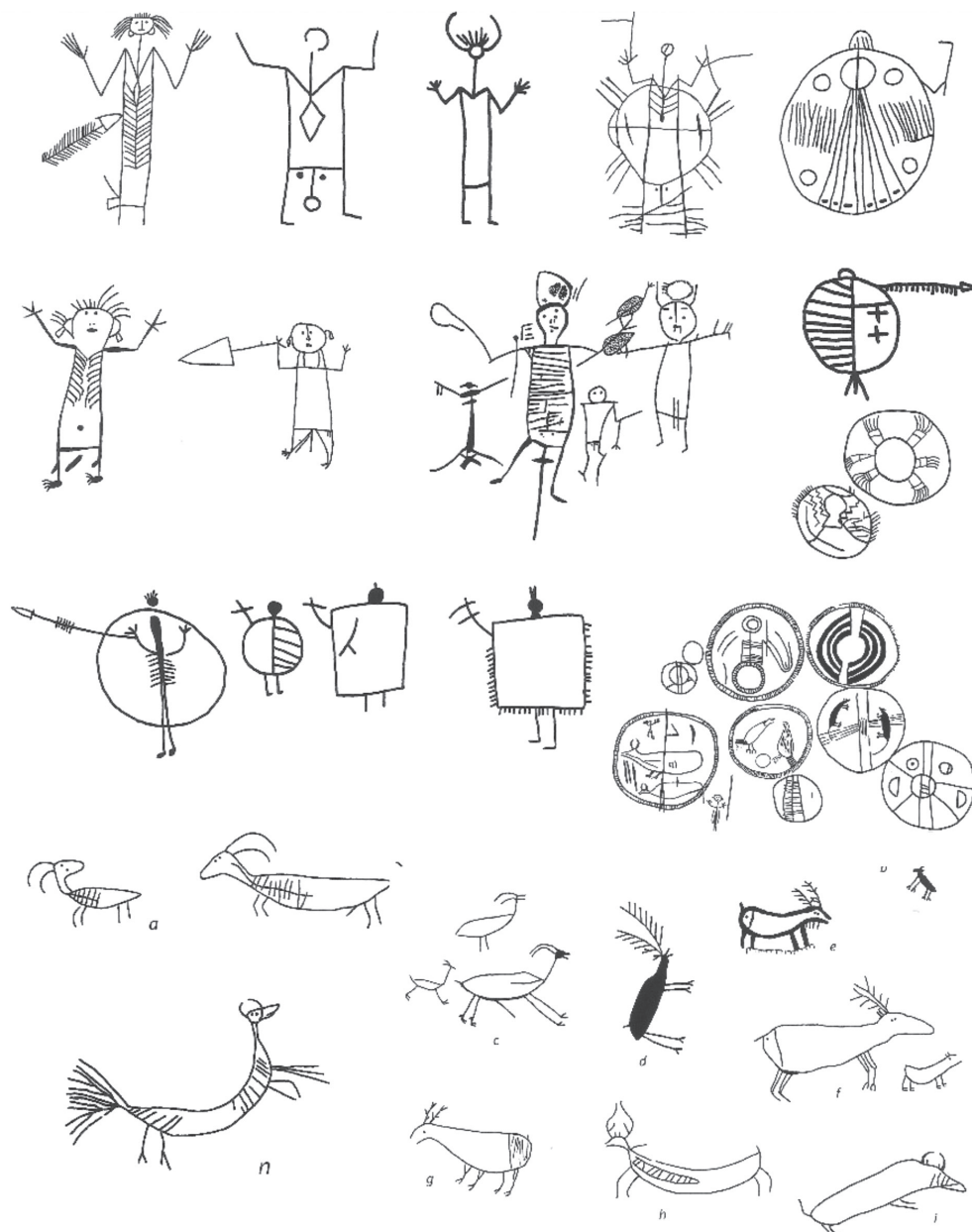


Figure 1. Ceremonial Tradition motifs. Images from Keyser and Klassen 2001 are modified with permission.

and 1900 (Keyser 2004:60; Keyser and Klassen 2001:208). This timeline is based on ethnographic documents and chronological data regarding the appearance of shields, eagle feather fans, and bison headdresses in the archeological record of the plains (Keyser 2004:60).

The CT is more commonly incised instead of painted, but both styles exist. The sites in Kansas are all of the incised petroglyph style. The CT style evolves directly into another style known as the Biographical Tradition (BT) (Keyser 2004:65; Keyser and Klassen 2001:224). The difference is the narrative. In contrast to static juxtaposed characters, the BT has motion and interaction that tells a story. The stories are commonly centered on warfare and usually depict groups of anthropomorphs in battle.

Another rock art style that occurs in Kansas is the Eastern Woodland Tradition (EWT) (Keyser 2004:63–64). This tradition depicts humans and animals in more realistic proportions but tend to be blocky as well. A notable expression in the EWT is that of mythical creatures, such as the Thunderbird and underwater monsters described as horned serpents or panthers. The underwater monsters live under rocks near water sources, such as springs, lakes, and rivers. Both thunderbirds and underwater monsters are found in ethnographic documentation of Siouan and Algonquian tribes (Dorsey 1888, 1894; Keyser 2004:64).

Numerous sites in Kansas contain CT petroglyphs with superimposed BT petroglyphs and become difficult to distinguish. In addition, palimpsests of earlier rock art forms (CT, BT, and modern graffiti) are common. In the following presentation of Rice County petroglyph sites, CT, BT, EWT, and other forms are noted, but emphasis is placed on the discussion of forms that have causal relationships with specific behaviors rather than formal traits for classification.

SHAMANS AND KANSAS PETROGLYPHS

The American Indian tribes known to have been living in regions of Kansas when Europeans first migrated into the area include the Kansa, Osage, Pawnee, Wichita, Kiowa, Comanche, Arapaho, Cheyenne, and both Plains and Kiowa Apache (Wedel 1959). Some were permanent residents,

while others were seasonal. This is important to note, because any of these groups might be responsible for the Kansas petroglyphs. The three sites presented here occur in Rice County in the central portion of the state. Similar petroglyphs are known in Russell and Ellsworth counties. Wichita, Kansa, Cheyenne, and Pawnee peoples once occupied this region for seasonal bison hunts. Ethnographic and historical documentations reveal that the Kansa have claimed this area as traditional bison hunting grounds (Morehouse 1908). They commonly encountered Pawnee and Cheyenne peoples in this area, which resulted in fighting over territory. This includes the area around the Little Arkansas River in Rice County where petroglyph sites have been recorded.

The sites in Rice County contain petroglyphs of anthropomorphs, animals, and abstract designs that are quite difficult to associate with specific patterns. At 14RC11 numerous circles, two anthropomorphs, and what might be a serpent or other underwater creature combine to depict a scene of one person being scalped by the magical powers of another. The scene shows a large concave circle at the top with another to its lower right that has hair lines, indicating a scalp. At the top left is the face of the individual who has been scalped, with an arrow and a serpent that has coiled around the head apparently doing the scalping. The serpent trails to the lower right in the scene. At the bottom left center is a smaller rectangular body anthropomorph with a portion of a horned animal overlapping it (Figure 2). In the image are at least two other circles with single vertical lines in the center of them. Using *Inkscape*, a vector graphics editing software, the light erasure negative filter was used in combination with the sharpness filter to modify the second photo in Figure 2. This technique reveals that some overlaying of glyphs has occurred, and thus it is impossible to be sure that everything was meant to go together as a scene. The overall scene actually may occur inside a larger depiction of a serpent-like creature, with the concave circle at the top being the eye.

Two areas of petroglyphs at 14RC10 will be discussed here. The first area contains a shield bearing a human petroglyph that was reported by Wedel (1959, 1969) and O'Neill (1980, 1981). The shield has a series of concentric circles, and two lines at

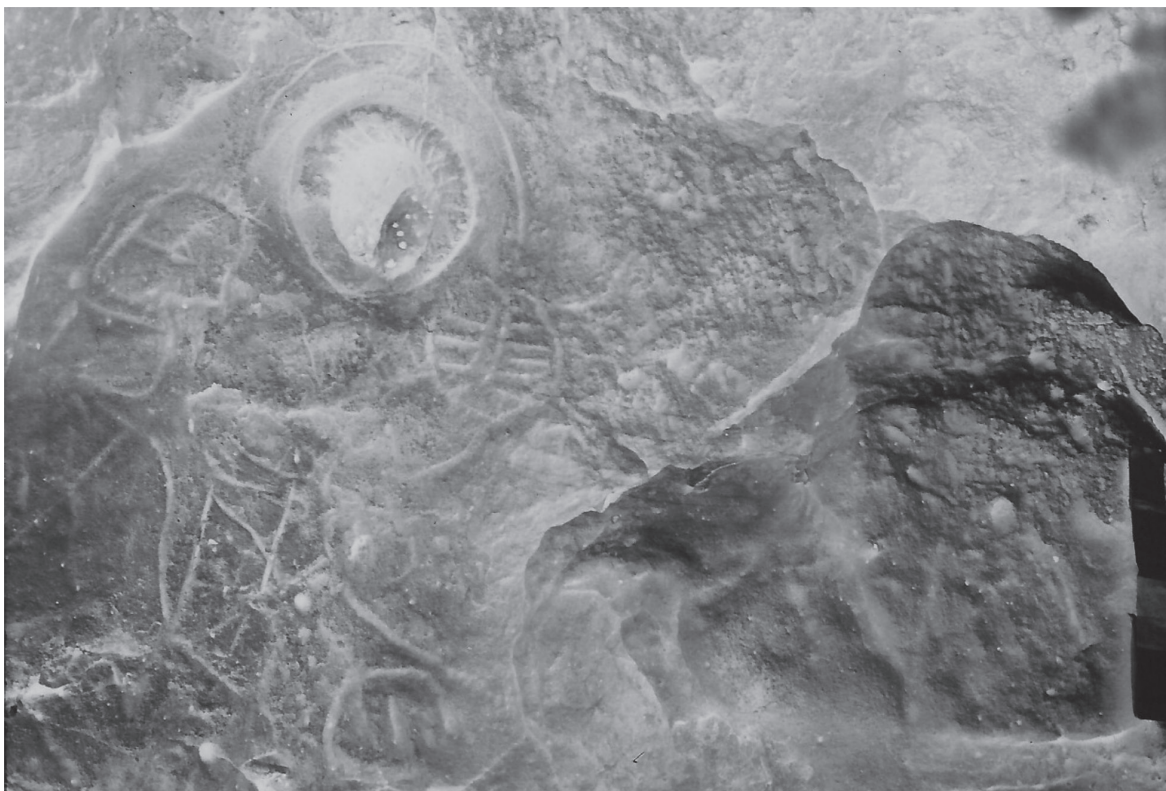


Figure 2. Scene at 14RC11, possibly indicating magical killing of an individual with the aid of spiritual creatures. Photograph appears courtesy of the Kansas Historical Society.

the top and the bottom representing the head and legs of an anthropomorph behind it. A spear accompanies the anthropomorph (Figures 3 and 4). There are numerous faded petroglyphs around the shield warrior motif. Vandalism also has occurred in recent times, and part of the petroglyph has been lost. This

petroglyph is characteristic of the CT shield motifs. The spear points to the west; following it along the sandstone outcropping, one reaches a small cave opening. Whether the petroglyph's creator intended the spear to act as a guide to this spot is unknown, but more petroglyphs are present in the cave.

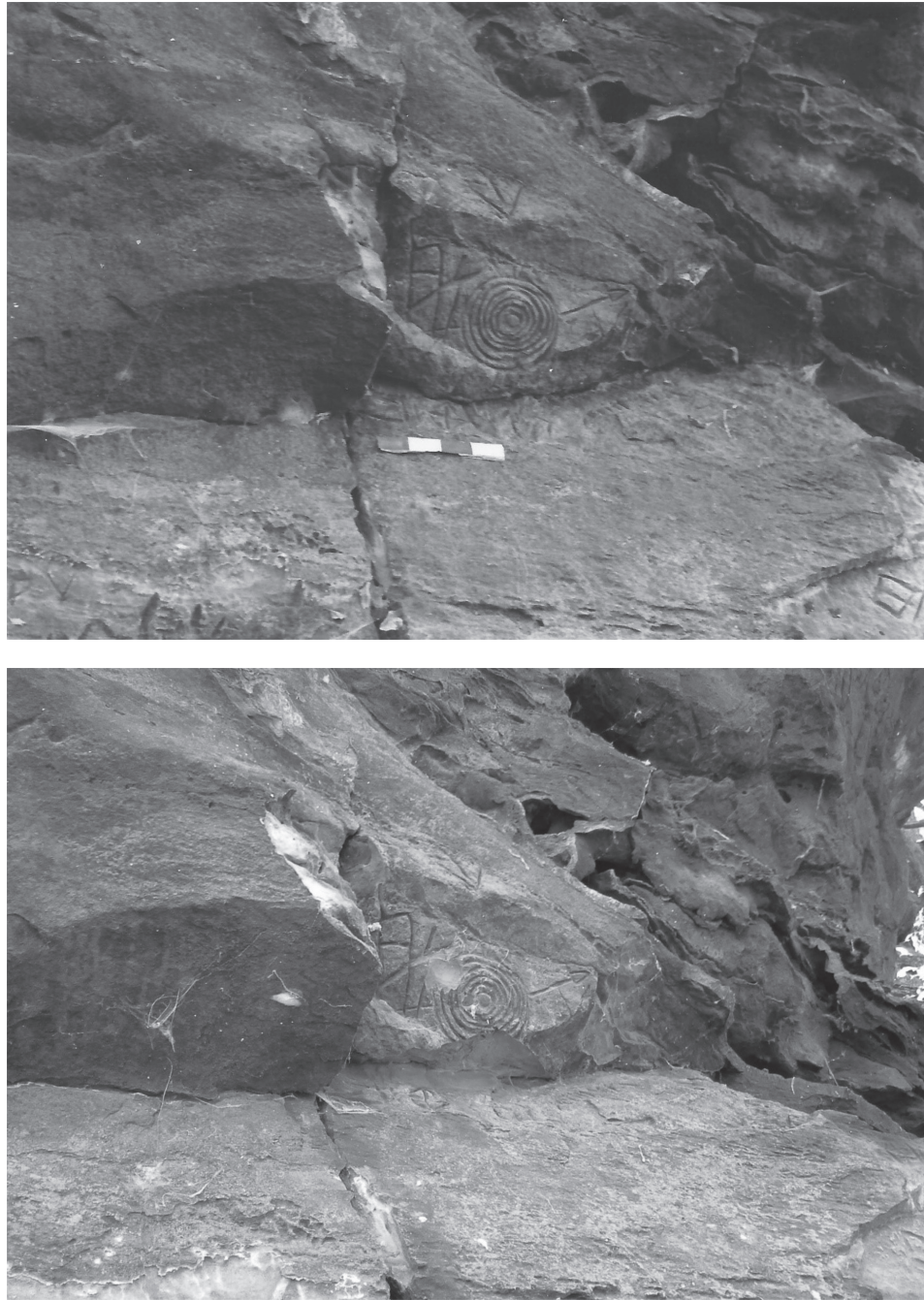


Figure 3. Shield motif warrior at 14RC10. Top photograph was taken by O'Neill in 1979 and appears courtesy of the Kansas Historical Society; bottom photograph was taken by the author in 2014.

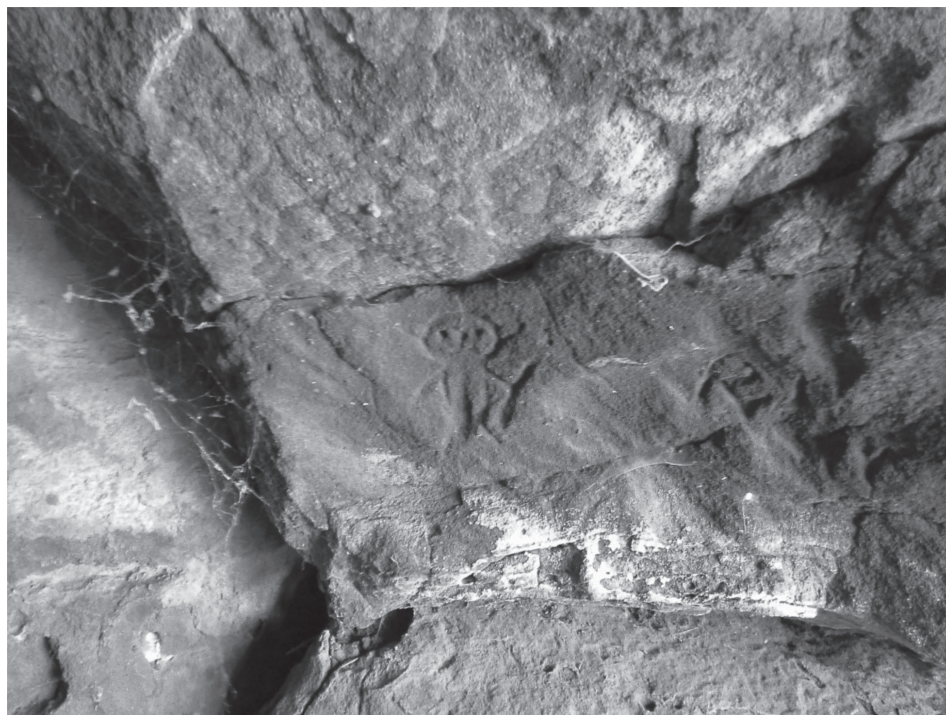
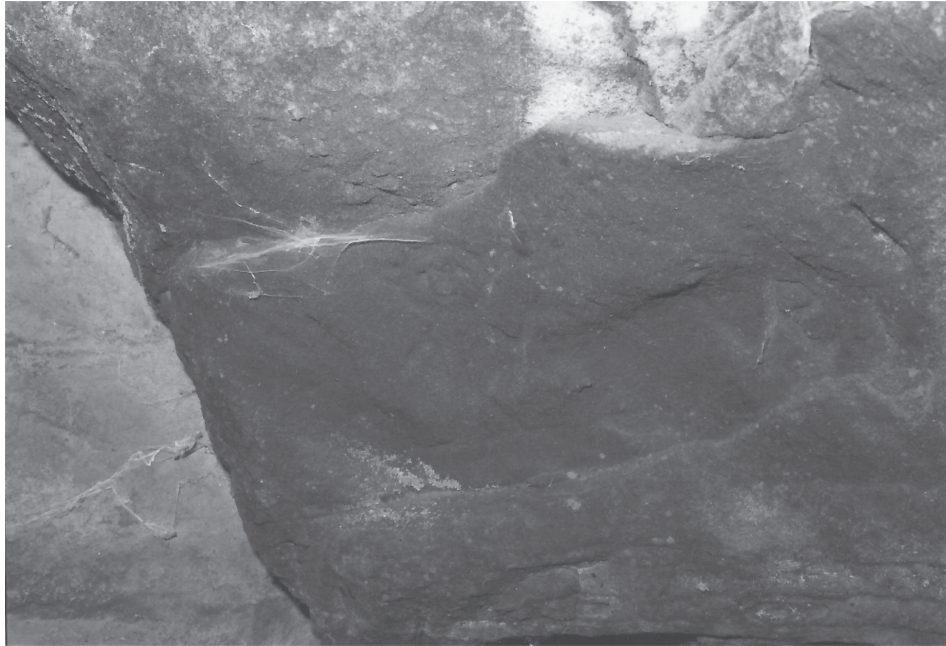


Figure 4. Anthropomorph in the cave of area 2 at 14RC10. The facial traits and arms resemble those of a bat. Top photograph was taken by O'Neill in 1979 and appears courtesy of the Kansas Historical Society; bottom photograph was taken by the author in 2014.

The most noticeable petroglyph in this second area is an anthropomorph, small in dimension and apparently isolated. To its right are two more faint anthropomorphs (Figure 4). After applying filters in *Inkscape*, they become more visible (Figure 5). In addition, immediately below the most apparent anthropomorph is an area that might have been intentionally modified at one time to act as a platform for the anthropomorph. It also resembles the outline of a serpent. However, this worn area once might have encompassed petroglyph designs that can never be reconstructed. The only remarkable traits are that the petroglyphs are located in a closed shelter, there are numerous anthropomorphs in full frontal views of the CT, and the facial traits of the most apparent anthropomorph share qualities with a bat. The ears are rounded, and the mouth has the characteristic V or rounded W-shape of bats. One arm looks like it is holding an object, but earlier photographs show that the arms actually rise up and go down again, suggesting that a “bat-man” might have been depicted here.

The final site described here is astonishing in size and quantity of petroglyphs. Recently relocated by Kansas Anthropological Association members Melanie Naden and Roger Ward, Hogan’s Bluff (14RC333) has never been the subject of the in-depth research it deserves. The site has potential to be one of the most important sites in the plains region. It clearly was important to the group responsible for its creation, and it should be preserved to the extent possible. Some areas show signs of intentional carving of a large-scale macro design in comparison to single panels of petroglyphs. As 14RC333 is too large to cover in this paper, only two of the most significant areas and aspects of the site will be discussed: a very large panel of petroglyphs and a cave with a carved silhouette at the entrance (Figures 6 through 9).

The Hogan’s Bluff site is located along a large sandstone outcrop that contains several natural springs. One large panel displays petroglyphs of birds and serpents that are hard to differentiate as either class alone. At the base of this panel is a composition that includes a possible thunderbird or stylized anthropomorph, surrounded by birds or reptiles that appear to spread out from the central figure. Faint anthropomorphs with rectangular bodies can be seen (Figures 6 and 8). Northwest of this

arrangement are more birds, one possibly an owl, and numerous lines in zigzag forms, again suggestive of a thunderbird (Figure 9). The entire composition in this section culminates in what might be a large raptor face with an eye, possibly forked in a style similar to that in Southern Ceremonial Complex (SCC) iconography. (For images of this motif, refer to Waring and Holder 1945.) The deeply incised lines to the right of this face could be interpreted as wings, possibly representing a winged serpent. However, further inspection reveals that those lines are parts of anthropomorphs. Individual petroglyphs are combined into larger compositions at this site, which is remarkable and calls for further in-depth analysis.

South and slightly west of this panel is a cave entrance along the sandstone bluff wall (Figures 6 and 7). Many petroglyphs are present at this location, but the most significant element is the cave with the silhouette of a person at its entrance. Deep impressions in the wall to the right of the cave entrance rise up along the face. One might be able to use them to scale the bluff face and reach higher areas to carve petroglyphs. Although this was not attempted during a site visit, numerous petroglyphs were observed high enough that they could be reached only by climbing.

A large amount of modern Euro-American graffiti, most commonly names and dates, is present at the site. This has destroyed many of the prehistoric and/or historic petroglyphs that were created by American Indians. Still, a large number are still intact and discernible. Some additional petroglyph designs, which may be seen in the pictures provided here, include shield motifs, pecked spots, straight lines, zigzag lines, forked lines, stars and/or crosses, among many others. At this time a much more in-depth documentation and description of the petroglyphs and larger carved rock formations at 14RC333 is in preparation.

DISCUSSION AND CONCLUSION

The petroglyphs at these Kansas sites contain many of the attributes that are associated with shamans. The isolated locations of rock bluffs and caves have been referred to as the homes of shamans (Lewis-Williams 2002). However, this does not provide enough evidence for concluding shaman causality

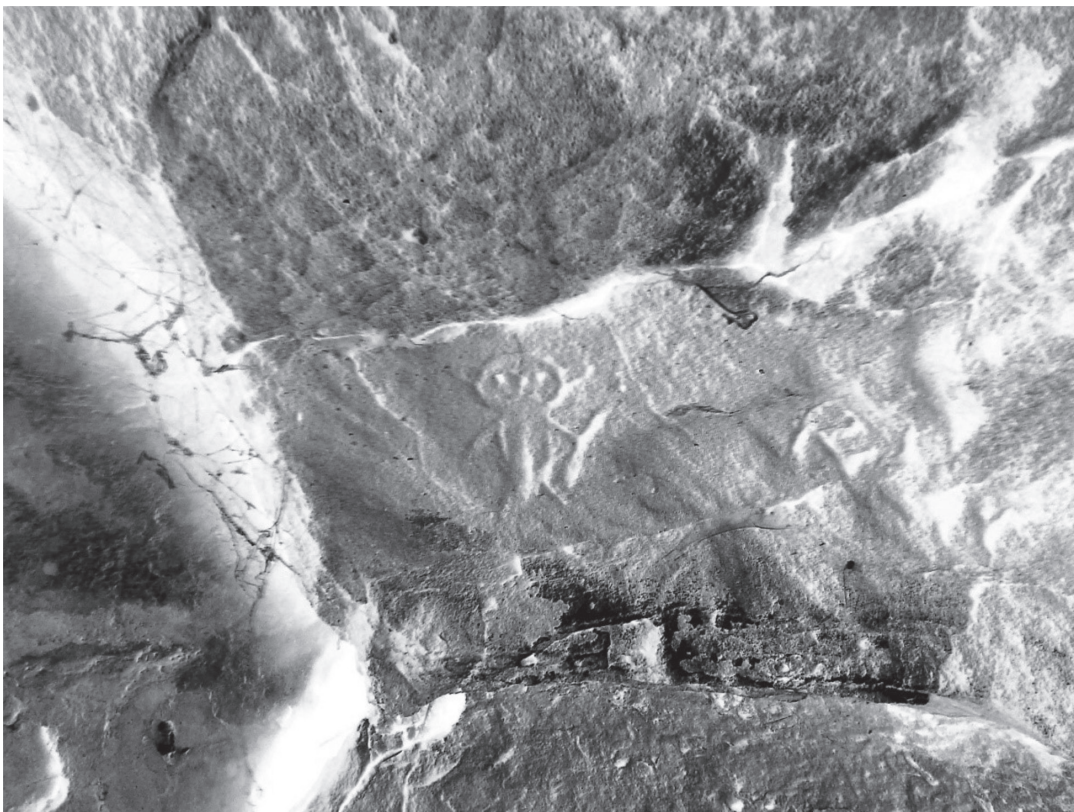
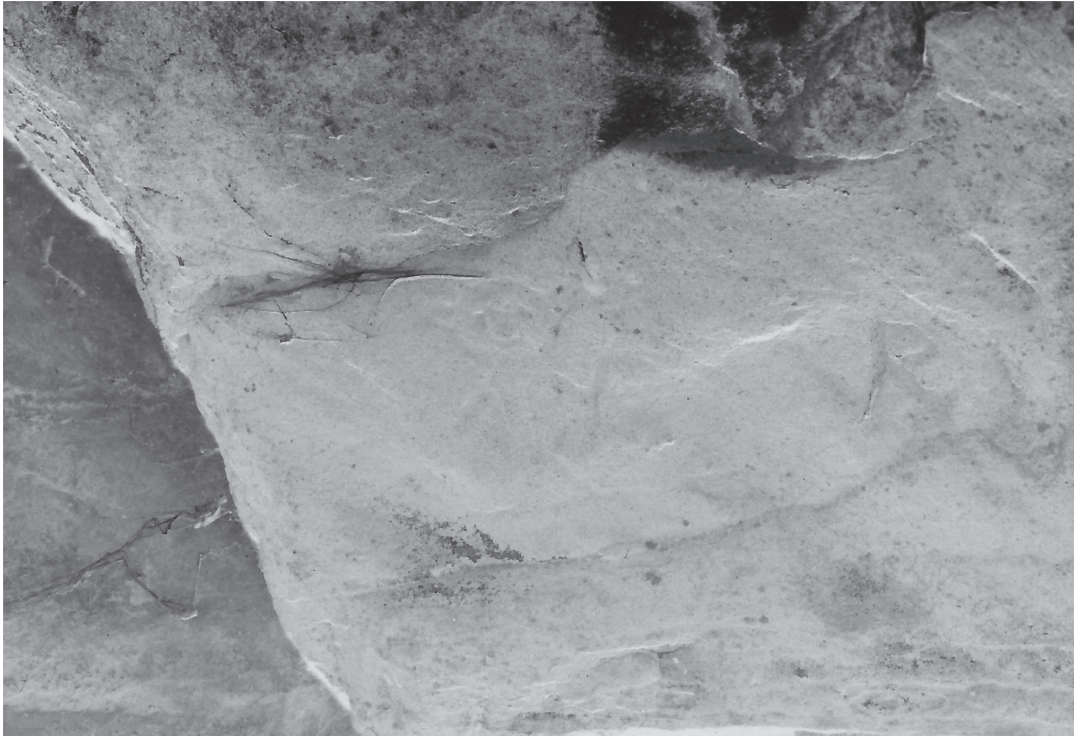


Figure 5. Inkscape filters of the anthropomorphs and faint remnants of other petroglyphs in a small cave opening at 14RC11. Top photograph was taken by O'Neill in 1979 and appears courtesy of the Kansas Historical Society; bottom photograph was taken by the author in 2014.



Figure 6. 14RC333. The top photograph is a large panel of petroglyphs; the bottom photograph shows the high bluff and cave entrance with the carved outline of a person at the entrance. Photograph was taken by the author in 2014.



Figure 7. A closer view of the cave entrance at 14RC333 with the outline of a person at the entrance. Photograph was taken by the author in 2014.



Figure 8. The bottom of a west-facing panel at 14RC333 with a possible thunderbird motif or anthropomorph in the center. Other birds, snakes, or ambiguous animal petroglyphs and anthropomorphs are superimposed in this panel. Photograph was taken by the author in 2014.



Figure 9. Another section of the petroglyph panel to the north and west of the location of Figure 8. There are numerous motifs of birds and the possible face of a large raptor. Photograph was taken by the author in 2014.

were responsible for the petroglyphs. The motifs of humans and animal interactions are stronger indicators that shamans might have created the petroglyphs. At 14RC11 the possible representation of magical scalping of an individual with the aid of supernatural animal spirits falls into a shamans' realm. The "bat-man" at 14RC10 and the raptor and reptile at 14RC333 are further evidence that shamans were responsible for their creation. The bird panel at Hogan's Bluff, showing a scattering of either bird or snake creatures from the central figure, might represent power in making unwanted entities flee, a power associated with shamans.

Shamans may have made all these petroglyphs, but alternative causal factors could be just as likely. The petroglyphs might represent motifs of death and spiritual or mythical animals as markers of territory to ward off intruders. They also might be the product

of warriors recording their successes in battle, adding flare to the stories with animal motifs. Children, adolescents, and adults alike might have made the petroglyphs for many reasons, including storytelling, recreation, and ceremonial activities. In regard to the last, ceremonial activities of a group might include activities considered shamanic. Vision questing and ingesting psychedelic substances are some of those, and 14RC333 may have been the location of group ceremonial activities rather than the location of one shaman's activities.

The iconography in the above-mentioned motifs makes a good argument for shamans, but the panels also contain motifs that have numerous known interpretations. Instances where animals and anthropomorphs are together might represent nothing more than a single person. For example, the Sioux and other tribes represented names by adding animals to

pictorial representations of people (Mallery 1886, 1893). Siouan tribes also used shield designs to mark their association with specific patrilineal clans of their tribe or for heraldry in warfare (Dorsey 1894; Szabo 1993). Some motifs are associated with the Ghost Dance Movement (Mooney 1897), which was a large group ceremony and not the activity of a shaman. Some pictorial designs have dual representations that are significant to one individual and are nothing more than nice patterns to another in the same community (Wissler 1904). It is important never to lose sight of this variability. Further research may reveal whether shamans were solely responsible for creating rock art, but for now responsible scholars must acknowledge the alternatives.

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TESTING AT 14RP1: HOUSE 26, FORTIFICATION, AND GEOPHYSICAL ANOMALIES

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A geophysical survey in 2007 of a Kansas Pawnee village site, 14RP1, detected what appeared to be previously unknown archeological features. Since that time, subsurface testing has confirmed that some of the geophysical anomalies are, in fact, features. A significant testing event in 2013 lends support to the interpretation of one geophysical anomaly as a previously undocumented house and identifies another anomaly as a storage pit. A hearth was identified in the center of the anomaly suspected to be a house. If it is a house, it was not burned, leaving a weak archeological signature. The pit is one of many similar anomalies, most of which are not currently identified as storage pits. Test excavations in the fortification were not sufficiently extensive to produce significant information, but the work done there and on the other anomalies gives concrete direction for methods to use in future efforts.

In October 2013 Kansas Historical Society (KSHS) staff and Kansas Anthropological Association (KAA) volunteers conducted testing in three different areas of 14RP1: a probable house, the fortification, and a series of anomalies interpreted as possible storage pits. The focus was on House 26, an anomaly in the geophysical survey conducted in 2007 by David Maki (2007) of Archaeo-Physics. House 26 was not known before the geophysical survey was conducted, and no one was certain that it was a house, based solely on the suggestive anomaly. Ground truthing was needed to confirm or refute the presence of another house. University of Kansas and KSHS archeologists excavated two test units in the House 26 anomaly in March 2008 but did not encounter a clear house floor (14RP1 site file, field notes). In July 2008 investigators, using a soil probe, encountered what was presumed to be a hearth in the center of the House 26 anomaly.

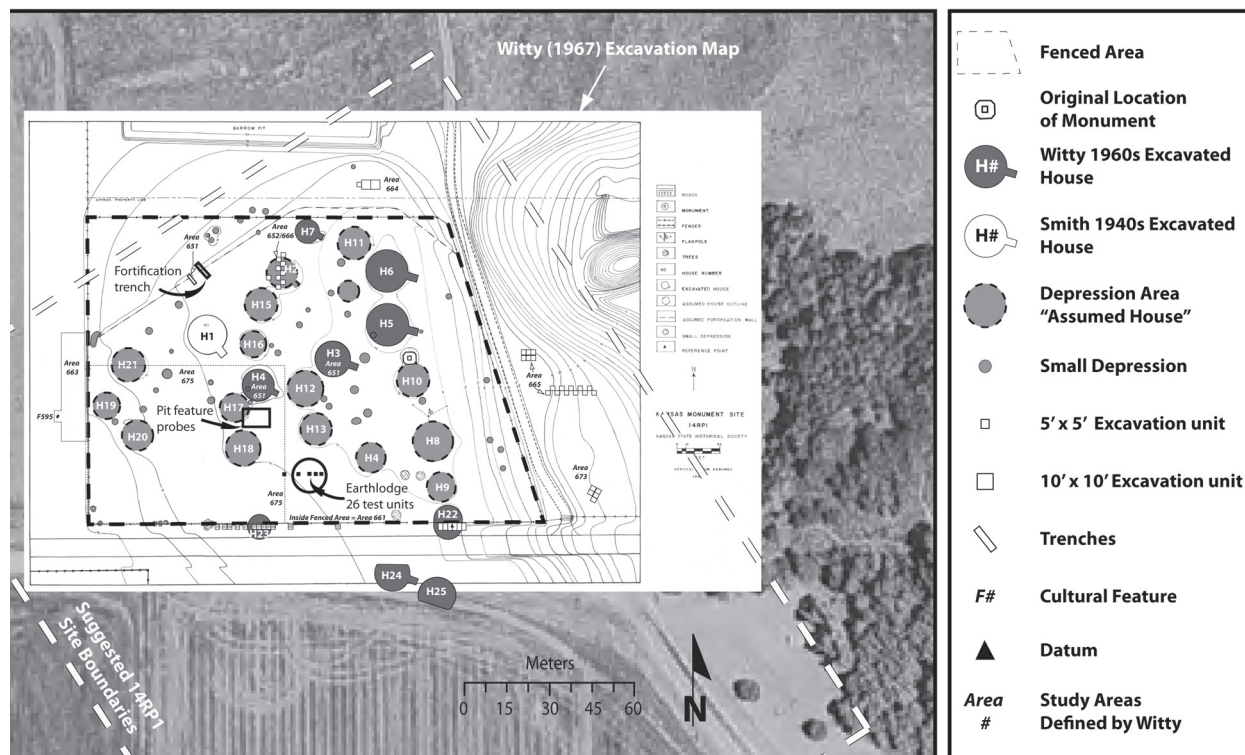
HOUSE 26 TEST EXCAVATIONS

The 2013 effort focused on gathering more concrete data on the House 26 anomaly. Investigators excavated five test units to accomplish three objectives: exposing the presumed hearth, indicated by

soil probing; finding the house floor, if it exists; and excavating a control unit just outside of the house anomaly to provide contrast between the house fill and the surrounding site area.

Investigators established 1-m square test units using the existing grid from excavations in 2008. All test units are identified by their grid coordinates at their southwest corners. The four units established to test House 26 were oriented east-to-west with the south edges along the N511 line (Figure 1). A control unit, deliberately set outside of the House 26 anomaly, was established at 511N 568E. The intent of excavating this unit was to contrast the profiles from the inside and outside of the house. Other units were established at 511N 579E, 511N 581E, 511N 583E, and 511N 585E.

An arbitrary elevation of 100 m was used for the site grid. The first level of each excavation unit was excavated to an elevation that is evenly divisible by 10 and approximated a 10-cm level. For example, the first level of 511N 579E was 100.812 to 100.70 m. Test units were excavated in 10-cm levels thereafter, so levels in all units would terminate at the same level in relation to the site datum. The control test unit, 511N 568E, had a beginning elevation of 100.7 and ended at 100.2. The four units



in the House 26 anomaly started between 100.883 and 100.800 and went to depths between 100.5 and 100.3, dependent on the speed of the excavators and the presence or absence of features, suspected features, and piece-plotted artifacts.

Excavators took a 10-l flotation sample and a 20-l water screening sample from each level of each unit. The rest of the fill was dry screened through 0.64 cm mesh. Artifacts encountered in place were mapped using a total station. Disturbances and features were mapped by hand in plan view on level forms, and the elevation of the north wall of each test unit was hand drawn when excavation of each unit was completed.

Test Unit Profiles

The field profile drawings vary significantly in their designation of Munsell colors and differences in stratigraphic breaks. This problem was exacerbated by a very dry soil column, as the region was in a drought at the time of excavation, and by uneven soil moisture resulting from efforts to achieve

moisture consistency by spraying water on the exposed unit walls. The units and the entire summit of the interfluvium on which 14RP1 lies are characterized by the Hastings silt loam, which developed in loess parent material (Soil Survey Staff 2014a, 2014b). There is little variation between the A and B horizons, but the C horizon, which is lighter colored and coarser grained, is distinct from the A and B horizons. Characteristics of Hastings silt loam are presented in Appendix 1. Recovered artifacts are itemized in Appendix 2.

A profile of the House 26 excavations is shown in Figure 2, and the units across House 26 are shown in Figure 3. Control unit 511N 568E was excavated to the elevation of 100.2. No change in the soil profile was noted, and no significant artifacts were recovered, so the profile for this unit is not presented. A probe in the floor of the control unit went an additional 20 to 100 cm, but again no change was noted.

The Hastings silt loam typically consists of an Ap-A horizon, extending to a depth of about 36 cm below surface (cmbs). A gradual, smooth boundary is followed by a BA horizon, distinguished from

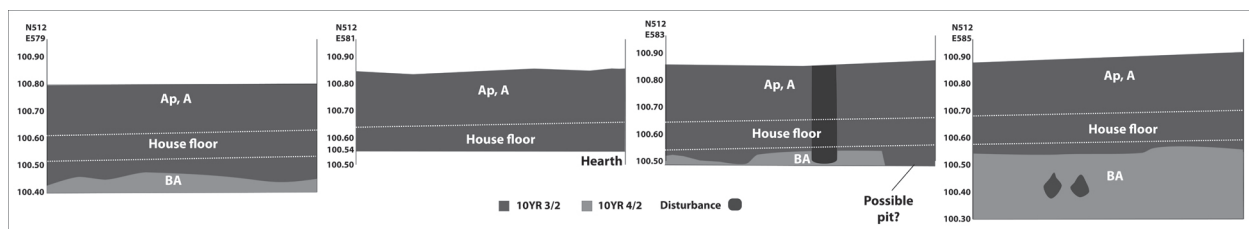


Figure 2. Profile of north walls of test units through House 26.

the Ap-A by a slight lightening and finer texture. Many of the field profiles and level forms record a change around 35 cmbs, although the Munsell values vary, probably due to varying moisture content. More importantly, the top of the hearth is at an elevation of 100.54, a level at which the house floor should be visible. While it is not, field profiles and notes record flecking of charcoal and burned earth at and above this level. Roof fall, too, should be evident, but it is not. If the anomaly centered around the hearth, clearly identified in unit 511N 581E, is a house, it seems likely that the house did not burn but was disassembled or abandoned and decayed in place without leaving the more typical burned rafters and supporting posts. The charcoal that was encountered may have originated in the hearth.

The BA horizon is not very clear, but combined sources of evidence—field notes, profiles, and soil descriptions—indicate that its elevation lies between 100.45 and 100.55 m. This is important because the BA horizon noted in 511N 583E is visible across most, but not all, of the bottom of the unit. It disappears abruptly at 583.82E, replaced by A horizon sediments. This could be the edge of a pit feature, located about 1.3 m east of the edge of the hearth, estimated to be about 80 cm in diameter. This possibility can be investigated by sampling with a soil probe.

Finally, the part of the site containing House 26 reportedly was plowed at least once. This notion is reinforced by the clearly visible dead furrows that mark edges of the plowed areas on the ground surface. However, the Ap horizon is neither distinct nor visible in the profile.

Test unit 511N 581E neatly exposed the west half of the hearth (Feature 6601) within the 100.6–100.5 m level, confirming its presence and also indicating a clear house floor elevation (Figure 4). Its highest elevation is 100.54 m; its depth is unknown, as it

was left unexcavated. The hearth is characterized by ash and burned earth. Charcoal is absent. Three other test units in the house anomaly were excavated to or through the level of the house floor. While differences in the sediments are exposed in test excavation profiles, the house floor cannot be clearly defined. Charcoal and small burned earth particles are visible, but they are diffuse. This also was true of the 2008 test excavations. Finally the control test



Figure 3. View of test excavations across House 26, looking west.



Figure 4. East wall profile of test unit 511N 581E, showing burned earth exposed at elevation 100.54 m.

unit revealed a profile with no significant changes in sediment. Soil samples were taken from each level of each unit for flotation, water screening, and particle size analysis. The water screening and flotation samples have been processed but not analyzed. The particle size samples have not yet been processed, so more information is forthcoming on the House 26 anomaly.

House 26 Test Unit Artifacts

Recovered artifacts are presented in Appendix 2. Much of the collection consists of bone fragments, burned earth, hematite, and charcoal. Artifacts that arguably represent the Pawnee occupation of the site include eight pottery sherds, one of which has red slip; four glass beads; four iron scraps and one copper scrap; and two pieces of glass. Three pieces of debitage and a chipped stone tool fragment may or may not relate to the Pawnee occupation. Daub is noted by its near absence, represented by a single piece at the same general level as the hearth.

Artifacts were concentrated in the upper levels. Ninety grams of cultural material came from ground surface to 100.70 m, 44.4 g from 100.70 to 100.60 m, 26.4 g from 100.60 to 100.50 m, and 1.9 g from 100.50 to 100.40 m. Two units did not have a

100.50 to 100.40 m level, and test unit 511N 581E ended at 100.54, affecting the amount of artifacts recovered by level. Still, clearly cultural material was concentrated near the surface and decreased in density with greater depth. No artifacts were recovered from the lowest level, 100.40 to 100.30 m, in test unit 511N 585E.

The expectation was that artifacts related to a domestic feature would be concentrated at the level of the hearth; that was not the case. Several explanations are possible. The anomaly around the hearth may not be a house. No post molds were encountered, although admittedly the test investigations, even combined with the 2008 excavations, were limited and could have missed any posts. It also is conceivable that the anomaly does represent a house, that the floor was kept clean, and that it did not burn but either decomposed in place or was intentionally disassembled. If the structure decomposed in place, artifacts concentrated near the surface may represent activities that took place on the roof and, being in and on the roof fall, came to rest well above the floor. It also is noteworthy that the control unit, 511N 569E, positioned outside of the anomaly interpreted as a house, produce only 3.1 g of cultural material, most of which is charcoal, burned earth, or small bone fragments. The single

piece of glass is minute, and its function is indeterminate. The control unit yielded a very diminished assemblage of cultural material compared to the units within the anomaly identified as House 26, supporting the notion that the anomaly represents an archeological feature.

FORTIFICATION EXCAVATIONS

Carlyle Smith and Tom Witty both excavated trenches through the fortification around 14RP1, but neither recorded the results of their work (Adair 2009). In 2013 a trench, consisting of three contiguous 1 m by 50-cm units, was excavated. The trench was placed, as best as possible, perpendicular to the orientation of the fortification. Consequently, the northings and eastings of the southwest unit corners were not on even meters. From southeast to northwest the units were 585.126N 532.552E, 585.859N 531.876E, and 586.590N 531.185E (Figure 5). These units had starting elevations varying between 100.808 and 100.710 m, and all were excavated to a depth of 100.3 m. Plan views and profiles were hand drawn on level forms, and these profiles are presented in Figure 6. While some charcoal and

burned earth is evident in the north wall profile, it is not distinct or particularly informative. A burned earth concentration, apparent on the profile drawing, was not as clear in the field and did not suggest a post mold, which might be expected if the fortification had a palisade.

Cultural material includes very small amounts of bone and burned earth, two scraps of copper, a maize kernel, and a small fragment of quartzite with a ground face. Also present were six small pot sherds, three of which have red slip. While not all sherds are slipped, they could be from a single vessel.

Artifacts were not equally distributed in the fortification but were concentrated in levels 100.70 to 100.60 and 100.50 to 100.40. Few artifacts were recovered from the first level below the surface. Possibly the fortification was constructed after the site had been occupied for some period of time, and the artifacts were village debris that was in surrounding soil that was used to build the fortification.

The 2013 trench needs to be reopened and expanded to 1 m in width and 10 m in length to better characterize the fortification construction. Deeper excavation should determine if the fortification was



Figure 5. View of excavation units across the fortification, looking east.

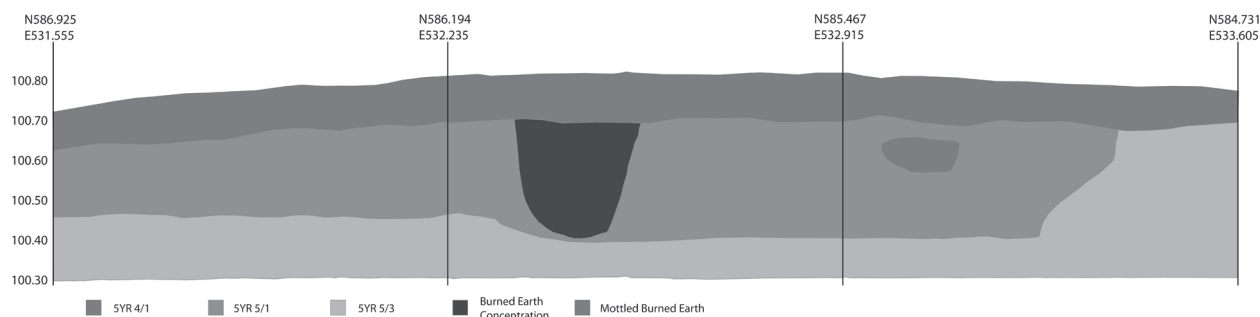


Figure 6. Profile of north walls of test units through the fortification.

built on a culturally buried A horizon, giving a better idea of when during the Pawnee occupation this feature was added.

POSSIBLE PIT FEATURE ANOMALIES

House 26 was not the only interesting anomaly revealed by the geophysical survey. Numerous areas of electrical resistance or magnetic contrast were evident throughout the site, suggesting the presence of previously undocumented features. To explore these, investigators established a 1-m grid in an area surrounded by Houses 12, 13, 4, 17, and 18 (Figures 1 and 7). In this locale were four clear areas of high electrical resistance with a signature characteristic of storage pits. Soil probes were taken at 1-m intervals on the grid (Figures 7 and 8). The ground was very dry and hard, causing equipment to break and making the task difficult in general. Consequently there was insufficient time to accomplish all of the planned probes.

Because the ground was so hard, a hammer was used to drive the probe to the desired depth of nearly 150 cm. As a result of the slow pace of work, only one of the high electrical resistance anomalies was sampled. Changes in sediment in the probe samples in and near the anomaly showed that sediments similar to the upper soil layer were present at significant depth near the anomaly. This suggests that a pit had been excavated in the past, but lack of time prevented a thorough investigation during the scheduled KAA event.

Chris Hord and Bob Hoard made another trip to the site two weeks after the testing. They implemented seven soil probes off the grid in the vicinity of the anomaly to the maximum depth that was practical. Evidence from the probes indicate

the presence of a pit. Specifically, probes outside of the anomaly (probes 32, 59, and 8 in Figure 9) presented a standard ABC soil profile, and the C horizon appeared between 75 and 95 cmbs. Colors and textures for the perceived breaks in stratigraphy noted in these probes concur with the Hastings soil description (Appendix 1). The probes had the advantage of being fresh when evaluated, unlike the test unit walls, which had been exposed for hours, scraped, and rewetted. In contrast the C horizon appeared at 140 cmbs in probes within the boundaries of the anomaly (probes 51, 57, 60, and 61 in Figure 9). Also, probes near the anomaly border had a darker, sometimes charcoal-mottled discontinuity between the B and C horizons, suggests the edge of a bell-shaped pit. The two probes near the anomaly's center showed no B horizon at all but instead revealed darker A horizon-type fill, as well as mottling and charcoal, which suggested feature fill, lying atop the C horizon. These probes confirmed that a pit is present and indicate that it is broader at the bottom ("bell-shaped"), a shape that is common for Pawnee storage pits. This also hints that the other three similar anomalies in the vicinity of the intensive probing also are storage pits; however, these, too, must be confirmed by testing.

CONCLUSION

The 2013 testing demonstrated that the 2007 geophysical survey provided significant new information about site 14RP1. Testing in the presumed house did not give substantial evidence supporting the anomaly as a house, although it identified a hearth in the middle of the house-shaped anomaly. While this lack of a distinct floor, post molds, and roof fall is disappointing, it also is informative. The

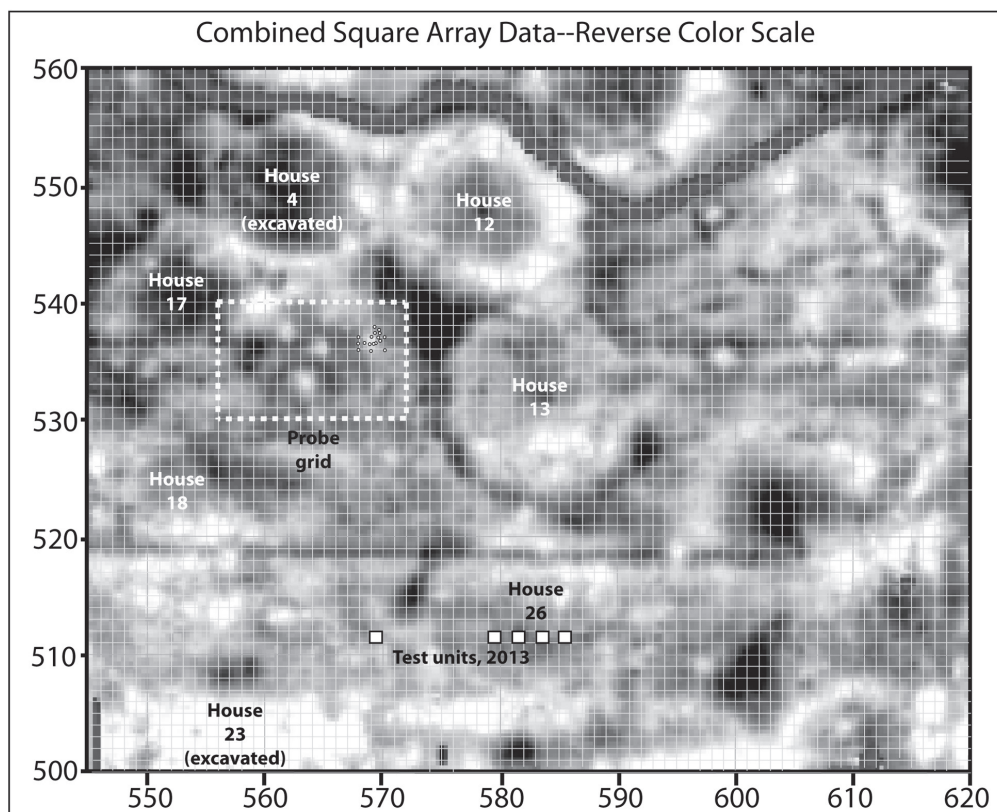


Figure 7. Results of the geophysical survey showing the locations of houses, as well as clusters of white anomalies suspected to be storage pits. A grid was established (white dashed line) to direct probing.

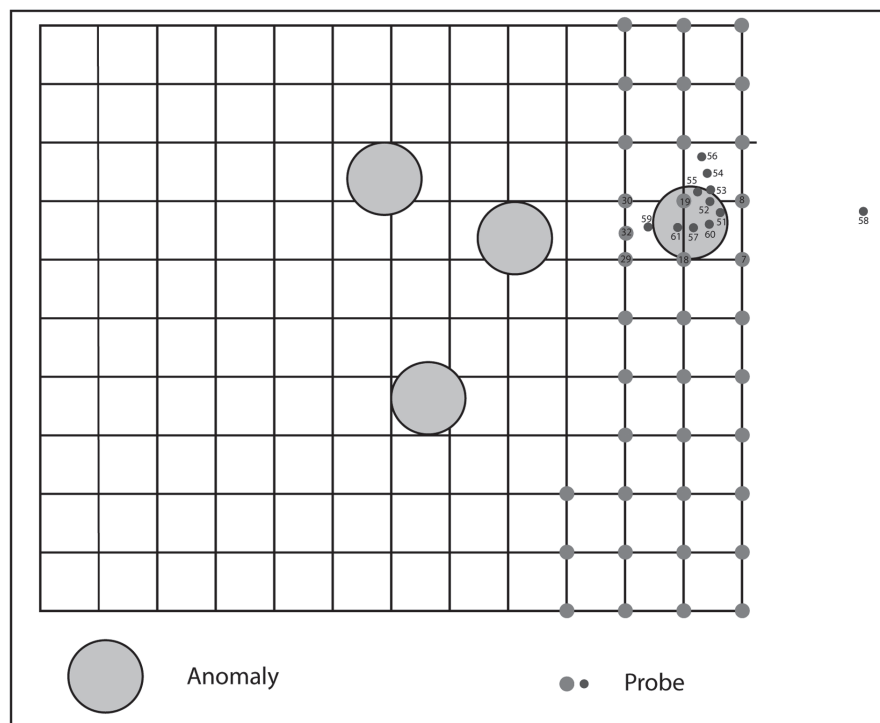


Figure 8. Expanded view of probing grid shown in Figure 7. Additional probes off the grid (right) were done to better define the anomaly.

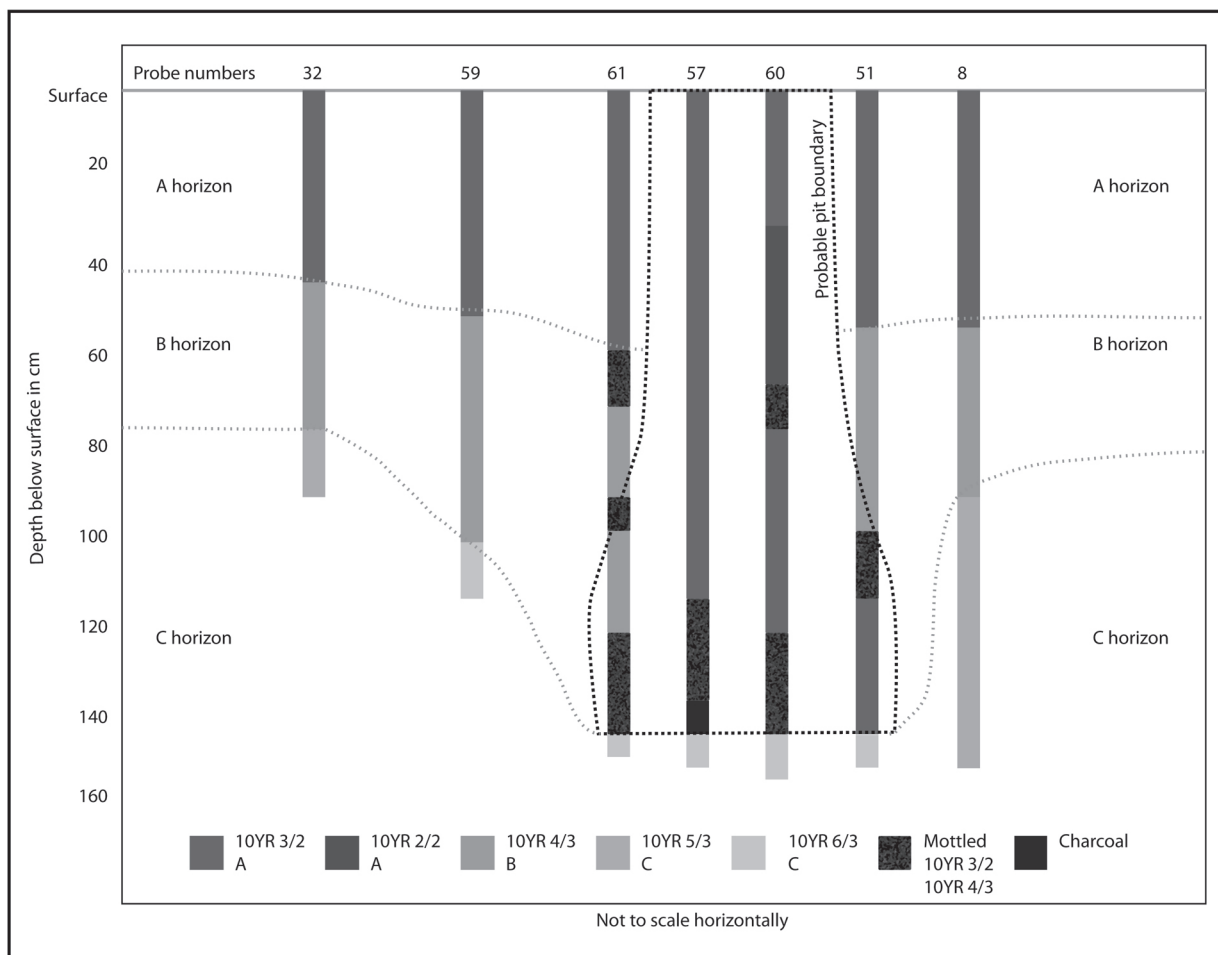


Figure 9. Seven soil probes across a resistivity anomaly that indicate a bell-shaped storage pit.

anomaly may, in fact, be a house. If so, it could signify that structures as substantial as earthlodges may not leave strong signatures under certain circumstances. Most earthlodges that are excavated have burned. The tested anomaly might be an unburned house that left a very light signature, lacking a baked clay floor and burned posts and rafters. Other anomalies recorded in Maki's 2007 investigation might be earthlodges, and these should be explored when time permits. Searching first for the hearth is productive, as a hearth is unambiguous. If a hearth is found, test excavations can center on it in search of supporting posts and interior pits.

There are many more anomalies that could be tested and have good potential to tell more about the structure and function of the village. Of particular interest is the presence of overlapping house floors, which could provide information about the

building sequence and length of site occupation. The confirmation that one of the many small circular high-resistivity anomalies is a bell-shaped pit is useful. Now a more expedient way to investigate anomalies has been developed: probe in the middle until the distinct C horizon is reached; then work away from it, noting any significant variation in the depth of the C horizon, the presence or absence of a B horizon, the depth of the A horizon, especially if there is a deep A-C contact, and the presence of cultural material. Not all pits at 14RP1 are trash filled, so this method will be useful in identifying pits without significant investment of time. Finally, still more work needs to be conducted on the fortification, including widening, lengthening, and deepening the existing test excavations. There is no hurry to gather this data; it can be acquired as time and resources become available.

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APPENDIX 1. HASTINGS SOIL SERIES DESCRIPTIONS

The stratigraphic characterization of the Hastings silt loam is as follows:

0 to 6 inches (0–15 cm): Silt loam
6 to 11 inches (15–28 cm): Silty clay loam
11 to 14 inches (28–36 cm): Silty clay loam
14 to 31 inches (36–79 cm): Silty clay loam
31 to 38 inches (79–96 cm): Silty clay loam
38 to 79 inches (96–200): Silt loam

Ap—0 to 15 centimeters (0 to 6 inches); dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; moderately acid; abrupt smooth boundary.

A—15 to 36 centimeters (6 to 14 inches); dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to moderate fine granular; slightly hard, friable; moderately acid; gradual smooth boundary. (Combined thickness of A horizon is 13 to 36 centimeters (5 to 14 inches).)

BA—36 to 51 centimeters (14 to 20 inches); grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic

structure parting to strong fine and very fine subangular blocky; hard, firm; dark colored coatings on faces of pedis; slightly acid; gradual smooth boundary. (8 to 15 centimeters (3 to 6 inches) thick)

Bt1—51 to 74 centimeters (20 to 29 inches); grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to strong medium and coarse subangular blocky; hard, firm; thin clay films on faces of pedis; slightly acid; gradual smooth boundary.

Bt2—74 to 94 centimeters (29 to 37 inches); brown (10YR 5/3) silty clay loam, light olive brown (2.5Y 5/3) moist; strong medium and coarse subangular blocky structure; hard, firm; dark coatings on faces of pedis; slightly acid; gradual smooth boundary. (Combined thickness of Bt horizon is 25 to 51 centimeters (10 to 20 inches).)

BC—94 to 122 centimeters (37 to 48 inches); pale brown (10YR 6/3) silty clay loam, light olive brown (2.5Y 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable; dark coatings on faces of pedis; slightly acid; gradual smooth boundary. (15 to 30 centimeters (6 to 12 inches) thick)

C—122 to 200 centimeters (48 to 80 inches); pale brown (10YR 6/3) silt loam, light olive brown (2.5Y 5/4) moist; massive; soft, friable; neutral.

A and Ap horizons:

Hue: 10YR

Value: 3 to 5 dry, 2 or 3 moist

Chroma: 1 or 2 dry or moist

Texture: silt loam or silty clay loam

Clay content: 23 to 32 percent

Sand content: 6 to 15 percent

Reaction: moderately acid or slightly acid

BA horizon:

Hue: 10YR

Value: 4 or 5 dry, 2 or 3 moist

Chroma: 1 to 3 dry or moist

Texture: silty clay loam

Clay content: 31 to 38 percent

Sand content: 5 to 12 percent

Reaction: moderately acid to neutral

Bt horizons:

Hue: 10YR or 2.5Y

Value: 5 or 6 dry, 3 to 5 moist

Chroma: 2 or 3 dry or moist

Texture: silty clay loam or silty clay

Clay content: 35 and 42

Sand content: 4 to 10 percent

Reaction: slightly acid to neutral

BC horizon:

Hue: 10YR or 2.5Y

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 2 to 4 dry or moist

Texture: silty clay loam

Clay content: 27 to 35 percent

Sand content: 5 to 12 percent

Reaction: neutral to moderately alkaline

C horizon:

Hue: 10YR or 2.5Y

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 2 to 4 dry or moist

Texture: silt loam or silty clay loam

Clay content: 20 to 30 percent

Sand content: 5 to 12 percent

Reaction: neutral to moderately alkaline

Comment: few, fine and medium, distinct, relict redoximorphic features having hue of 10YR, or 7.5YR, a value of 4 to 6 moist, and a chroma of 4 to 8 are present in the BC and C horizons; also few, fine and medium, prominent 10YR 8/1, rounded, carbonate concretions in C horizon in some pedons
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture (2014a and 2014b)

APPENDIX 2. ARTIFACTS RECOVERED DURING OCTOBER 2013 TEST EXCAVATIONS

Northing	Easting	Depth (cm) plus 100 m	Count	Weight (g)	Artifact
511	568	70 to 60		0.1	Burned earth
511	568	70 to 60	4	0.3	Miscellaneous stone
511	568	60 to 50		0.1	Bone fragment, burned
511	568	60 to 50	5	0.6	Miscellaneous stone
511	568	60 to 50		0.1	Charcoal
511	568	50 to 40		0.1	Bone fragment, burned
511	568	50 to 40		0.1	Bone fragment
511	568	50 to 40	1	0.1	Glass fragment, minute
511	568	50 to 40		0.1	Charcoal
511	568	40 to 30	1	1.5	Miscellaneous stone
511	579	81.2 to 70		0.1	Bone fragment, burned
511	579	81.2 to 70		3.6	Burned earth

Appendix 2. (continued)

Northing	Easting	Depth (cm) plus 100 m	Count	Weight (g)	Artifact
511	579	81.2 to 70	1	0.1	Debitage, Smoky Hill silicified chalk
511	579	81.2 to 70	3	0.6	Miscellaneous stone
511	579	81.2 to 70	1	1.3	Tooth fragment, Deer?
511	579	70 to 60		0.1	Bone fragment
511	579	70 to 60		0.2	Bone fragment, burned
511	579	70 to 60		5	Burned earth
511	579	70 to 60		7.7	Burned earth
511	579	70 to 60	1	0.1	Bead, glass, blue
511	579	70 to 60		0.1	Hematite
511	579	70 to 60	2	0.2	Miscellaneous stone
511	579	70 to 60		0.4	Charcoal
511	579	60 to 50		0.1	Bone fragment
511	579	60 to 50		0.1	Bone fragment, burned
511	579	60 to 50		7.3	Burned earth
511	579	60 to 50	1	0.1	Hematite
511	579	60 to 50	1	0.1	Debitage
511	579	60 to 50		0.3	Charcoal
511	579	50 to 40		0.1	Bone fragment, burned
511	579	50 to 40		0.1	Bone fragment, burned
511	579	50 to 40		0.3	Burned earth
511	579	50 to 40	4	0.5	Miscellaneous stone
511	581	81.8 to 70		0.2	Bone fragment, burned
511	581	81.8 to 70		0.1	Bone fragment
511	581	81.8 to 70	1	1	Pottery, body sherd, sand and grit temper
511	581	81.8 to 70		4.6	Burned earth
511	581	81.8 to 70		3.1	Burned earth
511	581	81.8 to 70	1	62.1	Sandstone fragment
511	581	70 to 60		0.1	Bone fragment
511	581	70 to 60		0.4	Bone fragment, burned
511	581	70 to 60		11.4	Burned earth
511	581	70 to 60	2	0.8	Pottery, body sherd
511	581	70 to 60	2	0.8	Pottery, body sherd
511	581	70 to 60	2	0.1	Hematite
511	581	70 to 60	1	0.1	Biface tip, quartzite
511	581	70 to 60	4	1.9	Miscellaneous stone
511	581	70 to 60		0.2	Charcoal
511	581	60 to 50		6.6	Burned earth
511	581	60 to 50		2.2	Burned earth
511	581	60 to 50	1	2.3	Iron scrap, strap
511	581	60 to 50		0.1	Hematite
511	581	60 to 50		0.1	Charcoal
511	581	57.1	1	1.8	Glass, flat
511	583	84.6 to 80	1	0.1	Iron scrap
511	583	80 to 70		0.4	Bone fragment

Appendix 2. (continued)

Northing	Easting	Depth (cm) plus 100 m	Count	Weight (g)	Artifact
511	583	80 to 70		2.1	Burned earth
511	583	80 to 70		0.5	Burned earth
511	583	80 to 70	1	0.1	Debitage
511	583	80 to 70	3	0.2	Miscellaneous stone
511	583	70 to 60		6.4	Bone fragment
511	583	70 to 60	0	3	Burned earth
511	583	70 to 60	1	0.8	Iron scrap
511	583	70 to 60	1	0.1	Miscellaneous stone
511	583	70 to 60		0.1	Charcoal
511	583	50.7	1	1	Daub
511	585	88.3 to 80	1	0.5	Pottery, body sherd, grit temper
511	585	88.3 to 80		0.3	Burned earth
511	585	80 to 70	1	1	Pottery, body sherd, sand temper
511	585	80 to 70		5.6	Burned earth
511	585	80 to 70	1	0.3	Copper scrap
511	585	80 to 70	1	0.1	Bead, glass, black
511	585	80 to 70	1	0.1	Bead, glass, black, tube
511	585	80 to 70	2	1.5	Debitage
511	585	80 to 70	2	0.1	Debitage, Smoky Hill silicified chalk
511	585	80 to 70	2	0.2	Miscellaneous stone
511	585	80 to 70		0.1	Charcoal
511	585	70 to 60		0.1	Bone fragment, burned
511	585	70 to 60		0.1	Bone fragment
511	585	70 to 60		2.4	Burned earth
511	585	70 to 60	1	0.2	Iron scrap
511	585	70 to 60	1	0.1	Bead, glass, black
511	585	70 to 60	1	0.1	Hematite
511	585	70 to 60	4	0.5	Miscellaneous stone
511	585	70 to 60		0.5	Charcoal
511	585	60 to 50		0.2	Bone fragment
511	585	60 to 50		0.6	Burned earth
511	585	51.1	1	2.7	Pottery, body sherd, sand temper, incised, red interior
511	585	50 to 40	4	0.4	Miscellaneous stone
511	585	50 to 40		0.1	Tooth fragment, rodent
Fortification test units					
Northing	Easting	Depth (cm) plus 100 m	Count	Weight (g)	Artifact
585.126	532.552	80.8 to 70	1	0.4	Pottery, body sherd, sand temper, red interior
585.126	532.552	70 to 60	1	1.4	Pottery, body sherd, sand and grit temper
585.126	532.552	70 to 60		0.1	Corn kernel, burned
585.126	532.552	63.1	1	2	Pottery, body sherd, sand temper
585.126	532.552	60 to 50		2.3	Bone
585.126	532.552	40 to 30	1	0.2	Pottery, body sherd

Appendix 2. (continued)

Northing	Easting	Depth (cm) plus 100 m	Count	Weight (g)	Artifact
585.126	532.552	40 to 30	1	0.4	Burned earth
585.859	531.876	79.4 to 70		0.6	Bone fragment, burned
585.859	531.876	70 to 60		1.2	Bone fragment, burned
585.859	531.876	70 to 60		0.9	Burned earth
585.979	532.062	61.8		3.3	Bone fragment
585.859	531.876	50 to 40	2	4.7	Pottery, body sherd, red slip
585.859	531.876	50 to 40	1	16.2	Miscellaneous stone
585.859	531.876	40 to 30	1	0.2	Copper scrap
585.817	532.164	38.2	1	1.5	Copper scrap
586.59	531.185	70 to 60	1	25	Miscellaneous stone
586.59	531.185	60 to 50	1	0.9	Bone fragment
586.59	531.185	50 to 40		0.7	Bone fragment
586.59	531.185	50 to 40	1	4.4	Ground stone, quartzite
586.541	531.76	70 to 60	1	9.4	Pottery, body sherd, grit temper, red interior slip

THE SEARCH FOR THE PAWNEE INDIAN WHITE FOX'S REMAINS: A SWEDISH REPATRIATION STORY

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In 2004 the authors were elected repatriation representatives for Sweden by the Pawnee Nation of Oklahoma Business Council to search for the remains of White Fox, a tribal member who died in Sweden in 1875. The project spanned close to a decade and took them to archives in many institutions and even into a forensic examination of specimens at the Karolinska Institute in Stockholm. Although the skeletal remains of White Fox have not yet been located, the cooperation of the Pawnee Nation, a number of Swedish academics, and the Swedish government represent an unprecedented collaboration.

In early January 1875 a very unusual patient was admitted to the Allmänna och Sahlgrenska Hospital in Gothenburg, Sweden. Patient No. 194 was listed as White Fox, Indian, 28 years of age, and from Nebraska (Figure 1). No admittance date was given, but the hospital bill had been paid for a six-day period. The fee was two riksdaler a day, and the payee was a Mr. Haglund. The journal stated that White Fox died on January 10, 1875, and the death certificate gave the time of death as one o'clock in the afternoon. The cause of death was specified as tuberculosis of the lungs. As in most writings of the time about White Fox, the Sahlgrenska Hospital death certificate pointed out that he was not "only" an Indian, but his Pawnee tribal affiliation was listed (Sahlgrenska Hospital 1875a, 1875b). His Pawnee name, *Kee-wuck oo-Tah-Kah*, was included on the death certificate (Figure 2). However, instead of his two fellow Pawnees getting permission to bury him, he ended up as a research object and a display item in an ethnographic exhibition.

So who was White Fox, and how did he come to die in a Swedish hospital and then end up on a dissection table in Stockholm, Sweden? The authors first encountered White Fox when visiting the Ethnographical Museum in Gothenburg

in the summer of 1999, where a postcard with his photograph was on sale. Wondering what had brought him to Sweden, they started looking into his story—and what a journey it turned out to be. As the research started to develop, they applied to the Pawnee Nation of Oklahoma for permission to look into White Fox's story, and this was granted in a resolution, dated February 18, 2004, from the Pawnee Business Council (2004; George Howell, president of Pawnee Nation Business Council, Pawnee, Oklahoma, to Eva Maria Olsson-Barton and Lewis Nisbet Ballantine, letter, 9 December 2014, Olsson-Barton personal archives).

This article gives a resume of White Fox's final days in Sweden before his death in 1875, starting with his visit to Linköping in January 1875. It concentrates on what happened to his body after his death, on the role played by the Pawnee Nation and the authors as their Swedish representatives in the search for any remains, and on the 2010 investigation in Stockholm.

THE PAWNEES IN SWEDEN

In 1874–1875 White Fox and two other Pawnee Indians, White Eagle and Red Fox, were



Figure 1. Photograph of White Fox with his shirt on display in the short-term exhibition, "Märkvärdigheter," at Vänersborgs Museum, Vänersborg, Sweden. Photograph ©Lewis N. Ballantine, published with permission of Vänersborgs Museum.

performing in Oslo (then Kristiania), Norway, and in Copenhagen, Denmark, before arriving in Sweden. It has been inferred that White Eagle and Red Fox were brothers (Blaine 1997). Apparently they caused quite a stir on their travels, and it is even written that they had a certificate of authenticity from the American Minister in Stockholm, Christopher Columbus Andrews (Johansson 2002). Andrews was born in 1829 in Hillsborough, New Hampshire, rose to the grade of Major General during the Civil War, and in 1869 was appointed American Minister for Sweden and Norway, based in Stockholm, a post he held until 1877 (*Nordisk Familjebok* 1926:991).

On the first day of January 1875, White Fox, Red Fox, and White Eagle, reached Linköping,

Sweden. The following item appeared in *Östgöta Correspondenten* (1875a) on that date, advertising their arrival: "The Indians. In Linköping for the first time. Saturday 2nd and Sunday 3rd from 6–10 p.m. the American Indians of the Pawnee Tribe will be shown in the Workers' Union Hall. The tickets are 50 öre per person and 25 öre for children." (An öre is a penny.) However, according to an article in the same paper a few days later, it seems that all was not well within the group. It reports that some unrest took place, as one of the performers fell out with the others and wanted to leave the performance—something they did not agree to. Even so, the performance was cancelled, and someone tried to find a sledge to take the Pawnees to their lodgings. As this was not successful, the three walked home

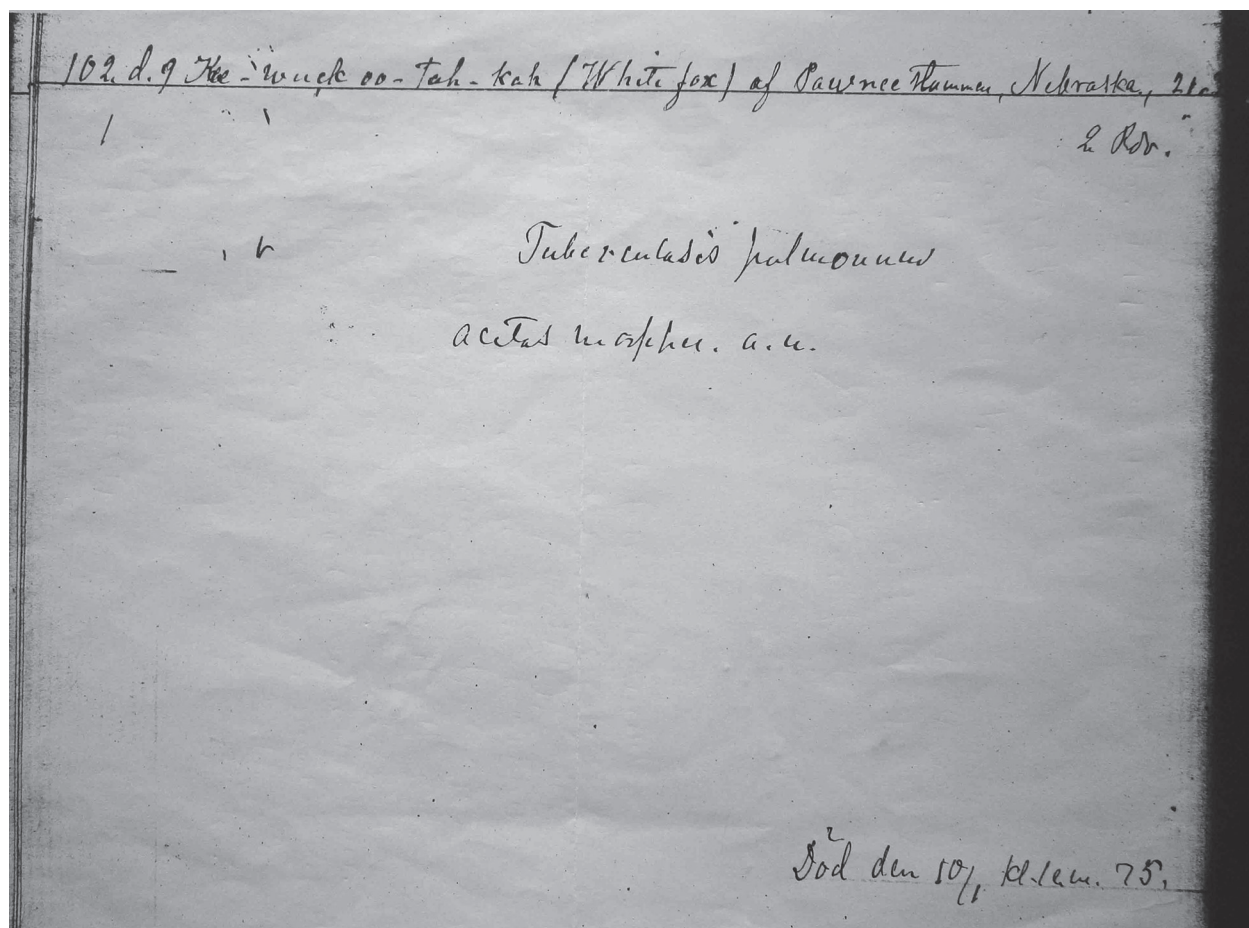


Figure 2. White Fox's death certificate, published with permission of the Regional and City Archives, Gothenburg, Sweden.

in the company of the caretaker of the hall, their manager, and a police constable, who was called to keep the pushy spectators at a distance (*Östgöta Correspondenten* 1875b). Nothing was mentioned as to which one of the Pawnees wanted to leave. Perhaps one might guess that it was White Fox, feeling too ill to perform that night; after all, he did have only 10 more days to live.

The Workers' Union in Linköping was founded in 1866 and, as it grew, so did the need for localities (Stern 1946). They were helped out by the hotelier, Mr. A. P. Andersson. He had buildings for his staff to stay in. One of these buildings is preserved in Linköping's Old Town (Figure 3). Maybe White Fox and the other two Pawnees stayed in this house during their visit. According to reports of the time, the weather was cold on the first of January, down to -5°C , and it snowed between January 2 and 5 (Hans Alexandersson, Swedish Metrological

and Hydrological Institute (SMHI), Gothenburg, Sweden, to Eva Maria Olsson-Barton, letter, 12 October 2004, Olsson-Barton personal archives). The house with its walls of timber, its dark and dank interior, and a wood burner as its only source of heating must have taken its toll on the sick White Fox.

After the visit to Linköping, the group took the train to Gothenburg, which would have been a cold and long journey, as it was snowing in Gothenburg also. They must have had a very tight schedule with their first performance on January 6. In *Göteborgs Handels-och Sjöfartstidning* (1875a) the following item appeared on January 7, 1875: "The Indians: As from Wednesday the 6th and until further notice, daily from 6 p.m.–9p.m. these will be on show in Mr Haglund's annex (formerly Bloms hotel . . .). The Indians are from the Pawnee Tribe. Tickets at 1kr for the adults and 50 öre for children will be on



Figure 3. Red timber building in Linköping's Old Town, built by Mr. Andersson for his staff. Photograph © Lewis N. Ballantine.

sale at the entrance.” The advert ran for several days with the addition “. . . they appear in their National costumes and perform dances and songs and also show their ability to shoot with bow and arrow.” Photos of White Fox, White Eagle, and Red Fox were sold at the price of 1 krona each (Johansson 2002). Bloms Hotel was a well-known venue and put on shows like “The Giant Lady” and performances involving acrobats and clowns. However, it was also a place for more formal events like high-society balls (Kranz 1954). It is interesting to note that, even though the three Pawnees apparently were organized by two white gentlemen, the hospital bill was paid by Mr. Haglund, the hotel owner.

In this damp and chilly January tuberculosis finally caught up with White Fox. The skies were cloudy, the humidity high, and the temperature stayed just below zero C. There might also have been soggy remnants of the recently fallen snow.

Tuberculosis probably did not exist in America before the arrival of European settlers. Due to lack of resistance, the disease spread rapidly among the native peoples. Hrdlička (1909:31) stated, “In a tribe such as the Sioux it would be very difficult, if not impossible, to find a family in which there have not been tuberculous individuals, some of whose progeny are congenitally predisposed to the disease.” In 1904 the Pawnee Agency in Oklahoma estimated that cases of pulmonary tuberculosis were 8.2 per 1,000 population. As a general observation tuberculosis of the lungs was probably the most common form of the disease, and Native Americans were especially susceptible. “Some of the most dreadful manifestations of tuberculosis susceptibility . . . in populations compelled to change suddenly their ancient ways of life are to be found among the Indians of North America” (Dubos and Dubos 1952).

The fact that White Fox was ill was mentioned in the press of the day. On January 20, 1875, *Norra Hallands Tidning* (1875) reported, “. . . on arrival here from Linköping one of the faraway guests was found to be suffering from an illness . . .,” while *Göteborgs Handels-och Sjöfartstidning* (1875b) stated on January 16, 1875, “one of the . . . strangers was found to be suffering from a disease and was therefore admitted to the Sahlgrenska Hospital where he died . . .”

The Sahlgrenska Hospital where White Fox finished his life on that cold January day was a fairly new building that had been inaugurated in 1854, replacing two previous venues. Today’s Sahlgrenska Hospital is housed in large, modern units elsewhere in Gothenburg, but the building where White Fox died still exists. After having been used as a health clinic and dental surgery, it now houses one of many institutions of the University of Gothenburg.

From the death certificate it is clear that White Fox must have been in much pain, as he received injections of morphine, a common treatment for this type of illness at the time. It must have been hard for Red Fox and White Eagle to lose the third member of their group, and they were keen to take care of his remains. On January 16, 1875, *Östgöta Correspondenten* (1875c) cited *Göteborgs Handels-och Sjöfartstidning*: “Both remaining [Pawnees] are likely to demand that they be allowed to bury their friend in accordance with their tribe’s unusual

customs, but no decisions have yet been taken regarding this or where he will later be buried.”

At this time when touring groups of Native American Indians, either with a promotor or as part of a circus, were not uncommon in Europe, there were regularly deaths among the performers (Moses 1999). The deceased were buried in churchyards of the country they were visiting at the time of death. They were, however, not the first visitors to Europe. In the years after Columbus’ arrival in the New World, “a number of Indians were carried to Europe for the ostensible purpose of serving as guides for later expeditions after they had learned the language of their abductors” (Foreman 1943:xviii). As early as March 21, 1617, Pocahontas, was interred in the churchyard in Gravesend, England (<https://en.wikipedia.org/wiki/Pocahontas>). A small baby, the child of an Iowa woman belonging to a group that arrived in England in 1843, was buried by Quakers in Newcastle-on-Tyne. The grieving mother was later to die of “quick consumption” while in Paris, France, and was buried there (Foreman 1943:191). Long Wolf, a Sioux Chief traveling with Buffalo Bill’s Wild West Show, caught bronchial pneumonia and was buried in Brompton Cemetery, London, England, on June 13, 1892, together with a 17-month-old Sioux baby named White Star (https://en.wikipedia.org/wiki/Brompton_Cemetery). Long Wolf’s remains were repatriated and buried in the Wolf Creek Cemetery at Pine Ridge, South Dakota, in 1997. Another man traveling with Buffalo Bill, Surrounded by the Enemy, is rumoured to have been buried in Salford near Manchester, England, in 1887 (<http://www.dailymail.co.uk/news/article-475572>). White Fox, however, was not to be given a funeral, Christian or otherwise. The article from *Östgöta Correspondenten* (1875c) continued: “According to what is being told, the authorities of medical science in Stockholm have been asking if they could receive the corps of the unusual stranger.”

How the news of White Fox’s death reached Stockholm is not known. At that time the Swedish population was small, and the groups of academics and researchers, some of them members of the nobility or of rich and influential families, were even smaller. The very influential Dickson family with roots in the Scottish lowlands lived in Gothenburg. Business had brought them to Sweden,

where they made their fortune. They started the first library in Gothenburg in 1866 and were involved in social reforms for the poor. They also helped finance the André Polar Expedition of 1897.¹ Charles Dickson, a family member at the time of White Fox’s death, was a doctor. That there was some connection to the family can be inferred from the following notice, which appeared in *Göteborgs Handels-och Sjöfartstidning* (1875c) on March 6, 1875: “Bequests to the Gothenburg Museum during Jan. and Feb. 1875: From Foundry Proprietor etc. James J:son Dickson a costume, consisting of a tunic and leggings from deer hide, with bead embroideries and attached strands of hair etc. worn by the in Gothenburg deceased indian of the Pawnee-tribe, Kee-wuch-oo-ta-kaa or White fox.” Had anyone owned a telephone at this time and contacted the relevant authorities in Stockholm, it would have been the Dicksons. In addition there was a law, existing well into the 1950s, which stated that those who died in prison or in other types of institutions and whose family members did not claim them or had no means to pay for a funeral, be sent to one of the anatomical institutions to be studied. This, in fact, possibly made the appropriation of White Fox’s remains illegal, as he had two close friends, who might have been relatives, claiming his remains in order to bury them. If they were unable to pay for a funeral, it is surprising that their manager did not help. The bodies to be despatched to institutions at this time were packed in boxes and coffins and transported to their destinations by train, wagon, or steamship. In 1884 by law these boxes had to be marked “objects of natural history.” They had to be accompanied by documents to be stamped by railway staff and police (Åhre’n-Snickare 2002). As a direct train connection existed between Gothenburg and Stockholm, it is assumed that White Fox’s remains were brought to Stockholm by train. January is a cold month in Sweden, which must have made it easier to transport the body, but possibly it was prepared in Gothenburg. If the body were to be used for anatomical dissections/teaching, it was prepared by an injection of formalin; if it were to be kept for some time, a formalin bath could be used (Eva Ahlsten, Museum of Medical History, Uppsala, Sweden, to Eva Maria Olsson-Barton, letter, 19 January 2004, Olsson-Barton personal archives).

Who then were the people in Stockholm eagerly awaiting White Fox's arrival? One can imagine that the excitement of being able to study something as unusual as these foreign remains must have caused a great deal of excitement. This was a time when faster travel to far distant lands had made the study of foreigners possible and also made it easier for outsiders, like the Pawnees, to visit. In Sweden at this time, increased interest in one's own national identity also led to the interest in the study of other peoples and races, which took the shape of less savory interests like craniology and the study of "race."

The Anthropological Society in Stockholm was founded in 1873 by four young scientists: Anders Retzius, anatomist and physiologist; Hjalmar Stolpe, ethnographer and archeologist; Hans Hildebrand, archeologist; and Oscar Montelius, archeologist (Ljungström 2004). In addition, Gustaf von Dueben, professor of anatomy and physiology at the Karolinska Institute, was in Stockholm. Founded in 1810, the Karolinska Institute is the third oldest medical school in Sweden (the older two being Uppsala University, founded in 1477, and Lund University, founded in 1666). Today it is one of the largest and most prestigious medical universities in the world. The Karolinska University Hospital is associated with the university as a research and teaching hospital ([https://en.wikipedia.org/Karolinska Institutet](https://en.wikipedia.org/Karolinska_Institutet)). Professor von Dueben himself is known primarily for his comprehensive work on the Swedish Sami people of northern Europe, published in 1873. His wife Lotten took many photographs of Samis, and two photographs of the deceased White Fox, which were found in the Hagströmer Library of Medical History in Stockholm, are probably her work.

Upon arriving in Stockholm, White Fox's remains ended up at Professor von Dueben's dissection table. His dissection report (von Dueben 1875) is kept in the Hagströmer Library of Medical History in Stockholm. As expected, it is very clinical, detailing that White Fox was 165 centimeters tall and very slender, but also very emaciated by tuberculosis, which had started to spread to the rest of his body. When describing the hands and feet, Professor von Dueben refers to the fact that plaster casts of these body parts were made. In addition, at least two plaster casts of White Fox's torso were made (Stolpe 1878). One would be covered by

White Fox's skin, taken from his dead body. At this time plaster cast busts became popular, and the anatomical institutions had big collections. What was strange was the fact that one of the White Fox busts was covered by his own skin (Ljungström 2004).

The professor also seemed to take an interest in the Pawnees as a people. A letter to him from Mr. Andrews, dated February 2, 1875, detailed some information about the Pawnees. He also collected notes with information from various sources, including writings by George Catlin (von Dueben 1875). This shows that Professor von Dueben was interested not only in the remains, but also in finding out more about White Fox's people and culture. Maybe he did this in preparation for the presentation about White Fox that he gave at the Anthropological Society's meeting on March 13, 1875. However, the remains were already known to the society, as an account of its January 16, 1875, meeting stated, "Herr von Dueben invited the society's members on Tuesday 19th January at 1–2 o'clock midday to the Karolinska Institute to look at the dead body of the indian White Fox." The minutes from the March meeting stated that Professor von Dueben "demonstrated the plaster cast of the bust and preparations [what kind is not mentioned—possibly the plaster casts and the bust] of the Pawnee indian which January last was acquired for the Institute's collection, while underlining the characteristics which in general signify the Indians of north America in this respect." White Fox did have company at the institute, as the professor also showed a mummy, possibly from Lima, Peru, from the Karolinska Institute's collections (Asp-Romefors 2004).

In 1877 the Swedish Society for Anthropology and Geography broached the idea of a museum of its own. Mr. Stolpe was put in charge of organizing an exhibition. In 1878 the Allmänna Etnografiska Utställningen (General Ethnographical Exhibition) opened in Stockholm. It included exhibits from all over the world with White Fox included in the North American section. Listed in the exhibition catalogue (Stolpe 1878) as part of the Royal Karolinska Institute's Anthropological Collection, presumably on loan to the exhibition, was "Torso of plaster cast of the in Gothenburg deceased Pawnee-indian Keewuchotaka or White Fox" and "D:o (ditto) covered by the skin of the same indian." White Fox's clothes, moccasins, and necklace were shown in

the same exhibition. The latter must have been on loan from the Gothenburg museum, as an inventory of items, written in beautiful handwriting by a Mr. G. Brusewitz, lists them as “The in Gothenburg in the year 1875 deceased White Fox’s clothes and moccasins” (Brusewitz 1870). An 1887 catalogue of an ethnographic exhibition in Gothenburg listed White Fox’s torso as one of the exhibits. How it came to be there, how it was returned to Stockholm, and how it ended up at the Karolinska Institute are not known. However, Professor Anders Retzius, an avid student and collector of crania, had his own collection at the institute, and perhaps the bust was left there after the exhibitions.

On June 19, 1994, the then Etnografical Museum, now called the Museum of World Culture, in Gothenburg, celebrated the inauguration of its new location with an exhibition of its unique collection of 2,000-year-old Paracas textiles from Peru. As White Fox’s regalia were in the museum’s collections, it was decided to include them in the exhibition to honor what was assumed to be the first Native American to visit Gothenburg, even though there is no proof that White Fox and the two other Pawnees were the first. Ms. Katarina Moro, B.A. in textile sciences, then working at the museum as a project assistant involved with the main exhibition, became very interested in White Fox’s story and started a search of her own. This led her to the Karolinska Institute, where the question eventually made its way to Professor Sten Grillner, who was in charge of the institution for neuro science, into which the institution for anatomy had been incorporated (Katarina Moro, personal communication 2015). At first it was assumed that any remains had been destroyed in 1892, when a fire destroyed Professor Retzius’ collection. However, further searches indicated that the anatomical institution collections might contain remains connected to White Fox that had been saved from the fire. A strange bust was recognized as a plaster cast, covered with a skin, as that of White Fox. Ms. Moro was contacted; she travelled to Stockholm to meet with Professor Grillner and Professor Emeritus Gunnar Grant and was shown the bust. Both the U.S. Embassy in Stockholm and Mr. Roger Echo-Hawk of the Pawnee Nation were informed, the latter by post by Ms. Moro (Katarina Moro to Roger Echo-Hawk, letter, 7 December 1994, Etnografical

Museum, Gothenburg, Sweden). Needless to say, the Pawnee Nation demanded that the remains be returned. In order to be sent back, permission to remove the remains from the institute collection had to be obtained. This was given by Mr. Thomas Adelcreutz, then departmental lawyer at the Swedish National Heritage Board, on July 4, 1994. In order for the skin to be admitted into the United States, a certificate attesting that no contagions were present in the skin was necessary, and this was issued by a doctor attached to the Karolinska Institute. Finally, Professor Grillner broke the plaster cast, wrapped the human skin in a piece of velvet, and packed it into a small box, which was collected for transportation to the United States initially by Ms. Mia Elmsäter, who has personal connections to the Pawnee Nation (Olsson-Barton and Ballantine 2005). The remains were delivered by Ms. Elmsäter to the American Embassy in Stockholm and brought back to the United States by courier, organized by the embassy (Johansson 2002).

Once back in Pawnee, Oklahoma—ironically a place where White Fox never lived—the remains were buried in the repatriation section of North Indian Cemetery in Pawnee, and eventually a powwow was arranged in his honor. As he was a Pawnee scout, the then-president of the Pawnee Business Council, applied to the U.S. Army for a veteran’s gravestone, which was granted (Figure 4) (Marshall Gover to U.S. Department of Veterans Affairs, Washington, D.C., draft letter regarding government headstone for White Fox’s grave, 1 February 1999, Olsson-Barton personal archive; *Arbetet* 1994).

Knowing that the bust had been returned to Pawnee, the authors, with permission from the Pawnee Nation, concentrated on finding out if any other remains of White Fox might exist in a museum, university collection, or storage in Sweden. One evening Swedish television broadcast a program that dealt with, among other things, craniology and relevant collections of the time, including some items from the Retzius collection that were saved from the 1892 fire. The program was presented by Professor Emeritus Ebba Dunge (now deceased) of the Osteoarchaeological Research Laboratory at the University of Stockholm. The authors contacted her to find out if any remains of White Fox might be in the collection. Associate Professor Jan Storå



Figure 4. White Fox's grave, North Indian Cemetery, Pawnee, Oklahoma. Photograph © E. M. Olsson-Barton.

from the same institution became the authors' contact. In June 2005 he informed them that a preparation of a torso fitting the description of White Fox had been found in a storage facility in Stockholm. Professor Storå himself, Professor Dunge, Professor Grant, and a colleague of theirs, Ms. Petra Molnar, promptly viewed the preparation. After quick visual inspection, they concluded that it could not be White Fox because the preparation, otherwise skinless, had ears and a nose, which White Fox's skin also had. To dismiss the possibility of the remains being those of White Fox, based on a mere visual inspection, did not feel acceptable. After all, a taxidermist of the day could easily have manufactured ears and a nose. An instance of this being done is found in the description of El Negro, the African

stuffed bushman, once kept in a Spanish museum: "The soft parts . . . were replaced by other materials" (Olsson-Barton and Ballantine 2007, 2009). As the authors did not reside permanently in Sweden then, some time passed until they could go to Stockholm and meet with Professor Storå and Professor Grant, who showed them photographs and some measurements of the preparation in comparison with photographs of White Fox, taken before he died. The examination did not prove that these were **not** the correct remains. The authors were not shown the preparation itself, and as neither inspection was deemed conclusive by the Pawnee Nation and the authors, they jointly decided to take the question further.

In 2007 on behalf of the Pawnee Nation, a

repatriation request was sent to the then Minister for Culture, Ms. Anna Adelsohn-Liljerot (Olsson-Barton and Ballantine 2007, 2009). Apart from the authors' letter, the packet included letters from Mr. George Howell, then president of the Pawnee Nation Business Council; Mr. Francis Morris, then coordinator of the Repatriation Program for the Pawnee Nation; and Mr. Walter Echo-Hawk, legal counsel to the Pawnee Nation Repatriation Office and at the time also working for the Native American Rights. Permission to carry out an in-depth investigation, which did not include permission for any research for scientific reasons alone, had been given by the Pawnee Nation, and it was deemed necessary to request that a computed tomography (CT) scan of the remains be done during the investigation. Letters from Dr. William Billeck, program manager, Repatriation Office, Natural Museum of Natural History, Washington, D.C., and Dr. Caroline Wilkinson, then senior lecturer in forensic anthropology at the Centre for Anatomy and Human Identification, University of Dundee, Scotland, attested that this procedure can prove a valuable help in identifying this type of remains (Olsson-Barton and Ballantine 2010).

And then absolutely nothing happened.

Time rolled on, and the authors waited. In 2009 a shorter version of the request was submitted (Olsson-Barton and Ballantine 2009), and things started to move. After having been bounced back and forth between the Department of Culture and the Ministry of Education and Research, both in Stockholm, the request finally landed on the table of Dr. Per Klingbjer, then the deputy director for the department at the Ministry for Education and Research that handles questions relating to the University of Stockholm, as the Osteological Research Laboratory there was involved. After Dr. Klingbjer had put in considerable work on behalf of Pawnee Nation and the authors as its representatives, the enterprise was successful. Toward the end of 2009, a confirmation was received that "in November 2009 the Swedish Government decided to give Stockholm University, in consultation with the Karolinska Institute, the task to undertake analysis of remains stored in the Stockholm County Council's magazine in Tumba in order to investigate whether the collection might contain

the remains of the Pawnee Indian White Fox, who died in Sweden in 1875" (Per Klingbjer, Division for Higher Education, Ministry of Education and Research, Stockholm, Sweden, to Eva Maria Olsson-Barton, letter, 21 June 2010, Olsson-Barton personal archives). In the Government's Resolution II:3 from the Ministry of Education, Appendix 38, dated November 12, 2009, which deals with Swedish government decisions regarding the allocations of funds to universities, high schools, etc., ap. 21, #20 stated, "The Government instructs Stockholm University in consultation with the Karolinska Institute to carry out analyses of the preparations kept in the Stockholm County Council's magazine in Tumba, to investigate if the remains come from the Pawnee Indian White Fox. In order to carry out the task, Kammarkollegiet (Administrative Services Agency) shall as soon as possible pay 100.000 kronor to the University of Stockholm. A report of this task is to be handed in to the Regeringskansliet (Government Offices) no later than 1st April 2010" (Swedish Government Department of Education 2009).

On December 17, 2009, the Vice-chancellor of Stockholm University decided that the Department of Archaeology and Classical Studies would be in charge of the project with Professor Storå of the Osteoarchaeological Research Laboratory as its leader. His report on the investigation stated, "Through additional information sent from the government offices of Sweden it had become known that the Pawnee Nation of Oklahoma wished for their Tribal Representatives in Sweden—i.e., Olsson-Barton and Ballantine—to take an active part in the project" (George Howell, president of Pawnee Nation Business Council, Pawnee, Oklahoma, to Eva Maria Olsson-Barton and Lewis Nisbet Ballantine, letter, 9 December 2014, Olsson-Barton personal archives; Storå 2010). The task of the first meeting in January 2010, in which the authors chose not to take part for practical reasons, was to get in touch with the Karolinska Institute to plan for the investigation. Various ideas for the way forward were laid out in mail from Professor Storå (Jan Storå to Eva Maria Olsson-Barton, letter, 10 January 2010, Olsson-Barton personal archives), and it was suggested that the authors bring an anthropologist as an independent advisor. The

authors chose Mr. Geoffrey Metz, then senior curator at Museum Gustavianum, Uppsala University, Sweden, an Egyptologist and mummy expert.

The initial investigation procedure took place in Stockholm over two days. On February 1, 2010, the group convened in the archives of the Swedish Museum Services facilities in Tumba near Stockholm (Figure 5). An investigation of the preparation was carried out after it had been brought out of storage and placed in a room set aside for the purpose. Present were Professor Emeritus Grant and Associate Professor Olof Ljungström from the Karolinska Institute, Associate Professors Storå and Anna Kjellström from the University of Stockholm, Senior Curator Metz of Uppsala Universitet, and the authors as tribal representatives for the Pawnee Nation. A lively discussion followed the presentation of the preparation. As no conclusive decision was reached and there was a request for a CT scan from the Pawnee Nation, it was decided, despite some resistance, that this should be done.

The preparation was taken to Uppsala by Mr. Metz and then on March 9, 2010, on to the Akademiska Hospital in the same town, for CT scans. Three dimensional reconstruction images were produced by Mr. Metz in addition to a 3D surface model. A full technical description of the scan and the following workings were included in the final report (Storå 2010).

A second search of the storage facilities in Tumba was carried out on February 3, 2010, by Professors Storå, Ljungström, and Kjellström, and the authors. In addition Mr. Lars Helin, Secretary for the Unit for Cultural Affairs attached to the Director's Office of the Karolinska Institute, and Ms. Jennie Magnusson, archivist from the Swedish Museum Services in Tumba, were present. A large number of storage boxes were checked. None of them contained any skeletal or other material that could be attributed to White Fox. Four full skeletons in the storage were investigated. Two were labelled "Swedish," and the remaining two did not fit the measurements, given



Figure 5. Stockholm City Council's storage facilities, Tumba, Sweden. Photograph © Lewis N Ballantine.

by Professor von Dueben's notes on White Fox. In addition, soft tissue and specimens in storage jars were examined, but no connections to White Fox were found (Storå 2010).

In addition in-depth archival searches were carried out by Mr. Helin and Professor Ljungström of the Karolinska Institute. The deposited archives of the Karolinska Institute 1810–1964 at the Swedish National Archive's Depot in Arninge were investigated, as were the manuscript collection that includes Professor von Dueben's personal archive of the Karolinska Institute, kept at the Hagströmer Library for Medical History in Stockholm and the records of the Karolinska Institute's anatomical collection, deposited alongside the actual collection at the Osteoarchaeological Research Laboratory of the University of Stockholm. Burial registers for four plausible Stockholm churches for the years 1875–1880 were surveyed. Despite a number of searches, nothing that could be connected to White Fox was found. A number of Swedish museums, including the Museum of World Culture, the Museum of Medical History, which includes collections from the Sahlgrenska University Hospital, and the Gothenburg Museum of Natural History, all in Gothenburg, were contacted, but inquiries produced no further information about or connections to White Fox (Storå 2010).

On March 19, 2010, the research group convened in Stockholm for a final time. In the morning the authors met with Professors Storå and Ljungström and Mr. Metz at the Osteoarchaeological Laboratory for the latter's presentation of the CT scan results. Based on these results, which showed White Fox's (skeletal) facial features and dental status of his front teeth as compared to the existing photos of him, it was decided that the preparation could not be White Fox. Specifically, the preparation lacks most of the front teeth, and one front tooth protrudes in a way not seen in the photograph of White Fox (Figure 6). The final statement was, "We find the observations of the specimen convincing and have to conclude that the specimen cannot be the remains of White Fox" (Storå 2010). In the afternoon Mr. Helin and Professor Grant joined the group (Figure 7) at the Karolinska Institute for final discussions, and "the participants of the meeting agreed on the conclusions of the project that are presented here." That is to say, the preparation was not that of White Fox.

SUMMARY OF WORK

Work carried out is summarized as follows:

- Searched the archives of the Museum of Medical History, located in Tumba, Sweden;
- Investigated in detail a the upper part of a torso of a male individual and performed a CT scan of the same specimen;
- Conducted extensive archival studies at the Karolinska Institute and investigated burial registers from Stockholm for any references to White Fox;
- Contacted several other institutions in Sweden, inquiring about possible archival sources or remains that might be associated with White Fox.



Figure 6. Portrait of White Fox. Photographer unknown; published with permission of the Museum of World Culture, Gothenborg, Sweden.



Figure 7. Final meeting at the Karolinska Institute. Left to right: Lars Helin, Gunnar Grant, Geoffrey Metz, Olof Ljungström, Jan Storå, and Lewis N. Ballantine. Photograph © E. M. Olsson-Barton.

The role of the Swedish government in making possible the search for remains of White Fox is very unusual. An American Indian Nation, helped by two representatives residing in Sweden, who are in no way connected to any university, museum, or research facility, were jointly allocated money, paid directly to the relevant bodies, by the Swedish Government, for the investigation to be carried out. As far as can be ascertained, such a thing has not happened before or to date. Normally in this type of case, the repatriation request is sent directly to the government or to the research facility, museum, or university that holds the items, and these institutions in turn approach the government (Anna Beijmo, Regeringskansliet, Stockholm, Sweden, to Eva Maria Olsson-Barton, letter, 21 September, 2015, Olsson-Barton personal archives; Per Klingbjer, personal communication 2015).

In conclusion it can be said that at the time everything possible was done to find White Fox's remains in Sweden. To date no further trace of him has been found.

ENDNOTE

1. S. A. André was an engineer, who in the 1870s got interested in air balloons during a visit to America. This gave him

the idea to use this type of travel to get to the North Pole, which at this time had not yet been reached. He also had previous experience with flying balloons and arctic life, having spent a winter at Spetsbergen. In 1897 his balloon took off, after having been transported north by boat. The balloon, named *The Eagle* and its crew disappeared into the distance and were not heard of until 1930, when a Norwegian whaler found the remains of the crew in a camp at Vitön, east of Spetsbergen (https://en.wikipedia.org/wiki/S._A._André's_Arctic_Balloon_Expedition_of_1897).

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BOOK REVIEWS

Exploring Variability in Early Holocene Hunter-Gatherer Lifeways. STANCE HURST and JACK L. HOFMAN (editors). University of Kansas Publications in Anthropology No. 25, Lawrence, Kansas, 2010. vii + 166 pp., 87 fig., 23 tables, contributors, references cited. \$25.00 (paper). ISBN 0-938332-25-2 (paper). Reviewed by Jim D. Feagins, St. Joseph Museum.

Archeologists and the general public give much attention and interest to the first peopling of the Americas. This is true regardless of one's viewpoint as to who came first—Clovis people or humans before Clovis. However, compared to the earlier fluted point makers, later Paleoamericans (or Paleoindians) traditionally have been neglected. (The late Paleoindian period is geologically within the early Holocene epoch. This epoch continues still and is post-Pleistocene in age.) *Exploring Variability in Early Holocene Hunter-Gatherer Lifeways* has much to offer toward developing a better understanding of this important transitional time segment. The book deals primarily with relatively poorly understood post-fluted point technological complexes.

This volume is an outgrowth of an e-symposium, presented at the 71st annual meeting of the Society for American Archaeology at San Juan, Puerto Rico, in 2006. The symposium was organized by Stance Hurst and John Taylor-Montoya, with a goal of bringing together researchers from many regions of North America to demonstrate regional diversity during the late Paleoamerican period. "The goal of the symposium was to examine new data and theories as to why there was a diversification of projectile point styles, changes in mobility and settlement patterns, and the effects of environmental change on cultural adaptations during the very dynamic early Holocene period" (p. v). Most of those involved with the symposium continued their involvement until the fruition of this volume. Written in 9 chapters by 10 authors, *Exploring Variability in Early Holocene Hunter-Gatherer Lifeways* contains a diversity of approaches. The various authors, writing about

different regions, document sites and assemblages, build cultural chronology, and present a range of research foci and a nuance of interpretations.

"New Perspectives on Early Holocene Hunter-Gatherer Archaeology: An Introduction" is the title of the first chapter in which editors Hofman and Hurst introduce the other chapters and the general volume. They describe a dynamic period of cultural and environmental change, transitioning into the early Archaic period. Study of the early Holocene has been greatly aided by the refinement of radio-active dating and its increased usage. In addition, other more rigorous applications of scientific methods in general and a refinement of technological applications have been adapted to better understand ancient environments and cultures. This has allowed researchers to not only ask new and different types of questions, but also to collect new types of data to aid in obtaining answers. It is an exciting time to study the early Holocene.

Hofman and Hurst (p. 5) list the following "First Rules of Early Holocene Hunter-Gatherer Archaeology." These eight conclusions are a platform to build on as understandings of this period are better developed.

- 1.) There is no single unilinear sequence of Paleoindian and Archaic technologies between 10,000 and 8,000 RCYBP [radiocarbon years before present] for any major region of North America. 2.) During the early Holocene 10,000–8,000 RCYBP, there were multiple technological systems including distinctive projectile point styles in contemporary use in all or most regions of North America. 3.) The economies of early Holocene hunter-gatherers were diverse in terms of species utilized, but included regional, seasonal, and shorter-term situational specializations. 4.) Much of the variability in the hunter-gatherer mobile-sedentary spectrum . . . is probably expressed by early Holocene hunter-gatherers, though much remains to be documented. 5.) Intensive use of all productive ecological areas is evident and the mid-elevation hunting, which is well expressed during the mid-Holocene in the Rocky Mountains . . . may have begun during this time. 6.) All significant lithic source areas we

know of today . . . were in long standing use by the early Holocene period. 7.) Social networks were assuredly in place which enabled human groups to remain in mutually supportive contact, for information sharing, mate finding, and trade in economic and technological materials. 8.) The term late Paleoindian holds regionally distinctive applications, meanings, and assumptions, as does the argued or assumed relationships with earlier Paleoindian or subsequent Archaic cultural groups or techno-complexes.

As the title of the volume indicates, the authors attempt to identify and expound on information that shows variability in hunter-gatherer adaptations. These variations should be expected in different regions, as human groups adjusted to retreating continental ice mass and, with changing temperatures and other weather patterns, the resulting regional environments that ensued.

In the chapter, "Modeling Resource Procurement of Late Paleoindian Hunter-Gatherers: A View from Northwest Alabama," Kandace Hollenbach argues that gatherers (primarily women) were probably more important in selecting site locations and times of campsite movement than were the hunters (men). She uses botanical evidence from four late Paleoamerican to early Archaic, or "Paleoarchaic," rock shelters, claiming that the data they supply may be relatively typical of most open-air sites in the region. While her arguments are not exactly new, she does quantify the preserved wild plant remains and uses the "central place foraging theory" with a geographic information system to strongly suggest that gathering strategies might have played a more important role than hunting strategies in when and where campsites were moved. This would enhance gathering possibilities during certain times of the year—a periodic (often seasonal) mobility pattern. In the past archeologists have relied on projectile points and other hunting tools to evaluate site subsistence, thus ignoring the importance of gatherers (women, children, and old men) in group decision-making processes. Hollenbach presents an interesting and well-reasoned case study.

The next chapter by Frederic Sellet and James Donohue is titled, "How Late Is Late? An Investigation of Early Holocene Adaptations at

the Jim Pitts Site, South Dakota." The authors use findings from a stratified Paleoamerican site in the Black Hills to study changes in technology between a lower Goshen level and later deposits. The overall site contains points of Folsom, Agate Basin, Cody, and Allen types, in addition to Goshen. The authors are interested in changes in lithic technology and tool stone sources through time. They believe that the trend toward greater reliance on local materials was a gradual behavior that started prior to what is usually considered late Paleoindian time. This reviewer feels that their interpretation is not conclusive due to the small sample size and exclusive reliance on Goshen materials for the older sample from the site. Still, the authors may be correct, as that interpretation is beginning to be supported with evidence from elsewhere. The analysis of sites like Jim Pitts has much to offer toward helping to solve a variety of questions.

The subjects of the next two chapters overlap somewhat. Jason LaBelle wrote "ReOccupation of Place: Late Paleoindian Land Use Strategies in the Central Plains," and Matthew E. Hill, Jr. authored "Regional Differences in Great Plains Paleoindian Occupational Intensity and Duration." How do regional and temporal variations of chipped stone assemblages reflect the uneven geographic distribution of these sources? How did differing landscapes and environmental changes affect land use and subsistence strategies that, in turn, are reflected in these varying assemblages? The diversity and availability of resources strongly correspond with site size and duration, and good association exists between types of physiographic regions and how different cultures used the land. Paleoamericans readily adapted to changing environments and differing resource availability. They had to—or suffer the consequences!

A chapter titled "Discovering Identity-Based Foraging Territories on the Southern Plains 10,200–8,000 RCYBP" is written by Stance Hurst. His study of 793 late Paleoamerican projectile points suggests that increased population density, subjected to environmental change, caused groups to occupy smaller territories. Thus, there was a reduction of mobility, as reflected by the distribution of projectile point hafting styles and limited availability of certain raw materials for the manufacture of these points. This led to ethnically distinct hunter-gatherer groups,

occupying territories that were smaller but identified as their own. Various groups sometimes had differing mental templates as to variations of hafting elements on their projectile points. Hurst's useful chapter focuses on ways in which the archeological record can illustrate, at least coarsely, how early Holocene human groups cooperated—or not.

Neal Lopinot and Jack Ray are the authors of "Late Paleoindian Interaction and Exchange at the Big Eddy Site in Southwest Missouri." This excellent chapter uses data from the well-known deep, well-stratified Big Eddy site (14CE426), located in the western Missouri Ozarks. The authors have access to abundant, carefully controlled data, collected during multiple research seasons at the site. Abundant artifacts from the Dalton and San Patrice occupations are contained in a 45-cm-thick late Paleoamerican horizon. A range of finished tools, as well as many broken, worn out (exhausted), and in various manufacturing stages (preform rejects and failures), were recovered from both occupations. Artifacts were found both in horizontally distinct and overlapping areas, where they were intermingled in this horizon. To further support this contention, Lopinot and Ray state, "The co-occurrence of Dalton and San Patrice artifacts in at least one large discrete knapping pile likely indicates at least some occupational contemporaneity" (p. 119). A subset of the many radiocarbon dates for the site indicates that the late Paleoamerican occupation dates to ca. 10,500–9,800 RCYBP. The authors argue that the Dalton and San Patrice were occupying contemporaneous residential base camps at the Big Eddy site at least some of the time. The Ozarks are "home" to Dalton occupations. However, San Patrice points are quite rare in the northern Ozarks, being best known for occupying the Gulf Coastal Plain, mainly in Louisiana and adjacent states. Dalton site occupations in the Ozarks usually contain only relatively local cherts, as their territories tend to be localized. Many types of chert are available in most parts of the Ozarks. However, the Big Eddy site contains cherts that have a wider range of chert sources, including some from Kansas City and southeastern Oklahoma. Other investigators could argue that the varieties of chert sources represented at a site are a reflection of the amount of work done at a site. The larger the collection, the greater is the chance of more sources being represented. The authors

speculate/hypothesize that "... Big Eddy may have existed as a rare but sustained San Patrice trading outpost in a region dominated by Dalton" (p. 131). They present well-balanced arguments, as well as much useful information.

A chapter titled "Allen Complex Behavior and Chronology in the Central Plains" is written by Jack Hofman. He has performed a useful service by summarizing the Allen complex, especially incorporating recent information obtained from Kansas sites into a broader framework of the Central Plains. Allen points are concave-based, lanceolate-shaped points with oblique parallel flaking. They date to the latter part of the Paleoamerican time period (circa 9,000 RCYBP). Named after the James Allen site (Mullor 1959), they are essentially the same as the Frederick point (Frison 1998), identified at the Hell Gap site (Byrnes 2009; Feagins 2009; Irwin 1968). Both of these sites are in Wyoming. Hofman presents an updated summary of the Allen complex field work in Kansas at the Winger (14ST401), Norton (14SN6), Gardiner (14CK320), and Burntwood Creek (14RW2) sites. These are bison kill bone bed sites, and Burntwood Creek is a rare Paleoamerican bison jump. These sites are briefly compared with Allen sites known from elsewhere on the Plains and with sites of somewhat similar age, containing Dalton components, in eastern Kansas and beyond. The relationship of Allen and Cody technological complexes, seemingly of similar age, is problematic. Some Allen complex sites contain a more diverse fauna than the Kansas bison kill sites listed above. Undoubtedly the people hunted and gathered diverse food sources and certainly did not live on bison alone.

The last chapter by Thomas Jennings is titled "Exploring the San Patrice Lanceolate to Notched Hafting Transition." There are several varieties of San Patrice points (Hope, St. Johns and Brazos). Jennings is interested in the technological aspects of notching but mainly ponders why the San Patrice people chose to haft their projectile points differently, adding notches and changing other point attributes in the process. He maintains that the abandonment of lanceolate hafting, replaced by notched hafting, was a relatively "sudden" event. Building a case for support of the old adage "form follows function," Jennings hypothesizes that notching is a better way of attaching these points when they

are used as knives for cutting rather than as projectiles (spears or darts). He states, "Compared to a lanceolate hafting technique, notching is a better design for keeping a point firmly fixed in the haft regardless of the direction of force acting on the point. Further, . . . notching facilitates the use of points as knives *and* projectiles interchangeably" (p. 156). Jennings maintains that with the short, notched stems of the St. Johns variety, the blade length potentially increased by 29 percent or more. As an added advantage, this supplied longer cutting edges and more material available for eventual re-sharpening. He presents a well-reasoned argument, but there are some loose ends. This reviewer would appreciate more refined dating for each of the San Patrice varieties. Also, Jennings did not comment on the large, unfluted, corner-notched projectile points/knives that Lopinot and Ray illustrate (p. 126) and suggest are "probably San Patrice knives." If they are correct, how does that affect Jennings' hypothesis, or does it?

Exploring Variability in Early Holocene Hunter-Gatherer Lifeways is well edited and contains much food for thought. It is worth the read and for some chapters a reread. A brief summary chapter could have tied together the disparate chapters. Unfortunately, there is a problem with the book's binding; just with this reviewer's gentle usage, some pages are separating from the stitching.

Even though the volume has not received as much publicity as it would have if published and advertised by a larger press, it should not be overlooked. Most readers of *The Kansas Anthropologist* and

anyone with a serious interest in Paleoamericans will find much of interest among its pages. It certainly is worth its relatively low asking price from the Anthropology Department, University of Kansas, Lawrence, Kansas 66045.

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Identifying and Interpreting Animal Bones: A Manual. APRIL M. BEISAW. Texas A&M University Press, College Station, Texas, 2013. vii + 179 pp., 77 figs. (including 43 color photos and 36 line drawings), 8 tables, 3 appendices, epilogue, glossary, references, index. \$35.00 (flexbound with flaps). ISBN 978-1-62349-026-3. *Reviewed by* Jim D. Feagins, St. Joseph Museum.

Identifying and Interpreting Animal Bones: A Manual is not a bone atlas. Rather, it presents necessary background information and a procedure for

the systematic examination of animal bones (faunal analysis)—all kinds of bones: mammals, reptiles, birds, fish, and amphibians. It should be read by a student before turning to the bone atlases and the comparative faunal collections.

Almost everyone who is involved with archaeological fieldwork or lab work for any length of time needs to identify (or at the very least be curious to know about) certain animal bones. What kinds of animals were people using for food? What environmental information can be learned? How were the bones modified for use as tools? What does the condition of the bones tell us about how they were processed? How do we identify the telltale taphonomic

signatures of what has happened since the death of the animal? There are many archeological questions that bones can help answer. Becoming a talented faunal analyzer is a skill not easily developed without spending considerable time.

Clearly author April Beisaw has a wide range of experience in faunal analysis. She is a clear, well-organized writer. Her manual is not a cookbook approach, but it does present sound scientific methods in a practical, logical, how-to-accomplish-it method. Beyond the analysis of the usual things bones can tell us, she encourages researchers to think outside the box by asking additional questions of the faunal data and incorporating them into research designs, when possible.

Identifying and Interpreting Animal Bones: A Manual discusses (1) preparing a faunal assemblage (cleaning, sorting, mending fresh breaks), (2) quickly identifying the rough taxonomy, (3) identifying which skeletal element a bone represents, (4) determining the affects of cutting, working, burning, weathering, gnawing, digestive damage, when and how bones were broken, and when a faunal assemblage is biased. In addition, Beisaw explains methods for recording and describing data by addressing levels of certainty, size classes, mutually exclusive categories, completeness and articulations, counting and weighing bones, common

calculations, body-part profiles, contextual analysis, other research questions, and producing a faunal report. The 329-term glossary is a big plus for those wanting faunal analysis basics. Terms are boldly printed and briefly defined within the text, and the readers who want to learn more can refer to the glossary. The in-volume appendices and the supplemental ones online should be handy.

While this reviewer is not in any way a faunal expert, as with most archeologists of much duration, there have been many opportunities to examine small assemblages of animal bones. This volume offered more new information than anticipated, and a few sections will be referred to from time to time in the future as a companion to bone atlases or traveling to view a comparative collection.

Identifying and Interpreting Animal Bones: A Manual should be useful in the field, as well as in the laboratory and classroom. This reasonably priced, slick-paper volume contains sharp photographs and drawings and helpful references. While it is primarily designed for students and avocational and professional archeologists, researchers in related fields will find it useful. In a nutshell, "The book models the steps that an experienced analyst might follow, from receiving specimens to writing a basic report" (p. 1). This volume may be obtained online at www.tamu.edu/upress or by calling 1-800-826-8911.

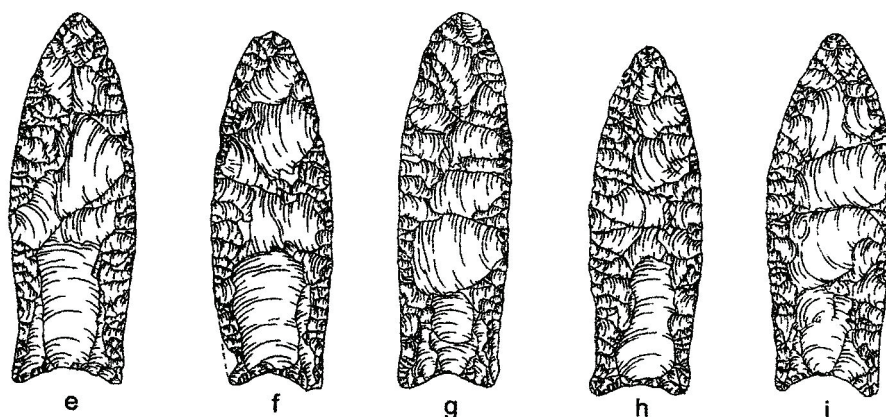
The Hogeye Clovis Cache. MICHAEL R. WATERS and THOMAS A. JENNINGS. Texas A&M University Press, College Station, Texas, 2015. xv + 151 pp., 100 figures, 29 tables, references cited, index. \$45.00. ISBN 978-1-62349-214-4 (hardcover) or ISBN 978-1-62349-232-8 (e-book). *Reviewed by* Jim D. Feagins, St. Joseph Museum.

Tantalized by a display of the oldest Hogeye cache at the Paleoamerican Odyssey in Santa Fe, New Mexico, in the fall of 2013 and then by reading short comments and limited analysis about this Clovis cache (Deeringer 2014; Feagins 2015:19–20; Kilby and Huckell 2013:263; Lohse et al. 2014:157–162), this reviewer was pleased to see *The Hogeye Clovis Cache* come to print. As can often happen with careful analysis, this cache had much to teach about

lithic technology, as well as about caching behaviors during this early time period.

The Clovis people are noted for their lanceolate-shaped spear points that have flutes (channel flake scars), originating from their bases. These well-crafted points were mounted on wooden shafts and thrown with atlatls (spear-throwers). While Clovis people hunted a variety of animals, they most often have been associated with the butchered remains of mammoths, mastodons, and other megafauna alive during the geologic Late Pleistocene, continuing in some areas into the Early Holocene transition—or archeologically during the early Paleoamerican (Paleoindian) period.

The Hogeye habitation site, which contained the Clovis cache, is situated in the Interior Coastal Plains of southeastern Texas near the border of the Blackland Prairie. Both physiographic regions would have been rich sources of game and plant



Portion of Figure 21. Late stage C projectile point preforms (Walters and Jennings 2015:43).

life in Paleoindian times. Furthermore, this location places Hogeye only 40 km from known chert sources along the Edwards Plateau to the west or 75 km southeast of the famous Gault (Clovis) quarry/workshop/camp site.

The Hogeye Clovis cache was discovered by John Wayne Farris, operator of a front-end loader, during commercial sandpit operations on April 22, 2003. Some of the cache artifacts were found at a spot where Farris had dumped a bucket load of sand for later pick up by a dump truck, and some were found on processing screens when an earlier, adjacent bucket load of sand was being sifted at a later time. Because of the discovery at the quarry, Farris was directed to immediately start working in a different area, leaving the bucket load where it was dumped in an isolated pile. Three company employees obtained major portions of the cache, and for a while it went by several different names (Kilby 2008; Pfeiffer 2005), leading to some confusion.

Years later in 2010, professional archeologists were shown the site and the general cache location. With permission, archeological and geoarcheological field investigations began. Hand-tool excavations were carried out on the bucket load of sand, a slumped block of soil at the quarry face, and squares from which two vertical stratigraphic columns were obtained. This research led to the recovery of 16 additional Clovis bifaces from the sand pile. By matching strata Michael Waters and fellow investigators were able to determine the layer from which the cache had originated. This stratum was then correlated with the exposed vertical profiles. The Clovis cache had been located near the bottom,

a little above an unconformity, formed at the eroded contact with Eocene bedrock.

The impressive Hogeye site contains multiple prehistoric components. The Clovis occupation was the earliest of many, dating approximately 13,000–12,600 years ago. In addition to the 52 Clovis bifaces, including mostly point preforms, in the cache itself, the site yielded a Clovis projectile point and a Clovis point preform and thousands of other artifacts from descending strata, representing Late Prehistoric, Late Archaic, Middle Archaic, Early Archaic, Late Paleoindian, and Early Paleoindian time periods. Focusing only on the Paleoindian projectile points from the general site, the following types were identified: Clovis, Folsom, Midland, San Patrice, Plainview, Pelican, St. Mary's Hall, Golondrina-Barber, Scottsbluff, Hell Gap-Thrall, and Angostura.

Mention should be made of two small Archaic biface caches that had been discovered years earlier at the site. They, along with a significant sample of other styles of projectile points and knives, are documented in varying degrees in the first chapter.

The main focus of the volume is a detailed study of the Clovis cache artifacts in chapters two and three. Collectively weighting 4 kg, the 52 bifaces are a minimum number, as additional artifacts might have escaped detection during the handling and sorting by power equipment. Forty-seven of those bifaces are Clovis projectile point preforms. Following Waters et al. (2011:95–97; Feagins 2012), the preform category is the general stage of lithic reduction just prior to the final form of a completed Clovis point. Preforms “. . . have

well-defined lanceolate plan views, biconvex cross sections, and . . . less sinuous edges” (p. 32). They “. . . range from roughly finished to almost completed projectile points” (p. 33). The authors divide the preforms into phases or stages (A, B, and C), as they were worked down to become completed Clovis points. Following their definitions, it is easy to look at the photos and, especially with the pen-and-ink drawings, determine the stage A, B, or C of a given preform, even before reading its identity in a photo caption. While the latter stages of lithic reduction can oftentimes be considered as a continuum, these attribute categories are useful to researchers and possibly had real usefulness to prehistoric flintknappers, as they followed their mental template on a path toward what a Clovis point should look like.

The remaining five artifacts are ovate bifaces. They are larger and quite distinctly different from the point preforms. The ovate bifaces probably were intended for use as knives, cores for generating flakes, or, less likely, preforms to be reduced into projectile points. The reduction stages of the ovate bifaces were not reconstructed by the authors, who focused on the remaining smaller bifaces.

Waters and Jennings do a fine job of comparing the metric and technological attributes of each phase of the Clovis point preforms—the “projectile point trajectory” bifaces. Preform stages A and B can be distinguished by their basal widths, and both are significantly larger than the stage C preforms. Differences in these three phases can be shown metrically by comparing their shapes in the form of ratios: width/thickness, length/width, and length/thickness. The flaking patterns—alternate-opposed flaking, dual-edge serial flaking, and shared-edge serial flaking—in each stage were compared. Pen-and-ink drawings were used to good advantage to show examples of each flaking pattern type.

The chief biface thinning techniques used by the Clovis knappers were 1) lateral overshot flaking, 2) lateral overface flaking, and 3) basal end-thinning. An overshot flake originates at the edge along the side of the biface, travels over the hump, and terminates with the removal of a small portion of the opposite edge. This type of flaking was still common in stage A, but was no longer used by stage C. Overface flakes are shorter, and they terminate sooner than overshot flakes; they go over the hump

but do not reach the opposite edge of the preform. Overface flakes are used to thin the artifact with no, or very minimal, width loss. Exactly when in the reduction sequence Clovis knappers stopped using overshot and overface flaking to thin bifaces is now clear.

Basal end-thinning flake scars are found in each of the preform stages. However, significant collective differences in scar length, width, and thickness exist between stages. This information presents useful insight concerning the step-by-step manner of finishing Clovis points. The authors state, “Fluting is a risky flaking procedure because of the possibility of breaking the biface and rendering it unusable By building stage C preforms around previous [end] removals, Clovis knappers were able to significantly reduce the risk of fluting failure” (p. 122).

All along it was clear that the Hogeye Clovis cache was made from Edwards chert. However, from what portion of this extensive lithic source was the material obtained? After all, the Edwards Plateau occupies much of central Texas. To better answer this question, a laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) system was used to analyze three representative bifaces from the cache. This system can identify almost every element in the periodic table from a sample so tiny that no damage to the artifact is visible. When compared with samples from a number of Edwards chert sources, researchers determined that the Hogeye Clovis cache source was in the vicinity of the Clovis quarry/workshop at the Gault site, some 75 km away.

Waters and Jennings devote a section to comparison of Clovis lithic technology at the Gault site with that reflected by the Hogeye cache bifaces. The information from the two sites complements each other. “Together, Gault and Hogeye provide evidence of the entire reduction sequence for the production of Clovis fluted points on one raw material type and by one group of Clovis knappers” (p. 133).

The authors and publishers are to be commended for their fine photographs and pen-and-ink drawings of every artifact from the Hogeye Clovis cache. These drawings and metric information form a baseline of data that is extremely useful to researchers of Clovis lithic technology and caching behaviors. Of course, the drawings are especially pleasing to those with an appreciative eye for the artistic.

While collector readers might get bogged down in the chapter containing artifact statistics, there is much elsewhere of interest to all individuals—professional and avocational archeologists, researchers in related fields, and to some degree the general public—who want to learn more about Clovis point manufacturing and where and why Clovis people chose to hoard these artifacts. Priced reasonably, *The Hogeys Clovis Cache* may be obtained by contacting the Texas A&M University Press—online at www.tamupress.com or by phone at 800-826-8911. Members of the Center for the Study of the First Americans qualify for a 20 percent price reduction.

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Buffalo Bird Woman's Garden: Agriculture of the Hidatsa Indians. GILBERT L. WILSON. Introduction by Jeffery R. Hanson. Reprint. Minnesota Historical Society Press, St. Paul, Minnesota, 1987. xxiv + 129 pp., 42 figures, 14 photos, table of contents. ISBN 0-87351-219-7. Reviewed by Denise Wallace, Kansas Anthropological Association.

Originally published in 1917 as *Agriculture of the Hidatsa Indians: An Indian Interpretation*, anthropologist Gilbert Wilson's University of Minnesota doctoral dissertation illuminated the gardening or agricultural practices of the Hidatsa through Buffalo Bird Woman, an elderly female of the tribe. In the Hidatsa tradition women were the primary gardeners. Buffalo Bird Woman, or *Maxidiwiac* in Hidatsa,

described in detail the techniques and centuries-old practices that she and women of her family used to grow "corn, beans, squash, and sunflower in the fertile bottomlands of the Missouri River" (p. 3).

Maxidiwiac was born in 1839 in an "earth lodge along the Knife River in present-day North Dakota" (p. 3). In 1845 the Hidatsa moved upstream and built Like-a-fishhook village, which they shared with the Mandan and Arikara tribes. These groups formed what are referred to as the Three Affiliated Tribes, "numerous, powerful, and independent tribes controlling practically the entire Missouri River Valley in what is now North and South Dakota" (p. 4). However, in the mid-1880s United States government policies changed, and the village was forced to break up, resulting in the dispersal of families into individual allotments on the Fort Berthold Reservation. *Maxidiwiac* and other Hidatsa women

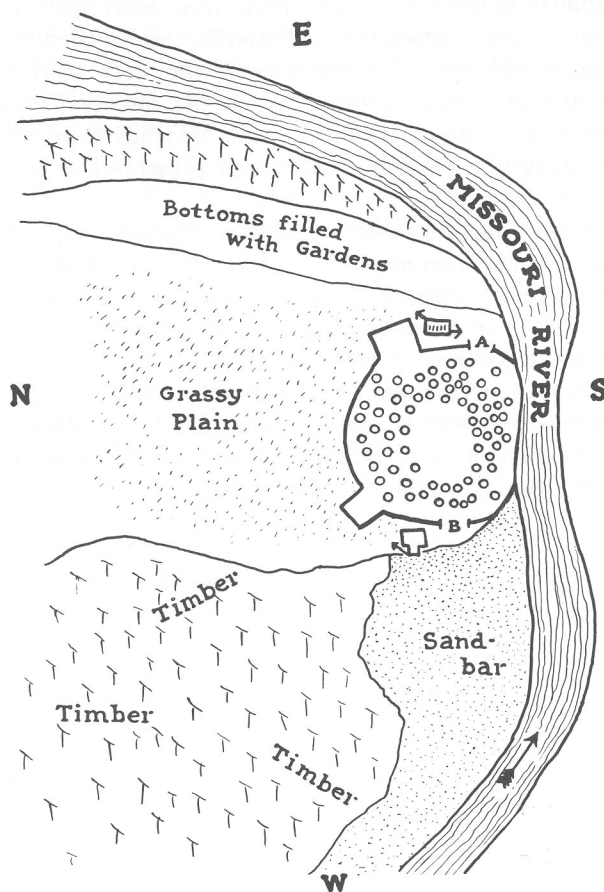


Figure caption: The site of Like-a-Fishhook Village (Old Fort Berthold) and its environs, which followed a typical Plains village settlement pattern. This drawing appeared as Figure 1 in Wilson's *The Hidatsa Earthlodge*, Anthropological Papers of the American Museum of Natural History 33(5):350, 1934.

"continued to grow the vegetables that have provided Midwestern farmers some of their most important crops" (p. 3).

Wilson observed that "their cultural adaptations represent a much more ancient and indigenous Plains Indian tradition than the 'typical' cultures of the nomadic Plains tribes, which depended on horses introduced by Euro-Americans" (p. 4). No fertilizers, pesticides or herbicides were used. According to *Maxidiwiac*, no animal dung was used as it brings worms, insects, and weeds (p. 117). (Modern farmers, take note!) Additionally, gardens were let go fallow for at least two years between plantings (p. 114). The floodplains and bottomlands were used for the garden plots (see figure), as prairie land soil is too hard and dry (p. 9). Her statement

reveals what modern man has sacrificed due to population increase: too many mouths to feed and not enough bottomlands to garden. She added, "It was our Indian rule to keep our fields very sacred. We did not like to quarrel about our garden lands" (p. 11).

Every Hidatsa woman was expected to learn to work in the garden. Wooden digging sticks, bone hoes, and wood and antler rakes were initially used. Iron tools later replaced these. To aid both the anthropologist and the archeologist, Wilson's work included drawings and dimensions of these tools. Throughout *Maxidiwiac* provided details of planting, weeding, harvesting, preparation, and storage, complete with diagrams explaining these processes. She described preparations and reasons for feasts.

While the Hidatsa survived on a dual economy of agriculture and hunting, Wilson noted that they had "a cultural commitment to agriculture" (p. 4). They produced enough surplus to supply nomadic tribes coming to trade. The old men, whose hunting days were over, had their small garden plots of tobacco for their exclusive use (p. 121). They also sold "a good deal of tobacco to the Sioux" (p. 125).

For the linguist, this work serves as a vocabulary study of Hidatsa language. The sociologist will enjoy the story about the mischievous children's game of slinging mud balls with bits of glowing charcoal, stolen from burning empty corn cobs at threshing season (p. 53). The modern housewife might cringe at the mention (p. 64) of the original (non-Ziploc) baggie: a dried buffalo heart skin! Take heart (no pun intended), several complete recipes are included.

Archeologists will hone in on the cache pit specific dimensions, drawings, and locations within the earth lodges. Drying stages, ladders, fences, puncheons, and other structures were described in detail, complete with measurements, dimensions, and materials used (p. 94, 127). Of note is that a buffalo bull's hide was used for a cache pit cover, while a buffalo cow's hide was used for a robe (p. 93). *Maxidiwiac* even detailed the basket types, uses, and methods of bearing (p. 123).

Maxidiwiac pointed out that the Hidatsa weeded their gardens meticulously (p. 116). This is particularly interesting to this reviewer, as the indigenous tribe in Panama with whom she works, does not weed their "plots" at all. In fact, their gardening

spaces cannot be considered true plots; they merely place transplants in among other plants in the forest without clearing any land.

According to *Maxidiwiac* songs and ceremonies were essential to a good harvest. Curiously enough, these songs were not about plants, harvest, or even weather, but about love (p. 34). This is where courtship occurred between males and females, young and old alike!

In the introduction Jeffery R. Hanson observed that “despite the pressures of assimilation, and the

cultural and psychological ambivalence that accompanied it, traditional ways held a firm place in the minds, hearts and souls of many Hidatsa families who sought to balance the new ways with the old, to make sure that the children remembered who they were and where they came from, so they could accommodate change and not be swallowed by it” (p. xvi). Regardless of discipline, this dissertation cum ethnographic gem has something for everyone. Enjoy and happy gardening!

ABOUT THE AUTHORS

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Brendon Asher is a Ph.D. student at the University of Kansas (KU), currently researching Clovis and Folsom artifact distributions and lithic procurement across the Central Plains. He has worked closely with the KAA as teaching assistant for a joint KU/KATP field school at the Kansas Monument site (14RP1) in 2008 and as field foreman at Fool Chief's Village (14SH305) in 2012. He instructed lithic identification sessions for the KATP Short Subjects classes in 2012 and 2015 and taught courses in Introduction to Archaeology and Introduction to Anthropology at KU. Brendon is also an archeological consultant and has completed contracts with the Center for American Paleolithic Research, Denver Museum of Nature & Science, and the Kansas Historical Society.

Lewis Nisbet Ballantine



Lewis Nisbet Ballantine is a native of Glasgow, Scotland, and has lived in Strömstad, Sweden, since 2006. He is a graduate of Glasgow School of Art, received a B.A. in drawing and painting in 1970, and has practiced as a professional artist since then. He was an official of the Panel for the Scottish Juvenile Justice System in the 1980s and has worked as a lecturer of art and art history for Glasgow University's Adult Education Department. In 2010 he was elected an official Repatriation Representative for Sweden by the Pawnee Nation of Oklahoma Business Council in its search for the remains of a tribal member, who died in Sweden in 1875. With his partner Eva Maria Olsson-Barton, he has written articles for *American Indian Review*, *Alternativ Nettverk*, and the internet magazine *Canku Ota*.

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Donald Blakeslee is professor of anthropology at Wichita State University. He has been conducting archeological research in Kansas since 1976.

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Jim Feagins is a private archeological consultant who also serves as part of the adjunct archeological staff for the St. Joseph Museum. He received a B.S. degree from Pittsburg State University and a MNS degree from the University of Oklahoma. After 30 years as a science instructor for Consolidated School District No. 4, Grandview, Missouri, he retired in 1995. Active in promoting archeological education, he is president emeritus of the Missouri Archaeological Society. He also served as president of the Kansas City Archaeological Society and as a vice-president of the Missouri Association of Professional Archaeologists and the Kansas Anthropological Association. He is a life member of the KAA.

Robert J. Hoard

Robert Hoard grew up in Omaha, Nebraska, and received degrees in anthropology from the University of Nebraska-Lincoln (Bachelors), University of Oregon (Masters), and University of Missouri-Columbia (Doctoral). He has worked in many parts of the United States and for a brief period in Micronesia. He is interested in the performance characteristics of prehistoric pottery, the adoption of horticulture by people in prehistory, and the application of techniques from physics and chemistry to archeological investigations. He currently is the state archeologist of Kansas.

Jack L. Hofman

Jack Hofman teaches archeology in the Department of Anthropology at the University of Kansas. He has done archeological research in the Great Plains region since 1971 and has interests in early prehistoric hunters, large scale land use, and studies of technological and cultural change. During the past few years he has been involved in the Republic County Area Archaeology and Paleoecology Project, of which the research reported here is a part.

Steven R. Holen

Steven Holen has more than 40 years of archeological experience in the Great Plains and has worked on all types of archeological sites, dating from historic to pre-Clovis. Recently he has concentrated his efforts on determining when humans first arrived in North America. He has excavated several mammoth sites with impact-fractured and flaked bone that suggest humans were present on the Great Plains during the Last Glacial Maximum when Canada was covered with glaciers from coast to coast. This evidence indicates that humans must have arrived before the route from Siberia to the Great Plains was closed about 22,000 years ago. Steve also researches Clovis lithic procurement and mobility on the Central Plains. He recently retired as Curator of Archaeology at the Denver Museum of Nature & Science, joining his wife Kathleen in a new nonprofit organization, the Center for American Paleolithic Research, with the goal of searching for evidence of early humans in the Americas.

Christopher S. Hord

Chris Hord earned a B.S. in meteorology from the University of Missouri in 1981 with secondary emphasis in geology. He has participated in numerous archeological projects across the Great Plains and Midwest and devotes most vacation time to visiting archeological sites in the American Southwest, Mexico, and Central America. Areas of interest include geoarchaeology, paleoclimatology, archaeoastronomy, prehistoric use of plants for food and medicine, and the use of remote sensing in archeological investigations. Chris is a member of the KAA Executive Committee and a Trustee for the Missouri Archaeological Society.

Steven Patrick Keehner



Steven Keehner received a B.G.S. degree in anthropology with minors in classics and history and a M.A. degree in anthropology from the University of Kansas. His interests include symbolism, social interaction, and cultural landscapes of formative and early state societies, high resolution data analysis, archeological methods and theory, and GIS. He has worked at sites in the Great Plains and with lithic and ceramic collections from the Great Plains and Mesoamerica. He is actively involved with the KAA by giving presentations at meetings and joining members on field trips to document rock art sites. Steven has worked for the Kansas Historical Society as the archeology program's administrative assistant, KU's Archaeological Research Center as a laboratory and graduate research assistant, and the Odyssey Archaeological Research Program. He is currently interning for the U.S. Bureau of Reclamation.

Eva Maria Olsson-Barton



Eva Maria Olsson-Barton is a native of Sweden, who returned to live there in 2006 after having lived in Germany, Malaysia, England, and Scotland. She holds a B.A. in education, sociology and psychology from the University of Gothenburg, Sweden, and a Diploma of Teaching from Falu Teacher Training College, Sweden. She now works as a freelance writer and photographer. In 2010 she was elected an official Repatriation Representative for Sweden by the Pawnee Nation of Oklahoma Business Council in its search for the remains of a tribal member, who died in Sweden in 1875. With her partner Lewis Nisbet Ballantine, she has written articles for *American Indian Review*, *Alternativ Nettverk*, and the internet magazine *Canku Ota*.

Denise Wallace



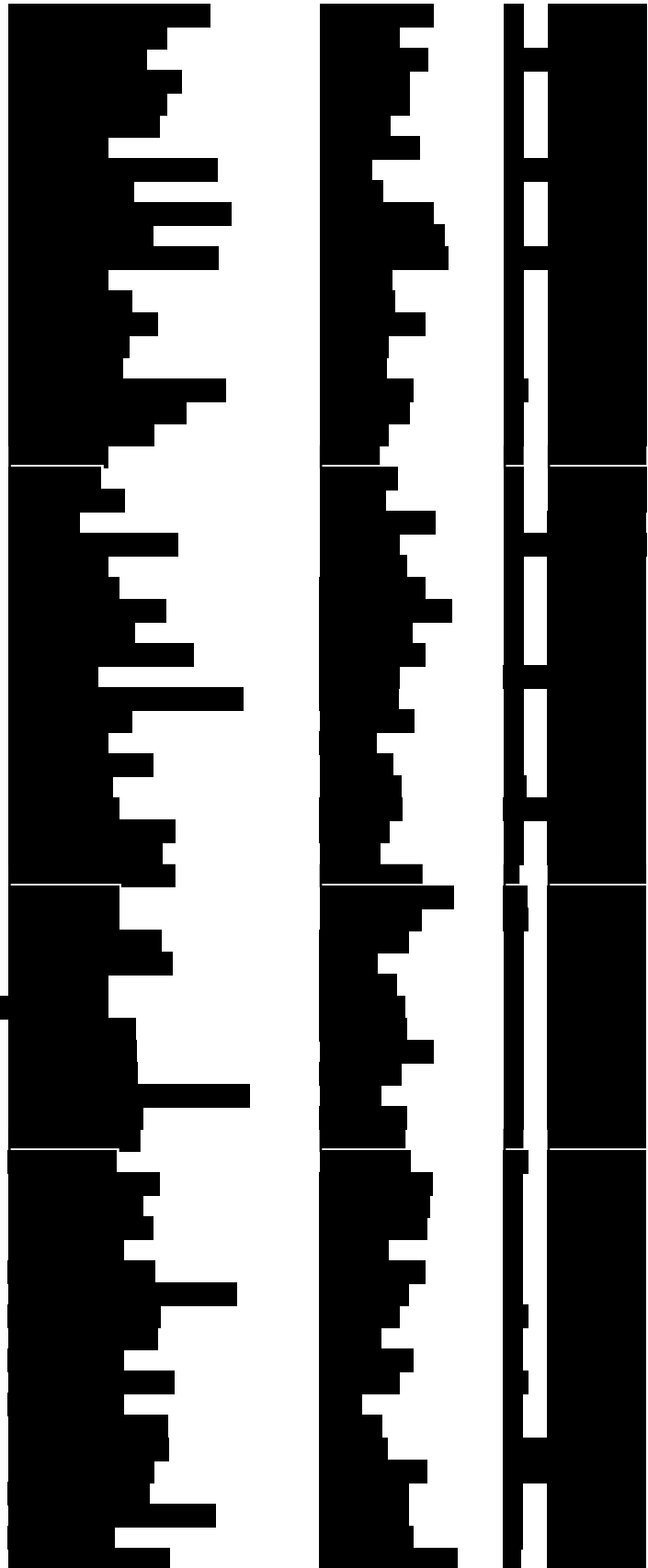
Denise is a language and culture instructor at Wentworth Military Academy. She has an extensive background in foreign languages. Her Master's degree in anthropology, with a combined emphasis in archeology and ethnobotany, from Tulane University has afforded her the training and skills to work with both present and past cultural groups. She is a Certified Project Archaeology Instructor. Denise has worked in Panama and Peru, advocating cultural patrimony and on ethnobotanical uses with indigenous tribes. She has conducted botanical surveys in Missouri, Kansas, Panama, and the Peruvian Amazon. Her archeological work ranges from Phase I-III work to artifact cataloging and curation in Arkansas, Kansas, Missouri, and Portugal. Denise's current long-term project is writing an ethnomedicine book on plant use by a variety of specific past and present indigenous groups worldwide in an effort to aid other researchers in this field.

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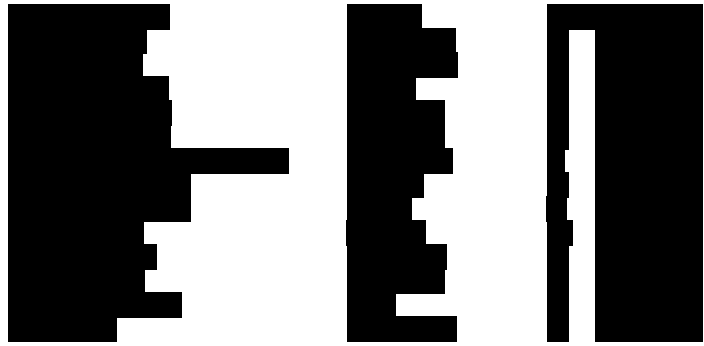
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INFORMATION FOR AUTHORS

Manuscripts are actively solicited for *The Kansas Anthropologist*. Articles should have a relationship to Kansas anthropology (archeology, ethnography, ethnohistory, cultural/social anthropology, physical anthropology, etc.). All manuscripts must be the original, unpublished work of the authors.

The varied readership of the journal should be kept in mind when preparing papers. **Jargon should be avoided.** The style authority is *American Antiquity* (see <http://saa.org/AbouttheSociety/Publications/StyleGuide/tabid/984/Default.aspx>). Professionals are expected to submit their manuscripts in this form; others who are not familiar with the *American Antiquity* style guide will receive editorial assistance.

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Partial funding for this publication is provided by the Kansas Historical Society and the National Park Service, U.S. Department of the Interior. The contents and opinions do not necessarily reflect the views or policies of the U.S. Department of the Interior, nor does the mention of trade names or commercial products constitute and endorsement or recommendation by the U.S. Department of the Interior. Regulations of the U.S. Department of the Interior strictly prohibit unlawful discrimination in departmental federally assisted programs on the basis of race, color, national origin, age, or handicap. Any person who believes he or she has been discriminated against in any program, activity, or facility operated by a recipient of federal assistance should write to: Director, Equal Opportunity Program, U.S. Department of the Interior, National Park Service, P.O. Box 37127, Washington, DC 20013-7127.