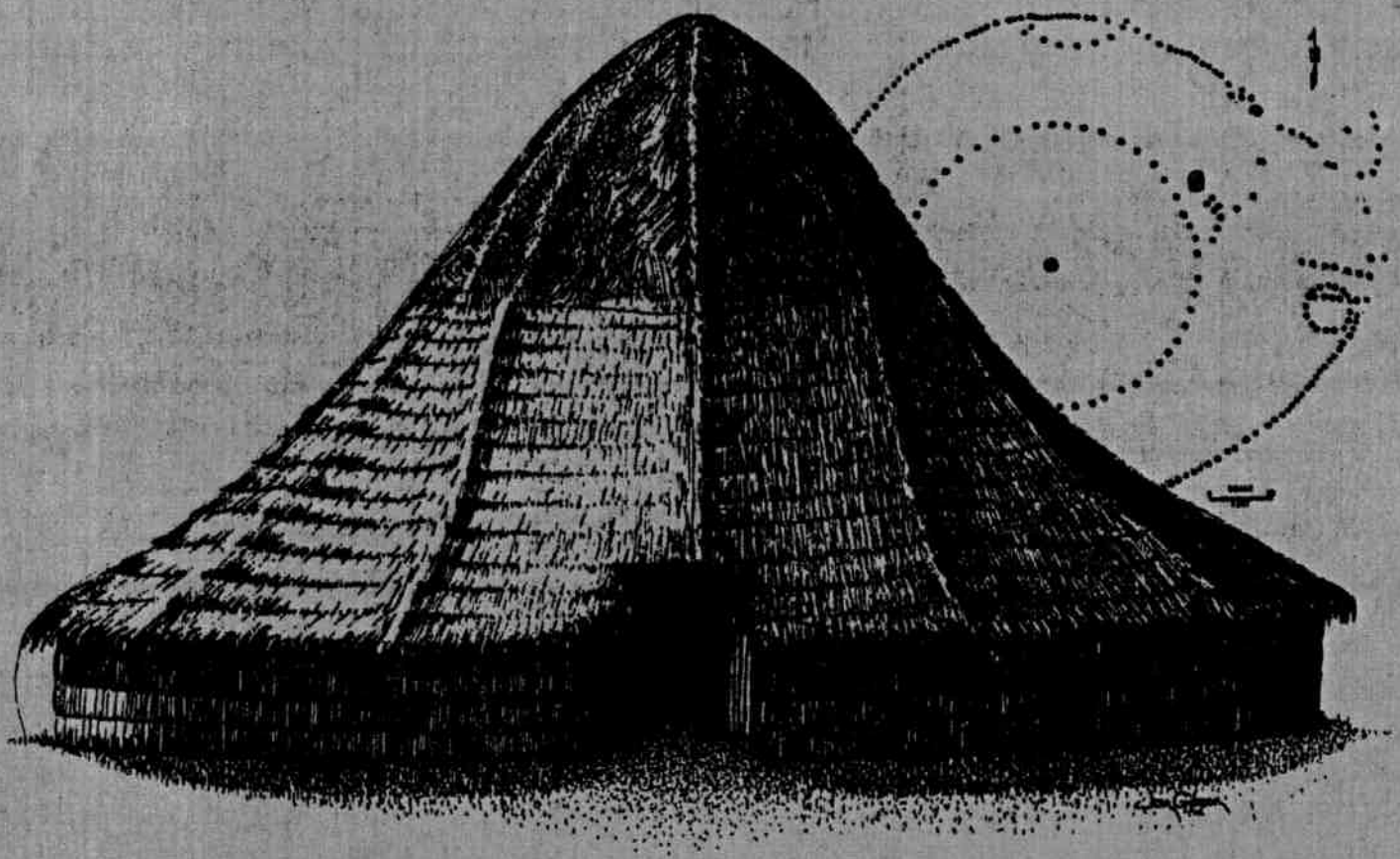
Caddoan Archeology Journal



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Mr. George E. Avery
115 Desoto Rd.
Natchitoches, LA 71457-4911

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Table of Contents

A Rediscovery of Caddo Heritage: The W. T. Scott Collection at the American Museum of Natural History

Robert Cast, Timothy K. Perttula, Bobby Gonzalez, and Bo Nelson
Caddo Nation of Oklahoma and Archeological & Environmental Consultants, LLC

Introduction

Back in August 1997, the Caddo Nation of Oklahoma had submitted a Native American Graves Protection and Repatriation Act (NAGPRA) claim for a cranium that had been obtained by the American Museum of Natural History (AMNH) in New York City in 1877. Very little information was known about these remains, other than it had been obtained "as a purchase/gift" to the museum by Charles C. Jones Jr. and was "found in a mound" somewhere near the "Shreveport vicinity" in Caddo or Bossier Parish, Louisiana. "Based on the presence of artificial cranial deformation," the museum dated these human remains to a period of between A.D. 800 and the contact period. Because of the cranial deformation, and the archeological investigations that had taken place in the past in Louisiana, the museum had determined that the remains were culturally affiliated to the Caddo Nation.

Through consultation with the Caddo Nation of Oklahoma and the Cultural Resources Office staff at the AMNH, in February 2001 the Notice of Inventory Completion was published for these human remains in the Federal Register (Volume 66, No. 35, p. 11043).

In June 2003, with the financial assistance of the AMNH, Bobby Gonzalez and Robert Cast planned a visit to the museum. The primary purpose of the trip was to repatriate the skull of this Caddo person under the NAGPRA. The secondary purpose was to look at the ethnographic items culturally affiliated to the Caddo and to further consult with the Cultural Resources Office staff at the AMNH on these and any of the other collections that the Caddo Nation believed to be of significance.

The next day, Bobby and Robert met with the Cultural Resources Office staff of the museum and discussed how the human remains should be handled for safe travel back to Oklahoma. They then looked at all the Caddo ethnographic objects that had been collected over the years by the museum. Bobby made a number of comments concerning the use of specific items and their importance to the tribe. He explained that a number of these items were sold to the museum because many of the Caddo people were in such a desperate state of affairs at the time. From the stories that some of the elders had told him, many of the families that sold items to Mark R. Harrington, did so because they were starving and needed money for food.

During their meetings over the next two days, they asked if any Caddo items were on exhibit in the museum. The staff explained to them that as far as they knew, no. While on a tour of the "Eastern Woodlands People Exhibit," Robert and Bobby spotted a vessel on display with a label clearly identifying this particular vessel (later identified as a Keno Trailed bottle) as "Caddo" (We would also a year later, discover another vessel, a Hodges Engraved bottle, on display. We found out from the museum staff that exhibit items are cataloged in a unique way, not based on any particular cultural affiliation, and most likely would not show up on a database, hence the staff could not have known whether or not any Caddo items were on display). This prompted them

to further investigate some of the archeological collections that the museum possessed. When asked if they could be provided a print-out based on counties and parishes from what the Caddo Nation considered to be the Caddo "heartland" area, the museum staff printed out an archeological database sheet that in total listed some 390 objects that needed further investigation.

Discovery of The W. T. Scott Collection and Efforts to Document the Collection

One of the most interesting findings they came across while perusing the archeological database (and where it became more and more obvious that they were going to need to come back to New York) was on one of the headings for the collections which stated: "Locale: TX, Cass County, Site: 1/2 mile from a small creek, Indian Grave."

At this point, Bobby and Robert asked for all of the available information that the museum had in regard to this specific collection. According to Mr. W. T. Scott's handwritten notes and letters that he wrote in 1900, there were actually "17 graves" associated with this collection. They knew at that very moment that they would need to work in a collaborative way to try to obtain grant funding to return to New York and continue this important investigation. It was obvious to them that to document this collection would take the expertise of a number of groups working together, namely the Caddo Nation Cultural Preservation Department, the AMNH Cultural Resources Office staff, and the efforts of the Caddo Nation's archeological consultants.

In February 2004, the Caddo Nation Cultural Preservation Office submitted a National Park Service NAGPRA grant to document the collection first encountered on paper the previous year. In June 2004, the Caddo Nation received notice that their NAGPRA grant (No. 40-04-GP-362) had been funded. In October 2004, Bobby and Robert were back on a plane heading to New York, accompanied by Timothy K. Perttula and Bo Nelson, the Caddo Nation's archeological consultants.

In retrospect, this Caddo person whose skull was obtained by the museum in 1877 (only 42 years after the Caddo had ceded their lands in Louisiana and 18 years after being forced out of the state of Texas) has taken Bobby Gonzalez and Robert Cast on a whirlwind journey from the small town of Binger, Oklahoma (pop. 600) to New York, New York, and back again. They thought at the time that they were the ones, acting out of respect and tribal traditions, that were leading the way and doing something special by bringing this person's remains back home. But just maybe they were the ones being led.

Through all the roles Bobby and Robert have taken on during this past repatriation and now with this current documentation project, their roles, as somewhat self-appointed "NAGPRA detectives" have been the most enjoyable and rewarding. When cultural affiliation with the Caddo can be determined, it has always been the Caddo people's wish to have human remains and funerary objects be brought back together in one place, the way they were originally found, if possible. To do so, takes investigative skills, a little patience, a lot of time, more money than the Caddo Nation has, and the cooperative efforts of everyone with a common interest in these issues.

Working through all the complications, this project is a case study of some of the burdens that are put upon tribal governments, institutions, and researchers who choose to follow and try to fulfill the spirit of NAGPRA. Those of us working in NAGPRA on a regular basis are all too familiar with collections that have been separated and "split up" with human remains stored in one institution while the funerary objects are housed in another, sometimes separated by hundreds, if not thousands, of miles. We are familiar with the Notices of Inventory

Completions that are published that don't match up with the actual remains and items housed at these institutions. We are familiar with the ongoing legal interpretations that continue to be fought out in federal court regarding the NAGPRA. We are also all too very familiar with the lack of funding for all the parties involved when compared to the amount of work that remains to be done.

These Caddo collections from the American Museum of Natural History represent collections that (1) had never been documented until now, and (2) are part of the unique history of the Caddo Nation in northeastern Texas. The "W. T. Scott" collection now represents more than just a collection of beautiful, artistic, objects, made by a people from the past only to be stored away in a series of dusty drawers. They have now become part of the living history of the great Caddo Nation.

We can define these objects under NAGPRA's legal definitions; give each vessel a specific name based on typology; or expound upon the notion that these items are unique and wonderful "works of art;" however, they are much more than that to the Caddo people. This collection represents a reconnection to and rediscovery of the places, lives, and work of Caddo ancestors.

Past and present archeological and ethnographic research for the areas of Arkansas, Louisiana, Oklahoma, and Texas has shown that the Caddo people have an expansive history in these states long before their removal back to southwestern Oklahoma in 1859 (see Rogers and Sabo 2004). The placement of certain types of artifacts found in mortuary contexts show that the Caddo people had ritual ceremonies for their deceased that are very similar to those they still practice today. By using this research and coordinating with the Caddo Elders of the tribe on their oral histories, religious practices, and what objects would be considered to be of religious or cultural significance, we knew that the "W. T. Scott" collection at the American Museum of Natural History (AMNH) was important to the Caddo people.

Caddo Elders have explained to us that they do not want to ever rebury or improperly handle some other tribal Nation's human remains or items that "were not Caddo." The Caddo Elders that we have talked with consider this taboo and believe that if they were to rebury remains or objects of some other tribe, something bad could happen to the person doing the ceremony and the people involved with the ceremony. In the case of reburying human remains and associated funerary objects that are excavated by archeologists or housed in a museum, the Caddo believe that all the necessary ceremonies were done when this person was originally interred, as evidenced by the items placed in the grave. They also believe that these items should remain together until a proper reburial can be performed. However, the elders who take care of these burial practices, will do a number of things out of respect for the person but will continue to say that the "ceremony was done way back there." They will perform a cleansing ceremony because the burials were disturbed but they do not want to "undo" something that has already been "done."

In a sense, these views presented us with an ultimatum: we needed to know beyond a reasonable doubt whether the human remains, associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony as defined by NAGPRA were indeed culturally affiliated to the Caddo Nation based upon the "preponderance of the evidence" according to the NAGPRA.

Partnering up with archeologists may not be suitable for every tribe, but it has worked fairly well for the Caddo Nation. This partnership has for one, provided us with expertise that only strengthens any legal claims we may have to human remains and cultural objects that fall under NAGPRA housed in museums across the United States. Another very practical aspect of this partnership is that the relationships we have developed over the years with the archeological community has given many of the Caddo people an opportunity to learn more

about archeology. Because of these relationships, we are also (in most cases) kept informed about upcoming proposals and projects that may impact sites of importance to the Caddo.

The W.T. Scott Collection and the Clements Site (41CS25)

The scope of our current investigations centered on the "W.T. Scott" collection from Cass County, Texas. On our initial visit to the AMNH to repatriate human remains from the museum, we discovered documentation that verified that Mr. Scott had personally excavated this collection from "17 graves" and had sold the collection to the museum for $200 in 1900. Thanks to the National Park Service NAGPRA grants program, we then put a proposal together that would help us document the items in the collection and begin to justify which items were indeed NAGPRA-related. We came up with a plan of action to photograph and measure all complete vessels, along with describing the vessel types and any decorating characteristics. Selected vessels with unique identifying characteristics would also be drawn. Any of the other items in the collections considered to be archeologically "diagnostic" would also be photographed and documented according to standard archeological citations/references for that type of diagnostic item.

We are fortunate to have a few letters written by Will T. Scott in 1900 concerning his work at the this site in Cass County, Texas. His letters and other later correspondence found in the Texas Archeological Research Laboratory files indicate that his collection came from what was later called the Clements site (41CS25) (Figure 1). That correspondence includes letters written in 1941 between A. T. Jackson and Samuel D. Dickinson—archeologists in Texas and Arkansas, respectively—about the site and its collections. Other primary documents available concerning the history of archeological investigations at the Clements site include Jackson's unpublished 1932 report on the University of Texas work there (Jackson 1932), and an article by Dickinson (1941) entitled "Certain Vessels from the Clements Place, an Historic Caddo Site" published in the Bulletin of the Texas Archeological and Paleontological Society.

Scott indicated in a March 20, 1900 letter to the AMNH that he discovered the site in about 1898 on his farm in Cass County, Texas. He mentioned that the site was 1/2 mile from a small creek, and was on a low knoll. He discovered 17 burials, about 3-6 feet in depth, that contained pottery vessels, stone arrow points, large points, ground stone tools (i.e., he called them tomahawks), and shell necklaces. To interest the AMNH in the purchase of his collection, he suggested the burials and artifacts were left by the Aztec. In a June 20, 1900 letter, however, he asserted that they were in fact Caddo burials, since the "Cadow Indians at one time inhabited the vicinity."

The burials were in rows, with the heads to the north and the feet of the deceased to the south; in Jackson's (1932) later investigations at the site, however, he discovered that almost all the burials were oriented with the head to the east and the feet to the west. Scott also wrote that almost all of the skeletal material in the majority of the graves had disappeared, marked by a "chalky line...where the bones had decayed " (March 20, 1900 letter). The grave goods he found had the large ceramic vessels (jars?) and bowls placed near the feet, with the smaller vessels, including bottles, around the head. The "smallest bottles [were] just under the side of the head at the base of the skull." In the only comments on the association of specific funerary objects in particular burials, Scott wrote to F. W. Putnam of the AMNH that he found blue glass beads in the same grave as two small "phial-shaped" bottles (Figure 2); some of the larger vessels also came from the same grave. The large chipped stone knives were "all in one grave."

In March 1900, W. T. Scott wrote to the AMNH to see if they were interested in purchasing his collection, or what was left of his collection from the site. We know from Dickinson's account that Scott "obtained

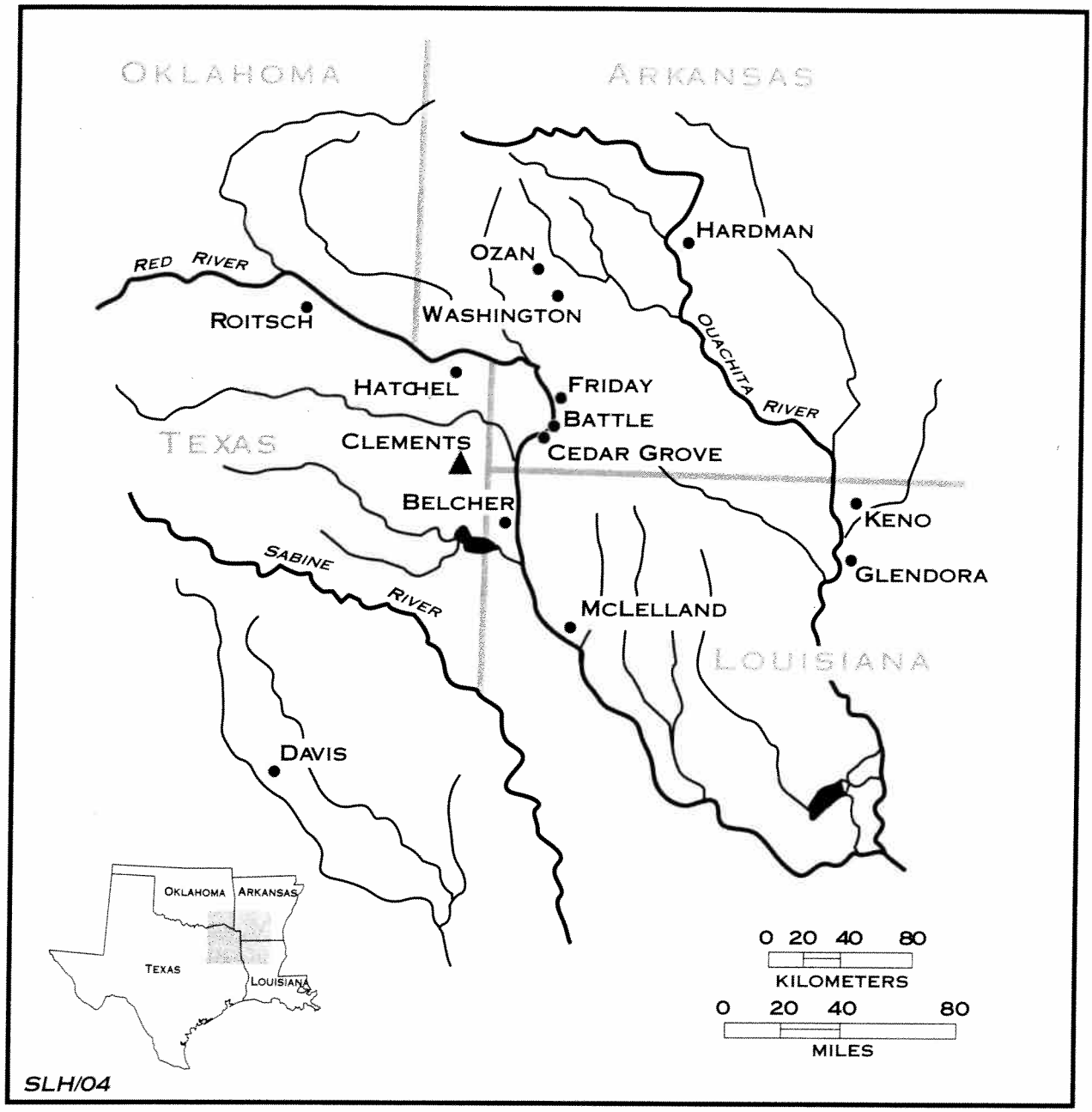

Figure 1. Map of the general location of the Clements site in the southern Caddo area.

a large collection of artifacts [from the Clements site], which he sold and gave to various people" (Dickinson 1941:117). Sometime prior to 1900, Scott had left his farm in Cass County and moved to the town of Gypsum in Hardeman County, Texas, near the Texas Panhandle. In his April 19, 1900 letter, he indicated that he needed the money, and asked for the sum of $200 for the collection from the AMNH.

Before the AMNH agreed to purchase the collection from Will Scott, they asked for a catalog of the collections, along with pencil sketches of the pottery vessels and other artifacts (April 9, 1900 letter from F. W. Putnam to Will T. Scott). Scott provided a rudimentary list, along with a series of well-done vessel drawings

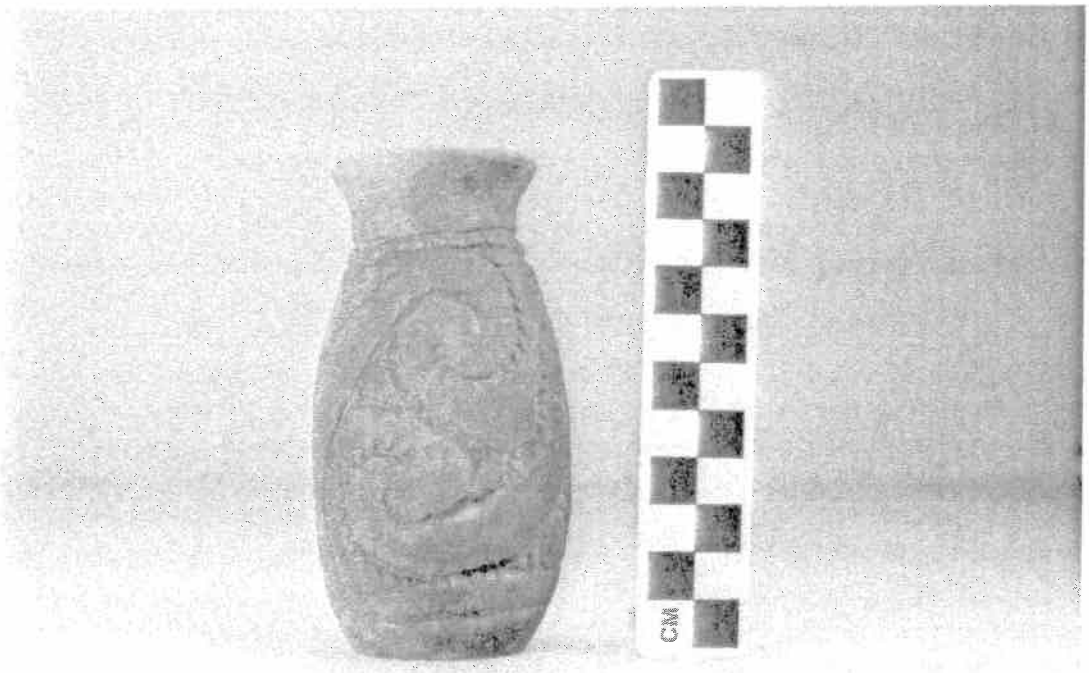

Figure 2. Small and narrow engraved bottle (AMNH catalog no. 20-5175) from the W.T. Scott Collection from the Clements site.

(on file at the AMNH) he had prepared by a Mr. Webber in July 1899, along with six photographs taken by Bonner's in the town of Quanah, Texas. Quanah is the county seat of Hardeman County.

Scott asked for $200 for his collection, and the AMNH agreed to that price on May 4, 1900, provided that Scott pack and ship his collection to the museum. Scott apparently shipped the collection on May 17, 1900. The W. T. Scott Collection at the AMNH includes 34 ceramic vessels, two complete ceramic elbow pipes, a small chunk of green clay pigment, three large chipped stone knives made from Central Texas cherts, three ground stone celts, a mussel shell hoe, unmodified freshwater mussel shell valves, 15 marine shell zoomorphic pendants, six shell ear disks, a single marine shell ear pendant, six barrel-shaped conch shell beads, and 25 medium to large blue glass beads.

Not included in this collection, however, were six ceramic vessels, a shell pendant, and a shell bead that Will Scott gave to his sister, Mrs. C. A. Smith (Dickinson 1941:117). The vessels eventually made their way to Samuel D. Dickinson. These six or seven vessels ("of the finest pieces of pottery" in the Scott collection) included two Hodges Engraved bottles (Dickinson 1941: Plate 19, nos. 1 and 2), two Cass Appliqued jars (Dickinson 1941: Plate 20, Nos. 1 and 2), two diminutive engraved bottles (Dickinson 1941: Plate 21, Nos. 2 and 3) that are much like two bottles now in the AMNH collection (see Figure 2), and a unique bi-lobed Hodges Engraved bottle (Dickinson 1941: Plate 21, No. 1). The vessel shape is reminiscent of a four-lobed Keno Trailed bottle vessel illustrated by Moore (1909: Figure 81) from the Glendora site in northern Louisiana, as well as to another four-lobed Belcher Engraved bottle from the Foster site (Moore 1912: Plate XLIV) along the Red River.

We know that the Clements site is a late 17th to early 18th century (ca. 1680-1720) Nasoni Caddo site in Cass County, Texas, in the northeastern part of the state. It is situated on a knoll near the headwaters of Black Bayou, a stream that flows in a southeasterly direction for a few miles to its confluence with the Red River near the Belcher mound site (16CD13, see Webb 1959). The site is also not far from the headwaters of streams flowing into the Sulphur River, another major tributary to the Red River, and only a few miles west of the Caddo Trace. The Caddo Trace was an aboriginal trail that led from the Hasinai Caddo settlements in East Texas to the Kadohadacho settlements on the Red River in the general area of Texarkana, Texas. The Goode Hunt site (41CS23), about 5 miles to the west of the Clements site, is a contemporaneous early historic Caddo settlement (see Perttula 1992). Two other Caddo cemeteries of similar kind and age in the vicinity include the A. P. Fourche and R. A. Simpson farm sites on Black Bayou and Black Cypress Bayou. These cemeteries had burials accompanied by glass trade beads, large well-made chert bifaces or knives, and numerous aboriginal ceramic vessels.

The Clements site was next excavated by the University of Texas in 1932 (Jackson 1932; Lewis 1987). At that time, 22 Caddo burials were exposed over a 600 square meter area adjacent to a small midden deposit. Twenty of the burials were apparently single, primary extended inhumations, but a semi-flexed burial (Burial 2) was also recorded, along with a multiple individual (Burial 11) containing three individuals. According to Jackson (1932), the three individuals are from three superimposed primary extended burials rather than the product of one burial event, which is a very rare if not unique mortuary context for prehistoric or early historic Caddo burials.

There were apparently several different burial groupings at the Clements site. This is based more than anything on the size and orientation of the burial pits across the cemetery, but the kinds of funerary objects placed with the individuals may help to differentiate the age and sex of the deceased along with their status as well as the status of their lineage.

Jackson (1932) had noted that the site had been disturbed prior to the University of Texas excavations. Much of the skeletal remains had been moved and rearranged, and many artifacts had been removed from the graves. As we know now, this disturbance to the Clements site burials was the result of extensive digging by W. T. Scott and others, who dug 17 burials here, but removed no skeletal remains. Jackson (1932) indicated that the site had been discovered about 1900, when we know from Scott's letters that it must have been a few years before that, since his collection from the Clements site was sold to the AMNH in 1900. Jackson was unaware that any of Scott's collection had been sold to the American Museum of Natural History, although he had been told that "about a dozen vessels from this site were sent to the Smithsonian Institution at that time [1900]." Since there are no materials from the Clements site at the Smithsonian Institution, we suspect that this inaccurate information actually was referring to the materials sold by Scott to the AMNH. Jackson was aware of Scott's considerable digging at the site, and he also knew about a small collection of ceramic vessels from the Clements site that were in the hands of Samuel D. Dickinson of Prescott, Arkansas (Jackson 1932). Dickinson, a well-known archeologist at the time in Arkansas, received these vessels from the daughter of Will Scott's sister, a Mrs. J. B. Hesterly of Prescott, Arkansas (Dickinson 1941:118).

Nevertheless, a relatively diverse assemblage of funerary objects was recovered from the site during Jackson's work at the Clements site, as well as in Scott's digging. Conch shell ornaments made from Gulf Coast marine shells were the most common item placed with the deceased, including probable bead necklaces from at least three burials (Burials 2, 8, and 15), bracelets (Burial 15), ear discs, and portions of pendant necklaces. The zoomorphic style of the conch shell pendants from the Clements site (Figure 3) is very similar to ones recovered at both the Belcher (Webb 1959:172-173) and Cedar Grove (Kay 1984: Figure 13-22) sites, as well

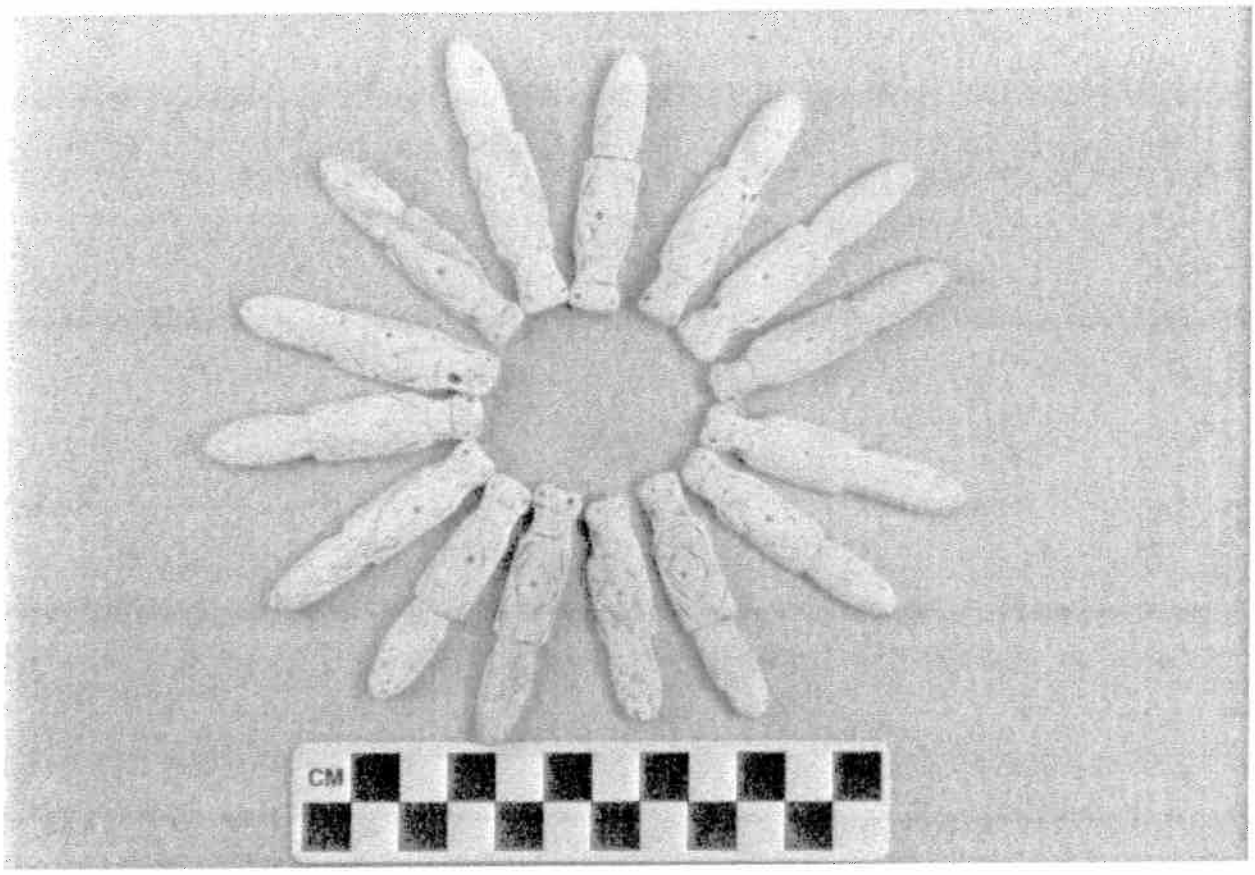

Figure 3. Engraved zoomorphic pendants from the W. T. Scott Collection (AMNH catalog no. 20-5156).

as from Belcher phase components at the Foster, Friday, and Battle sites along the Red River in southwestern Arkansas.

Half of the Clements burials had conch shell ornaments, certainly indicative of a ready access to these materials of exotic origin; a similar relationship was noted in the Chakanina phase burials at the Cedar Grove site (Trubowitz 1984; Perttula 1992: Table 16). Along with the shell ornaments were European glass beads (1-26 beads per burial) from five separate interments at Clements. In two instances, shell beads or other shell ornaments were found together in the same burial with the European glass beads. The 25 blue glass beads in the W. T. Scott collection from the Clements site were apparently found together with the small and narrow engraved bottles (see Figure 2).

Pottery vessels were also commonly placed as funerary objects in the burials, with as many as nine vessels placed with Burial 11. Others had between 1-6 vessels per burial. In the W. T. Scott Collection, there are 15 spool-necked bottles, two simple bowls (including a bird effigy bowl), 10 carinated bowls, two compound bowls, and five jars. The principal ceramic types among the bottles, bowls, carinated bowls, and compound bowls include Keno Trailed (n=2), including one Keno Trailed, var. Phillips bowl (Figure 4), Hodges Engraved (n=7, Figure 5), Taylor Engraved (n=6, Figure 6), and Simms Engraved (n=5).

One of the bottles had red-slipped scrolls and triangular areas (repeated five times) in relief across the body and at the base (Figure 7). The red-slipped areas around the scrolls have been scraped away to emphasize the scroll itself. The scraped areas show the original color of the pottery vessel before it was slipped. This is a new

Caddo ceramic type, and we have named it Hatinu Engraved for its unique red scrolls. Hatinu is the Caddo word for red. The very distinctive slipped and negative cut scrolls on the Hatinu Engraved vessel from the Clements site are noted on vessels in collections from the Hatchel site (41BW3), the Friday site in southwestern Arkansas (Moore 1912: Figures 106 and 107), and in a private collection from another site in Arkansas (Townsend and Walker 2004: Figure 19).

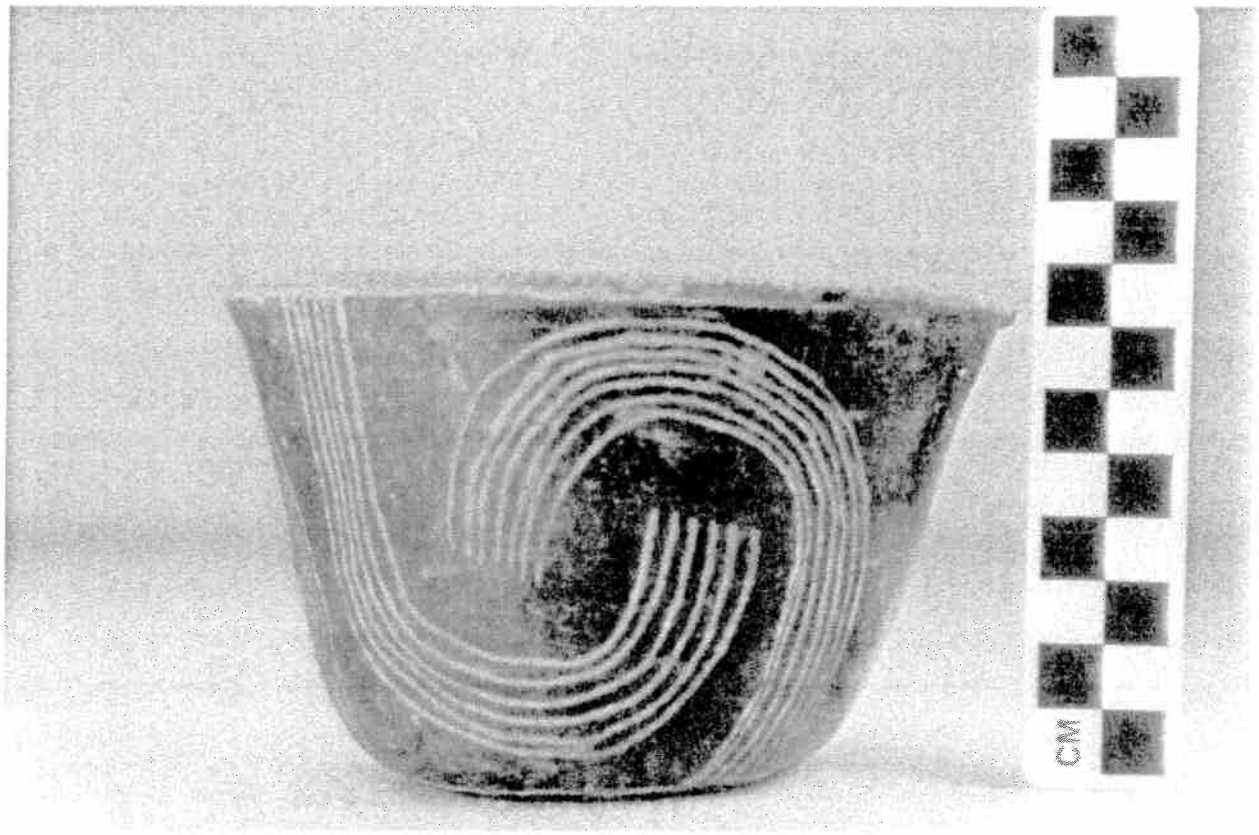

Figure 4. Keno Trailed, var. Phillips bowl (AMNH catalog no. 20-5181).

Utility ware jars comprise only 15% of the vessels in the collection. They include the following types: Clements Brushed (n=1), Cass Appliqued (n=1), Pease Brushed-Incised (n=1), and Mockingbird Punctated (n=1), as well as one unique red-slipped jar.

Fifteen of the burials excavated by Jackson at the Clements site also had clay pigment (green, brown, red, and gray colors) and/or mussel shell offerings (Jackson 1932). Four of the five burials with European trade goods had pigments, particularly a green pigment from a local glauconitic clay.

Conclusions

It is our sincere hope that this project by the Caddo Nation of Oklahoma can be of use by tribal governments with NAGPRA programs, State Historic Preservation Offices, Federal agencies that work with tribal governments, along with museums and institutions that are either complying or in the process of complying with the

Figure 5. Hodges Engraved bottle (AMNH catalog no. 20-5173).

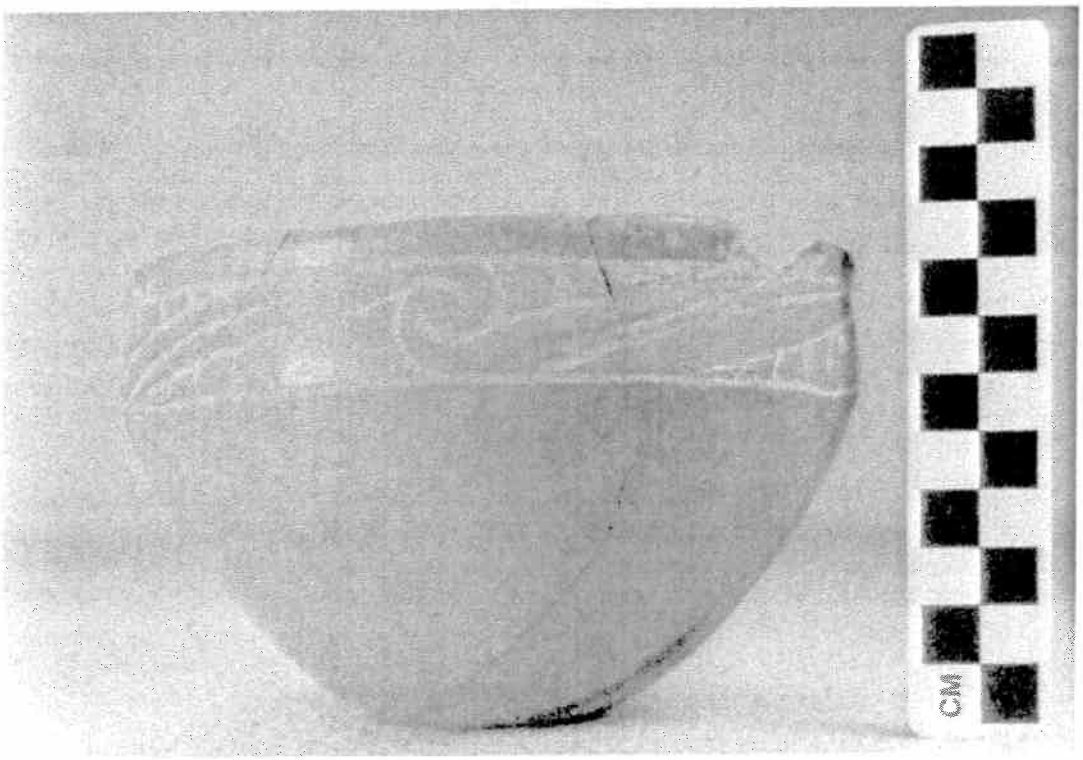

Figure 6. Taylor Engraved red-slipped carinated bowl (AMNH catalog no. 20-5182).

Figure 7. Hatinu Engraved bottle (AMNH catlog no. 20-5170).

NAGPRA. Our goals were twofold: one was to document the collections at the AMNH and prepare a report of our findings; the report will be published and distributed by the Caddo Nation in 2005. Our other goals were a little broader in their reach: to heighten the awareness of NAGPRA; reveal some of its real life complications; and support the continued need for cooperative efforts between the archeological and tribal communities.

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Mapping a Novaculite Quarry in Hot Springs National Park

Mary Beth Trubitt,
Arkansas Archeological Survey,
Henderson State University Research Station,
Arkadelphia, Arkansas

Abstract

Novaculite quarries in the Ouachita Mountains of Arkansas and Oklahoma were created through large-scale extraction of lithic raw materials, used for stone tools by Caddos and other Native Americans over the past 11,000 years and in recent centuries by Euro-Americans for whetstones. Quarry sites are characterized by surface features like large pits, trenches, battered boulders, and debris piles. This article summarizes the results of an Arkansas Archeological Survey research project that described and mapped surface features at one site (3GA22) to provide a better understanding of the problems and potential of documenting novaculite quarries.

Introduction

Novaculite, outcropping in the Ouachita Mountains of Arkansas and Oklahoma, has been valued as a raw material for stone tools for millennia. Ancient novaculite quarries form some of the largest archeological sites in this area, but their investigation has been hampered by their large size and scale and their inaccessible mountain ridge-top locations. The Arkansas Archeological Survey has recently completed a project with the U.S. Forest Service to create an overarching research design to guide novaculite quarries research in the Ouachita Mountains (Trubitt et al. 2004). The 2002 mapping project at 3GA22 was an offshoot of this effort, and was designed to explore techniques and methods for documenting quarry sites, as well as to clarify the site boundaries and periods of use for possible nomination to the National Register of Historic Places.

Some Background on Novaculite and Novaculite Quarries

The Arkansas Novaculite formation, made up of massive layers of novaculite and interbedded chert and shale, outcrops on ridges in the southern Ouachita Mountains along a 200 mile stretch from west of Little Rock, Arkansas, to Broken Bow, Oklahoma (Holbrook and Stone 1979). Like chert or flint, novaculite is a microcrystalline sedimentary rock formed by chemical precipitation of siliceous minerals, but Arkansas novaculite is thought to have been altered to some extent by diagenesis and metamorphosis during the formation of the Ouachita Mountains (Holbrook and Stone 1979; Keller et al. 1985; Steuart et al. 1984). Novaculite is described as "a homogenous, mostly white or light-colored rock, translucent on thin edges, with a waxy to dull luster" (Holbrook and Stone 1979:2). However, there is some variation in color, texture, and luster. Colors from white and gray to pink, red, tan, and black can be found (even at the same quarry). Texture and luster vary as well, from the hard fine-grained "Arkansas stone" to the more porous "Ouachita stone," to the weathered calcareous novaculite or tripoli (Griswold 1892:57-58 89-95, 103; Holbrook and Stone 1979:4-5). The translucency of

novaculite is often used as a sorting criterion (Jeter and Jackson 1994:160) but translucency is related to texture and varies in novaculite (Luedtke 1992:69 and Appendix B).

Chipped stone tools made from Arkansas Novaculite are ubiquitous on archeological sites in the Ouachita Mountains and adjacent areas of the Gulf Coastal Plain in southwest Arkansas and southeast Oklahoma (e.g., Early 1988; Schambach 1998; Waddell et al. 1995; Wyckoff 1968). As Holmes (1891:313) expansively described: "...hundreds of square miles are strewn with flakes, fragments, failures and rejected pieces [of novaculite], and the country around, from the mountains to the gulf, is dotted with the finished forms that have been used and lost." In the mountains, novaculite could be procured directly from outcrops, from surfaces of talus slopes below outcrops, and in the form of cobbles from riverbed gravels (Coleman et al. 2000; Martin 1982; Waddell et al. 1995). Away from the Ouachita Mountains in southern Arkansas, eastern Oklahoma, and northeastern Texas, novaculite could be obtained either from riverbed cobbles from the rivers flowing out of the mountains or from gravel deposits in Pleistocene terraces. Novaculite could have also been procured from outcrops back in the Ouachitas and transported directly or traded into these regions (Hemmings 1982; Perino and Bennett 1978; Perttula 1984; Waddell and King 1990).

In west-central Arkansas, the use of novaculite spans the range of prehistoric periods (e.g., Schambach 1998). There is some evidence that the heaviest use was during the Archaic period (e.g., Baker 1974:28-29), perhaps as novaculite became part of the Late Archaic period Poverty Point exchange system (Jeter and Jackson 1994). Different regions show different temporal trends, however. In the Felsenthal region (Ouachita River valley in southern Arkansas), novaculite use was higher during pre-Mississippian periods than during the Mississippian period (Hemmings 1982:242-244; Kelley 1984). But in a study of Lake Fork Reservoir sites in northeastern Texas, non-local lithics (including novaculite) had low frequencies in Archaic period assemblages and higher frequencies in Caddo contexts (Perttula 1984:137-139). In Hot Springs, Arkansas, quarrying novaculite for whetstones became an important local industry early in the nineteenth century and continued during the twentieth century (Griswold 1892; Whittington 1969). Novaculite and tripoli are still being mined commercially today (Steuart et al. 1984).

Nineteenth-century descriptions of novaculite quarries (Featherstonhaugh 1968[1844]:110-111; Griswold 1892:175-176; Holmes 1891, 1974[1919]:196-200; Jenney 1891) linked their use to the Indians previously living in the region and noted evidence of novaculite tool manufacture at habitation sites in the area. W. H. Holmes (1974) used novaculite quarries as examples in his treatise on aboriginal stone quarrying in North America. Only brief descriptions appeared in the literature in the mid-twentieth century (Lemley 1942; Whittington 1969).

More recent archeological investigation of novaculite quarries and workshop sites has focused on recording new sites and examining the spatial distribution of novaculite tool-working activities. A 1973 reconnaissance of Hot Springs National Park by the Arkansas Archeological Survey recorded several new novaculite quarry and tool manufacturing sites (Baker 1974, 1982). As part of his thesis research, Baker (1974, 1982) also conducted limited test excavations at a quarry site near Magnet Cove (3GA48/3HS158/3HS433). Recent surveys of U.S. Forest Service lands have recorded numerous quarry sites and examined the patterning of novaculite reduction activities across the landscape (e.g., Waddell and Waddell 1992; Waddell et al. 1995; Williams et al. 1993). Forest Service archeologists have been actively documenting novaculite quarry and workshop sites. Etchieson (1997) describes the types of large-scale features found at quarry sites, including pits and trenches, battered boulders and outcrops, artificial benches created by surface stripping to expose novaculite, shelters or caves enlarged by quarrying novaculite, and trails to quarries. Coleman's (2003) analysis of the lithic assemblage from test excavations at a Middle Archaic period novaculite workshop site investigated ideas about hunter-gatherer mobility patterns and technological organization. During the Arkansas Archeological Survey/Arkansas Archeological Society training program at Shady Lake in 1993, a novaculite quarry site (3PL349) was mapped

and tested (Coleman et al. 1999; Hilliard 1995). A more detailed analysis of the novaculite debitage from these excavations is currently underway at the Survey's Henderson Research Station.

Previous Research at 3GA22

Site 3GA22, a novaculite quarry in Arkansas's Hot Springs National Park, has been known to the archeological community for over 100 years. W. H. Holmes (1891:314) described the site as "a number of pits and excavations dug in and about the crest of the ridge. This ridge is a solid formation of the novaculite weathering out in irregular grayish flinty-looking masses which protrude from the crest or project on the slopes, forming short broken cliffs from ten to twenty feet in height." Two of the largest pits, one about 150 ft. (ca. 46 m) in diameter and 25 ft. (ca. 8 m) deep, the other larger but shallower, were formed by quarrying a novaculite outcrop downwards from the surface and discarding debris from knapping blanks around the pit edges (Holmes [1974:Figure 77] marked these pits "D" and "C" on his map, shown here as Figure 1). Holmes (1891) hypothesized that fire was used for quarrying, based on his observance of "blackened patches" on some undercuts (Holmes 1891:315). Quantities of knapping debris were seen around the pits and on level areas of the ridgetop (the "Great Workshop"), and Holmes (1891:315 and Plate III) also hypothesized that bifacial blanks and preforms were taken from the quarries to be finished into tools at other sites. He notes some evidence of recent disturbance at the site by people searching for old Spanish gold mines, but writes: "That the recent work has not seriously changed the contour of the ancient quarries is evident from the fact that the entire mass of ejected material, interior and exterior, is composed of the partially shaped fragments derived from ancient flaking" (Holmes 1891:315).

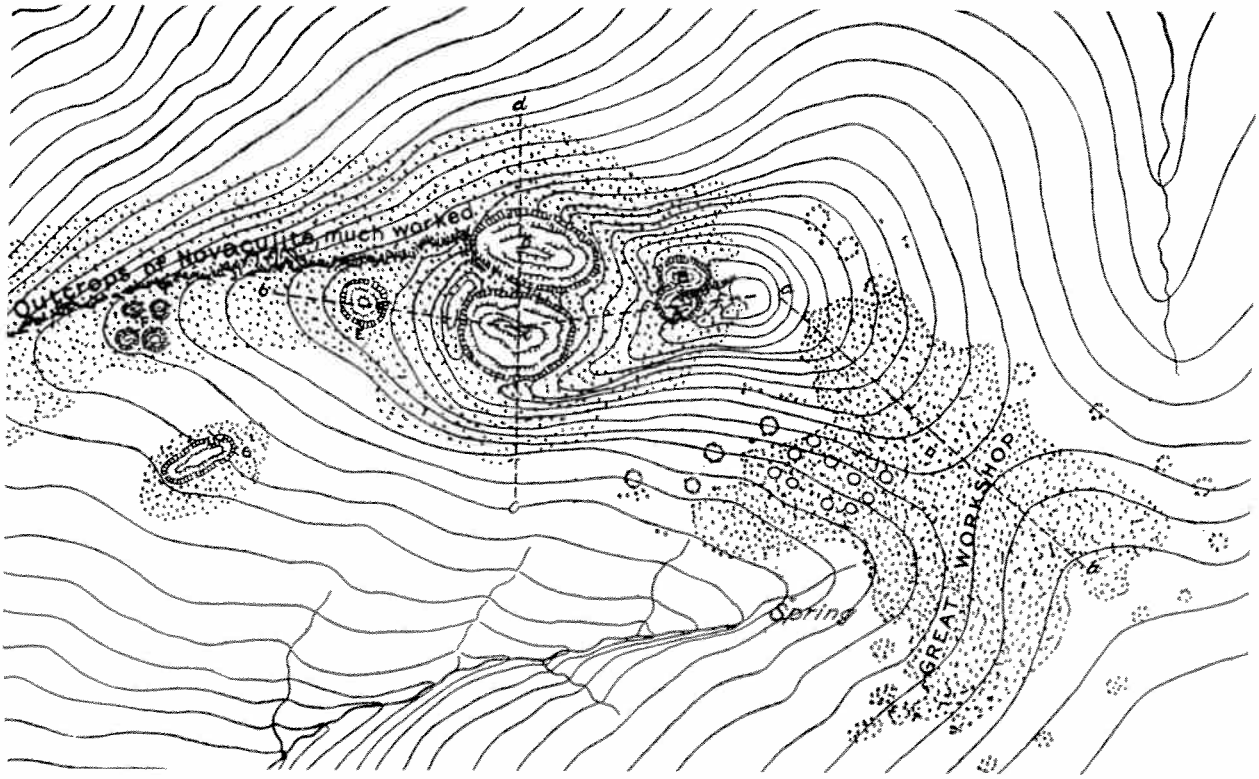

Figure 1. W. H. Holmes's map of the main quarrying area at 3GA22 (Holmes 1974:Figure 77).

Following visits to the site by local amateur archeologist Forest Sargent (1966), 3GA22 was recorded in the state site files in 1969 by Sargent and James Scholtz. Collections made at that time included hammerstones, novaculite debris, and worked pieces of novaculite (AAS/HSU Accession 69-40, 70-655). The presence of nearby abandoned whetstone quarries was noted. Baker (1974, 1982) revisited the site during his master's thesis research in 1973. He relocated Holmes' "Great Workshop" and the novaculite "ledge" and quarry pits (Baker 1974:Figure 1), and extended the site boundaries on the eastern side with the addition of seven quarry pits, about 2-4 m in diameter and 1-2 m deep with "chipping debris, tool blanks, and hammerstones" around them, scattered over an approximately 3 acre area (Baker 1974:11; 3GA22 site form; this area was originally designated as 3GA46 but is now included in 3GA22).

The novaculite source on this mountain has provided raw material samples for published novaculite heat treatment experiments. Flenniken and Garrison (1975) used a large piece of white novaculite to make bifaces and then heated them to 200°C, 450°C, and 500°C (392°F, 842°F, and 932°F). No change was seen at 200°C, but the 450-500°C samples showed a change in microscopic texture that resulted in a glossy appearance and improvement in knapping characteristics. Sollberger (in Bennett 1986:69-73) found that pieces of white novaculite showed a change to a pink or red color with an increase in luster, along with an increase in workability, when heated to 620°F (327°C). It should be noted that a wide range of novaculite colors can be seen in debris at 3GA22, but it is not clear whether this range reflects natural variation of the outcrops or the use of heat treatment.

There are archeological sites further east of 3GA22 along the mountain ridge (3GA47, 3GA135, 3GA138, 3GA141, and 3GA832-840) that have evidence of aboriginal quarrying in the form of shallow pits and trenches and scatters of chipping debris. In addition, there are unrecorded sites that reflect the nineteenth and twentieth century mining of novaculite for whetstone raw material (Griswold 1892:308; Whittington 1969:228). One of the companies operating in this area was Arkansas Abrasives, Inc., managed by Frank Thompson, which marketed a line of whetstones beginning in the 1950s and expanded into industrial abrasives and novaculite finishing media, later doing business as Buffalo Stone Corporation (Ms. Mary Little, 2002 personal communication; Mrs. Frank Thompson, 2002 personal communication). The overlapping of ancient quarry features by more recent activity at novaculite outcrops is typical of the Hot Springs region; nineteenth and twentieth century quarrymen often found and collected hammerstones during their work, and they likely started their operations in or near ancient quarries.

Recently, Mark Blaeuer (1995) of the National Park Service prepared a draft National Register of Historic Places nomination for 3GA22. Two issues raised during this process were the need to clarify the boundaries of the site and the need for more information on the periods of use of the site. The 2002 mapping project at 3GA22 was intended to contribute information for the first of these issues by describing and mapping surface features.

The 2002 Mapping Project: Methods and Results

New research at 3GA22 was designed to map the cultural features associated with novaculite quarrying activities in an effort to refine the site boundaries and to test techniques and methods for researching this kind of large-scale lithic extraction site. Creating measured maps of quarry sites that indicate cultural features such as battered outcrops and boulders, quarry pits, and debris scatters, is the first step in assessing and comparing the scale and types of lithic extraction and procurement activities, as Hatch (1994) has shown for jasper quarries in Pennsylvania.

The mapping project at 3GA22 was done under an Archaeological Resources Protection Act permit (MWR-02-1) obtained through the Hot Springs National Park and the National Park Service's Midwest Archeological Center. The field work took place over six days between February 15th and March 8th, 2002. Field personnel included Mary Beth Trubitt and Kate Wright (Arkansas Archeological Survey), assisted by Harry Hammond, Mary Little, Mildred Grissom, and Patricia Heacock (Arkansas Archeological Society, Ouachita Chapter), and Michael Head and Jeffrey Gaskin (students from Henderson State University). Mapping was done with a combination of techniques and equipment, including an electronic total station (Topcon GTS-211D) with stadia/target, a hand-held global positioning system unit (Garmin eTrex Vista), and standard metric tape measures. After field work, maps were produced using Golden Software's Surfer program and Maptech's Terrain Navigator software. A final report was prepared and submitted to the National Park Service (Trubitt 2003).

Several logistical problems were encountered during field work. Visibility for topographic mapping in a wooded environment and identification of surface features was maximized by scheduling the field work for the late winter/early spring before trees and vines fully leafed out. Site accessibility was a factor, as equipment had to be carried from the vehicle up about 300 ft. of elevation to the site. A backpack for the total station and multiple crew members made it possible to carry equipment up the mountain. Another factor was the size of the site. While a total station has a much greater useful range than a transit in open areas, trees and rough terrain made multiple setups or mapping stations necessary. Topographic mapping only included the area of the site covered by the Holmes map. Outcrops further west, and areas of modern quarrying to the south and east, were plotted on a digital quad sheet using the GPS unit. In addition, the novaculite outcrops on the site's northwest side presented mapping hurdles because the irregular and steep topography was difficult to access with equipment in the field and difficult to portray using the mapping software. Finally, differentiating between the older pits from Native American toolstone procurement activities and newer pits from Euro-American whetstone mining activities can be problematic. In the absence of archival research, detectable surface artifacts such as hammerstones or metal quarry tools, or excavations to identify characteristic debitage, I used rectangularity and steepness of pit sides as an indicator of modern quarry features, or features modified by nineteenth and twentieth century whetstone quarrying.

Points taken with the GPS unit indicate the more ancient and more recent quarry features of 3GA22 extend about 1000 m along two ridges on the mountain between about 800-1100 feet amsl. A total of 18 quarry pits or trenches were plotted along the southern ridge; based on steepness of pit sides, square or rectangular outlines, and proximity to an old access road, these are identified as nineteenth and/or twentieth century features. Additional pits may be identified with more field survey. Examining the associated debris would give a more conclusive interpretation of period of use (some have flakes in the debris piles and may have overlapping ancient and modern use).

An area of about 250 m north-south x 200 m east-west corresponds to the main area of 3GA22 used for novaculite toolstone quarrying, as indicated by surface flaking debris, shallow to deep circular quarry pits, and worked/battered novaculite outcrops. In addition to GPS point plotting, this area was mapped topographically using the total station (Figure 2), and corresponds to the area mapped previously by Holmes (see Figure 1). A total of 11 quarry features was identified in this area (Table 1). Most are pits or trenches (F-2, 3, 4, 5, 6, 8, 9, 10, 11), one is a concentrated area of debris on the surface (F-1, Holmes' "Great Workshop"), and one is an outcrop with evidence of working (F-7). The quarry features are concentrated on the northern ridge. Features on the southern ridge include a shallow oval quarry pit (F-4) that is thought to be from toolstone quarrying, two depressions (F-10, 11) that appear to be from more recent whetstone quarrying (or older pits with more recent disturbances), and a small depression (F-9) that may be either a quarry feature or a large tree fall. In a flat saddle between the two ridges is an extensive area covered with chipping debris (F-1).

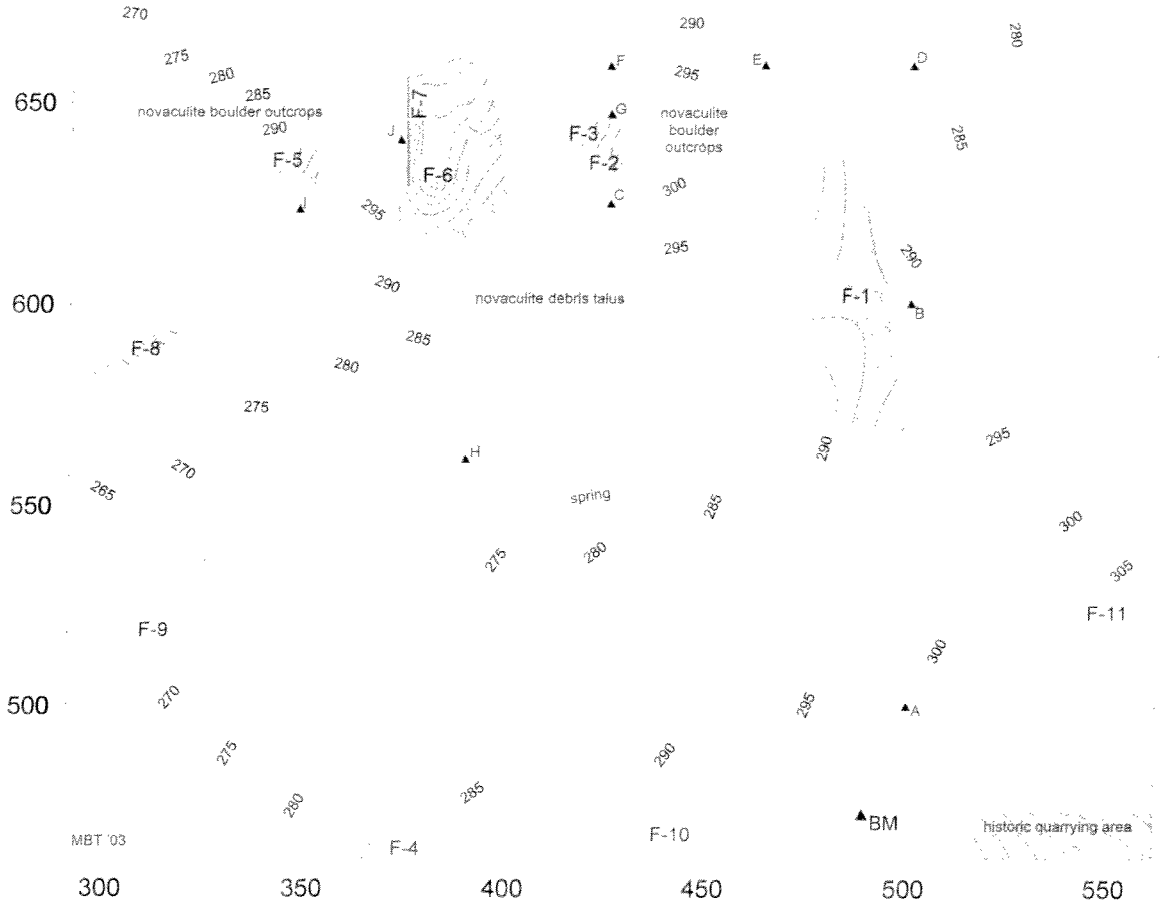

Figure 2. New topographic map of 3GA22 showing locations of surface features and mapping stations.

A 'spring' is shown on the Holmes map and was mapped in 2002 as well. There was some water found in the bottom of this gully during our field work in February-March, but none at the time of a July site visit, so this may be seasonal water drainage rather than a perennial spring. Ancient quarry workers may have preferred novaculite outcrops with nearby springs or seeps, since working on a mountaintop for any length of time would require water (carried up or accessible nearby). Springs have been noted near other novaculite quarries visited in the Ouachita Mountains, and I suspect that this is not coincidental.

Feature 1, Holmes' "Great Workshop," is a large sprawl of novaculite debris in the saddle of flatter land between the ridges and gullies. This area is literally covered with novaculite debitage, highly visible because of its density and a recently re-cut right-of-way access road. The F-1 boundaries approximate the area of heaviest exposed debris (novaculite flakes and shatter, as well as chipped novaculite bifaces/fragments and sandstone hammerstones/fragments), and novaculite continues beyond this on the surface. During our field work, we mapped and described (but did not collect) a total of 17 sandstone hammerstones or fragments and one novaculite dart point (Table 2). The hammerstones are made of a raw material that is not found on the ridgetop formation but was transported from lower elevations. The dart point, the only diagnostic identified during the field work, is typed as a Fourche Maline period Gary, *var. LeFlore/Bodcaw* point (Schambach 1998:58-59, 118-121).

Table 1. Surface Quarry Features, 3GA22.

Fea.#	*Description*	*Size*	*Holmes Designation*
1	surface scatter of quarry/workshop debris	area of greatest concentration: 20 m E-W x 70 m N-S	Great Workshop
2	oval quarry pit	7 x 10 m, 1.5 m deep	A
3	oval quarry pit	12 x 18 m, 3 m deep	B
4	oval quarry pit	4.5 x 7.5 m, 0.5 m deep	
5	circular quarry pit	15 x 16.5 m, 2.5 m deep	E
6	large oval quarry pit with 2 interior debris piles	30 x 46 m, 5 m deep	C, D
7	quarried outcrop exposed by F-6	26 m (N-S), 4.7 m max. height	
8	linear depression into side of ridge, quarry trench?	7 x 10 m, 1 m deep	G
9	possible quarry pit (or tree fall)	2 x 3 m, 0.5 m deep	
10	oval/rectangular quarry trench, recent or recent disturbance to old feature?	5 x 9 m, 1.5 m deep	
11	small rectangular quarry trench, recent?	1 x 2 m, 0.5 m deep	

The main area of quarrying on the northern ridge (Figure 3) has several distinct pits (F-2, 3, and 5, Figure 4), a large pit filled with piles of debris (F-6, Figure 5), and adjacent exposed outcrop (F-7, Figure 6). The adjacent oval pits labeled F-2 and F-3 (Figures 7 and 8) are separated by a line of large novaculite boulders that appears to be the surface of a novaculite outcrop left in place while adjacent seams were quarried out. A scatter of novaculite boulders lie on the surface of the ridge just east of these two pits. The F-6 pit and F-7 outcrop area (see Figures 3, 5-6) is a large feature complex created by quarrying to expose a seam of high-quality toolstone visible at the base of the outcrop (Baker 1974:10-11). Some debris from this quarrying was left in piles within F-6 while other debris forms an extensive talus slope on the south side of the ridge.

It is clear that the northern ridge was extensively remodeled by the quarrying and knapping activities that took place here in the past. A three-dimensional view of the northern ridge (Figure 9) shows that so much novaculite was removed that over 50 m of the ridge crest has been obliterated. Presumably this activity took place over the span of thousands of years. The one diagnostic recorded during this field work suggests use at least during the Fourche Maline period (ca. 650 B.C. – A.D. 950). Dating the use of this complex of quarry features remains as a major research question for this site, and may be answerable through excavation.

Table 2. Artifacts Piece-Plotted on Surface, F-1, 3GA22.

Hammerstones:

Art. #	*Material*	*Description*	*Size*	*Weight*
1	sandstone	battered, rounded, with one flat surface	9.5 x 8 cm	1012 g
2	sandstone	very battered, square	9.5 x 8.5 cm	632 g
3	sandstone	battered, square	10.5 x 9.5 cm	942 g
4	sandstone	battered, round with pitting	9 x 8.5 cm	566 g
5	sandstone	battered, pitted round fragment, some flat surfaces	7 x 6 cm	186 g
6	sandstone	battered round cobble fragment	6 x 6 cm	146 g
7	sandstone	battered round cobble fragment	11.5 x 7 cm	592 g
8	sandstone	battered round cobble fragment	7.5 x 7 cm	186 g
9	sandstone	battered round cobble fragment	8.5 x 7.5 cm	280 g
10	sandstone	battered round cobble fragment	13 x 10 cm	762 g
11	sandstone	battered round cobble fragment	9 x 7 cm	300 g
12	sandstone with quartzite	battered round cobble fragment	8.5 x 8.5 cm	488 g
13	sandstone	flat, battered on ends	18 x 17.5 cm	1814 g
14	sandstone	very battered, very rounded	7 x 7 cm	450 g
15	sandstone	very battered and rounded	9 x 7 cm	436 g
16	sandstone	battered round cobble fragment	8 x 6 cm	132 g
17	sandstone	battered rounded cobble fragment	10 x 8 cm	340 g

Dart Point:

Art. #	*Material*	*Description*	*Size*	*Weight*
18	novaculite, white/gray	contracting-stemmed point or late stage preform, beveled, no resharpening apparent; similar to type Gary, *var. LeFlore/Bodcaw*	L 6 cm W 3.5 cm Th 1 cm	NA

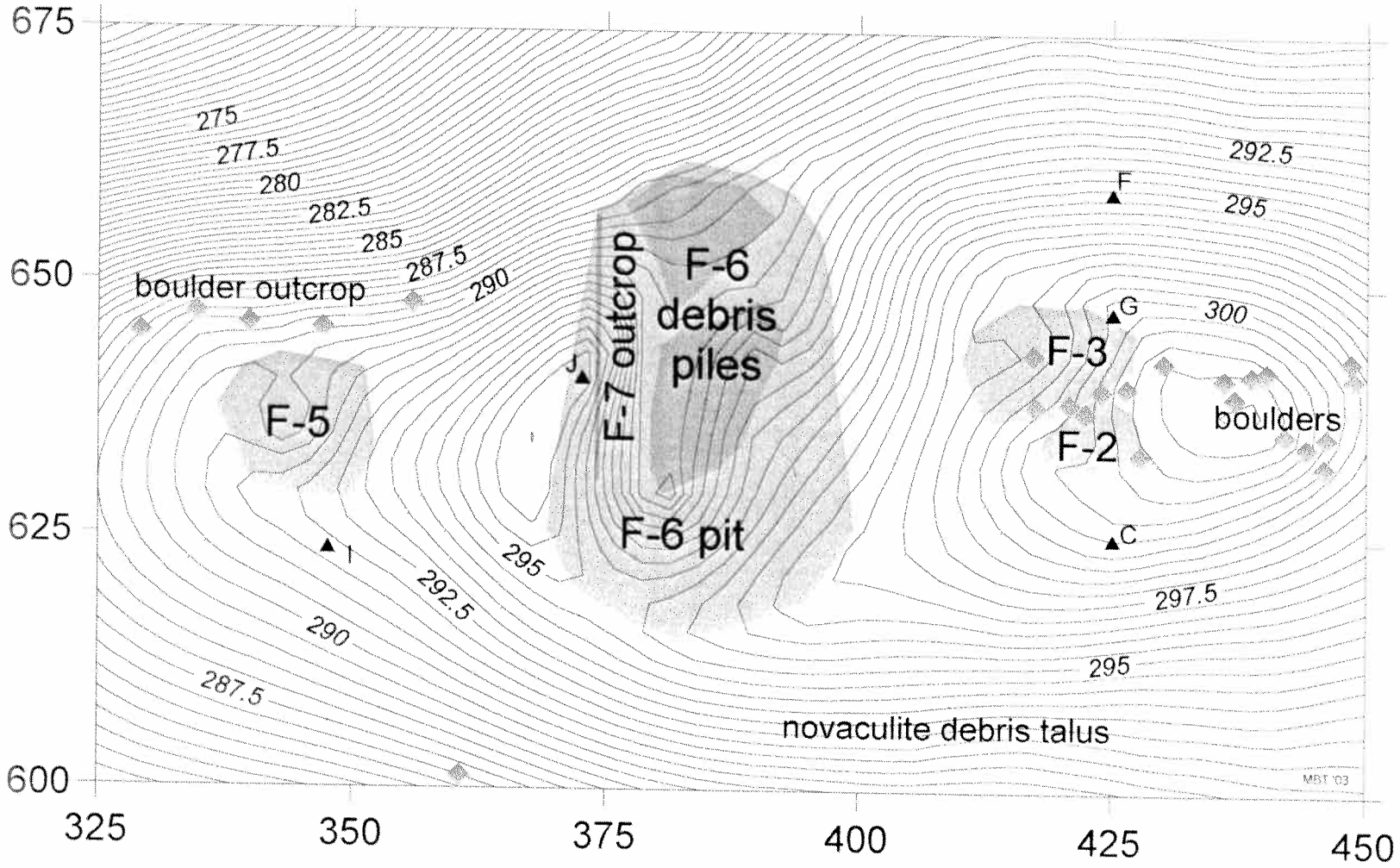

Figure 3. Detail map of 3GA22 showing F-2, 3, 5, 6, and 7 area.

Figure 4. Mapping quarry pit F-5, facing north (AAS/HSU slide 10435).

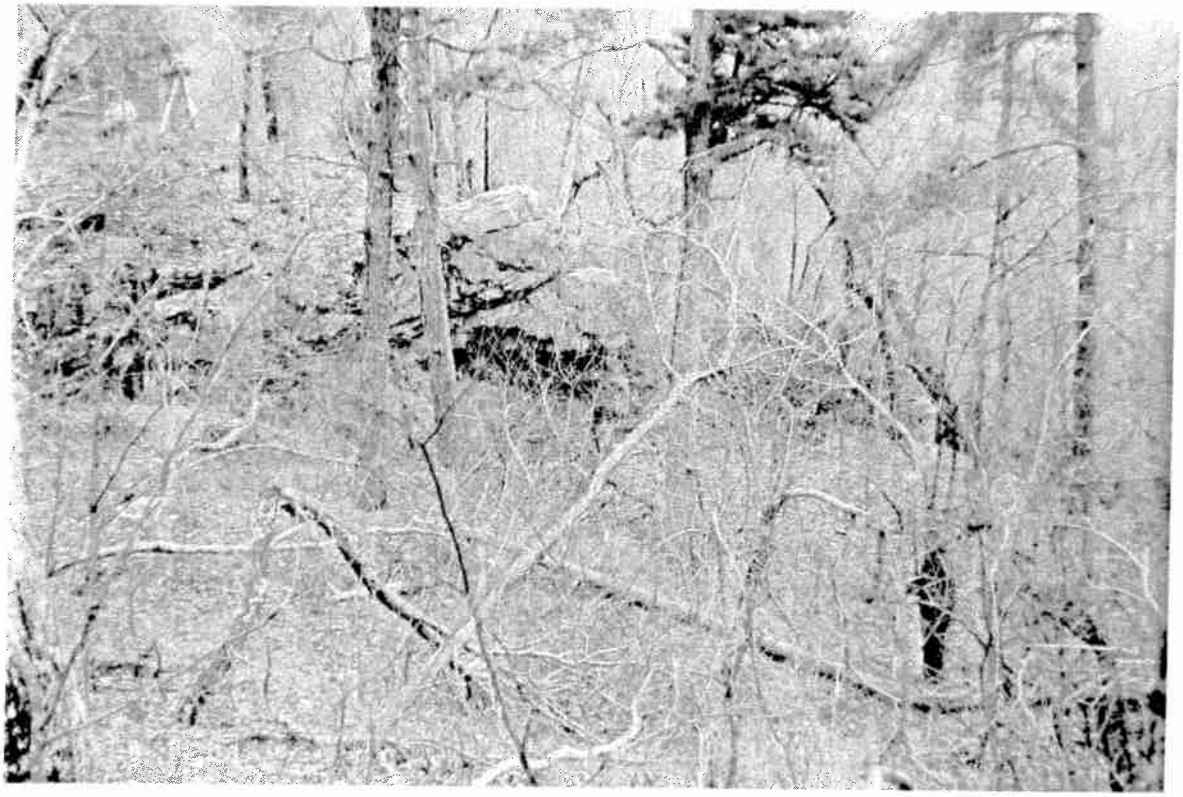

Figure 5. Mapping quarry pit F-6, with total station set on top of novaculite outcrop F-7, facing west (AAS/HSU slide 10439).

Figure 6. Novaculite outcrop F-7, facing north (AAS/HSU slide 10182).

Conclusions

Novaculite quarries are a major site type in the Ouachita Mountains, and one that presents numerous logistic and methodological problems as well as great potential for investigating past human activities in this region. There are certainly logistical problems to deal with when researching these large mountaintop quarry sites. Tree foliage limits visibility of surface features, so surveying during late winter/early spring is optimal for visibility and weather conditions.

The size and scale and rugged terrain of novaculite quarries makes mapping these sites more difficult. Three mapping methods were used during this project. Plotting GPS points taken at quarry features provided an indication of the extent of the site and its location on the geological quadrangle map, but not at sufficiently large scale to show details of the site or its features. Higher resolution global positioning system units could be used for more detailed site mapping. A topographic map was created of the main quarry feature area using a total station. In conjunction with this, more detailed sketch maps of individual quarry pits were made using standard tape measures. These techniques showed the relationships between features and between features and the landscape. However, novaculite outcrops with extreme topographic variation proved difficult to show on the maps produced, and the more detailed mapping was time-consuming.

After the field work was done, several kinds of aerial photographs of Hot Springs National Park were examined. While exposed novaculite in the modern quarries shows up strongly against the wooded vegetation of adjacent areas, the smaller exposures, such as the F-2, 3, 5, 6, and 7 complex mapped at 3GA22, were not visible. In the future it may be worthwhile to use a combination of high resolution aerial photographs and more accurate GPS technology to generate large-scale maps that focus on the locations and situation of cultural features. Since quarry features are often scattered over large areas, detailed topographic mapping using a total station might focus on configurations of the features themselves (quarry pits, talus slopes of debris, workshop areas).

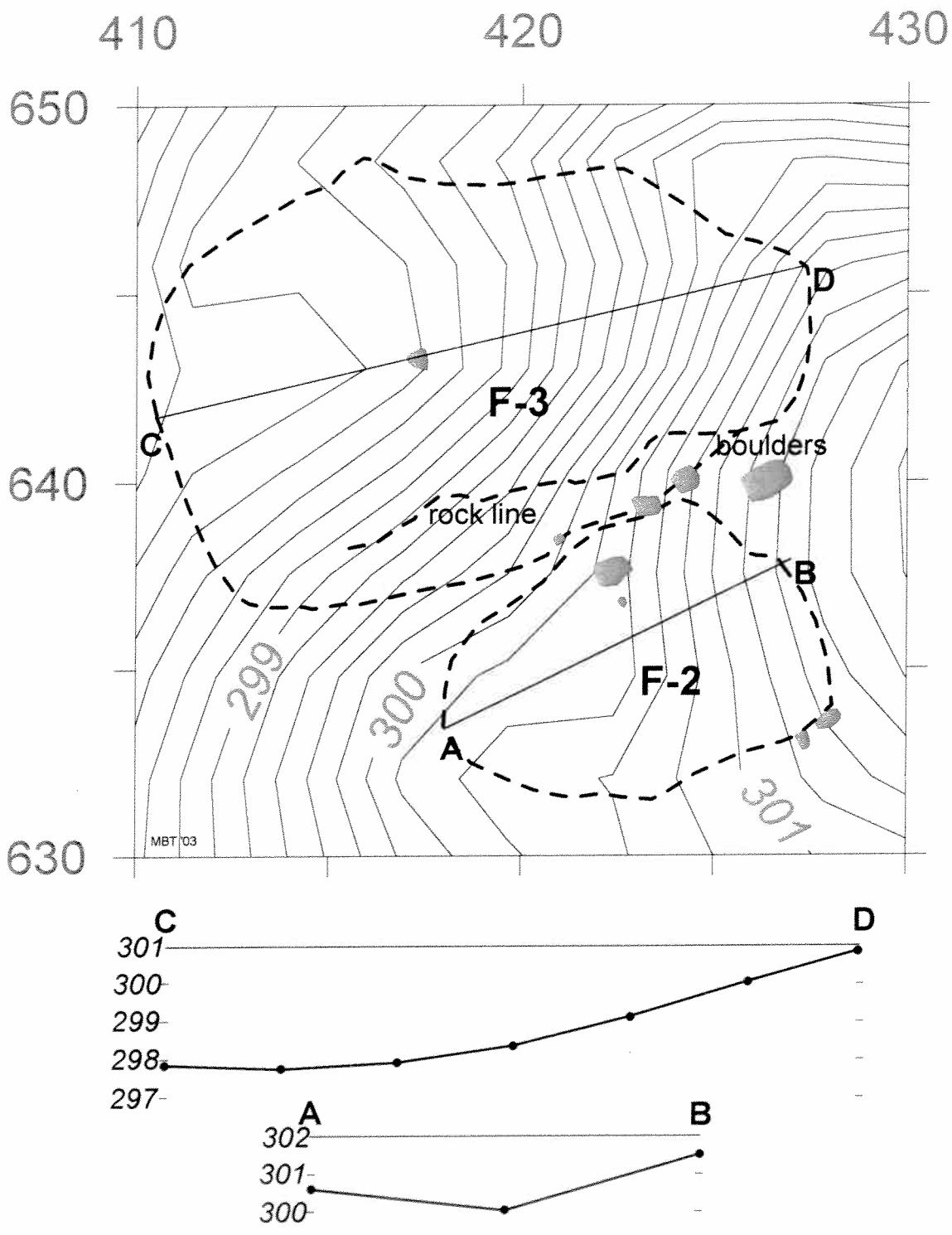

Figure 7. Detail plan and cross-sections of quarry pits F-2 and F-3.

Figure 8. Mapping quarry pit F-3, facing southwest (AAS/HSU slide 10427).

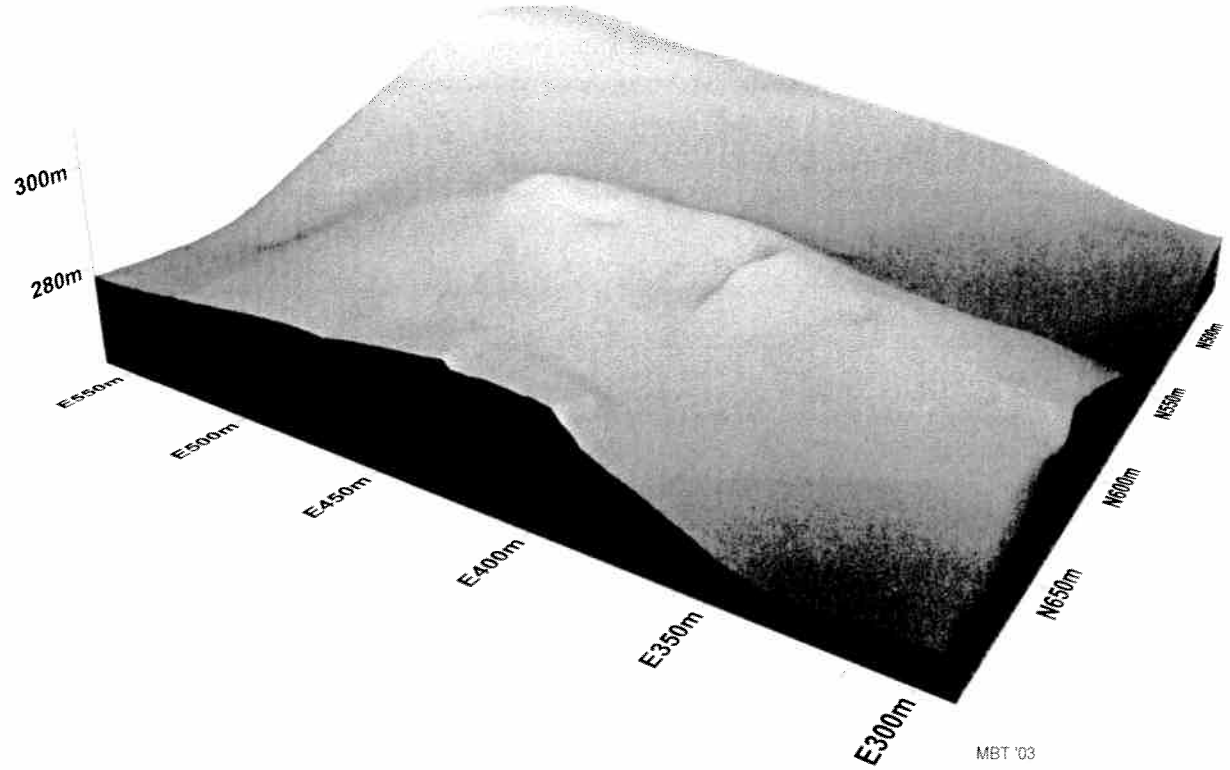

Figure 9. Three-dimensional view of the heavily-quarried northern ridge at 3GA22, view towards southeast.

Mapping of novaculite quarry sites is an important first step in understanding the size and scale of these sites and the types of extraction techniques used that resulted in features of different types observable on the surfaces. Presumably the objective was similar from quarry to quarry – to expose high quality novaculite and extract it from the surrounding rock or soil – but the situation differed within and between mountains and left behind differing surface alterations.

It is clear that novaculite quarrying for toolstone was done by Caddos and their ancestors, and perhaps other Indian groups as well, over a period of thousands of years. One of the ongoing research problems is dating the period(s) of quarry use. Diagnostic artifacts found elsewhere indicate that novaculite was the favored raw material for chipped stone tools for most of the long prehistoric sequence in this region. It is not clear, however, whether quarrying was actively done at outcrops throughout this time span, or whether riverbed cobble sources or talus or surface pieces were used during specific time periods. If novaculite from outcrop quarries was exchanged beyond the local area, there remains the question of whether local people obtained and then traded it or whether outside groups came to get their own supplies directly.

Surface diagnostics at quarry sites are few, especially after collecting by visitors over the last two hundred years. Excavations of quarry features and workshop areas may produce diagnostic artifacts and/or samples suitable for dating, but sampling strategies for excavation and analysis must be developed to deal with the large amounts of artifacts uncovered (e.g., Torrence 1984). In general, few finished tools are expected at most quarry sites, compared with the quantities of quarrying and chipping debris.

Unlike most other North American cherts or flints, novaculite has continued to be quarried or mined into the modern era. Quarrying novaculite for whetstones began in the early 1800s around Hot Springs, and has continued, along with other commercial uses, through the twentieth century. Quarry sites (including 3GA22) show evidence of use by both Euro-Americans and Indians in different time periods, and the more recent rock quarrying may have obliterated older portions of this and other sites. Distinguishing older quarry features from the more recent ones could be done by examining debris, since distinctive tools and technologies were used by toolstone quarrying versus whetstone mining. While angular pieces of novaculite debris characterize the bulk of the natural talus and the cultural waste piles in and around quarry pits and outcrops, close examination may expose hammerstones and identifiable flakes versus metal tools, drill marks for black powder charges, or distinctive whetstone debris (although this may not be so straightforward; see Martin [1982:120] for a cautionary tale of "flakes" resulting from modern tools used to test stone quality prior to whetstone quarrying).

Numerous novaculite quarries are preserved on U.S. Forest Service and National Park Service lands. Using both old and new field techniques to document these sites has benefits both for researching novaculite tool production and exchange systems and for interpretation of these historical resources for the public. While there are many logistical problems, the potential for learning about past lifeways is significant. Specific research areas include sourcing studies to tie novaculite artifacts to their source quarries: investigation of quarrying tools and techniques; analysis of the byproducts of novaculite tool manufacture at quarries, workshops, and habitation sites to understand the spatial and social organization of production; analyzing the distribution of novaculite tools to interpret the mechanisms for novaculite exchange; and investigating the people involved in these activities as both producers' and consumers' (Trubitt et al. 2004). Novaculite quarries are but one part of the tool production and exchange systems. When novaculite quarrying is conceptualized as part of these larger cultural systems, we can shift focus from artifacts to the people who made and used these tools. The spatial distributions of novaculite artifacts show in a material form the relationships between groups of people in the past, and the interactions between people on a regional and inter-regional scale.

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Cavanaugh: A Late Prehistoric Platform Mound in Western Arkansas

Gregory Vogel
The University of Arkansas

Introduction

Cavanaugh Mound (3SB3, also known as Etter's Mound, Jones Mound [Newkumet 1940], Site Zeta [Dollar 1958], and occasionally misspelled Cavenaugh) is a largely intact Late Prehistoric platform mound on the Arkansas River just east of the Oklahoma border, about 14 km from the Spiro Mounds complex (Figure 1). The site is situated on a high terrace above the Arkansas River as it runs between the Ouachita Mountains to the south and the Ozarks to the north. The Poteau River enters the Arkansas River floodplain just west of Cavanaugh, creating one of the widest stretches of bottomland in the region. The area immediately around Cavanaugh Mound is now a residential neighborhood in the city of Fort Smith, and the mound itself is in a tiny lot with a church to the south, a trailer park to the east (named Indian Mounds Trailer Park), and a row of houses to the west. At about 60 m across and 9 m high, Cavanaugh Mound is one of the largest, if not the largest, prehistoric mound in the region. Very little has been published concerning this site, however, and very little formal archeological work has been done there.

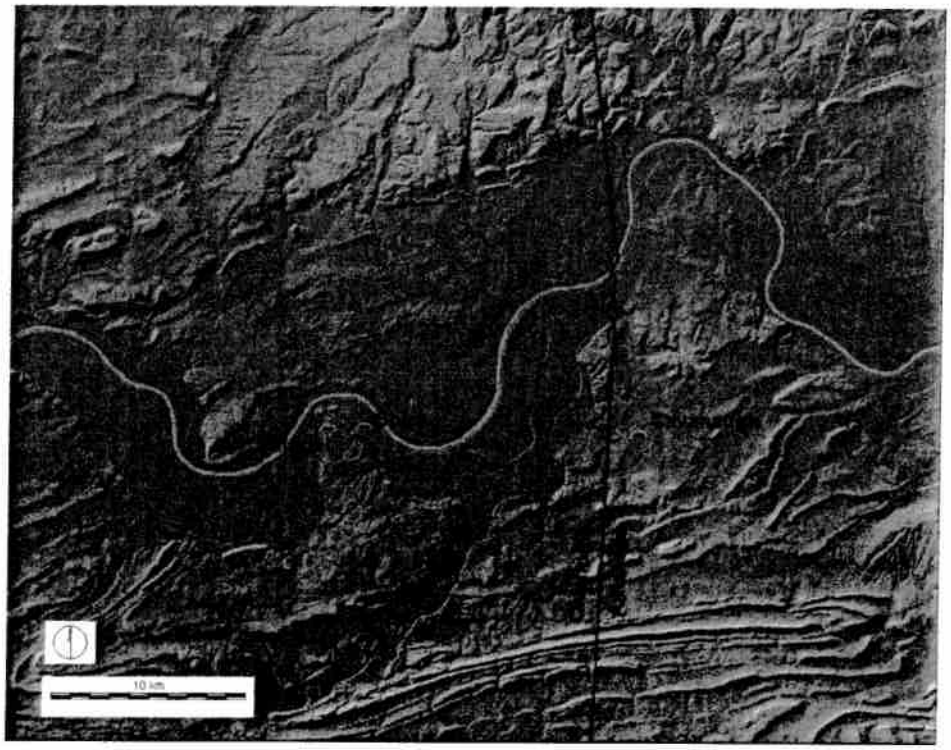

Figure 1. Shaded relief map of the region surrounding Cavanaugh Mound.

This article is partly intended to call attention to Cavanaugh Mound, and to compile all reports and descriptions of the mound in one publication. The first part of the article is therefore mostly descriptive. I also offer some tentative interpretations of the site and its possible relationship to the nearby Spiro and Skidgel sites. The size, shape, and stratigraphy of the mound all indicate that it was constructed and used in a manner similar to other Caddoan era platform mounds in the Arkansas River valley. The mound

appears to be alone on the landscape, not connected to a group of surrounding mounds and not located within or near a contemporaneous settlement. It overlooks the Poteau/Arkansas River bottoms to the west and was probably visible from both the Spiro and Skidgel sites in prehistoric times.

History of Investigations at Cavanaugh

The first printed mention of Cavanaugh probably comes from Goodspeed's *History of Arkansas*, first published in 1889. After a brief discussion of the "Mound Builder" question, Goodspeed (1889:687) relates, "There are some earth formations in Sebastian County supposed by some to have been made by the Mound Builders, but so far as they have been explored nothing of interest leading to a certainty of whether they were formed by nature or by man has been found." No other earthworks are reported for Sebastian County, but there are numerous naturally-formed prairie mounds that have occasionally been mistaken for prehistoric constructions. If this brief passage does relate to the Cavanaugh Mound it is the first time the site is mentioned in print. There does not appear to be further mention of the site for several decades after this.

The first systematic observations of Cavanaugh Mound come from Phil Newkumet, who visited the site in 1940 in conjunction with WPA work at the Spiro site (summarized in Brown 1996:176-179). Newkumet made a sketch of the mound at this time (Figure 2, from Brown 1996:178 and Figure 1-57) that shows it as a truncated pyramid, 61 m (200 feet) on each side, and 12 m (40 feet) tall. The flat summit portion of the mound is shown as square and 23 m (75 feet) on a side. The sketch includes a tunnel going into the mound from near the base of the east side. A cemetery is shown in the northeast quarter of the upper, flat portion. A narrow terrace or bench-like feature is shown encircling the base of the mound. No dimensions are given for this bench, but from the sketch it appears to be about 2 m high.

The next observations come from James Shaeffer of the Oklahoma Anthropological Society, who visited the site in October 1956 in conjunction with visits to other area sites in threat of destruction. Shaeffer's (1956:4) description reads:

> Traveling farther south and east the Spiro mounds were visited under the guidance of Mr. and Mrs. Cecil Cleavanger [sic: should be Cleavenger] of Fort Smith, Arkansas. Following this a visit was made at a large mound south of Fort Smith on the property of Mr. Dale Brown, a displaced Oklahoman. This is a very well preserved and interesting mound about 30 feet high and perhaps 100 feet in diameter. There are no indications of settlements in the area and no points, pottery sherds or other debris have been seen in the vicinity. The mound itself appears to be flat topped and truncated. There are a number of white graves of the middle 1800's on top and near the base a tunnel about four feet in diameter has been cut

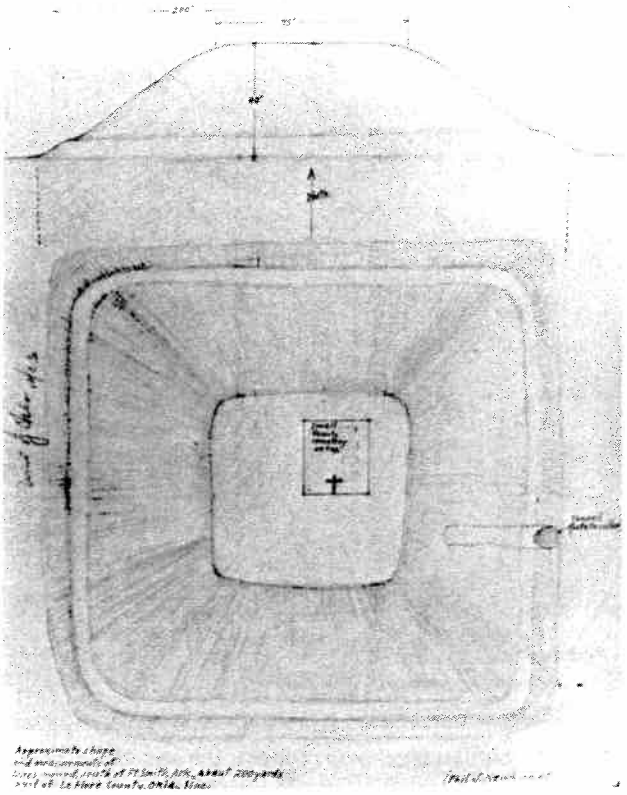

Figure 2. Phil Newkumet's sketch map of Cavanaugh Mound, made in 1940 (from Brown 1996:178 and Figure 1-57).

almost to the center of the mound. Examination of the interior shows alternate banks of dark earth and a light grey clay mixed with large grains of burned clay. The bands are from 4 to 8 inches in width. It is estimated that there must be approximately a hundred layers or so within the mound. These facts seem to indicate a temple mound which is probably late in time.

The next observations of the site come in the form of letters from Hugh C. Rogers of Fort Smith. Rogers was a long-time amateur archeologist and a member of the Ft. Smith chapter of an archeological society. Rogers sent a letter about Cavanaugh Mound to Robert Bell dated February 15, 1958 (Bell 1980), and one to Charles McGimsey dated February 22, 1958 (Rogers 1958). Both letters are substantially similar in their descriptions of Cavanaugh. The letter to McGimsey is slightly more detailed and contains background information on Rogers and his archeological interests, including the Spiro site. The entire letter is reproduced here; the material directly concerning Cavanaugh begins with paragraph seven (There is a large mound...).

Dear Dr. McGimsey:-

We were glad that you could be with our Ft. Smith Chapter last Tuesday night and that we could get acquainted with you. I hope that we can work very closely with you and that we can get better acquainted as time goes on.

I have been an amateur archaeologist for over fifty years, first getting interested while in Vernon County, Mo. then in Lafayette County Missouri, where I was County Engineer for 29 years, and then as Supervisory Engineer at Camp (now Fort) Chaffee, for the past 15 years. I am now retired and hope, health permitting, to get interested in some Archaeological work here.

I am inclosing you a copy of my recent book, "Indian Relics and their Story" [Rogers 1954], and while it is not written in a technical manner, you might find something of interest in it. It has generally been received favorably by the public, and I have had some nice letters regarding it, and recently received an order from a man who stated that it had been recommended to him by the National Geographic Magazine. Feel free to "Pan" it if you desire.

In our meeting Tuesday, the question was brought up of "Site Preservation". I am very much interested in this, but certainly do not wish us to get a law passed that is patterned in a way after the Oklahoma Law. This law provides that there be no private excavation, even by the landowner, and that all material recovered become the property of some public museum. I feel that this law has proved unworkable, is unconstitutional in that it seeks to take private property without due process of law, and above all has been a hindrance to the actual spotting of definite source.

I have been far too busy to do much actual work during the time I have been at the Post, but have carried on a Project, to salvage as much Spiro material as possible from the old private collections in the area. I have been able to acquire a number of important Spiro artifacts, some from collections made by excavation years prior to the Commercial Excavation. I still have some relics brought in to me that I am sure were recovered from the mound (digging has not stopped) but have had to turn them down as the owner, fearing the Oklahoma law, simply states that they were "plowed up in a field". I always ask, How? When? Where? and by Whom? and in the event that I cannot trace the Artifact back to Spiro, I pass it up. I am sure that I have turned down many genuine Spiro relics, and it is a shame that many of these are still being scattered over large areas outside of Oklahoma and Arkansas.

I have done some Bluff Dweller investigations in Crawford County, just North of here, and have had two papers published in the Missouri Archaeologist. These are in Volume 16, No. 2 July 1954, and Volume 19, No. 4, December 1957. The latter might interest you, since Dr. Dellinger feels that it records the first

direct association of the bow and arrow to the Bluff Dweller Culture. He has a copy, but if neither of these issues are available to you, would be glad to send you copies.

There is a large mound just South of the City Limits of Fort Smith. It has a base about 210 feet East and West, by 160 feet North and South, is about 25 feet high, and contains about 21,000 cubic yards. The top is flat (truncated) about 70 feet square, and on it is a family cemetery containing about 16 burials. Twelve of these are marked by headstones and foot stones, and burials date from 1881 to 1895. I have been told that this cemetery was put there by a former landowner who has Indian blood in his veins, expressly to prevent the mound from ever being disturbed. There is a clause in the transfers of the land requiring this cemetery to remain. A number of Archaeologists have looked this mound over, but like in the course of Spiro, they have considered it to be a House Mound, and have not been interested in its investigation. I looked at it five years ago and arrived at the same opinion, taking into account the truncated top and the steep sides. The angle of repose of the slopes approaches 50 degrees from the horizontal in places, and indicates a high degree of compaction.

The land on which the mound is located has recently been purchased by Mr. and Mrs. Frank Etter, who are interested in Archaeology, and they wish to investigate it, and have asked me to act as a kind of unofficial technical advisor. I have carefully examined the mound, and feel that a proper investigation might indicate some other use than as a House, or Temple Mound. About 50 years ago there was an exploratory tunnel driven into the middle of the East end, beginning about six feet above the natural ground then sloping steeply down to the natural surface, and then back about 20 feet. I am very much interested, as an Engineer in the degree [of] compaction obtained by the builders, since no caving or spalling, either of the walls or ceiling has occurred during the ensuing years, even though it has never had any shoring or bracing. I feel sure that the degree of compaction would closely approach that possible with modern construction equipment, and would be about 100 percent (Proctor). The walls do not indicate much stratification, but show lamination in about six inch layers.

One thing that influenced me to classify it as a house mound was that on the South side, near the bottom, there was a fanlike accumulation of earth which I assumed to be the remains of an old ramp. On running down rumors about this mound, I was told that about 50 or 60 years ago, there had been a tunnel driven into the South side of the mound and that a number of fine artifacts had been recovered. Mr. and Mrs. Etter have made a test excavation at this point and uncovered the plugged mouth of this tunnel, and it runs back about 25 feet, ending in a room about six feet square, and earth excavated from this tunnel was wheeled out and formed the deformation of the mound, which I had thought to be the remains of the ramp. Rumor has it that the further excavations were stopped by the landowner who feared that it would injure the cemetery.

Since the cemetery on top is on flat ground, it might be possible that the ground was leveled at the time of the construction of the cemetery, explaining the truncated appearance. Since this mound cannot be investigated in the usual manner, due to the location of the cemetery, the usual method of excavation of the mound is impossible. I have therefore recommended that an earth auger be used to sink holes down from the top, seeking to find a void which might indicate a chamber. If so, it would be practical to drift a tunnel in from the side slope.

In the event that something important turns up, will keep in touch with you.

Sincerely,

Hugh C. Rogers

P.S. Have a large collection of artifacts from all over the United States, of which less than half is shown on the plates of my book, and would be glad to have you stop in anytime and look these over.

The only substantive difference in Rogers' letter to Bell one week earlier (Bell 1980:11) is that the north-to-south length of the mound is given as 170 feet (instead of 160 feet).

Later the same year (May 1958) the site was recorded by amateur archeologist Clyde Dollar. Like Rogers, Dollar was a long-time avocational archeologist, and also worked as an engineer for Fort Chaffee. Dollar also occasionally worked for the University of Arkansas Museum under Charles McGimsey. It is unclear whether Dollar was acquainted with Rogers (who had retired from his work at Fort Chaffee at this time), but it is possible that Rogers' letter to McGimsey led to Dollar's visit. Dollar's designation for Cavanaugh Mound was "Site Zeta," and his report for the University of Arkansas. Museum is worth quoting at length (Dollar 1958):

Description and Use of Site

A large earthen mound shaped roughly in a pyramidical form with truncated top. The sides and dimensions are generally symmetrical with a plus or minus factor of 10 feet. The site presents a most interesting problem in that the dirt of which the mound is built apparently did not come from any place in the immediate area. This absence of excavation may indicate that nearby river banks could have been the source of dirt. At present, the Poteau River, the closest natural water supply outside of shallow wet weather springs, is approximately 2.5 miles away. The soil used in the construction is also notable in its complete lack of foreign material such as sticks, grass, and rocks other than small sedimentary type pebbles of 1/8" to 1/4" diameter. The soil itself is a white sand and has the appearance of being screened before use.

The probable use of this mound by its builders was for religious ceremonies or similar occasions. Intermittent excavations for the past 60 years have apparently revealed nothing of value whatsoever. It is interesting to note that this site has been known and recognized as an "Indian" mound for almost a century. The flat area on top contains a cemetery of at least 12 marked graves and an undetermined number of unmarked graves. The present existing tombstones date from 1833 to the beginning of the 20th century. The abstract for the land specifically has a condition of sale that this cemetery will not be violated or moved. At present there are trees growing from the top of the mound; estimated age of the oldest tree is approximately 50 to 60 years old.

Description and Location of Artifacts

No artifacts have ever actually been found by this observer at the site. However, other individuals have made small finds, some dubious as to relationship to the mound, and all somewhat inconclusive. Among these finds was one small potsherd, found in the southwestern quarter of the field immediately around the mound, the stone end of a war club, broken and of poor quality, and what was reputed to be a human skull, in badly mutilated condition, taken from a three foot grave at the top of the mound. Undoubtedly this latter was an unmarked settler's grave, and no other artifact was found in association with it. The disposition of these artifacts is not known, inasmuch as the individuals who found them retained possession.

Previous Work and Amount of Disturbance

This mound presents a magnificent example of what rank amateurs and "pot hunters" can do to an authentic site. Some 60 years ago, according to the best information, a tunnel measuring approximately 4' x 4' x 60' was dug into the mound from the eastern face at ground level. No record exists of any material ever being taken from the tunnel and subsequently it was converted into a potato cellar. It is still in use at the present, and the compaction of the dirt is such that no shoring or beams are required on the inside.

In recent months, Mr. Frank Etter, a man who has a passing interest in archaeology and visions of much wealth, purchased the land surrounding this mound. In December, 1957, he began operations which apparently have been carried on very spasmodically and with no tangible results other than much disturbance

to the site. He began a tunnel from the south face, middle way up. It extends for approximately 20 feet into the mound. Although he claims to have discovered a previously emptied room' (4' x 6' x 4'), this observer was unable to find any trace of it. Mr. Etter has never displayed any material taken from his diggings.

Recommendations

It is the opinion of this observer – or rather a guess – that this site represents the work of a very ancient culture. The mounds' obvious symmetry and workmanship, coupled with its close proximity to the Spiro Mound, tend to support this guess. It is recommended that further study be given to this site and that initial excavations be undertaken, if possible, in order to establish definitely if the site is a burial mound or otherwise.

In addition to the site description, Dollar's report includes a sketch of the mound dimensions (Figure 3), four photographs from the ground (Figures 4-7), and one low altitude aerial photograph (Figure 8). These photographs represent the most detailed documentation of the mound before its shape was altered by excavation. The sketch is schematic, showing the major dimensions of the mound and compass headings from each of the four corners. The photographs appear to have been taken in the fall or early spring, with leaves mostly down and the field around the mound in close-cropped pasture. The overall shape of the mound is clearly visible as a flat-topped or truncated pyramid. The base of the mound slopes gradually into the surrounding ground, but this may be due to erosion. Tunnels into both the east and south sides of the mound are visible in Figures 6 and 7, with a door resting above the southern tunnel. The aerial photograph shows the flat summit free of trees and brush, apparently in close-cropped grass.

Dollar visited the site again sometime in the 1960s, when a large portion of the mound had been removed from the southeastern quarter. Figure 9 is a photograph Dollar took at this time. The south tunnel does not appear to be open in this photograph, but the slope of the mound above it is slumping. The figure is from a color slide, but unfortunately the resolution is not clear enough to make out any mound stratigraphy that may have been exposed. The reason for the excavation of this section of the mound is unclear, but it may have been the work of land owner Frank Etter.

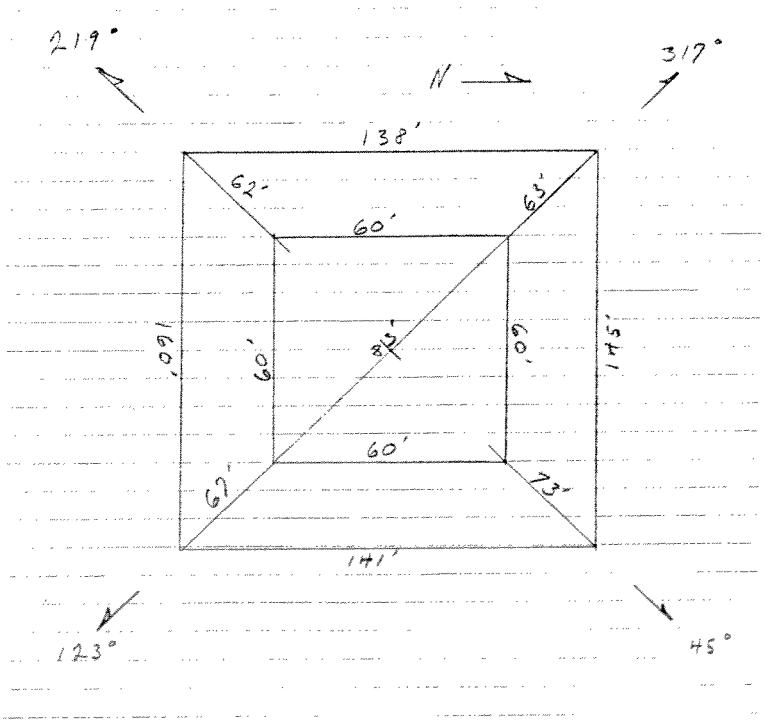

Figure 3. Clyde Dollar's sketch of the mound made in 1958 (from AAS site files for 3SB3).

The next recorded visit to the site by archeologists was in 1972, when Martha Rolingson of the Arkansas Archeological Survey (AAS) visited the site with Mickey and Cecil Cleavenger. At this time they noted that the east face of the mound had been cut away,

Figure 4. Clyde Dollar photograph of the mound, taken in 1958. Facing South. Photo from University of Arkansas Museum.

Figure 5. Clyde Dollar photograph of the mound, taken in 1958. Facing East. Photo from University of Arkansas Museum.

Figure 6. Clyde Dollar photograph of the mound, taken in 1958. Facing North. The southern tunnel is open, with fresh backfill accumulated beneath it. Photo from University of Arkansas Museum.

Figure 7. Clyde Dollar photograph of the mound, taken in 1958. Facing West. The eastern tunnel is open. Photo from University of Arkansas Museum.

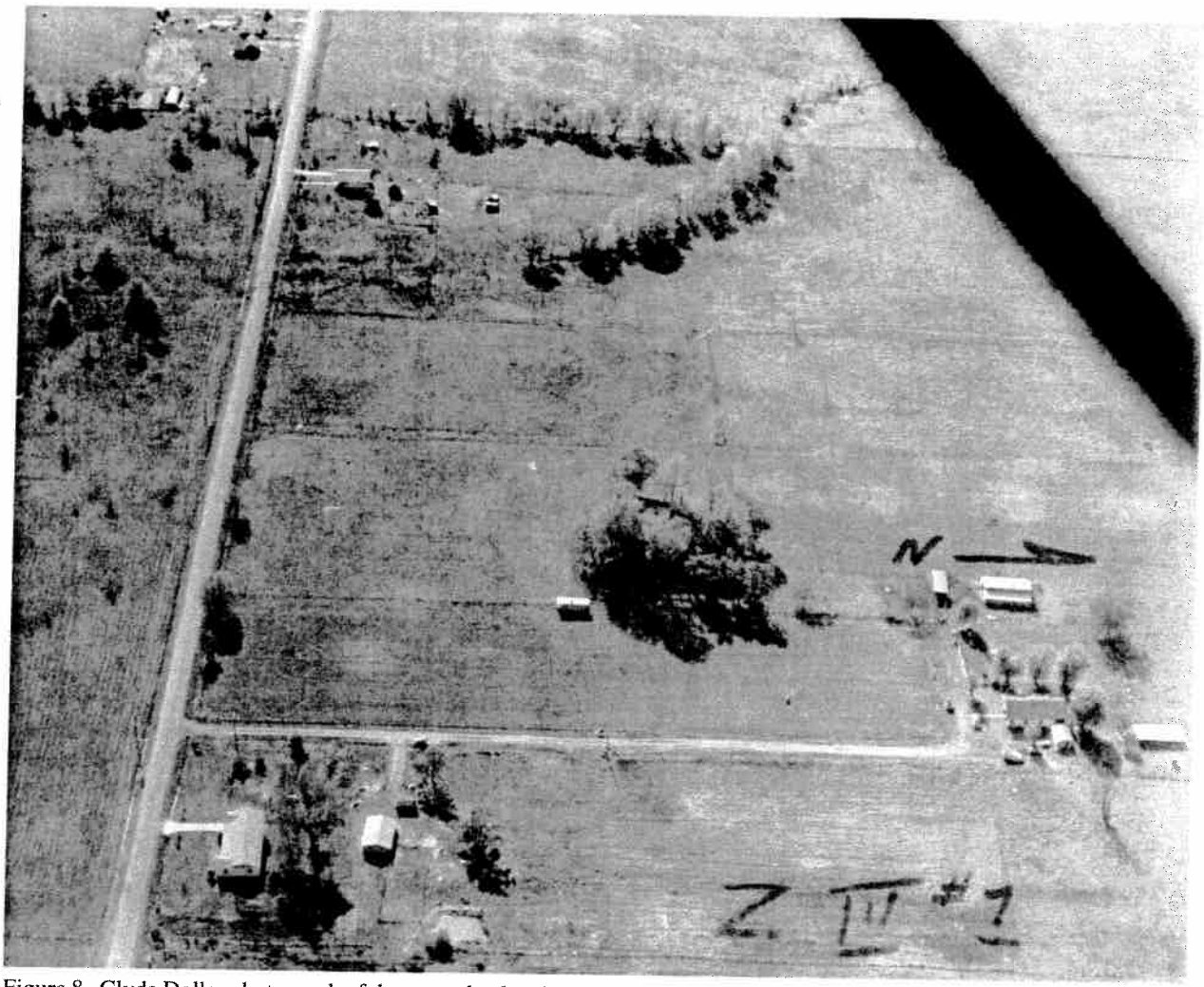

Figure 8. Clyde Dollar photograph of the mound, taken in 1958. North is to the right. The mound is in trees near the center of the photograph. The flat summit is visible as a cleared area. Photo from University of Arkansas Museum.

but it is unclear whether more had been cut away than in Dollar's slides. The AAS site revisit form from this trip reads:

> Mound site once cut by large equipment does not appear to have been cut into for some time. No new holes on top of mound or erosion on sides. No gravestones could be located on either the mound top or at the base. A fresh backhoe trench along the access road some 100' off the mound did not have any artifacts present or evidence of prehistoric disturbance or occupation. (AAS Site files for 3SB3)

Neal Trubowitz and other AAS personnel visited the site in 1979 to check on the mound's condition. Trees and dense underbrush covered much of the mound at this time, and footpaths crossing the summit were eroding into it. The eastern tunnel, which had been exposed along the cut in the eastern edge, was sealed at this time. A local resident reported that he had been in the tunnel before it was sealed, and that it went about 6 m into the mound and opened up into a room large enough for a person to stand up in. This was likely the "potato cellar" mentioned in Dollar's (1958) report.

At this time the cut into the eastern face had been expanded, exposing a straight, vertical profile through much of the mound, extending from the ground surface to near the very top of the mound. Figures 10 and 11 show the cut as it appeared in 1979. Exactly when and why the entire eastern face was cut away is not recorded.

Figure 9. Clyde Dollar photograph of the mound, taken in the 1960s. Facing northwest. The eastern face of the mound had been partly removed in this photograph. The southern tunnel is backfilled in this photograph, but the slope of the mound above it is slumping. Photo courtesy of University of Arkansas Libraries, Clyde Dollar Manuscript collection, MC489, slide 25.

An access road for a trailer park passes just east of the mound, and the cut may have been made in order to make room for this road. The cut is still vertical and largely intact in the 1979 photographs, suggesting that it had not been exposed for a long time. The photographs from this visit are black and white only, and the profile cut is quite rough, so little stratigraphic detail is visible.

The eastern tunnel is covered by corrugated metal in the 1979 photographs, but the profile immediately around the tunnel opening shows a widened area where the tunnel emerges from the mound. Above this widened area, the profile is cut back further with clearly visible, apparently recent, shovel marks. The tunnel may have begun collapsing as the cut was made, creating a cavity as an artifact of the recent construction, or the cavity may represent the "potato cellar" at the end of the eastern tunnel shown on Newkumet's 1940 map and mentioned in later descriptions. The area above the cavity may have been cut away for safety, in order to keep it from collapsing into the cavity below.

No gravestones could be found during the 1979 visit, although Trubowitz reported (in an AAS site revisit form) that the dense undergrowth on the top of the mound could easily have obscured any gravestones present. The only material noted or collected at this time were some pieces of bone near the top of the mound (later identified as turtle, of recent origin), and a historic metal button or closure.

Jerry Hilliard visited the site again for the AAS in 1981 and noted severe erosion along the cut eastern face. A large pothole was visible at the top of the mound near the eastern edge, and two areas along the eastern profile had been recently scraped with a shovel. Foot trails and motorbike paths were continuing to entrench into the mound. No artifacts were found in these disturbances. Hilliard also examined areas of recent construction and grading a few hundred meters from the mound at this time, but found no features or artifacts.

Figure 10. Photograph of the eastern cut into the mound, 1979. Facing west. Note the shovel marks above the area covered by corrugated metal. AAS negative # 794342.

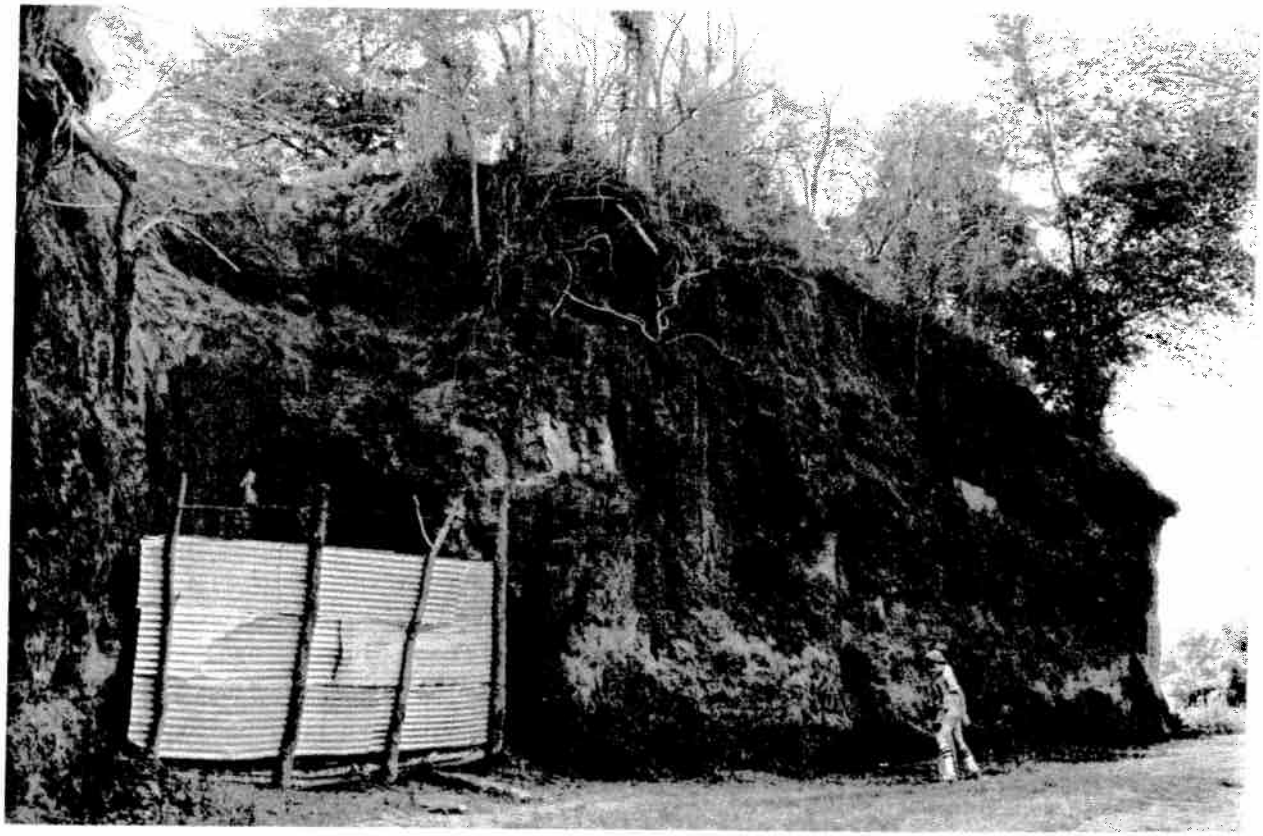

Figure 11. Photograph of the eastern cut into the mound, 1979. Facing west. AAS negative # 794346.

The eastern face continued to erode and the tunnel into the east face was re-exposed by 1991, when the site was visited by Arkansas Archeological Society member Mark Orsbun. Orsbun scraped a short section of the eastern profile clean, about 3 m above the surrounding ground level. This profile exposed several different colors of fill (yellow, red, and brown), and two lenses of charcoal. No samples were taken, and there are no photographs from this visit.

The eastern tunnel was plugged with rebar and concrete sometime during or after 1991, but was later re-exposed by local children. In 1994 Jerry Hilliard and George Sabo of the AAS visited the site with City of Fort Smith workers, who were there to plug the opening again. At this time Hilliard reported that "basket loading" was visible in a profile near the tunnel, and "1.7 m above ground surface at this point a probable mound stage division could be seen" (AAS site files for 3SB3).

The site was visited by myself several times from 2002-2004, and by myself and Jerry Hilliard, Michelle Berg Vogel, and Bob Dalton in 2004 in order to make a formal map documenting the remains of the mound. The condition of the mound continues to deteriorate: foot paths and sledding runs are entrenching more deeply into several sections, and the eastern face is still eroding back from the cut. Sediment washed from the exposed profile is accumulating at the base of the cut, and now forms a 4 to 5 m tall "ramp" up to the tunnel. The rebar and concrete plug over the tunnel have again been removed, and (as of late 2004) it is still open and occasionally visited by local children. A local resident reported that a tire had been set on fire in the tunnel several years ago, which the fire department was called to extinguish. There are several large depressions near the northeastern quarter of the summit, which may be pot holes or sunken graves. Aside from the cleared paths the mound is covered in dense underbrush and modern trash. The majority of the mound, however, appears to be intact.

Size and Shape of the Mound

Earlier reports estimated the mound to be as little as 43 m and as much as 64 m on a side, and from 7.5 to 12 m tall (Table 1). These estimates do not appear to be based on formal data from mapping instruments, and it is unclear whether the authors used tape measures, pacing methods, or dead reckoning to come up with the numbers. It is therefore not surprising that such variation exists. A topographic map of the mound made with a total station in 2004 (Figure 12) shows the current configuration of the mound. The mound is currently about 9 m above the surrounding ground level. A broad alluvial apron of sediment surrounds the mound, extending 10-30 m out from what was likely the base of the mound when it was constructed. The upper portion of the eastern face of the mound is cut and exposes a nearly vertical profile, while the lower half of the eastern face is covered by material eroded from above.

The mound is about 50 m north to south, although judging where the original mound edges were located is difficult given the current vegetation and the erosion the mound has experienced. East to west the mound is about 40 m wide. Photographs from 1979 (see Figures 10 and 11) show the entire eastern face of the mound cut back to vertical, but the southeastern portion was not cut back as far. The projection off of the southeast corner is still expressed in the mound topography. The flattish summit portion of the mound is about 20 m side to side. There is a small, low mound off of the northeast corner of the main mound, which may be intact mound sediment, or may be spoil from the cut into the eastern side. Extrapolating from the preserved portions of the mound, its size falls well within the range given by the four early descriptions (see Table 1). Except for the cut in to the eastern side, in fact, it appears to be remarkably intact.

Table 1. Early descriptions of Cavanaugh.

	Newkumet (1940)	Shaeffer (1956)	Rogers (1958) and Bell (1980)	Dollar (1958)
Dimensions	61 m N/S 61 m E/W	30.5 m in diameter	49 m N/S 64 m E/W	43 m N/S 46 m E/W
Height	12 m	9.1 m	7.5 m	(none given)
Dimensions of flat top	26.1 by 26.1 m	(not given)	21.3 by 21.3 m	18.3 by 18.3 m
Cemetery	Sketched on NE quad of summit; at least six graves shown	Several from "middle 1800s"	About 16 burials, 12 marked 1881 to 1895	At least 12 marked 1833 to "beginning of 20th century"
East Tunnel	Shown on sketch	One tunnel mentioned, no location noted.	Dug 1908 6 m long	Dug 1898 18 m long – became potato cellar
South Tunnel	Not shown on sketch		Dug 1898-1908 7.5 m long 1.8 m square room at end. Etters unplugged tunnel and excavated further into it.	Etter dug 6 m long tunnel in 1957, encountered earlier tunnel
Other Observations	1.8 m high "bench" encircling base of mound.	Banding of light and dark colored fill; burned clay	Visited mound in 1953 and 1958; "stratification" in 6-inch layers	

Newkumet's 1940 sketch shows a bench around the base of the mound that is not mentioned in any later descriptions, and it is not expressed today in the topography of the mound. It is possible that Newkumet's "bench" was actually an accumulation of eroded material, forming an alluvial apron around its base. Loose material eroded from the top and sides (and possibly backfill from the historic internments on top?) could easily account for this. Newkumet's sketch shows a very sharply defined bench, though, and it is possible that this actually existed as it was drawn in 1940 and was only obscured by erosion after then. If this is the case, Cavanaugh would be the only mound in this region for which such a feature was recorded.

Stratigraphy

Earlier reports noted several different types of mound fill, sometimes in alternating bands or discernible basket loads. These were mostly observed in the walls of the tunnels. Much of the upper half of the eastern

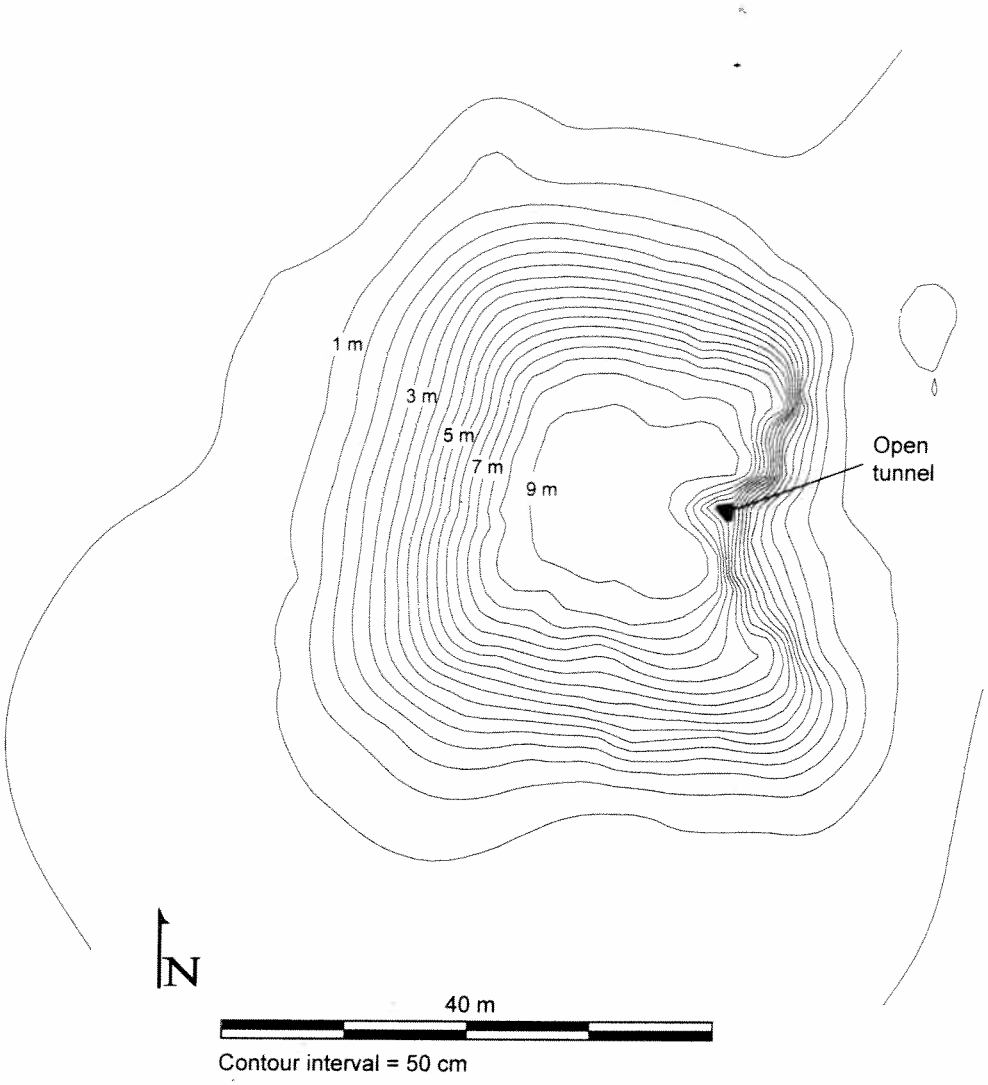

Figure 12. Contour map of Cavanaugh Mound, made with a total station in 2004. Several trails are entrenched into the mound 50 cm or more, but because of vegetation and time these were not mapped in detail and are not expressed in these contours.

profile is currently exposed, but is open to the elements and little of stratigraphic interest is currently visible without scraping back the outer layer. Investigations of the mound in 2004 included scraping clean several small areas of the exposed profile. In order to minimize damage to the mound and reduce the risk of further erosion, the cleaned areas were relatively small and separated from one another. No overall view of mound stratigraphy was therefore obtained, but several suggestive features were exposed.

Figure 13 shows a cleaned portion of the profile about 10 m south of the open tunnel. Individual loads of darker sediment are clearly visible in this area. The dark loading features are very dark gray (10YR3/1) silt loam, and the surrounding matrix is composed of brown (10YR4/3) and yellowish-brown (10YR5/4) silt loam. The sediment expressed a weak blocky structure, but this is likely due to weathering from the recently exposed profile. Within the matrix around the dark loading features were also a few small (2-4 cm diameter) distinct clods of pale yellow (2.5Y7/4) sediment. Exposed in this small window alone, then, are at least three different types of fill. Earlier reports also noted several different types of fill, including sediment with and without pebbles. It seems unlikely that all the different fills originated in the area immediately surrounding the mound.

Where the different sediments came from and how far they were transported remains an open question, as it does at many area platform mounds.

Extending from the open tunnel to about 10 m south is a clear horizontal unconformity in the fill (Figure 14). Through the windows of small scraped areas on the profile, this line appears to run the entire length of the mound. Redox concentrations (iron staining) and ferromanganese concretions are concentrated along this unconformity, indicating differential water flow above and below the line. A horizon about 10 cm thick below the line appears to be compacted, and composed of slightly different fill than the sediment below it. This horizon is reminiscent of mound stage divisions noted in other area platform mounds, such as the Huntsville site (Sabo 1986), Goforth-Saindon (Kay et al. 1989), Harlan (Bell 1972) and Norman (Finkelstein 1940; Vogel et al. 2004).

Artifacts

No artifacts have been reliably reported as coming from the mound, or even from the general area around the mound. The surrounding field is in cultivation in several of the early photographs, so surface visibility has been good throughout much of the time the mound has been under investigation (Figure 15 and 16). Newkumet's 1940 notes make no mention of artifacts, and Shaeffer (1956:4) explicitly states the lack of artifacts found on or around the mound. The current land owner, Frank Etter, recalls recovering no artifacts even after continuing excavations into both the east and south tunnels (personal communication 2004). More recent investigators have failed to find artifacts as well. At least 10 archeologists from the AAS and other institutions have visited the site since 1972, and found no prehistoric artifacts. Much of the mound's internal structure has been exposed during this time. Numerous AAS archeologists have also examined ground cleared for construction, foundation trenches, and other disturbances in the area immediately surrounding the mound, again without finding a single artifact or feature.

Aside from the mound itself, no prehistoric sites have been reported within a radius of about 5 km. At least three cultural resource management surveys have been conducted within a few km of the site (Heartfield, Price and Greene, Inc. 1984; Hilliard 1981; McAlexander 1994). Although these surveys were all fairly limited in scope, all included surface and subsurface investigations, but failed to recover any prehistoric artifacts.

There are three references to artifacts from the site descriptions above. AAS personnel found turtle shell of recent origin and a historic button or closure on the mound in 1979; neither relate to the prehistoric construction or use of the mound. Dollar (1958:2) notes that while he had found no artifacts personally, "other individuals have made small finds, some dubious as to relationship to the mound, and all somewhat inconclusive. Among these finds was one small potsherd, found in the southwestern quarter of the field immediately around the mound, [and] the stone end of a war club, broken and of poor quality." In his letters to both McGimsey and Bell, Rogers (1958:3) reports being told that "a number of fine artifacts had been recovered" from the southern tunnel.

Dollar's reported artifacts, as he states, are of "dubious relationship" to the mound, and Rogers' reports are rumors of artifacts found 50 to 60 years earlier. It is impossible to dismiss Rogers' report entirely, but it seems likely that if "a number of fine artifacts" had been found there would be more of record of the find than one vague rumor.

The Tunnels

Tunnels were excavated into the east and south sides of the mound, and both of them may date to the 1890s or earlier (see Table 1 for a summary of descriptions). The purpose for these early tunnels is unclear. They both

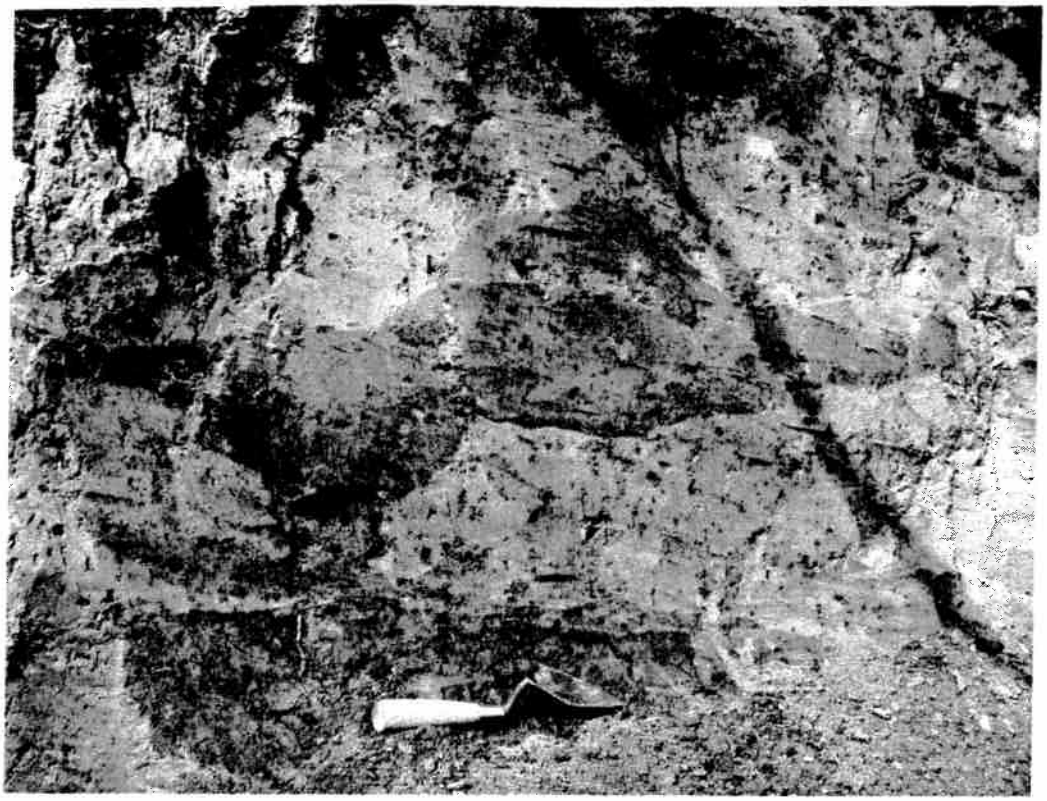

Figure 13. Loading features visible in the mound profile, about 10 m south of the open tunnel.

Figure 14. Possible mound stage division visible in profile, about 5 m south of the open tunnel.

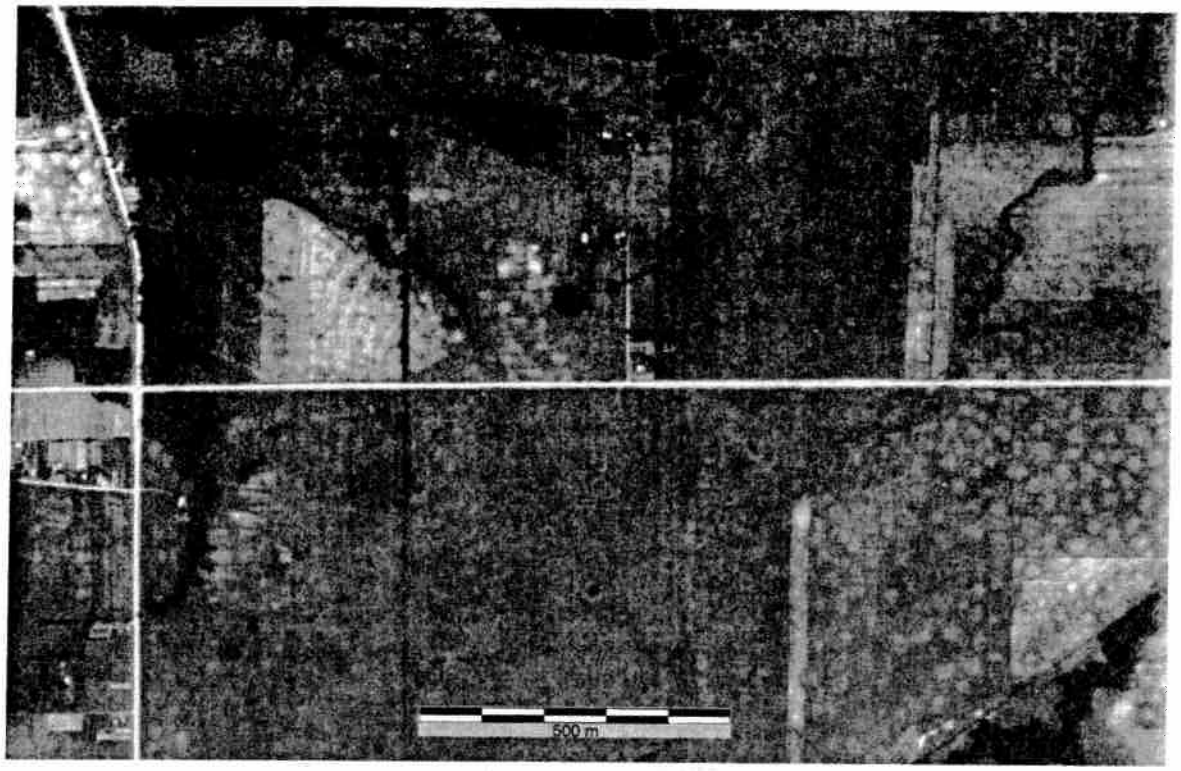

Figure 15. Aerial photograph taken in July of 1938. North is to the top. Arrow points to the mound. The summit is visible as a cleared patch surrounded by trees. Prairie mounds cover virtually all the exposed ground. Note the prairie mounds expressed as lighter colored patches just west of the mound. USDA aerial photo AWA-6-32.

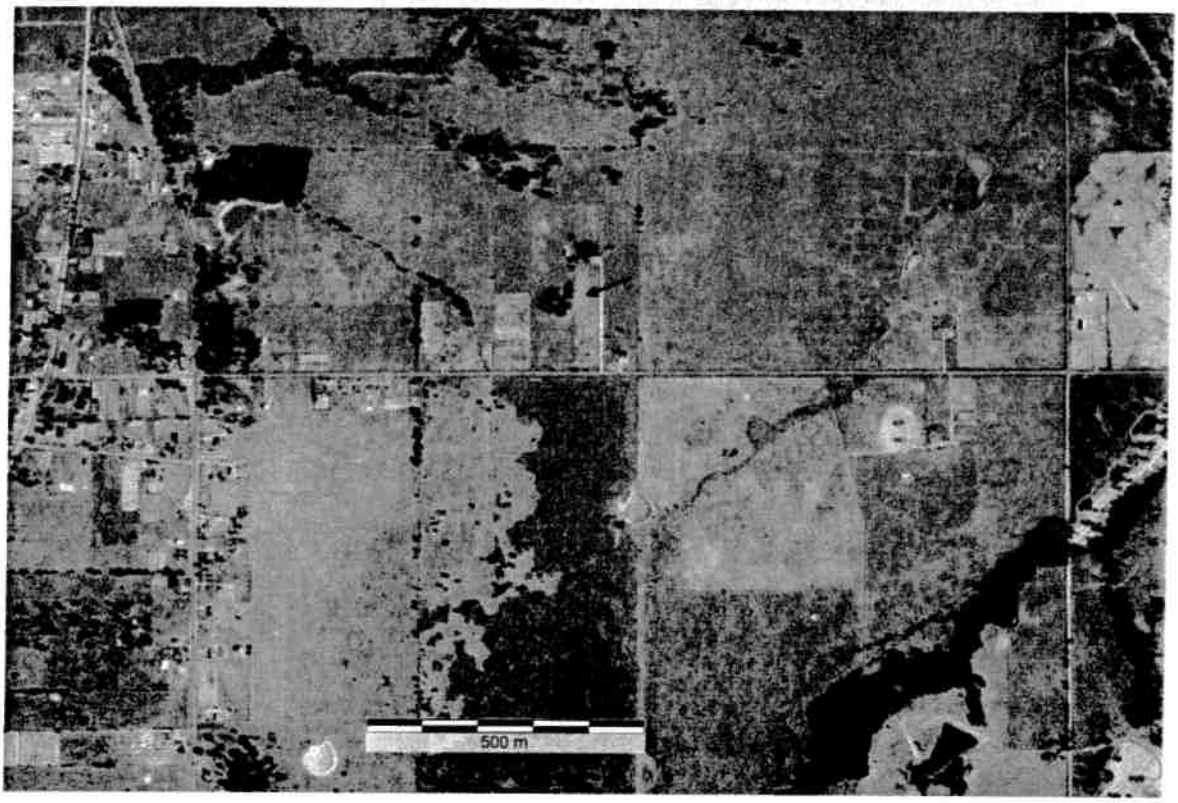

Figure 16. Aerial photograph taken in August of 1954. North is to the top. Arrow points to the mound. USDA aerial photo AWA-1N-12.

apparently originated well before the 1930s, when the discovery of spectacular artifacts at the nearby Spiro site led to tunneling and large-scale excavations of many of the mounds there. Whether the tunnels were originally excavated for storage spaces or as amateur explorations into the mound, they ended up being used for both. The south tunnel appears to have been backfilled, or at least the opening of it was plugged, by 1940 when Newkumet made his sketch of the mound (see Figure 2).

The east tunnel was open and at least occasionally used for storage until the 1970s, when it was plugged for safety concerns. The tunnel has been opened and re-plugged several times since then. Beginning around 1957 Frank Etter continued excavation into the east tunnel, and re-opened the south tunnel for excavation. Etter reportedly found an open room at the end of the south tunnel, although Dollar (1958) states that he found no evidence of this. A substantial room existed at one time connected to the eastern tunnel (the "potato cellar"), and may still exist. Note that there are no claims that these rooms were part of the original mound and were "discovered" by the historic tunneling efforts – every indication is that they were created in historic times as part of the tunneling efforts.

The eastern tunnel is currently open (as of late 2004). The tunnel is about 1 m wide and just over 1 m high, extending into the mound for at least 15 m. At least one side-tunnel branches off to the north. Trash litters the tunnel throughout. Safety considerations precluded a thorough examination of the tunnel deep into the mound during the 2004 visit.

The Historic Cemetery

All that remains of the historic cemetery at the summit of the mound are a few depressions that may mark the locations of individual graves. Descriptions from observers who actually saw the cemetery intact vary slightly in the number and dating of the graves (see Table 1), but it is clear that the cemetery contains a dozen or more burials from the 1800s. None of these reports contain information about the gravestones except for bracketing dates. The last mention of intact gravestones at the cemetery are from Dollar (1958), who also reports observing "what was reputed to be a human skull, in badly mutilated condition, taken from a three foot grave at the top of the mound" (Dollar 1958:2). It is therefore possible that one or more of the graves was looted prior to 1958.

An 1887 land plat of Sebastian County (Hayes 1887) shows the land under the ownership of Henry Stappleman ("Stappleman" is either a misspelling or an earlier variant of "Stoppleman"). A plat book from 1903 shows that the land was divided and the mound was owned by Mrs. B. Stoppleman (Foote 1903). In a short article on Cavanaugh Mound in the Journal of the Fort Smith Historical Society, Minor (1995:16-17) reports that the gravestones were removed before 1968, but that broken pieces had been found sometime after then. The only piece with writing contained the epitaph "Truth was her motto and God her trust" (Minor 1995:17). Minor also reports that Fort Smith Putman Funeral Home records show that 12 members of the Stoppleman family were buried on the mound between 1890 and 1900. A few local informants remembered seeing the Stoppleman name on the gravestones, but could recall no other details.

Minor (1995:17) relates a story of one of the Stoppleman descendents visiting the cemetery:

> During the last decade an elderly visitor to the graveyard on the mound, paying respect to a relative, believed himself to be one of the two remaining survivors of that family. Within his memory he recalled his kin owning the farm at the turn of the century. He remembered the tunnels in the mound were used for storing hay and grain.

All accounts agree that the cemetery is located on the summit of the mound, and Newkumet's sketch shows the cemetery in the northeast quarter of the summit. It is unclear whether this sketch reflects the full extent of the cemetery. The depressions currently visible on the summit (which may mark the location of sunken graves) are within the northeast quarter. There are no clear photographs of the grave plots or marker stones, but one of Dollar's photographs (from 1958) shows features that appear to be displaced grave stones, near the bottom of the western slope of the mound (Figure 17). This photo also shows horses grazing on and around the mound, which may well account for the overturned and displaced stones.

The cut into the eastern portion of the mound reaches from the ground surface up to the top of the mound, and may extend past the eastern edge of the summit itself now. Particularly if the cemetery were located on the eastern portion of the summit (as depicted in Newkumet's 1940 sketch), it is in danger of being disturbed as the eastern cut continues to erode westward into the mound.

The Gift Shop

Sometime during the late 1950s or early 1960s landowner Frank Etter set up a large, wooden teepee-shaped gift shop and attempted to turn the mound into a tourist attraction. The teepee can be seen in a postcard of the site from its tourist-attraction days (Figure 18). The gift shop sold souvenirs and trinkets, but no prehistoric artifacts. Arkansas Archeological Society member Bob Dalton (personal communication 2004) recalls visiting

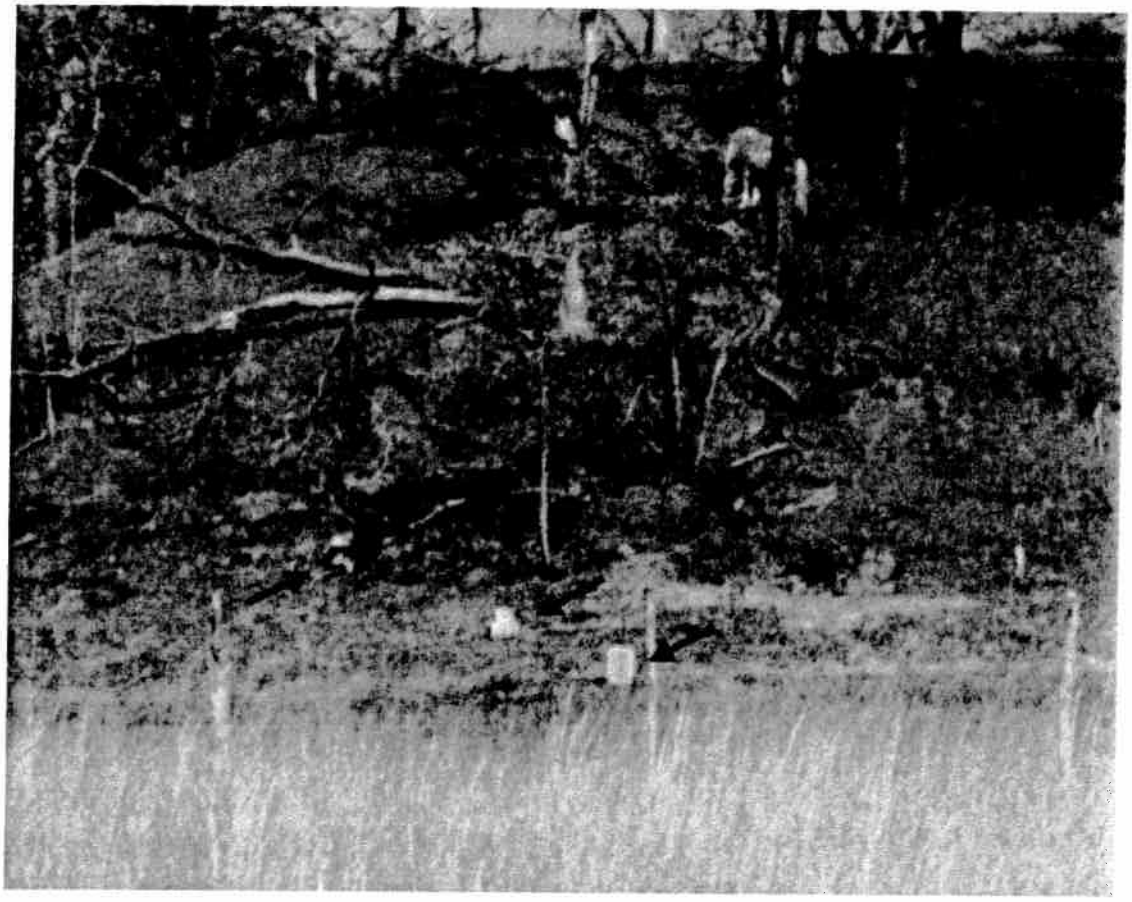

Figure 17. Close-up view of Figure 5. Arrows point to features that appear to be displaced gravestones.

the site as a child sometime around 1960. At the time, the mound was being advertised as a tourist attraction on a local country music radio station, which touted not only the mound and teepee gift shop, but rides for children in a stagecoach drawn by four Shetland ponies.

The tourist attraction was a short-lived venture, only lasting a few seasons. The teepee gift shop was taken down sometime in the 1980s. The land on which the teepee stood is now owned by a church adjacent to the mound, and only the circular, concrete slab foundation remains.

Aerial Photographs

Two early aerial photographs, one from 1938 (see Figure 15), and one from 1954 (see Figure 16), show Cavanaugh Mound and the surrounding terrain before much of it was covered by urban development. The 1938 photograph may be the earliest image of Cavanaugh ever taken. The mound's location is clearly visible in both images as a patch of trees surrounded by cultivated fields. The cleared summit of the mound is also visible in the 1938 image, but the resolution of the photographs is too low for finer details to be expressed.

Naturally occurring prairie mounds are visible in both photographs, covering the entire landscape for several hundred m around the mound. Prairie mounds occur throughout much of the western United States, generally occurring in large fields within river floodplains or terraces. In areas where they are not plowed, eroded, or otherwise disturbed by modern land use practices, they are generally one to two meters tall. The prairie mounds surrounding Cavanaugh are about 20 m in diameter and closely spaced, creating a regular pattern across much of the landscape. The soil stratigraphy of prairie mounds is ideally suited to studies of prehistoric landscape modification.

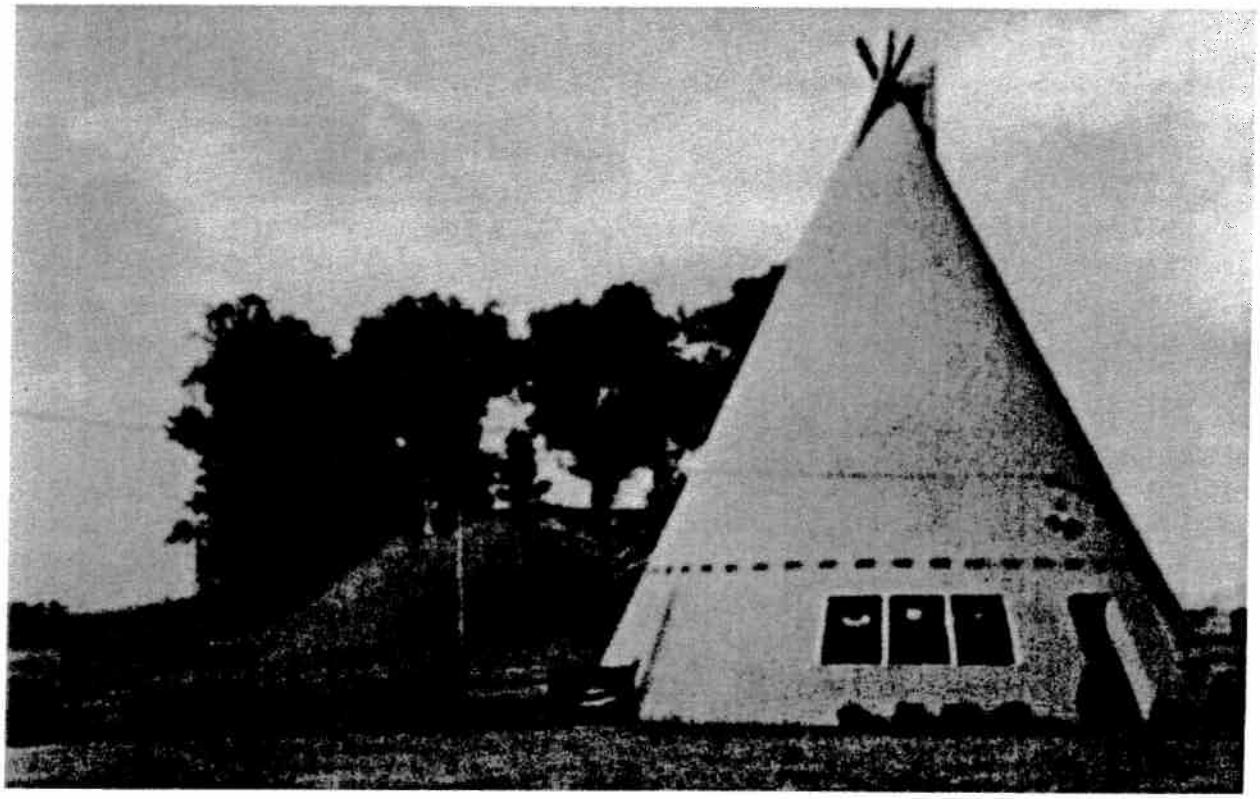

Figure 18. Undated postcard of Cavanaugh Mound with a tourist-shop teepee in front.

Because the upper, organic-rich A horizon contours the surface of the mounds and is darker than the underlying soil, the truncation or leveling of a mound leaves behind a lighter-colored patch where the mound used to be. Such patches are easily identified in aerial photographs as distinct from un-truncated prairie mounds, indicating a landscape modification at least more recent than the time it takes for a well-developed A-horizon to form.

Immediately west of the mound (see Figure 15) is an irregularly-shaped area of apparently truncated prairie mounds, not corresponding to any field edge or other historic land use pattern. These are not as well expressed in the 1954 aerial photograph (see Figure 16), possibly due to moisture conditions or ground cover. These mounds may have been leveled long before the fields were plowed in historic times, possibly contemporaneous with the mound construction or use. The prairie mounds may have been used for mound fill, or the area may have been leveled flat for use as a plaza within an area of otherwise undulating topography.

The majority of the land in both photographs is in open field. Within 1 km of the mound, only about 13% (42 out of 314 hectares) is covered by trees or buildings that obscure the prairie mound pattern (determined through a simple GIS model derived from the aerial photographs). Besides the patch just west of Cavanaugh, there are no disruptions in the regular patterns made by prairie mounds that are not accounted for by modern land-use practices. Cavanaugh Mound therefore appears to be alone on the landscape, and not part of a group of mounds in close association.

Viewsheds

Although quite speculative at this point, there are some suggestive relationships among the viewsheds of Cavanaugh Mound and mounds at the Spiro and Skidgel sites. I offer this analysis as one way to view the possible relationships of the mounds on the landscape and in relation to one another. GIS viewshed analysis is necessary for testing the potential inter-visibility of the sites because of historic changes to the landscape. Dense vegetation on the mounds, houses and other buildings, and high road embankments now block much of the view, making it impossible to determine what would have been visible in prehistoric times simply by going to the mounds and looking.

A "viewshed" is the sum of what can be seen from any particular point on the landscape. From a digital elevation model (DEM) in GIS we can specify a location, the height of the viewer, a maximum potential distance to which a person can see, and derive an output showing us which portions of the landscape would be in view. The viewsheds in this analysis are based on U.S. Geological Survey DEMs with 30 m resolution. There are several considerations which much be kept in mind when employing such viewshed studies, however. Atmospheric haze can often limit the maximum distance from which features can be seen, for example (termed distance decay), and modern landscape changes expressed in DEMs can significantly alter viewsheds from what they would have been in prehistoric times.

Modern landscape changes in the Cavanaugh area that have the potential to alter the viewshed include tall road embankments and changes in the course of the Arkansas and Poteau rivers due to natural meandering and intentional modification. The road embankments are easily "erased" from the DEM and leveled to the elevation of the surrounding ground. The river channels may be similarly altered in the DEM to reflect previous positions, but I do not consider this necessary for the current study. The exact course of the rivers will affect the viewsheds within the bottomlands in possibly significant ways, but because the mounds are above the floodplain itself, the exact river location will not alter the potential inter-visibility of the sites, or the overall shape and size of the viewsheds in general.

I also do not consider distance decay to be a significant factor for this study. The sites in question are relatively close to one another (Cavanaugh and Skidgel are only about 16 km apart), and historic precedence shows us that atmospheric conditions in the region were often clear enough to allow for far greater lines of site. Thomas Nuttall's journal of his travels through the area in 1819, for example, includes the following passage for April 24:

> This morning we passed the hills of Lee's Creek, which, for a short distance, borders the Arkansas, and about noon arrived at the garrison, which comes into view at the distance of about four miles, agreeably terminating a stretch of the river. Rising, as it were, out of the alluvial forest, is seen from hence at a distance of 35 miles, a conic mountain nearly as blue as the sky, and known by the French hunters under the name of Point de Sucre, or Sugar Loaf. (Nuttall 1821:197).

Tall vegetation can also obstruct views, but is not accounted for in the topography of DEMs. For the bottomlands I do not consider this to be a hindrance in determining the overall viewsheds or inter-visibility of the sites. Cavanaugh, Brown, and Skidgel mounds are all located on terraces above the bottomlands and several meters tall. Even relatively high vegetation in the bottoms would not obstruct the views from one site to another. Trees or other vegetation on the terraces near the mounds could easily block the views, however, and there is no way of reconstructing exactly what vegetation was present at specific times in the occupation of the sites. I therefore consider the following examples to be the maximum potential viewshed for each specific location, and not necessarily the exact viewsheds actually existing prehistorically. From what we know of the nature of the mounds, however, particularly the public nature of their construction and the use of colorful and contrasting colors for fill, it seems unlikely that they would have been intentionally screened from view. Possibly the ability to see the mounds from a great distance was even a consideration in deciding where to locate them.

For this analysis I used a somewhat conservative viewing height of 150 cm as the approximate eye-level for a prehistoric person of average height. The maximum viewing distance was set at 25 km. This is large enough to encompass all three sites, but small enough that edge effects from the curvature of the earth are negligible.

Figure 19 shows the viewshed from the ground level at the location of Cavanaugh Mound. Cavanaugh Mound is substantial enough on the landscape that it is expressed as a topographic high even on the U.S. Geological Survey 30 m DEM. For this analysis, the DEM was altered to produce a level surface in the location of Cavanaugh Mound, effectively "erasing" it from the landscape. The light areas in this figure thus represent what a person would be able to see, if no tall vegetation were present, standing at the location of Cavanaugh, before the mound was constructed. The light areas also represent portions of the landscape from which that person would be visible. The viewshed is primarily directed to the west and northwest, overlooking the Poteau/Arkansas River bottoms. The Arkansas River off to the east is out of sight. A low rise in the landscape about 150 m west of Cavanaugh blocks the view down into the southern part of the bottoms. A few of the hills above the bluff line to the north of the Arkansas River are visible as well. The viewshed from this analysis covers about half of the Spiro site, and comes within about 90 m of Brown Mound. 90 m in a DEM with 30 m resolution is of course only equal to 3 raster cells, and it would be unwarranted to assume accuracy of the model at this level of detail. What we can say is that from the ground surface, the Cavanaugh and Spiro areas may have been just barely visible to one another. If there were even low vegetation on the ground, however, the view would have been totally obscured. Skidgel Mound, even though it sits on a local topographic prominence, is obscured by the landscape alone in this analysis, even without the added obstruction of vegetation.

Adding 9 m of height to the viewer's elevation and repeating the analysis results in the viewshed shown in Figure 20. This represents the landscape viewable from the top of Cavanaugh Mound, and, possibly more importantly, the areas on the landscape from which Cavanaugh Mound itself would be visible. The viewshed off to the west overlooking the Poteau/Arkansas River bottoms is now much wider, and the Spiro and Skidgel

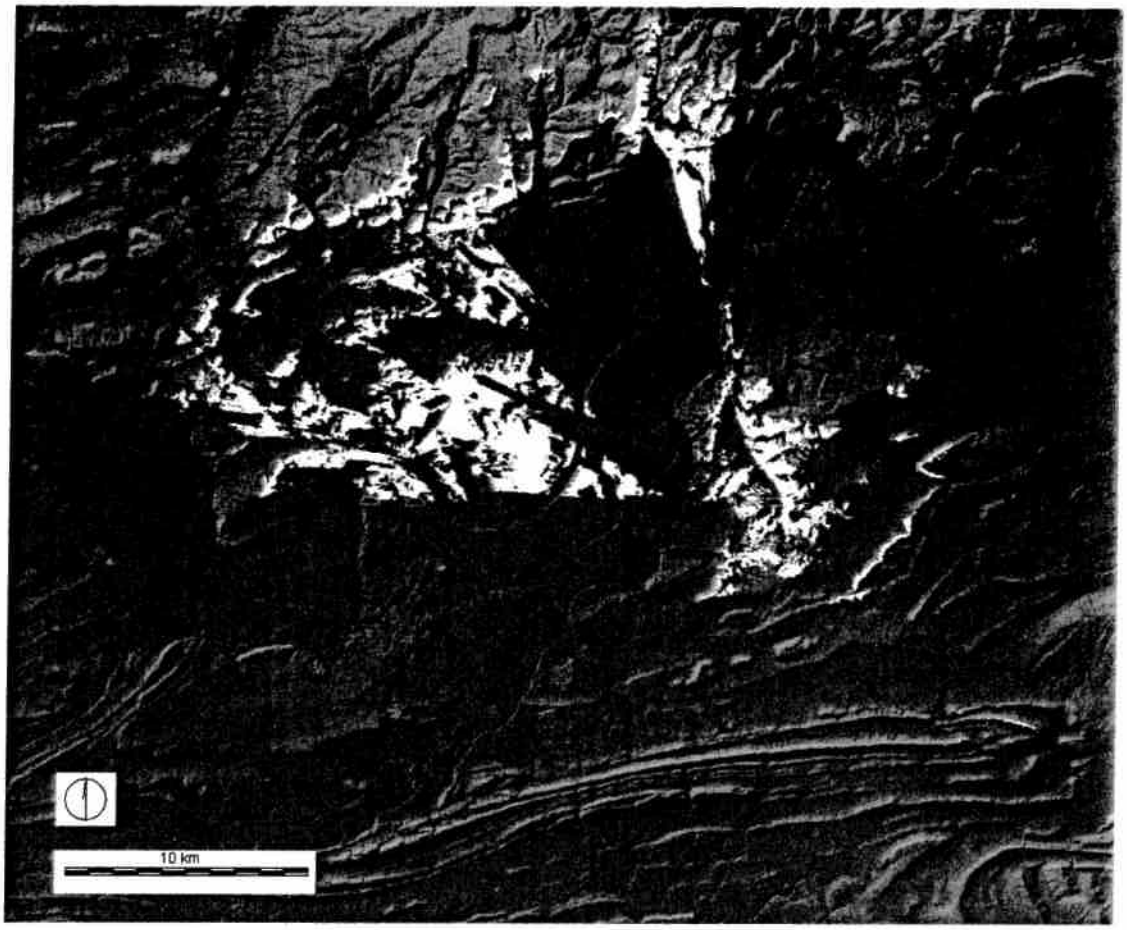

Figure 19. Viewshed from ground level at the location of Cavanaugh Mound. The Spiro and Skidgel sites are possibly within view, but would have easily been obscured by vegetation.

sites are clearly within view. Even relatively tall vegetation in the bottoms would not obstruct this inter-visibility. The narrow views off to the east and north in this viewshed are somewhat suspect. The ground along these paths is not much lower than the mound itself, and any vegetation of even moderate height would completely obstruct these lines of sight. Unless these corridors were completely cleared of trees and tall bushes (for about 10 km to the east and about 6 km to the north), these views would not have been possible. The view off to the west may be more realistic. Cavanaugh Mound is just over 200 m from the sharp drop of the bluff line, and only tall vegetation within this area would block the view into the bottoms.

Figure 21 shows the viewshed from the top of Brown Mound, the largest platform mound at the Spiro site. The viewshed from Copple Mound, the other platform mound at the site, is substantially similar. This viewshed is primarily directed to the east, overlooking the Poteau/Arkansas River bottoms. Nearly all of the bottomland area between Cavanaugh and Spiro, in fact, is within this viewshed. Some of the hills behind the Arkansas River bluff line both to the north and to the south are within this viewshed. Although there is some lower-lying land between Spiro and Skidgel, the prominence on which the Skidgel Mound is located is well within view. As with Cavanaugh Mound, Brown Mound would also have been visible from much of the wide bottomlands between the sites.

Figure 22 shows the viewshed from the top of Skidgel Mound. Because it is already on a local topographic high, its overall viewshed is larger than that for both Brown and Cavanaugh mounds. Again, the largest portion

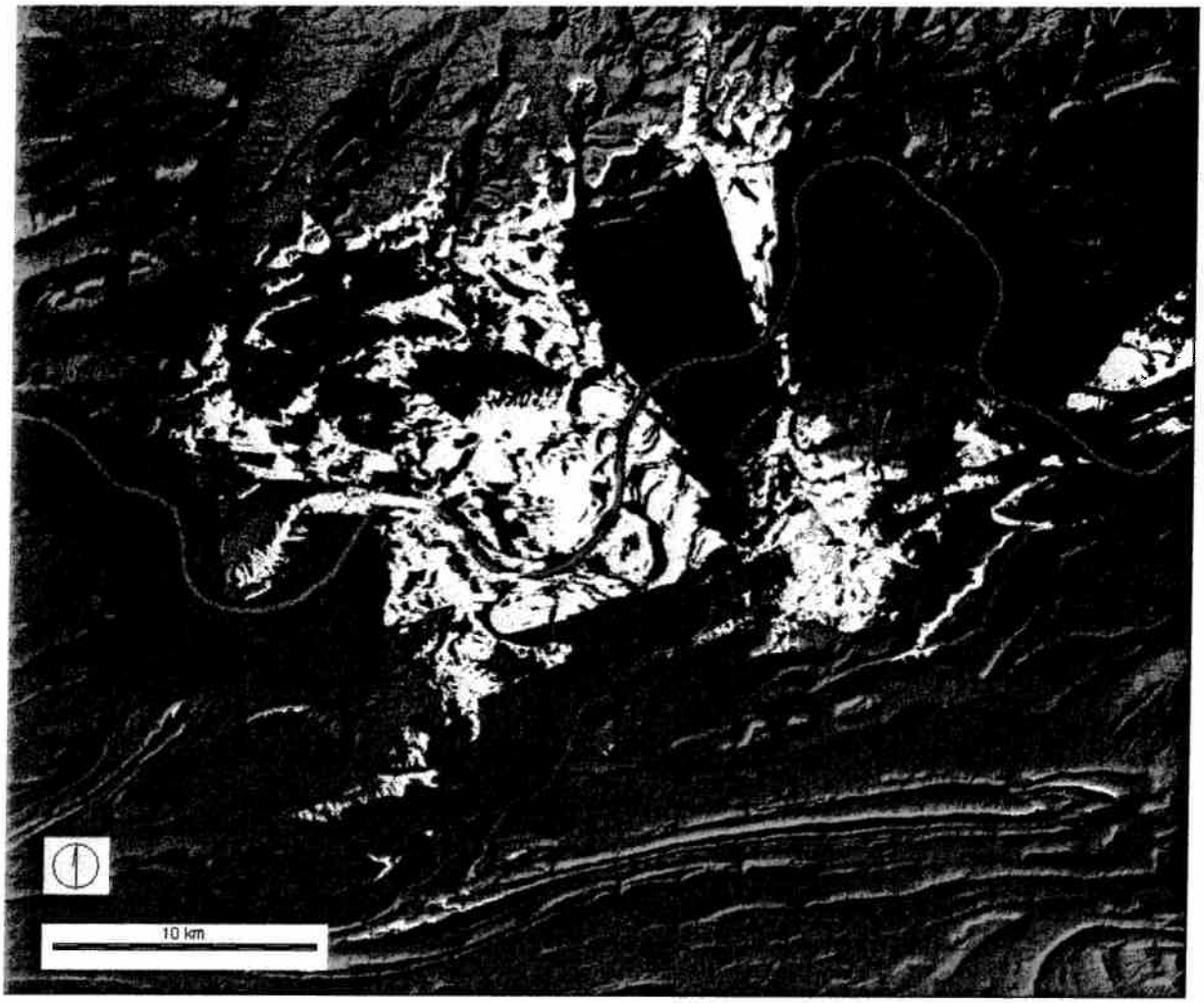

Figure 20. Viewshed from the top of Cavanaugh Mound. The Spiro and Skidgel sites are well within this view.

of the viewshed looks east over the Poteau/Arkansas River bottoms. Similar to the viewshed from Brown Mound, several of the hills back from the bluff line of the Arkansas River are within the viewshed, both to the south and to the north. The viewshed also encompasses much of the bottomlands west of Skidgel (the Redland Bottom). The high, steep northern bluff of the Arkansas River southwest of Skidgel blocks the view into the bottoms farther up river.

To travelers coming up the Arkansas River either on foot or by boat, the first mounds to come into sight would have been those at Spiro and Skidgel. Barring tall vegetation blocking either, they would have come into view at about the same time, just as the travelers came into the broad stretch of bottomlands a little east of what is now the Oklahoma/Arkansas state line. Although Skidgel would have been a little farther away, it is situated on a local prominence and may have come into view first. About halfway through the bottomlands (again barring any tall vegetation in the way) Cavanaugh Mound would have come into view, off to the left.

To travelers coming down the Arkansas River, Skidgel Mound would have been clearly visible as a mound on an already existing peak, right at the top of the steeply rising bluff line. This would have come into sight as the travelers entered the Redland Bottom. Cavanaugh Mound and mounds at Spiro would not have been visible until the travelers rounded the final bend into the Poteau/Arkansas River bottoms. From most locations

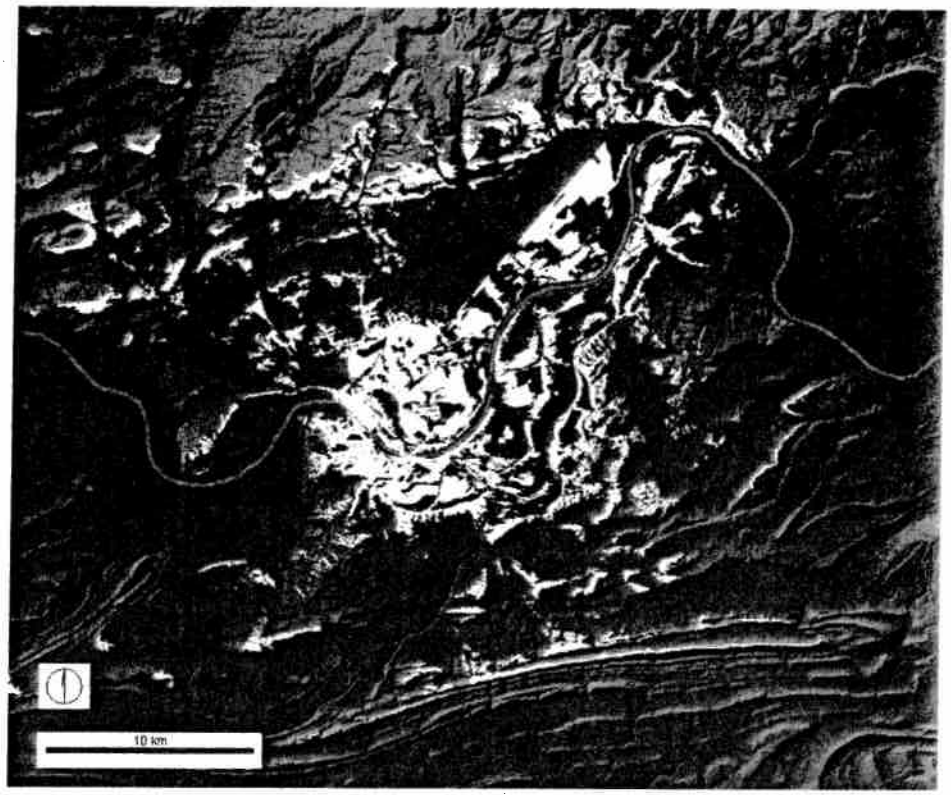

Figure 21. Viewshed from the top of Brown Mound at Spiro.

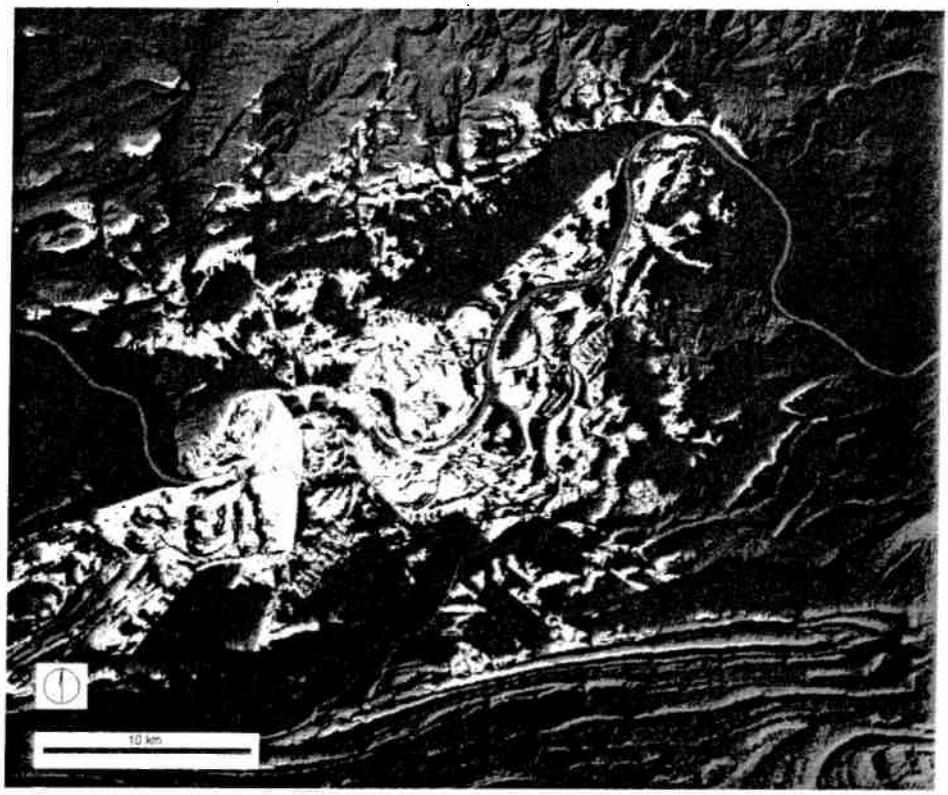

Figure 22. Viewshed from the top of Skidgel. Note that although Skidgel is on the western edge of a meander bend of the Arkansas River, the view from the mound is still primarily to the east, overlooking the Poteau/Arkansas River bottoms.

within the Poteau/Arkansas River bottoms, a person would likely have been able to look up and see a mound at one or more of the sites.

Mounds in the Arkansas River Valley

Numerous Caddoan era mound sites are found along the Arkansas River and its tributaries. Spiro (34LF37), Norman (34WG2), and Harlan (34CK6) are the three largest and best known of these. Three primary mound types are recognized for this area, consisting of burial, structure, and platform mounds. Structure mounds are generally low, conical mounds erected on top of structures that appear to have been used as charnel houses or temporary burial locations. Burial mounds are conical, elongated, or multi-lobed features that are usually the result of numerous episodes of mound building. Grave goods are commonly associated with burials in these mounds.

Platform mounds are the largest earthen structures found in the Arkansas River valley. These are generally flat-topped or "truncated pyramids," built in multiple episodes. Platform mounds generally contain no artifacts or burials. Their internal structure can be quite complex, however, revealing numerous stages of mound construction. A typical sequence of platform mound construction begins with a "fill" stage of a few decimeters of soil, sometimes constructed of basket loads of highly contrasting matrix. Each fill layer was "active" for some time, with structures built on top and sometimes pits excavated into the fill and then backfilled. Fill layers were typically capped with a thin layer of burnt or compacted sediment, which was in turn covered by another fill layer, and so on. The actual internal structures of platform mounds are quite complex, however, so even this "typical" sequence is suggestive only. The similarities of area platform mounds that have been excavated lie in their complexity and expression of cyclical building more than in any particular sequence or progression of construction. This cyclical building pattern is clearly expressed at several platform mounds throughout the region (see Brown [1996:172-179] for a discussion of this patterning and platform mounds in general).

Sites that contain several mounds are termed civic ceremonial centers, and appear to have served as the location of important community ceremonies tied to regional political power. Brown et al. (1978) constructed a hierarchical typology of civic ceremonial centers which they termed first, second, and third echelon. Sites are considered first echelon if they contain at least one burial mound and an associated structure mound. Second echelon centers contain several structure mounds, at least one burial mound, and an additional platform mound. Third echelon centers are essentially large second echelon centers with the addition of a fourth mound type or other large architectural element. The additional mound type or architectural element is generally unique to the site, suggesting an "organizational discontinuity with the lower-order centers" (Brown et al. 1978:189). In the case of the Spiro site, the unique architectural element is the Craig mound with four conical burial mounds joined by earthen saddles.

Cavanaugh appears to be a typical platform mound for the region, except for its isolation from other mounds or from an associated residential area. Because it is a platform mound alone on the landscape, isolated from closely associated mounds, it does not fit into Brown et al.'s (1978) echelon system.

Figure 23 shows a shaded relief representation of Cavanaugh Mound compared to some other large Caddoan platform mounds in the region. The Craig Mound at Spiro is included as an aid in visualizing the scale of these earthworks; Craig has been reconstructed and undoubtedly numerous readers have visited the site and have a strong and personal impression of how large that structure is. For purposes of this comparison, Craig Mound was based on a topographic map of Spiro (Peterson 1989:2 and Figure 1); Brown Mound was based on the description by Orr (1946:230); Skidgel was based on the "primary" flat-topped mound (before a final layer converted the mound to a conical shape), from Brown (1996:177 and Figure 1-56); Harlan Unit 7 was based

on a detailed topographic map (Bell 1972:186 and Figure 21); and the reconstruction of Cavanaugh was based on the 2004 mapping efforts described in this article.

These representations are not meant to be exact; the edges and heights of the mounds are difficult to reconstruct even for those that have been fully excavated. From the accumulated effects of centuries of erosion and natural soil forming processes, combined with decades of plowing, looting, and other historic disturbances, the mounds have likely been altered in ways we cannot reconstruct, and any determination of a mound's exact shape and size is only an approximation. Still, the general outlines and sizes may be compared within reasonable limits of uncertainty. By almost any measure, Cavanaugh is a large mound, and certainly ranks as one of the most impressive in the Arkansas River valley and adjacent regions.

Conclusions and Further Questions

Cavanaugh Mound is certainly an important archeological resource and a prominent mound in this region or anywhere within the American Southeast. It appears to be a complete platform mound, and had apparently been "used" for at least two cycles of construction. Unlike other platform mounds in the region, though, it is alone on the landscape and appears to not have an associated residential area. Its inter-visibility with the Spiro and Skidgel sites, and similarity of viewshed overlooking the Poteau/Arkansas River bottoms, is suggestive of a connection but this is not conclusive.

I have not addressed the question of dating in this article simply because no dates exist for Cavanaugh Mound. Dollar (1958) mentions a single pottery sherd reportedly found in the field around the mound, but he

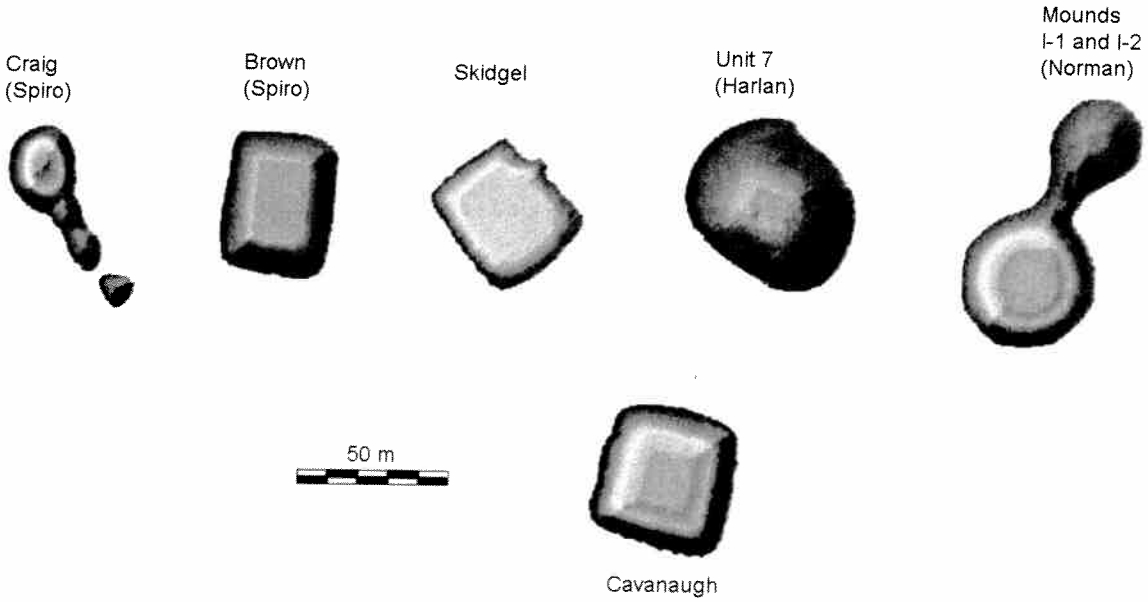

Figure 23. Shaded relief representations of several large mounds in the Arkansas River valley.

includes no description of what it looked like, or whether it was even time-diagnostic. Orsbun noted seeing charcoal in the exposed profile during his 1991 visit to the site, but apparently took no samples. No datable material was noted during the 2004 investigations. The only way to date the mound at this point is to compare its size, shape, and internal structure to other area mounds. By these measures, it appears to be at least roughly contemporaneous with other Caddoan era platform mounds, but any more specific date would be speculation only. Unless datable material is recovered from within the mound itself, its timing will remain vague.

Similar to other platform mounds, Cavanaugh holds great potential for revealing various aspects of the social and ceremonial life of the people who constructed it. Rather than the typical discarded or displaced artifact debris so common in the archeological record, mounds are monumental artifacts in primary context, constructed for the purpose of ritual. Sears (1961:227) terms this type of structure "fossilized ceremony." Mounds are thus one step closer to the human condition we try to understand as archeologists: if we reconstruct the building techniques and sequences within and between mounds, we reconstruct something of the conceptual framework of the people who built them. We know so little about Cavanaugh Mound today that not much progress can be made along these lines, but because of its unique status as a solitary mound isolated from other structures or an associated settlement, and because it is so well preserved, Cavanaugh certainly holds promise along these lines in the future.

Acknowledgments

I would like to thank Frank and Lillian Etter for their continued interest in Arkansas archeology and in Cavanaugh Mound in particular. Recent recording at the site was possible through the hard work of Jerry Hilliard of the Arkansas Archeological Survey, and Michelle Berg Vogel and Bob Dalton, who graciously volunteered their time to help in field recording. I also thank the staff of the Arkansas Archeological Survey Office of the Registrar, the University of Arkansas Museum, and the University of Arkansas Libraries Special Collections.

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The Pine Saddle site (3PL1080) in the Ouachita Mountains, Polk County, Arkansas

Timothy K. Perttula and Bo Nelson
Archeological & Environmental Consultants, LLC

Introduction

Novaculite was procured and knapped by aboriginal Indian populations living in southwestern Arkansas for thousands of years (see Trubitt et al. 2003), and there are numerous prehistoric novaculite quarries in the Ouachita Mountains (Etchieson 1997). In Late Archaic times, this desirable material was widely traded and exchanged with other groups to the south, east, and west, particularly with the peoples living at the Poverty Point site and environs in the lower Mississippi valley in northern Louisiana (see Jeter and Jackson 1994:159-166). Later groups such as the Caddo also made considerable use of this material, since it was in their traditional homelands, and many habitation sites and mound centers in the region contain quantities of novaculite lithic debris and tools. Other local materials were also chosen for lithic tool manufacture, such as Big Fork chert, a distinctive black chert. Abundant amounts of novaculite and Big Fork chert are also found apparently in non-domestic Caddo contexts on lithic workshops and camp sites in the Ouachita Mountains, and one such site is discussed in this article.

The Pine Saddle site

The Pine Saddle site (3PL1080) is located in a unique landform in this part of the southern Ouachita Mountains, namely a saddle (1340 feet amsl) between two linear ridges 20-40 feet higher in elevation (Figure 1). There are several intermittent drainages to the northeast, west, and south of the site; these drain into Twomile Creek, a tributary to the Mountain Fork River, which flows south to its confluence with the Little River in southeastern Oklahoma. The saddle area covers about 6400 square meters (1.6 acres), and is wooded with a stand of pine trees. The overall surface visibility on the landform is poor.

Fourteen shovel tests were excavated across the landform during a recent archeological survey of a tract of land for the Ouachita National Forest (Perttula and Nelson 2004a), and all 14 contained prehistoric archeological materials from 0-40 cm bs in Sherless-Bengal sediments. One shovel test (ST 220) has a dark grayish-brown (10YR 3/2) loam deposit with charcoal flecks that may represent a patch of prehistoric midden deposits, but otherwise midden deposits are absent, as are pieces of ceramic vessels, animal bones, or other obvious signs of domestic use of the Pine Saddle site. That shovel test also has 1.36 kg of fire-cracked rock, probably evidence of either the mass processing of plant foods by the prehistoric occupants of the Pine Saddle site, or the use of heated rock for the heat-treating of novaculite. Four other shovel tests in the saddle (ST 221, ST 223, ST 230, and ST 231) also have fire-cracked sandstone rocks weighing another 2.1 kg. These same shovel tests also have small amounts of wood charcoal.

A column of 200 g sediment samples were obtained from ST 232 for Oxidizable Carbon Ratio (OCR) dating (see Frink 1992, 1994, 1995, 1999) of the archeological deposits. The only other datable material at the Pine Saddle site are a few small pieces of wood charcoal, but they did not occur in reliable contexts. We have obtained good results from the OCR dating of archeological deposits at several other Caddo sites in the

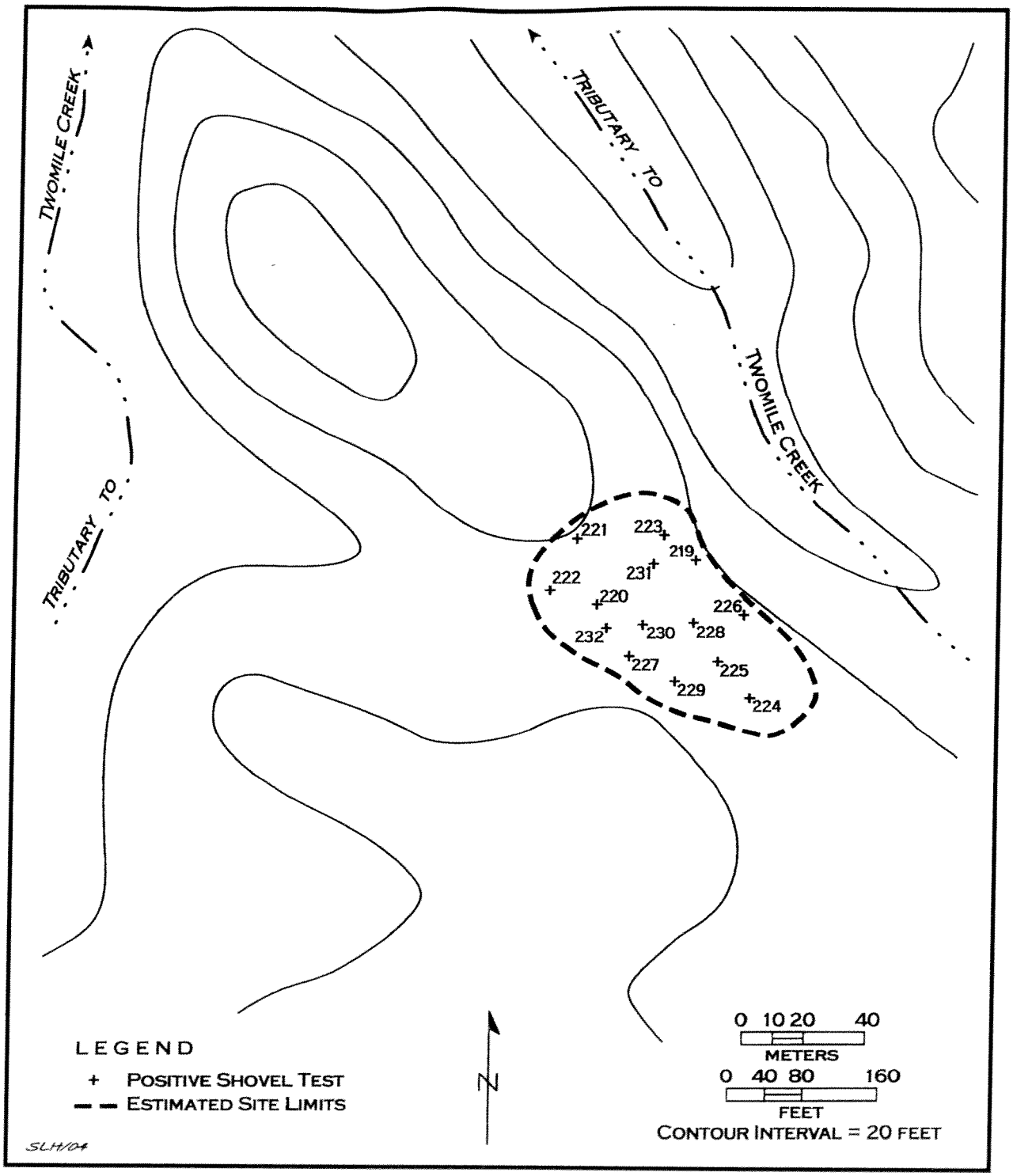

Figure 1. The Pine Saddle site (3PL1080).

southern Ouachita Mountains (Perttula and Nelson 2004b: Tables 2, 7, and 10), and we decided to pursue that dating option.

Based on differences in the frequency of coarse and very coarse particles in the different soil samples, changes in pH and % Organic Carbon, and % Oxidizable Carbon, the OCR dates from several pedogenic events

point to two different prehistoric occupations by Caddo peoples at the Pine Saddle site (Table 1). The first dates to about 440 years ago (A.D. 1510), and corresponds to the upper part of the archeological deposits. The earlier occupation is focused on the OCR sample from 33-35 cm bs, and dates to about 1010 years ago (A.D. 940).

The different clusters of samples [i.e., 3-5 cm and 8-10 cm samples] represent "packages of soils related by the pedogenic history. The highlighted data sets represent the youngest pedologic event of the particular package" (Douglas Frink, June 18, 2004 personal communication).

Table 1. OCR dates from the Pine Saddle site (3PL1080).

Sample Depth (cm bs)	Sample No.	OCR date (B.P.)	Conventional Age (A.D.)
3-5	**ACT-7039**	**192**	**A.D. 1758**
8-10	ACT-7040	398	A.D. 1552
13-15	**ACT-7041**	**442**	**A.D. 1508**
18-20	ACT-7042	587	A.D. 1363
23-25	ACT-7043	937	A.D. 1013
28-30	ACT-7044	1026	A.D. 924
33-35	**ACT-7045**	**1014**	**A.D. 936**
38-40	**ACT-7046**	**1386**	**A.D. 564**

Note: the highlighted samples represent dated pedogenic events

Lithic Artifacts from the Pine Saddle site

No temporally diagnostic lithic or ceramic artifacts were recovered in our work at the Pine Saddle site, only broken tools, a hammerstone, and many pieces of novaculite lithic debris. The mean density of prehistoric lithic artifacts is high, at 23.1 artifacts per positive shovel test (approximately 185 artifacts per square meter). The highest densities (between 43-64 artifacts per shovel test, or 344-512 artifacts per square meter) of prehistoric artifacts are in the central part of the saddle (see Figure 1), as are most of the shovel tests that have fire-cracked rocks and preserved wood charcoal. If the densities from these shovel tests can be extrapolated across the entire site, it suggests that the Pine Saddle site contains about 1,200,000 lithic artifacts! Clearly, a significant amount of lithic knapping of novaculite and Big Fork chert by Caddo peoples took place at the site between A.D. 940 and A.D. 1510.

Two chipped stone tools (both biface fragments) and a hammerstone were recovered in shovel testing at the Pine Saddle site. The first biface (ST 228, 0-12 cm bs) is a thin biface fragment (8.37 mm) of heat-treated gray novaculite, formed by both hard hammer and soft hammer flaking; the edges are sinuous and apparently the biface is not from a finished bifacial tool. It measures 28.73 mm in width and 8.37 mm in thickness. The

second biface (ST 231, 0-20 cm bs) is a thick biface fragment (10.64 mm) of Big Fork chert, formed by hard hammer flaking; there is no cortex remaining on the piece, but the edges are crushed from knapping.

The hammerstone (ST 230, 20-27 cm) is made from a dense sandstone. It has a flat and smoothed poll end, with edge abrading along two edges of the tool. Opposite the poll end, the tool has both crushing and abraded areas, and there is a small area of pecking on one face; the latter is probably the product of the crushing and pulverizing of plant materials, such as seeds or nutshells. The hammerstone is 102.78 mm in length, 78.17 mm in width, and 45.77 mm in thickness.

Eighteen pieces of lithic debris were noted on the surface of the Pine Saddle site. From the shovel testing, we recovered four flake cores, one each of white novaculite, dark gray novaculite, Big Fork chert, and blue-gray chert (probably a weathered variety of Big Fork chert). There were a wide variety of lithic raw materials in the lithic debris, particularly Big Fork chert (n=118, 37%), gray novaculite (n=99, 31%), dark gray novaculite (n=36, 11%), white novaculite (n=29, 9%), and blue-gray chert (n=21, 7%) (Table 2).

About 20% of the Big Fork chert lithic debris are secondary decortification flakes, compared to about 1% of the novaculite lithic debris, and it seems likely that the debris from each of these raw materials were the product of different stages in the process of tool production at the Pine Saddle site. Big Fork chert was apparently brought to the site in rougher form than the novaculite, and more knapping of cores and rough bifaces had to be done to remove the outer cortex and thin the pieces meant for tools. The novaculite flakes were predominantly the product of final biface reduction and tool manufacture, or at least the cobbles, cores, and bifaces knapped at the site had had the outer rind removed at another location, probably at one of the novaculite quarries or workshops.

This differential knapping of Big Fork chert versus novaculite raw materials (at least all colors except for red) is not just characteristic of the Pine Saddle lithic debris assemblage, but generally holds at the sites across the Twomile Creek project area (Perttula and Nelson 2004a). Taken together, more than 14% of the Big Fork lithic debris from the project area sites are primary or secondary decortification flakes. By comparison, less than

Table 2. Flake types and raw materials in the Pine Saddle site lithic debris.

Raw Material	Primary	Secondary	Tertiary	Thinning	Blade
Big Fork chert	–	22	94	1	1
Blue-gray chert	–	–	20	–	1
Dark gray chert	–	–	4	–	–
White novaculite	–	–	29	–	–
Gray novaculite	–	–	97	2	–
Dark gray novaculite	–	1	35	–	–
Dark gray-black nov.	–	–	1	–	–
Red novaculite	–	–	3	–	–
White-black novaculite	–	1	–	–	–
Black novaculite	–	–	2	–	–
Heat-treated novaculite	–	–	3	–	–

1% of the gray novaculite flakes are cortical; none of the white novaculite flakes are cortical, and only 3.7% of the dark gray novaculite flakes are cortical pieces. Other lithic raw materials with relatively high percentages of cortical flakes are gray chert (14%, n=7) and red novaculite (14%, n=14).

Thinning flakes are not well-represented in the Pine Saddle lithic debris assemblage (see Table 2), accounting for less than 1% of the sample. They are not particularly abundant at any of the other 26 prehistoric sites recorded along Twomile Creek and tributaries (Perttula and Nelson 2004a), and they only comprise 2.9% of the entire lithic debris sample from these prehistoric sites. However, the frequency of bifacial thinning activities appears to be limited at all the sites, regardless of the kind of lithic raw material being worked, as among the four principal raw materials only 3.3% of Big Fork chert flakes are thinning flakes compared to 3.3% of the gray novaculite flakes; 3.7% of the dark gray novaculite flakes; and 1% of the white novaculite flakes. This in turn suggests that the long-term goal of knapping at the Pine Saddle site by Caddo knappers, and at other nearby sites, was primarily the production of flakes of Big Fork chert and novaculite that would be suitable for use as flake tools and as blanks for arrow point manufacture.

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Note on a Possible Chipped Stone Grubbing Tool from Upshur County, Texas

Christopher Lintz and Floyd Largent
Geo-Marine, Inc., Plano, Texas

During the period August 6-27, and November 18-20, 2003, archeologists from Geo-Marine Inc. (GMI), of Plano, Texas, conducted a pedestrian survey of a 51.5 km-long corridor for the proposed Southside Regional Water System in Marion, Harrison, Upshur, and Gregg counties, Texas (Largent et al. 2004). The proposed waterline is intended to draw water from Lake O The Pines in the Big Cypress drainage system and distribute it to various communities in both the Big Cypress and Little Cypress Creek basins in the aforementioned counties. Specifically, the pipeline will benefit the communities of Ore City, Old Diana, Diana, and James before the pipeline crosses Little Cypress Creek and winds southeastward to a booster pump station for further distribution to other communities through existing pipelines. During the survey, random shovel testing near the community of James found an isolated, expended chipped stone "grubbing implement" made of gray siltstone. Due to the scarcity of such tools, and the desire to call attention to the locus of this unusual item, the State Historic Preservation Office suggested that GMI assign the location an archeological site number, rather than retain it as an isolated occurrence. The purpose of this brief note is to discuss the find location, describe this relatively unusual artifact, and draw comparisons with similar implements.

Site 41UR302 represents the find locality of this single prehistoric chipped stone grubbing tool. The find was made in an overgrown grassy agricultural field approximately 100 m north of a small cemetery on Killdeer Road, in the community of James, Texas, atop a small terrace or knoll some 100 m south of an unnamed eastern drainage of Walnut Creek. While associated remains may lie on lands inaccessible due to lack of right-of-entry, the site, as presently recorded, lies entirely within the project corridor, and covers less than 10 m^2. Representative natural vegetation occurring adjacent to the agricultural field consists of briars, elderberry, French mulberry, poison oak/ivy, pine, hickory, oak, and sassafras. The site occurs on an area mapped as having Bowie fine sandy loam, 2-5 percent slopes, which is an ultisol (Roberts 1983).

The siltstone artifact was found in a random shovel test placed along the pipeline route on the side slope of a ridge, at a depth between 20-40 cm below surface. Four additional shovel tests were excavated in a cruciform pattern around the initial find, at 10 m intervals. However, no additional cultural materials of any kind were identified. It is possible that associated features and artifacts were present outside the pipeline corridor, but we were not able to determine whether the site extended onto adjacent private land.

This specimen is a "T"-shaped piece of bifacially chipped gray, moderately-coarse siltstone whose blade probably has been extensively reworked down from a broad and presumably ovate spatulate form to a narrow blade remnant (Figure 1). The implement has a wedge-shaped cross-section, which is thickest at the base of the stem or shank. The prominently projecting, haftable stem is bifacially flaked to a relatively rectangular form with moderately straight, parallel edges, which curve rather abruptly outward to form the much wider blade. In contrast to the regular flaking of the stem and lateral edges, the distal blade is short with a ragged, irregularly flaked, and undulating distal edge. No polish or other forms of use-wear are apparent on the faces. The implement appears to have been extensively reworked, crudely resharpened, or perhaps misused by being damaged by being battered against some hard material shortly before discard. No polish is macroscopically apparent on the blade.

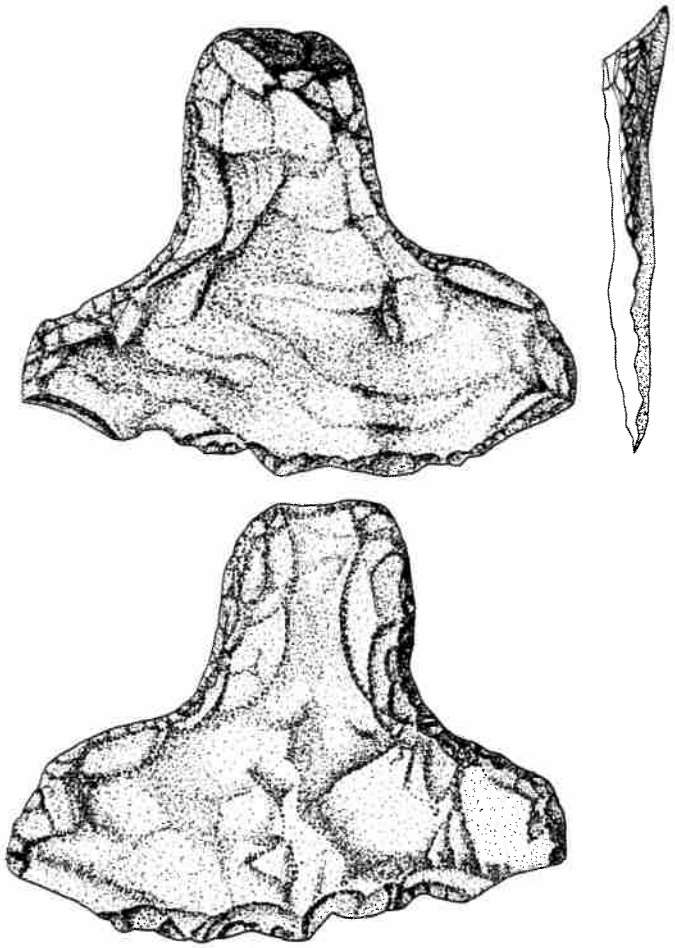

Figure 1. The possible grubbing stone specimen from Upshur County, Texas.

The specimen from Upshur County measures 106 mm long, 135 mm wide, 19.5 mm in maximum thickness, and weighs 196.4 grams. The stem dimensions are 48 mm wide, 54 mm long, and 19.5 mm thick. The blade width (perpendicular to the stem) is 135 mm whereas the blade length (parallel to the stem) is about 52 mm.

This bifacially chipped artifact compares favorably in morphology and tool stone material to artifacts called stemmed "grubbing tools" from the Boston Mountains region of west-central Arkansas (Bond 1977; Jurney 1979; Trubowitz 1980:153-154). In Arkansas, Bond (1977) classifies these tools with prominent shoulders and well-defined stems as "Category 1A" forms, which in complete specimens have a well defined stem, prominent shoulders, and a convex or even slightly pointed distal end; many show polish that is accentuated on one face more than the other. The form occurs occasionally in the Boston Mountains north of the Arkansas River (three of 81 specimens studied by Bond [1977]), but is rare in northeastern Texas (Timothy K. Perttula, personal communications 2003). Replication studies by Bond (1977) on the forms from Arkansas suggest that the polish on these tools is comparable to that obtained from digging in soils and sediments.

One intact specimen recovered from a dry cave was still mounted in a short (30 cm long) oak haft with a distinctive crook or bend in the handle. The blade is set roughly parallel to the axis of the handle, suggesting that it was a small axe-like grubbing tool (Jurney 1979; Trubowitz 1980:153-154). Presumably such implements would have served well to dig out tubers and other root crops, or perhaps to harvest yucca heads. Based on the stone head orientation to the hafted handle, these are not regarded as hoes.

Except for the blade length, the size of the specimen from Upshur County, Texas, is very comparable to the Arkansas Category 1A. Three Arkansas specimens available to Bond for study have lengths ranging from 81 to 113 mm, widths ranging from 81 to 99 mm, thicknesses ranging from 19 to 25 mm, and stem lengths ranging from 45 to 56 mm (Bond 1977:36). In the Boston Mountains area of western Arkansas, these items are associated with the Gober complex, the earliest ceramic complex contemporaneous with the Fourche Maline phase and predating Late Prehistoric Caddoan occupations.

Due to the lack of context, and the scarcity of reported specimens from nearby areas, the age and cultural affiliation of the Upshur County specimen remains unknown. The coarse, gray siltstone is not commonly found

in northeastern Texas, but it is the preferred material from the grubbing implements found in the Gober complex of Arkansas. It would seem remarkable that such a utilitarian implement might have been carried from the Boston Mountain to northeastern Texas, a distance of nearly 350 km. Of course, other sources of coarse gray siltstone are present in the Ouachita Mountains of southeastern Oklahoma, and it is possible there could be a much closer source. We simply do not know where this tool was made.

In light of the battered condition to this specimen, there is no assurance that the Upshur County specimen was necessarily contemporaneous with those made by people responsible for the Gober complex. Later people might have found and transported the implement into northeastern Texas. And there is also no reason to believe that this implement was used in the same manner as the grubbing implements of Arkansas. Indeed, the battered nature of the blade and absence of polish on the blade remnant suggests that shortly before abandonment, the implement received some pretty rough treatment in some manner other than that as a grubbing tool. Presently, the implement is an enigma that raises more questions than it addresses. However, its occurrence is worthy of note as a means of recording such specimens in the region.

Acknowledgements

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Casañas, Hidalgo, and Espinosa: A Spanish Learning Curve

Mariah F. Wade
The University of Texas at Austin

In 1690, Alonso de León arrived in East Texas to establish two missions among the Asinai. He was accompanied by Fr. Fontcuberta, Fr. Casañas, Fr. Bordoy, Fr. Massanet, and Brother Antonio. Fr. Massanet returned to Mexico to inform the Viceroy about the trip, and came back to East Texas with Terán de Los Rios in August 1691. Fr. Fontcuberta died in February 1691 of an epidemic that, according to Fr. Casañas, killed about 3,000 natives in the area. Fr. Casañas who died in New Mexico in 1696, left us the first intimate view of the Caddoan-speaking groups in East Texas. Casañas Relación was written in spurts and delivered to Terán de los Rios in August 1691.The Terán expedition brought to the Asinai Fr. Hidalgo who stayed about two years. In 1716, Fr. Hidalgo returned to Texas with Fr. Espinosa. While in the Asinai Province, the social conditions, the environment for learning and the interests of the three friars were quite different. We have found little archival material from Hidalgo, and Espinosa s style and education provide a disengaged narrative that loses flavor and re-uses some of the material provided by the other friars.

The arrival of the Spaniards did not match native expectations. The Asinai wanted a Spanish community composed of families that would live side-by-side with them and would provide a measure of protection and prestige, as well as trade opportunities. Instead they got seven single males: four friars and three soldiers. Casañas grappled with a new language and its dialects, unfamiliar social and religious practices, a major epidemic in 1691 that deeply affected the relationship between Europeans and Natives, and very poor harvests in 1691 and 1692. His Relación, which serves as a colonial baseline, was created while learning, attempting to proselytize and surviving. Casañas Relación is constructed from several kinds of knowledge: what he saw, experienced, and was told.

Casañas did not travel beyond the Asinai Province, nor could he: most of the time there were only two other friars and three soldiers, and between February and August 1691 Casañas was left with one companion and two soldiers. At first, Casañas was at Mission San Francisco de los Tejas because he only established Mission Santisimo Nombre de Maria (hereafter shown as S.N. de Maria) in October 1690. From 1690 through 1691 he probably remained at S. N. de Maria where he was met by Terán on August 4, 1691. Unlike Hidalgo and Espinosa, most of the information related by Casañas concerns the political and religious structure and the practices of the people in the Asinai Province. In this article I will concentrate on two issues: first, what can we learn about the location of the nations belonging to the Asinai Province using the archival materials from these friars, and second what cosmological and religious changes occurred between the period of Casañas and Hidalgo, and the period of Hidalgo and Espinosa. I should add that all the evidence to be presented, except for obvious exceptions, is based completely on the archival materials mentioned.

Location of the groups in the Asinai Province

Casañas reports that the territory of the Province was about 91 miles to the north and east, making the Sabine River its rough eastern boundary. He provides a description of the location of the Asinai groups as he walked and rode a mule from village to village following defined traveling paths. Mission S. Francisco was

located at the western edge of the Province seven miles west of Mission S. N. de Maria, which was located on the western margin of the Neches River. Casañas is rather specific about that, and he would not mistake a creek for a river since he points to the existence of some 30 creeks. Fr. Casañas who remained in the area for 18 months, located the following groups: Nabedacho, Nabiti, Nacachau, Nacogdoches, Nacono, Nasoni, Nechavi, Neche and Cache.

Political—Religious structure—Responsibilities and Privileges

Casañas provides a clear picture of the political-religious structure of these groups. The unifying element between the groups of the province was the Xinesi as the high priest, who never left the area, kept the sacred fire, and was the principal intermediary between the people and the spiritual world. This bounded existence of the Xinesi was a restriction of his office and has cosmological implications. The hierarchical structure had a top/down orientation balanced by horizontal structural elements. The Caddi accumulated civic and religious functions, and each Asinai division had one. At a similar hierarchical level was the Council of Elders (apparently 12), an advisory body to the Xinesi and the Caddi also responsible for civic and religious duties. If Casañas did not make a mistake in his pronouns, the Council of Elders included older women. The Canaha had civic and enforcement roles as lieutenants to the Caddi and the Elders, and they were also in charge of the lodging arrangements for the Caddi when he left the pueblo to hunt or to make war. The number of Canaha was proportional to the population, and Casañas states that while the small divisions had three or four Canaha, larger ones had seven or eight. This means that some divisions were twice as big as others in terms of population. The Chaya appeared to be lieutenants to the Canaha, and the Tarima, or Tamma, held roles as town criers and enforcers of work schedules. There were individuals who presided over burial ceremonies, but Casañas does not name them. There are substantial differences between the role assignments according to Casañas and according to Espinosa, but these differences are too numerous to be addressed in this article. However, these differences may be due to Espinosa s tendency to generalize, or to major cosmological and social shifts that occurred between the end of the 17th century and the beginning of the 18th century.

Between 1690 and 1693 the cosmological beliefs of the Asinai Province included two children, the Coninisi, who came from the other side of the heavens and were the intermediaries used by the Xinesi to access their Supreme Being, the Ayo Caddi Aymay. The children, who Espinosa refers to as boys and I believe to be the Twins of the Gemini constellation, had to be provided for by the people, but were cared for only by the Xinesi. Casañas, intrigued by the mystery of the children and determined to snub the superstition, asked to see the children. He was permitted access to the house, but he was told that he could not see them because "they could only be seen when they had just arrived from the other side of the sky," and that the time and an hour of their appearance coincided with the time when their house was set on fire and they were burned with it. These Twins, the Coninisi, had a physical reality translated into statues, dwelling, ritual paraphernalia, and food requirements. Some of the requests made by the Asinai to the Supreme Being via the Coninisi, related to forgiveness for failure to give appropriate amounts of harvest products. This emphasized that the gifts were never equal in value and therefore inequality in reciprocity was maintained. They also requested health, endurance, energy, victories against enemies and many women to procreate. During the first period Hidalgo was among the Asinai (1691 through October 1693), the Coninisi were still present and the Xinesi consulted then and accessed the Superior Being through them.

The third distinct part of the Relación was written after the death of Fr. Fontcuberta on February 5th, 1691, and it was after that time that Casañas confronted the Xinesi over the children. As it happens, the Gemini constellation, The Twins, is best seen in February, and Casañas was told he could not see the Coninisi because they were only visible when they first arrived.

Most of Espinosa s material on the Asinai resulted from his experiences between 1716 and 1719. In October 1719, the friars abandoned East Texas. Espinosa later returned with the Aguayo expedition and recorded some material between 1721 and 1722. Espinosa states that, sometime shortly prior to 1714, the houses of the Coninisi burned down and they saw the Coninisi climb on the smoke to the sky. This is consistent with previous statements made by the Xinesi to Casañas. What is different is that Espinosa states that since that event the Coninisi were not seen again. Unlike Casañas, Espinosa states that there were two Coninisi houses where the small coffers with sacred objects related to the Coninisi rituals were kept. Espinosa provides two scenarios for the disappearance of the Coninisi. First he implies that the destruction of the house was due to a Christian God s intervention which prepared the way for the return of the friars to the Asinai Province. Second he reports that, according to the female Asinai interpreter who had been raised in Coahuila, the destruction of the house resulted from an attack by the Yojuane on the Asinai which occurred presumably ca. 1714. Regardless, between 1691 and 1714 some drastic changes occurred in the cosmological and religious world of the people in the Asinai Province. These changes had to affect the power structure, particularly in terms of the Xinesi s access to the Superior Being.

Espinosa also states that some of the shamans, which he calls Santones, were experts in astrology and that in the month of February, called sacabbi, the Asinai groups held a large feast that involved the whole Province. During this feast, marked by propitiatory rites, drinking of laurel tea, dancing and eating, the shamans used the feathers of an eagle that ascended to the sky to communicate with the Supreme Being and serve as intermediary to the spiritual realm for weather and crop forecasts. The abundance of shaman practitioners related by Espinosa, and the use of the eagle as mediator, are absent from the Casañas report. In September, the whole Province, and possibly groups from other Provinces, celebrated a feast called sanata. This feast, which was said to be a celebration for women of all ages, began when the Pleiades were located above the house of the Xinesi and the celebration was centered on the arrival of the seven sisters in the sky.

Between 1693 and 1714 either the Xinesi or the most influential Caddi died. Whether this death was connected with the disappearance of the Coninisi is not known. In 1714 the Asinai lost their corn crop, and in June 1714 four Frenchmen, including Louis de Saint-Denis, and six Asinai came to the Rio Grande to request the friars return to their lands. One of the Asinai was Bernardino, a Caddi, and another was a person who had come to the Rio Grande some years before looking for Fr. Hidalgo. With the arrival of the Spanish in July 1716 several Caddi were appointed by the Spanish, but Bernardino remained in power. In December 1716, about six months after the return of the Spanish, the house of the Xinesi was moved and rebuilt.

To conclude, the collected archival evidence points quite strongly to the identity of the Coninisi as Castor and Polux in the constellation Gemini. The February festival would be connected to the maximum visibility of the constellation. Between 1690 and 1714 it appears that the Coninisi ascended to the sky severing their connection with the earthly realm. If that is the case, the Xinesi retained his connection to the ancestral world and the community through the Sacred Fire, but lost access to the Supreme Being through the Coninisi.

The arrival of the Spanish did not herald auspicious times. Crop failures, epidemics with consequent loss of population and inherent social disruption together with the disappearance of the Coninisi would have provoked serious structural and power changes that would affect the whole Province. To understand and gauge the cosmological and cultural changes that may have occurred during the early tenure of Casañas and Hidalgo and during the following period, we must continue to do close readings of the archival material, and scrutinize the archeological record for any clues that may substantiate these changes.

Caddo Archives and Economies

Paul Shawn Marceaux
The University of Texas at Austin

Introduction

This article is a discussion of archival research on contact through historic period (ca. A.D. 1519 to 18th century) Caddo groups in eastern Texas and west central Louisiana. First, I describe general objectives for current and long-term research on the Caddo Indians, followed by the central issues the article will address. A brief summary of protohistoric and historic events, actors, and sources will be followed by methodological considerations, as well as a discussion of Caddo economies, concluding with some reflections on Caddo archives and economies. This article explores the complex and interrelated economies of Native American and European populations during the colonization process in early Spanish Texas.

Objectives

My principal long-term goals are thorough cultural and archeological analysis of Caddo groups from the Late Caddoan period (ca. A.D. 1500) through their removal from Texas in 1859. In order to better understand the consequences of Native American and European contact, I will employ an interdisciplinary approach that utilizes previously excavated archeological data, information from ongoing archeological investigations, and archival records documenting the arrival and subsequent occupation of the area by Spanish and French military, missionaries, and traders.

I concentrate on information fleshed out from primary texts and translations of Spanish and French documents from initial contact to the mid-18th century. Subject matter focuses on the economic processes and material exchange that accompanied the arrival of European groups. Economic affairs of Caddo and European groups were negotiated through alliances, trade connections and interactions, marriage, and at times straightforward military might. The main goal of reviewing the archival records associated with Caddo groups is to reveal the events and processes of changing economic, political, and social systems of Native and European populations.

It is my contention that the archival material provides insight into the chaotic shifts and changes of the economies of both Caddo and European groups. I also believe it will be beneficial to further differentiate, when possible, between the colonial policies of the French and Spanish. For this reason, special attention is directed to interactions, transactions, and negotiations of Caddo groups with Spanish and French missionaries, soldiers, and government officials.

This research is designed to fill in crucial gaps in our knowledge of Caddo groups, especially fine-tuning our current understanding of their economic systems. Relevant research questions include:

- What is the nature of trade and exchange (economic interactions) between the Caddo and Europeans?
- What adaptive responses are the Caddo instituting to deal with the influx of European trade goods, a demographic collapse, and other effects of contact?

- How are Europeans using Caddo political systems to control and manipulate the Caddo, and conversely how are the Caddo controlling and manipulating the Europeans?

- How are economic products such as horses, guns, animal skins, salt, and maize negotiated; in other words what are the (cultural) exchange rates?

A Few Notes on Methodology

The archival documents for this region and time are rich; however relatively little work has been done on the primary sources in recent years. The majority of studies have relied on 20th century translations, which after a brief review are found to contain some discrepancies. I consulted both primary documents and reviewed translations in order to ensure accuracy in their content and meaning. With the assistance of Dr. Mariah Wade, at The University of Texas at Austin, primary documents that are especially relevant to the current study have been re-translated. The vast number of applicable archival sources precludes examination of the entire archival corpus. However, a manageable number of primary documents were consulted and the majority of secondary translations were reviewed.

The first step was to review translated archives for the protohistoric and early Historic periods. Many of these sources, especially those from the earliest missions, have been used by numerous scholars to elucidate the processes of Caddo cultural change. Secondly, primary sources, including Casañas (1927) and various items in Margry (1879), were re-translated (with translations at hand for comparison when available).

Finally, using examples from the archives I analyze and compare Caddo and European economies. In an attempt to maintain a semblance of chronology and continuity, events, actors, and interactions are placed in historical context. Of course, there are problems with continuity due to the inherent incompleteness of the historical record. Additionally, one must consider the potentially disjunctive effects of disease and population collapse (see Derrick and Wilson 2001; Dobyns 1983; Ewers 1973; Ramenofsky 1987) on Native American social, political, and economic systems.

The ostensibly cyclical founding and abandonment of Spanish missions serves as an example of the difficulties associated with establishing permanent European settlements among the Caddo Indians. The French example of La Salle's Fort St. Louis bears further witness. The site was on the receiving end of Native American attacks, likely by the Karankawa, and ended in the destruction of the site and the death of all but a handful of its occupants. What follows is an overview of the early sources on contact period Caddo groups occupying parts of eastern Texas and west central Louisiana.

Protohistoric Period

According to Perttula (2002), the Caddo protohistoric period, the time from earliest evidence of European contact to the start of detailed and continuous written records and sustained contact, extends from ca. 1520-1685. "Only the De Soto entrada in 1542 and the La Salle expedition in 1685 record actual face-to-face European contact with Caddo groups in this period" (Perttula 1992:95).

The De Soto entrada was the first Spanish expedition to make contact with Caddo groups (Table 1), and this occurred in the Caddo province of Naguatex on the Red River in August 1542 (Clayton et al. 1993). There is significant evidence available for local and non-local trade; for example, Hudson (1997) notes that De Soto's

expedition observed objects made of turquoise and cotton, indicating trade between the Guasco, a Caddo group on the Neches River in East Texas, and Southwestern groups. However brief, the De Soto chronicles provide insight into the geographic boundaries (Hudson 1997) and social organization (Perttula 2002) of Caddo contact period polities.

Table 1. Associated Spanish Expeditions, 1542-1778.

Expedition	Date
De Soto-Moscoso	1542
Alonso de Leon	1689
Alonso de León and Fray Massanet	1690
Domingo Terán de los Ríos	1691-1692
Gregorio de Salinas Varona	1693
Fray Isidro de Espinosa, Fray Antonio de Olivares and Pedro de Aguirre	1709
Domingo Ramón with Espinosa and St. Denis	1716
Martín de Alarcón	1718
Marqués de San Miguel de Aguayo	1721-1722
Pedro de Rivera	1776
Marqués de Rubí	1767
Mézières, lieutenant governor of Natchitoches	1772, 1778

Juan Sabeata provides an interesting 'case history' of a Native agent that appears in the historical record from 1683 to 1692 (Kelley 1955; Wade 2003). Sabeata and a number of Native delegates appear first in El Paso del Norte, now known as Ciudad Juarez, Chihuahua, Mexico. During the first two meetings (11 August and 20 October 1683), he relates to Spanish officials important information such as:

> 1) they want to reestablish the communication and friendship they had before, 2) [they] would profit and trade as they had always done, 3) that other Spaniards [actually the French] very white and with red hair came by the sea in wooden houses that walk on water, 4) ask for a friar in order that when they were ill he [the friar] could console them and when they died [they] would be buried as Christians and [the friar] would baptize the other people who are...over ten thousand souls, 5) ask for Spanish families in order that they will defend them against their enemies the Apaches, and 6) that Sabeata will guide them to the Texas (translations from Wade 2003: 236-240, brackets mine).

First-hand statements by Native individuals, although recorded by European actors, are regrettably uncommon. However, those that are known serve to illustrate the stated agendas and requests of Native groups. Notably, Sabeata mentions the Tejas on both visits relaying their "good lands and great production" and willingness to "receive the Spaniards and the Friars with great affection and love" (Wade 2003).

Early Historic Period

Although Rene-Robert Cavelier, Sieur de La Salle's expedition landed on the Texas coast in 1685 (Table 2), he did not depart on his first trip to the Cenis (Hasinai) villages until 28 April 1686. When La Salle visited

the Hasinai on this trip, he purchased horses already owned by Caddo groups. This point is reinforced by Tonti, who in 1690 reported that horses were widely available (Swanton 1942).

La Salle's second trip to the Hasinai village was cut short when on 19 March 1687 he was assassinated by members of his own party. However, Henri Joutel (Foster 1998; Joutel 1906) continued to document the French experience, which included important details on the role of economic exchange. Joutel and his group arrived at the Hasinai villages on 30 March 1687 and stayed for almost three months. In this account, the Hasinai provided raw materials, and produced prepared (manufactured) goods, which were constantly negotiated for French trade items.

Table 2. Associated French Expeditions, 1685-1721.

Expedition	Date
La Salle lands on Texas coast, founds Fort St. Louis	1685
La Salle first trip to Cenis	1686
Henri de Tonti	1690
Louis Juchereau de St. Denis	1700, 1705
St. Denis, establish Fort St. Jean Baptiste aux Natchitos	1714
La Harpe and Du Rivage, establish trading post with Kadohadacho	1719
La Harpe, establish trading post among Wichita	1721

Henri de Tonti, founder of the Arkansas Post, descended the Mississippi River in 1690 to locate La Salle (Delangez 1944; Margry 1879). In search of the lost colony, on 17 February 1690 Tonti arrived in the Natchitoches area. While there, he helped arrange a treaty between the Natchitoches and Taensa.

Captain Alonso de León led two expeditions in 1689 and 1690 to locate La Salle's settlement on the central Texas coast. De León's 1690 expedition diary, Fray Damián Massanet's letter, and Juan Bautista Chapa's "Historia del Nuevo Reino Leon" (Chapa 1997; Massanet 1899) provide vital sources for Native American-Spanish relations in northeastern Mexico and into East Texas. While searching for two Frenchmen from Fort St. Louis, Captain De León and his expedition encountered a 'Tejas captain' on the Guadalupe River. This represents the first documented Spanish contact with the Caddo since the 1650 Martin-Castillo expedition (Wade 2003:74).

Captain De León did eventually locate La Salle's settlement, along with drifting Frenchmen, which prompted the first Spanish missions to be established among the Caddo. De León's expedition in 1690 was "arranged to explore the province of the Tejas" (Chapa 1997:143). On 22 May, the Spanish, accompanied by a "Tejas governor," crossed the Rio de la Santisima [Trinity River] into the beginning of the land of the Tejas (Chapa 1997). Here the Spanish noted numerous fields of corn, beans, pumpkins, and watermelon, and were hospitably treated to tamales. Alonso de León describes the community along the Neches River:

> The principal settlement encompasses fourteen to fifteen leagues, but we were unable to see all of it because of a river that passes through the middle. In the part that we did see there were more than four thousand people (Hadley et al. 1997:323).

Captain Alonso de León and Fray Massanet established the first two Spanish missions, Mission San Francisco de los Tejas and Mission El Santisimo de Nombre Maria, among the Nabedache on the Neches River

in 1690. An important question I attempt to address below is: during this first sustained contact, what are the particular historical circumstances and conditions surrounding the trade and negotiation of European and Caddo goods? In addition, what are the politico-economic strategies being employed by each side?

The expedition of Domingo Terán de los Ríos, sent to establish seven missions among the Tejas (see Table 1), provides us with one of the earliest (and most discussed) maps of a Nasoni Caddo village (Schambach et al. 1983). The map provides clues, through the eyes of the Spanish, about the physical landscape of Caddo settlements. Details of the map include the temple mound, still in use, and the location of the caddi's house. Although de los Rios was given a number of other tasks, including exploration of the lower Mississippi River, all of the missions he established among the Caddo ended in failure.

This first Spanish effort at colonization in the Caddo world resulted in continuous occupation until 1693. A great deal of information from this period is available, including the narratives of Fray Francisco Casañas de Jesus Maria, Juan Bautista Chapa, Captain Alonso de León, Fray Francisco Hidalgo, and Fray Damián Massanet (Bolton 1917, 1987; Casañas 1927; Castañeda 1936; Chapa 1997; De León 1690; Hidalgo 1927; Massanet 1899) and I will draw upon them to discuss the early Spanish missionizing experience in eastern Texas.

Louis Juchereau de St. Denis' exploration of the Red River in 1700 and 1705 led to the establishment of Fort St. Jean Baptiste aux Natchitos in 1714 (Habig 1984; Margry 1879). Although material and cultural exchange had long been initiated between the French and the Caddo, this represents the first permanent French establishment among the Caddo. Additional analysis of the role of this French settlement, including its particular association to the Natchitoches confederacy, will provide a comparative case for French and Spanish attempts at colonization.

The re-establishment of Spanish missions and towns, including San Miguel de Linares de los Adaes by Domingo Ramón in 1716-1717 and Presidio Nuestra Señora del Pilar de los Adaes by the Aguayo expedition in 1721, signaled the repeated effort to combat what the Spanish believed to be the infringement of French traders (Table 3). However, this did not dissuade the French from further advances, exemplified by the 1719 exploration of La Harpe and Du Rivage that founded a trading post with the Kadohadacho.

This back and forth characterizes the sporadic founding and abandonment of settlements (see Table 3). Three times between 1690 and 1773, the Spanish completely withdrew their missions from the area. Shortly after the French ceded Louisiana to Spain in 1767, all Spanish missions in the provinces of Texas and Louisiana were abandoned. The narratives of La Salle, Joutel, St. Denis, and Henri de Tonti (Delangez 1944; Foster 1998; Habig 1984; Joutel 1906; Margry 1879) will be used to discuss the early French experience in the study area.

Caddo Economies

During the protohistoric period, the discontinuity of documents makes it difficult to clarify the exact changes affecting Caddo economies. It is in these gaps that archeology can best be used to supplement historic records. Up to this point I have relied on previous excavations to complement archival records. In order to address the incompleteness of this period, in the future I hope to organize additional archeological research on Caddo sites dating to the protohistoric period.

The first exposure to goods such as guns, metal implements, horses, and cloth, undoubtedly had an impact on Native economic systems. Two noteworthy examples include: (1) the change from using wooden or bison scapula hoes to those manufactured from metal; and (2) the switch from stone tool technology for knives and

Table 3. Founding and Abandonment of European Settlements.

Event	Date
First two Spanish missions, *Mission San Francisco de los Tejas* and *Mission El Santisimo de Nombre Maria*, established	1690
Spanish missions withdrawn	1693
First French outpost, *Fort St. Jean Baptiste aux Natchitos*, established	1714
Missions *Nuestra Padre San Francisco de Tejas, Purisima Concepcion, San Jose de Nazones, Nuestra Senora de los Nacogdoches, Nuestra Senora Dolores de Ais,* and *San Miguel de los Linares de los Adaes* , and Presidio *Nuestra Senora de los Dolores de los Tejas* founded.	1716
Spanish missions and presidios withdrawn	1719
Missions *Nuestra Padre San Francisco de Tejas, Purisima Concepcion, San Jose de Nazones, Nuestra Senora de los Nacogdoches, Nuestra Senora Dolores de Ais,* and *San Miguel de los Linares de los Adaes*, and Presidios *Nuestra Senora de los Dolores de los Tejas,* and *Nuestra Senora del Pilar de los Adaes* (re)founded.	1721
Mission *Purisima Concepcion* abandoned	1729
Missions *Nuestra Padre San Francisco de Tejas* and *San Jose de Nazones*, and Presidio *Nuestra Senora de los Dolores de los Tejas* abandoned.	1730
French cede Louisiana to Spain	1767
All Spanish missions abandoned in provinces of Texas and Louisiana	1773

scraping tools to metal goods such as knives and reused gun parts. Carlson and Corbin (1999:54) note that the small number of lithic tools at Mission Dolores de los Ais, including arrow points, may point to the replacement of "stone tools with ones of metal manufacture." In return, Caddo groups provided raw materials, such as salt, bois d'arc, food items, and processed goods such as maize, skins and furs, and ceramics. Although early European expeditions were well equipped, without Native manufactured goods, local raw materials, and the cultural knowledge and insight of Native groups, many would have failed miserably.

According to Wyckoff and Baugh (1980:229), the Hasinai economy was based on four basic subsistence activities: farming, hunting, collecting, and fishing. Horticulture and the production of maize was a major component of the subsistence economy, although Caddo groups were by no means reliant on agricultural products. This subsistence-based agricultural society, whose economy was based on goods necessary for basic needs, relied on a diversified food production system.

Both the Hasinai and Natchitoches confederacies, although more aptly termed kin-based alliances of tribes, were in existence by ca. 1690 (Perttula 1993). The Hasinai confederacy occupied the upper reaches of the Neches and Angelina river valleys in East Texas, while the Natchitoches confederacy occupied the Red River near the French post of Natchitoches in west-central Louisiana. According to Casañas (1927), the Hasinai confederacy

consisted of nine principal tribes, including the Cachae, Nabadacho, Nabiti, Nacachau, Nacono, Nasayaha, Nazadachotzi, Necha, and Nechavi. These allied groups, consisting of approximately 3500 people (Smith 1998), are well-known from a variety of historical and ethnohistorical studies (Bolton 1914, 1987; Espinosa 1927; Griffith 1954; Hickerson 1992; Kress and Hatcher 1932; Newkumet and Meredith 1988; Wyckoff and Baugh 1980). The Natchitoches confederacy consisted of at least three tribes, including the Yatasi, Doustioni, and lower Natchitoches (Smith 1998). Although the exact nature of these confederacies needs further attention, it is clear from the archival record that these groups maintained distinct affiliations.

It is difficult, if not impossible, to gauge whether the Spanish had a greater impact on the Hasinai confederacy, or conversely, the French had greater influence on the Natchitoches confederacy. Questions such as the impact of European contact on particular groups can only be addressed when placed in a specific historical context. What is apparent is that both the confederacies and Europeans were engaged in exploitation and compromise, with each group working towards their own best interests.

Juan Sabeata, a Jumano leader asserting political relations with the Caddo, requested friars, Spanish settlers, and military personnel to battle the Apache, on a promise to aide the Spanish in return. Unfortunately, he is one of the only examples I found of a named Native American agent appealing for and engaging in material and ideological exchange. His pleas came at an opportune time for Spanish authorities seeking to: (1) keep the peace in El Paso; (2) acquire more military supplies; (3) appease the friars; (4) obtain food and furs desperately needed by colonists; and (5) and scout potential new areas for settlement (Wade 2003:77). The Mendoza-López expedition that was to follow Sabeata's request was made even more attractive, considering that the Pueblo revolts of 1680 in New Mexico were preventing Spanish from maintaining settlements in that area.

During his address to the Governor, Sabeata offered the Spanish food and material incentives such as pearls, deer gamusas, shoes, and buffalo skins. He also indicated that the Tejas have many horses, of which they feed corn because "they have many herds of mares which they have raised" (Wade 2003:239) His ability to corroborate several events involving the Spanish and his more fanciful tales of crosses "falling from the sky" confirms his understanding and skill at diplomacy. Sabeata, and individuals like him, played a vital role in the material and communication exchange network between the Caddo in East Texas, the Spanish in New Mexico, and associated mobile groups occupying areas in between the two.

During the La Salle expedition, individual transactions in the form of amounts and descriptions of goods provide eventful facts of trade and exchange. On La Salle's last journey, from Fort St. Louis to the Brazos River, the French were decidedly dependent on Native guides in order to successfully navigate the local landscape (Foster 1998). Joutel, for example, tells us that a hatchet was offered by La Salle in exchange for a Native American guide to lead them to the place where he (La Salle) had left a stash of corn and beans (Foster 1998:194). There is a tit-for-tat rhythm to the needs and payment of services and material goods. This is not to say that the hatchet was an especially expensive item for the French, but for the hungry French there was little option. Just after La Salle's death, right before entering the Cenis village, Joutel in effect admits that the French are reliant on the Caddo for food and other necessities. He even retells the crossing of the large stream, where the Natives could have easily left several Frenchmen to their death, returning afterward to collect the booty (Foster 1998:200).

Upon Joutel's approach into the villages of the Cenis, they were surprised by the presence of a Caddo dressed in Spanish clothing. They were also informed that residing in a near-by village were "one and two others ... in a place called Sapony [Nasoni?]." These individuals were actually French deserters from Fort St. Louis. At this point, three years before the Spanish founded their first two missions, Joutel notes:

> seven or eight of them [Caddos from the Nabedache village] had sword blades with clusters of feathers on the hilt. These blades were squared like those of the Spaniards; they also had several large bells...a few of them also had some piece of blue material which they must have obtained from the Spaniards [brackets my own] (Foster 1998:205).

Joutel's journal while among the Cenis is an informative record of two knives here, and a bell and some trinkets there. Most interactions that the Frenchman noted were accompanied by material exchange of some sort. On several occasions, once by a "respected elder," Joutel is offered a wife/female, an event that demonstrates further the efforts of the Caddo to build relationships and/or alliances between the two groups. Using the social institution of marriage, the Caddo were deliberately extending fictive kin alliances between themselves and the French.

Noting the Cenis' affinity for, and yet lack of, knives and hatchets, Joutel declared this as proof that "the Spaniards had not given them much" (Foster 1998:210). This statement supports the notable differences in Spanish and French strategies and methods of material distribution, the French being 'traders' and 'mercantilists' and the Spaniards primary concerns lay elsewhere (Perttula 1992; Wade 1989). The subtlety of the Spanish approach (and underlying motives) can be surmised in Casañas' section of text that moves from a description of material goods the Caddo utilized to the statement "how wise it would be to provide these poor creatures with the abovementioned items" (Casañas 1927:285).

According to Chapa (1997), the first meeting in the principal Nabedache village was full of pomp and pageantry, including a procession of Spanish priests and officers. It also resulted in the Spanish constructing a chapel, and three priests were left behind to manage the souls of the Tejas. When De León and Fray Massanet requested that more than three soldiers remain, the Caddo chief refused. A certain measure of influence can be gleamed from this refusal; that the Spanish complied is something of an exception. The Caddo insisted that no more than six men, three priests and three soldiers, remain for fear that the Spanish would "appropriate the Indians' women" (Chapa 1997:151). This assertion of power stands in contrast to the strategy of extending fictive kin alliances, demonstrating the importance of context and situation.

In Chapa's accounts, Native American-Spanish interactions took on various forms with mixed results depending on the circumstance. Numerous encounters began with Natives scurrying into the countryside or mountains, only to be coaxed out later with gifts (Chapa 1997). In these instances, pacification (or ingratiation as the Spanish refer to it) of Native Americans was accomplished through the material exchange of clothing, food, knives, tobacco, and jewelry. It is unclear whether Caddo groups were among those to "flee the scene."

Casañas noted that there were so many vines, and fruit-producing plants, it looked as if they had been planted by hand (Casañas 1927:210). The agricultural success of the Caddo comes as no surprise considering they had been involved in farming practices for some 700 years or more before the Spanish or French ever arrived. Another interesting note is that in May 1690 the de León expedition notes that watermelons were being grown, a food source not native to the area. Caddo local experience and knowledge likely expedited the practice of cultivating foreign agricultural goods.

The law of supply and demand dictated the scale of social and political interaction. In my opinion, a closer examination of the inventory of European goods being distributed to the Caddo at particular points in time in the context of the Spanish mission/presidio system versus the French focus on mercantilism would support this.

Two unambiguous examples of the differences in Spanish and French policies are: first, in 1722, along with multiple missions, the Spanish occupied two presidios on the eastern border with France, one on the coast, and

one in the interior. France, on the other hand, at this time had only two military posts, one with a garrison and one with a fort. However, it is also likely the French had several 'unofficial' trading villages (Gilmore 1992). Second, in a list of 26 suggestions and proposals for projects related to the settlement of this area, "friars for ecclesiastical purposes" was relegated to no. 22 (Margry 1879, Vol. 4: 40). The first 21 suggestions indicate that the French were much more interested in securing commerce, and building companies that would set up trade. Companies involved in commerce were in charge of equipping and arming, organizing the settlers, and providing jobs. Many of these functions were organized by the Spanish crown, with its explicit ecclesiastical objectives, and not led by commercial companies.

Around the beginning of the 18th century as the Spanish abandoned their first mission attempts, we see the French sending several expeditions to visit the Hasinai tribes, developing and engaging in trade relations (Swanton 1942). In a letter from Sieur Argoud, a friend of La Salle, to the Marine Minister it is stated, "there is no need for the French to carry cash, Natives would rather knick-knacks" (Margry 1879, Vol. 4:24). According to Perttula (1992:35), there was no material dependence by the Caddo on Spanish goods because the French were so successful in promoting trade. However, the horse was an invaluable commodity that may be an exception. A caveat to this would be that the Caddo were likely getting many of their horses from other Native groups and not directly from the Spanish.

As further evidence of early European interaction, Cadillac, the French commander in Louisiana, received a letter from Fray Hidalgo asking the French for assistance. This letter, encouraging French and Spanish coordination, directly contradicted Spanish colonial policy. One response to this letter was the trip of St. Denis from Natchitoches across northern New Spain and eventually to Mexico City (Shelby 1923) where he was detained.

The Spanish were aware of French ventures, indicated by Casañas' list of goods and "ornaments they have secured from other nations" (Casañas 1927). And conversely, the French were aware of the Spanish, an example being the meeting between Joutel and the Hasinai where the Native chiefs were adorned with Spanish goods (Foster 1998). Ethnohistoric and archeological evidence supports the acquisition, trade, and exchange of European and non-local objects as one of the many priorities of ruling elites and other members of the Caddo Nation.

The introduction of the Caddo Area into the world economy (Braudel 1984; Wallerstein 1974-1980; Wolf 1982) is a significant event that requires more attention. The rate at which Caddo groups were introduced and integrated into that economy varied. Although early Spanish policies were to restrict French trade, they were unable to provide enough supplies to satisfy Native requests. "These nations say: the Spaniards offer fair words; the French fair words and presents" (Hackett 1931-1946). One factor influencing provisions was the difference in supply lines between those originating in northern New Spain and those originating in New Orleans (Bolton 1914). For example, the post of Natchitoches was approximately 130 leagues (338 miles) from New Orleans and there was a good road between Los Adaes and Natchitoches. The Spanish, on the other hand, were forced to bring merchandise over 600 leagues (1560 miles) over land, a very expensive endeavor.

Reflections

The economic goods utilized, traded, and consumed by Native and European populations included maize, skins and furs, bois d'arc, salt, horses, guns, pearls, ceramics, and other raw materials. The mechanisms and varying components of food production systems, agricultural economies, trading strategies, hunting and gather-

ing activities (and the accompanying territorial issues), as well as land-use and management, are all significant issues that need further sorting out.

Many of the Spanish accounts reflect the religious fervor and bias that frequently accompany colonial projects, but there is an underlying substance useful for anthropological study. European military attention to (1) Natives' calls to war, (2) outside threats from Apache tribes, and (3) local uprisings are indicative of the resistance Native Indian groups were capable of. Although Spanish equipment used in warfare was superior, Native's knowledge and use of the landscape provided advantages. Chapa (1997) notes the frequent practice of abandonment of camps, as well as the hiding from and evading Spanish forces. In addition, without the help of Natives guides, many Spanish expeditions would have been painfully unsuccessful.

An interesting example of social exchange, the Caddo adoption of Spanish religious practices, was witnessed by De León (Chapa 1997:136). Apparently, a shrine was set up by the first Tejas captain they met. Though at this time no permanent Spanish settlement had been established, a Tejas captain on the Guadalupe River (many miles from their principal villages), camped with two Frenchmen from Fort. St. Louis, was utilizing Christian ideological symbols. Chapa specifically recalled one night that the Tejas captain replied in response to the question "had he or his ancestors seen a woman wearing a habit":

> He had not seen her, but ...he had heard of such a person from his ancestors...on some occasions a lady wearing the habit they showed him had appeared to his ancestors (Chapa 1997:138).

Whether these statements are accurate, a fabrication to maintain Spanish attention, or distorted missionary zeal; what is certain is that the Tejas captain used Christian ideology in order to gain further access to Spanish goods.

Further investigation of the archeological material remains will add to the wealth of information from the historical sources of Spanish and French explorers. It has been shown here that the archives provide unique insights into the economic and social exchange of these contact period Caddo groups. Due to the influx of European trade goods, and the introduction of disease and population decline that followed, Caddo groups that occupied eastern Texas and Louisiana experienced major changes in political, economic, ideological, and social organization.

It is hoped that in the future, archives from the mid-18th century through the removal period will be re-evaluated, with special consideration given to those previously receiving little attention. This will require the translation of archival sources tangential to expeditions and settlements, further concentrating on economic relationships and interactions between the Caddo and Europeans, as these would add to the current study. In conclusion, this article represents a scratch on the surface of possibilities that the archives provide. I have learned that the archives are packed with examples of material and social interactions of contact period Native American groups, like the Caddo, and Europeans.

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Bossier Tribes, Caddo in North Louisiana's Pineywoods

Jon L. Gibson
Lake Claiborne, Louisiana

Bossier Revisited Again

Clarence Webb (1948) christened Bossier more than a half century ago. Its namesake was the northwestern Louisiana parish where several Bossier sites were located, but it could just as easily been named after Webster, Claiborne, Harrison, Columbia, or other political subdivisions in northwestern Louisiana, southwestern Arkansas, or eastern Texas where its distinctive pottery was found. This is Caddo country, linguistically and ethnically (Carter 1995; Perttula 1992; Swanton 1942; Webb and Gregory 1978). Bossier is the issue of Caddoan cultural tradition, a culmination of agents, practices, and histories that transpired in the Red River valley and adjoining Pineywoods hills between ca. A.D. 1300 and 1500 (McGimsey and van der Koogh 2001; Webb 1948, 1961, 1983; Webb and Gregory 1978; Webb and Jeane 1977).

Bossier is best known for its pottery (Webb 1948, 1961, 1983). Pottery hoists the load for this examination, but other factors such as presence or absence of mounds and relative geographic location help me contextualize Bossier pottery and contemplate Bossier materiality as the product of human minds and hands. I organize pottery data, new and old, by a simple arithmetic measure, an average index of similarity. I don't see how more robust statistical comparisons could do any better when data come from potsherds picked up from bare spots on the ground but not from underneath the pine straw.[1] Powerful statistics don't create powerful data. They don't create data at all.

I'll not be purveying data from all of Bossier Country, only the Pineywoods between the Red and Ouachita rivers in northern Louisiana (Figure 1). And I'll not be looking at all decorated Bossier pottery variations, only those six styles which Webb found to be most common on late prehistoric components in northwestern Louisiana: banded cross-hatched engraved, paneled brushed-incised, vertical ridged, linear punctated, multiple-line rim incised, and overall brushing (Figure 2). It would be easy enough to label these variations with their type names—Maddox Engraved, Pease Brushed-Incised, Belcher Ridged, Sinner Linear Punctated, Dunkin Incised (late variant), and Bossier Brushed—but such types equate representational material with bounded society (see Lyman et al. 1997), and I am hoping to show that Bossier is merely a name for many politically autonomous families and bands who interacted with each other in varying ways to varying degrees over several generations.

From old data and new analyses rises a new Bossier, more historical, better able to incorporate the materiality produced by neighboring Pineywoods peoples during a centuries-long, multi-generational span. In this sense, the new Bossier is really a history of a tradition and the peoples responsible for it. What can Bossier pottery tell us about these Pineywoods potters, especially their organization?

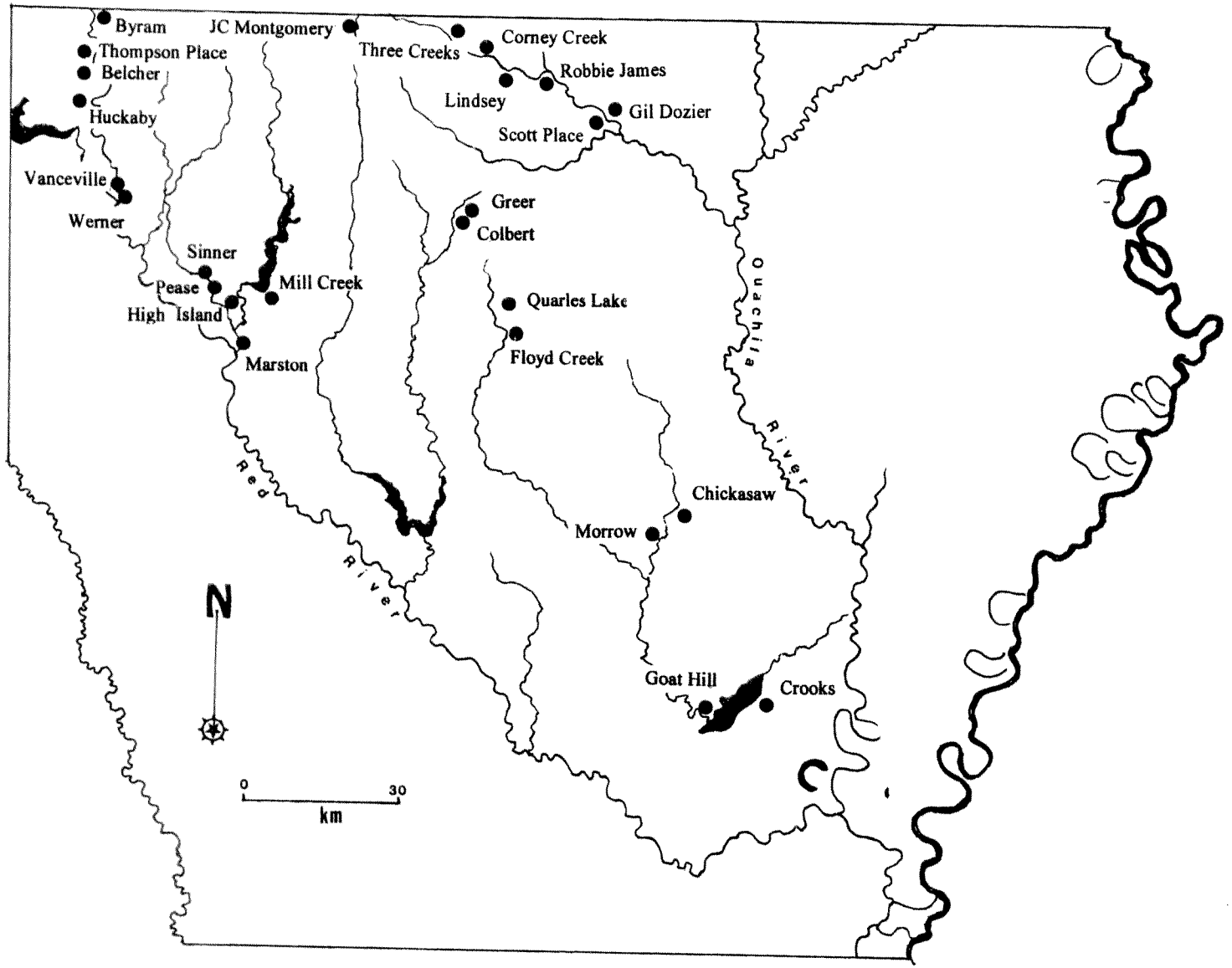

Figure 1. North Louisiana Pineywoods Bossier territory. Locations of sites discussed in text are shown.

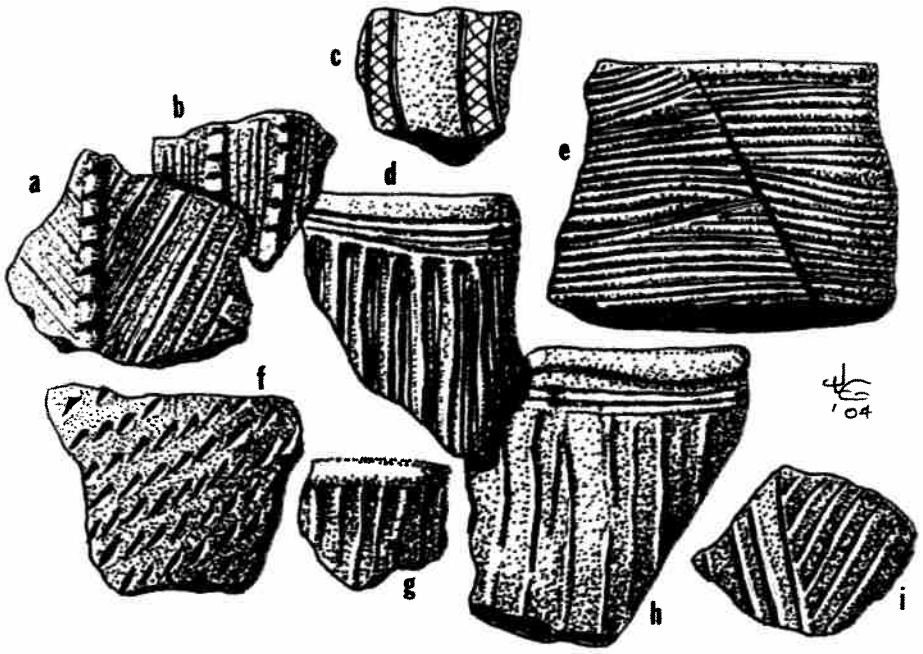

Figure 2. Diagnostic Bossier pottery styles: a-b, d, paneled brushed incised; c, banded cross-hatched engraved; e, overall brushing; f, linear punctated; g-h, vertical ridged; i, multiple-line incised. a-f, i, drawn from Webb 1983:Figure 3r, s, c, u, p, and l respectively; and f drawn from Webb 1983:Figure 2x ; h-i, drawn from Webb 1948:Plate 13, Nos. 2, 4. Pen and ink by Jon L. Gibson.

Associations and Similarities

I begin this comparison by selecting 16 Bossier components with decent-sized collections and representation in at least any four of the six "diagnostic" decorative categories (Table 1; Tables 1-4 are found at the end of this article; Gibson 1966; Gregory et al. 1989, 1990; Harty 1997; Johnson 1984; Webb 1948, 1983). Decent size is not a matter of magic numbers or hard-fast selection criteria. Greer, for example, has a decent-sized collection with only 31 pottery sherds, so is Werner Mound with 3,148 sherds. Here, ubiquity is as important as numbers. The selected sample includes sites from several major drainages across North Louisiana's interior hill country—some falling into Red River, others into Ouachita River (see Figure 1). Sample sites include: Chickasaw (16LA58), Colbert (16BI2), Corney Lake (16CL25), Floyd Creek (16WN218), Greer (16BI1), High Island (16BO16), Lindsey (16UN8), Marston (16RR2), Mill Creek (16BI9), J. C. Montgomery I (16WE32), Morrow's Pear Field (16LA65), Pease (16BO2), Quarles Lake (16JA21), Sinner (16BO3), Vanceville (16BO7), and Werner (16BO11).

My objective was to spot similar collections and explain how they got to be that way. I exhaustively compared the 16 sites by figuring out how much each site's collection deviated from cumulative, area-wide Bossier averages. First, I calculated percentages of each represented style for each site (see Table 1) and then figured cumulative averages for each of the six diagnostic styles by dividing by 16, the total number of sites in the sample (see Table 1). Next, percentages of each style at each site were subtracted from cumulative averages (Table 2), creating a profile for each site. Then, I compared profiles by pairing each site with every other site in the sample, subtracting their percentage deviations from area-wide cumulative averages, and totaling the differences (Table 3). The sums provide quantitative measures of similarities between each pair of sites, or numerical indices of similarity (Table 4). Because indices were generated from area-wide averages, they furnish a yardstick of site-to-site variability across North Louisiana's Pineywoods hills.

Take the index of 20, for example, the value derived by comparing Chickasaw with Morrow's Pear Field, two nearby sites located in the Castor Creek drainage on the southeastern edge of Bossier country (see Tables 3-4). This low value means that Chickasaw and Morrow's Pear Field are twice as similar as Morrow's Pear Field and Marston (index=42) and three times as similar as Morrow's Pear Field and Floyd Creek (index=60). Similarity between collections increases the closer an index comes to zero and decreases as indices get larger. An index of zero is a perfect fit, whereas one of 156, such as J. C. Montgomery versus Quarles Lake, is about as different as you can get and still have both assemblages warrant the Bossier name.

A further word of explanation is needed here. All these quantitative measures do is quantify differences and similarities; they point out patterns in the pottery. They do not say anything about what is responsible for the differences. I throw in a few more variables to see if I can pin down responsible agents and conditions more closely.

Comparisons reveal four statistically significant associations—groups of two or more relatively similar sites (see Table 4). One association involves the Pease, Sinner, and High Island sites (chi square=7.8, df=8); another, the Colbert and Greer sites (chi square=0.1, df=3); a third, the Morrow's Pear Field and Chickasaw sites (chi square=0.9, df=2), and the last, the Lindsey, Vanceville, and Werner sites (chi square=8.4, df=4). In the Pease-Sinner-High Island association, multiple-line horizontal rim incising prevails followed by a fair amount of paneled brushing-incising and horizontal ridging, and lesser amounts of brushing, curvilinear linear punctating, and banded cross-hatched engraving. Multiple-line horizontal rim incising also prevails in the Colbert-Greer association where it makes up three sherds out of five; brushing is next, followed by vertical ridging, curvilinear linear punctating, banded cross-hatched engraving, and lastly by paneled brushing-incising. In the Morrow's Pear Field-Chickasaw association, brushing predominates, followed by sizeable amounts of multiple-line horizontal rim incising and paneled brushing-incising. Other decorations are rare or missing altogether. Paneled brushing-incised predominates in the Lindsey-Vanceville-Werner association, closely followed by brushing. All other styles are minor.

In addition, several other comparisons produce fairly small indices. On the chance that they too comprised statistically significant associations, I ran contingency tests on them, but, alas, they all lacked statistical coherence. These comparisons include J. C. Montgomery I and Marston (chi square=174.4, df=5); Quarles Lake and Floyd Creek (chi square=64.4, df=4); Quarles Lake, Greer, and Colbert (chi square=34.5, df=6); and Corney Lake and Lindsey (chi square=26.0, df=3). Interestingly, Werner and Vanceville, which together with Lindsey constitute one of the four associations, do not produce a statistically significant association between themselves (chi square=36.2, df=3).

And then, there is Mill Creek. It stands off by itself, the most dissimilar site in the sample.

Locational Patterns

The findings—both the associations and the lack of them—are based strictly on statistical similarity (see Tables 3-4, also see chi square values embedded above). Location is not factored in, but when it is, interesting patterns emerge. The three coherent associations all involve nearby sites in the same drainage—Pease, Sinner, and High Island on lower Red Chute Bayou; Colbert and Greer on upper Black Lake Bayou; and Chickasaw and Morrow's Pear Field on middle Castor Creek. Only one association, Werner, Vanceville, and Lindsey, involves sites from separate stream basins. Still, I hasten to add that neither proximity nor being on the same or interconnected streams is a foolproof determinant of how similar their potteries are. Take Werner and

Vanceville, for example (Webb 1983). They are only a few kilometers apart on upper Willow Chute, yet their pottery assemblages—though generally similar—are statistically distinctive. Werner has more brushing and less multiple-line horizontal rim incising than Vanceville (Webb 1983: Tables 7 and 10), Yet, when Lindsey, a mound site on Corney Creek—a separate drainage—is brought into the comparison, the three sites together form a statistically significant association. Additionally, Quarles Lake and Floyd Creek, which are both located on Bayou Dugdemona, are not alike. Quarles Lake has more paneled-brushing-incising, linear punctating, and multiple-line horizontal rim incising than Floyd Creek (Gregory et al. 1989: Table 1; Gregory et al. 1990: Table 3). J. C. Montgomery I and Marston are on Bayou Dorcheat, and they have distinctive potteries. Marston has more vertical ridging, multiple-line horizontal rim incising, and less brushing than J. C. Montgomery I (Webb 1948:Table 2; Webb 1983:Table 3). Corney Lake and Lindsey are both on Corney Creek but are ceramically different. Corney Lake has more banded cross-hatched engraving, linear punctating, and multiple-line rim incising and less paneled brushing-incising and brushing than Lindsey (Harty 1997:136; James Harty, 2004 personal communication; Johnson 1984).

Nearly all inter-drainage comparisons, even between sites that are not that far apart as the crow flies, produce dissimilar assemblages (see Tables 3-4). For instance, Quarles Lake on Bayou Dugdemona is unlike Greer and Colbert on Black Lake Bayou. Quarles is also different from Chickasaw and Morrow's Pear Field on Castor Creek. Lindsey on Corney Creek does not resemble the Castor sites either, but intriguingly, it closely resembles Werner and Vanceville on Willow Chute, perhaps inculcating hidden history. If relative location is not fully responsible for Bossier ceramic variability, what is?

Time as Agent of Change

Could it have been time? Maybe for two nearby sites, one dating to the onset of Caddo III times, the other to its end, time might be an indirect factor. Consider Werner Mound and Vanceville. If Werner dates ca. cal. A.D. 1440 (two sigma range, A.D. 1300-1490), as the latest of its four radiocarbon dates indicates (Webb 1983: Table 11), and if Vanceville dates to cal. A.D. 1280 (two sigma range, A.D. 1185-1395), as the earliest of the five dates indicates (Girard 1992, 1996, 1997), then we can envision pottery styles gaining or losing popularity over the century and a half that possibly intervened.[2] But we cannot reconcile potential time differences by choosing dates we like and ignoring those we do not. Radiocarbon's standard errors do not support that kind of thinking.

J. C. Montgomery I is another dated site in our sample (Webb 1983:183-240; Webb and Jeane 1977:3-6). Its potteries are not closely associated with any other assemblage; ergo, its radiocarbon dates, which are either all too early or too late, cannot help us either (Webb 1983:Table 11). Scott Place Mounds (16UN8) has produced a date of cal. A.D. 1040-1300 (McGimsey and van der Koogh 2001), which is very close to the moment when distinctively Bossier tradition coalesced on Corney Creek, maybe even slightly before, but we don't have a collection to check out Scott's relationship with other Corney sites.

Regardless of what effect the passing years may have had on ceramic changes at individual sites, we can dispense with time as a primary factor associated with change because Bossier represents the gist of all pottery assemblages viewed over the long term. The social aggregation that was Bossier simply is more than the lifetime of one person or the duration of a single village. Wish as wish might, radiocarbon estimates simply will not allow us to work out a year-by-year or even decade-by-decade chronology for Bossier. The period is just too short, and radiocarbon dating too, well, too statistical.

Domestic or Political Economic Differences as Agents of Change: Mound Building and Public Gathering

If we cannot blame time, then what about domestic economic or political economic differences? What I am driving at is the possibility that field parties used different potteries than village people and that village people used different potteries than town people. Or the possibility that mound-top serving dishes differed from household cooking pots, that burial wares differed from domestic wares, or that china for the caddi differed from pots for the plebians? Jeffery Girard's (2002:56) discovery of distinctive sets of pottery at Three Creeks (16CL4)—engraved and red painted bowls and bottles on the slope of Mound B and brushed pots in the living area east of the mound-encircled plaza—opens up such possibilities.

A string of mound sites along Corney Creek might provide a good test case (see Figure 1). At the moment, ceramic data are inadequate, but it is interesting that the only two Corney collections compared so far, those from Corney Lake, a village without mounds, and Lindsey, a small mound center, are different—a finding compatible with the notion that activities relating to high ceremonialism and social inequality affected ceramic content. However, the Corney bottom sites are special in the Pineywoods world. Here, along a 50–km stretch are at least five mound sites, including one major mound complex (Girard 2000:65-76, 2003; Harty 1997:129-130). Robbie James (16UN87) and Gil Dozier (16UN37) have single platform mounds (Jones et al. 1992:36; Saunders 1992:15-16, 1993:35). Lindsey has two fairly large platforms, about 30 m square and 4 m high, set on an east-west line about 220 m apart (Harty 1997:125-142). Scott Place Mounds has five mounds, one large. flat-topped platform about 3.3 m high and 35 m square, and four small domes, all less than 1.3 m high and 23 m in diameter (Moore 1913:78-79; Saunders 1992, 1993).

The crown jewel on the Corney is Three Creeks, the northernmost of the known mound sites (Girard 2000:65-76, 2002:51-57, 2003). Its five mounds are set in a semi-elliptical arrangement overlooking the steep bank of Corney Creek (Figure 3; Girard 2000:Figure 24). The principal mound (Mound A) is the northernmost, a steep-sided flat-topped platform with a large summit plateau. It stands 4 m high and measures 60 m along its long axis (northwest by southeast) and 40 m along the short one. Coring disclosed its bulk was separated by four thin organic strata (Girard 2000:66 and Table 19), which could represent older, littered mound surfaces, loaded village midden fill, or, less likely, natural weathering of long-exposed mound tops. Proceeding clockwise around the ellipse, we encounter Mound B, a 2.25 m high flat-topped platform. Its base measures 30 by 40 m. It is not as steep-sided as Mound A, so its summit is correspondingly smaller. It lies only 26-28 m from Mound A, with its short side facing the sharp southeastern corner of Mound A. Coring reveals it was built in a single stage (Girard 2000:67 and Table 20). Next is Mound E, a 2.65 m high, 36 m square platform. Its summit plateau is smaller than Mound B's. An elongated apron extends off the southwestern corner suggesting, if it's not a natural or modern man-made feature, an artificial ramp leading toward Mound D. Like Mound E, Mound D is also 2.65 m high but its base is bigger, 45 by 50 m. The eastern, southern, and western sides are steep, but its northern side is gentler and actually bulges into the plaza, affording a wide ascent slope. Its flat top is bigger than Mound E's, but the sloping side distorts the shape of the summit, leaving it triangular instead of rectangular. The last mound in the ring is Mound C. It is the smallest of the five mounds, only 1.7 m high when viewed from the plaza side, but its western side coincides with the high bluff bank of Corney Creek, which makes it appear to tower over the cliff rim. It has been described as conical, but mapping shows that it is shaped more like an elongated triangle with its apex near the midpoint of its short bulging side. I do not see how erosion could have altered a dome into this curious shape and suspect that Mound C was built this way on purpose.

The plaza at Three Creeks is large, defined by the steep bluff bank of Corney Creek on the west and the encircling mounds everywhere else. It covers 7 hectares. Its level surface slopes gently, falling about 2 m from its higher end near Mound D to its lower end at Mound A.

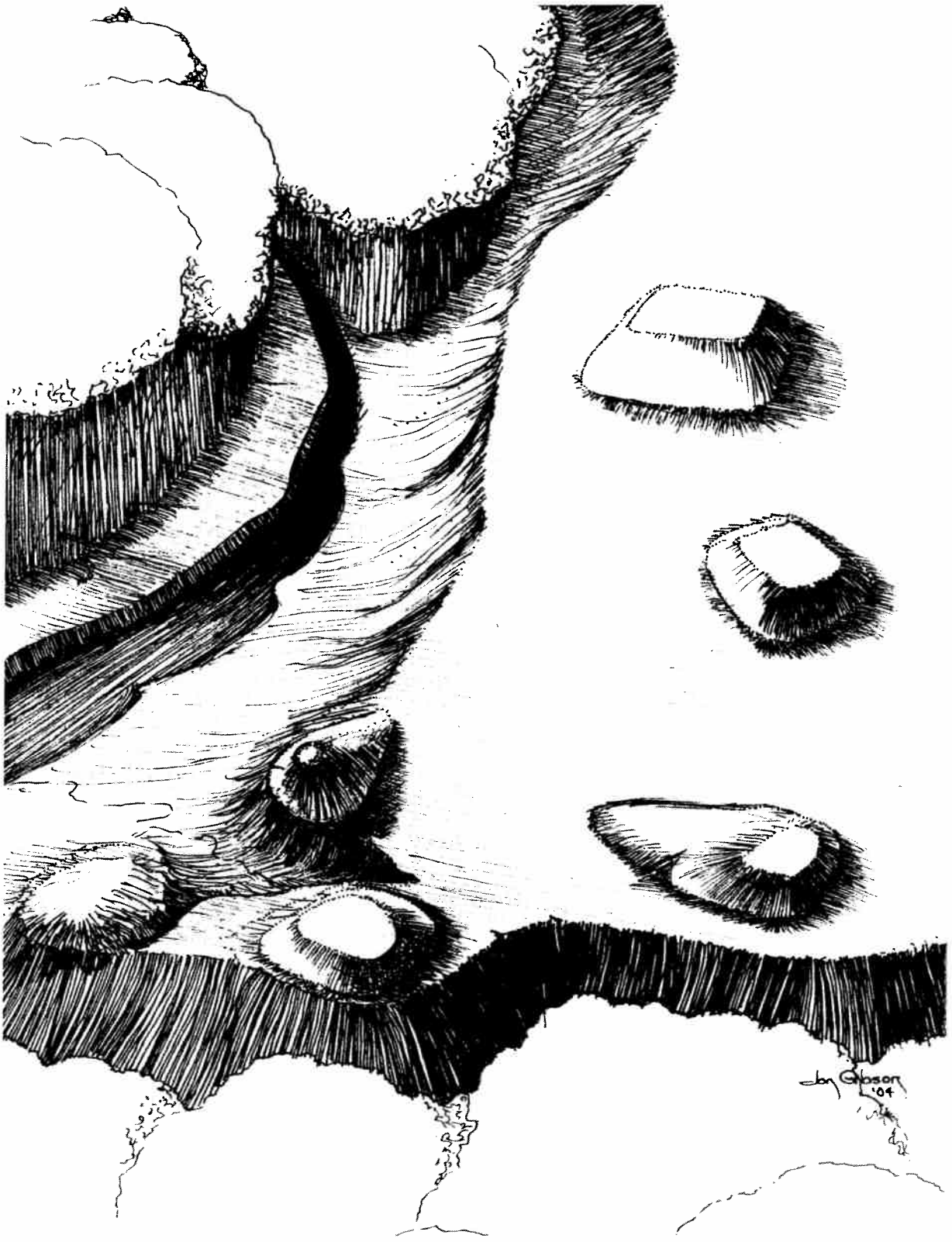

Figure 3. Bird's eye view of mound layout at Three Creeks (16CL4). Based on total station contour map engineered by Jeffrey Girard (2000:Figure 24). Pen and ink by Jon L. Gibson.

At first glance, it looks like the Corney mound sites and the Willow Chute sites of Vanceville and Werner Mound were the only places where Bossier folks built mounds, but Jeffery Girard (2004 personal communication) suspects that Bossier mound building was more extensive. He lists other possible Bossier mounds: i.e., Swan Lake Mound (16BO11), also on Willow Chute, and Thompson's Place Mound (16CD32) on Red River (Moore 1912:525), both with solitary mounds, as well as the Byram Ferry (16BO17) (Girard 2003:15-30; Moore 1912:525) and Huckaby (16CD31) sites on Red River, with two mounds each. He even pointed out that the early stage of Belcher Mound (16CD13) dated before A.D. 1500 and primarily contained Bossier pottery, not Haley materials (cf. Webb 1959). All these mounds, if indeed they are Bossier constructions, were not in the Pineywoods but down in the Red River floodplain, which was thought to be uninhabitable at the time because of flooding (Webb and Gregory 1978). Obviously, the Great Raft left a few sanctuaries here and there. But I gloss over mound sites in Red River Valley for two reasons—first, they are floodplain sites, and my story is about hill country sites, and, second, we do not know much about them.

To promote comparison with mound sites in the Pineywoods, I delve a bit deeper into two bottomland mound sites on Willow Chute. Vanceville Mound and Werner Mound are close enough to have seen the smoke from each other's fires on the horizon, yet they too are ceramically dissimilar (Webb 1983:Table 10). Both have been radiocarbon dated (Webb 1983:Table 11), but age estimates overlap, raising the bar for social influences on pottery composition. Vanceville is unusual simply because it has a mound, and a sizeable one at that, a rarity in Red River Bossierdom. Webb (1983:227) said the mound was surmounted by a building—a fire temple or a caddi's house?—which makes it like temple mounds elsewhere in the Southeast. But Werner Mound is more than unusual. Werner Mound was a big dirt pile raised over the remains of a burned or dismantled wooden building (Figure 4). There was no surrounding village, no burials in the mound, and mound fill was devoid of material remains (Webb 1983:217). Webb (1983:221) was assuredly right in claiming the mound was a memorial to the meaning of the place and the actions expended there. Werner Mound stood apart, all the more imposing in its solitude.

Yet, the mound was only an external covering for Werner's deepest secret. Underneath were remains of one of the biggest wooden buildings ever constructed by Bossier people, a great house (see Figure 4). Its outer wall formed a perfect circle, 25 m in diameter, except near the entrance, where it bulged out another 3 m. Inside was a thick center post surrounded by a second circle of posts, 14.4 m in diameter, which supported a heavy thatched roof. The entrance was narrow, just wide enough for a man's shoulders, and stuck out three arm spans past the eastern wall. Inside were several, small, walled-in cubby holes, one attached to the northern wall of the big room, a second fixed to the eastern side of the circle of roof supports and, after enlargement of the walls connected to the entranceway, a third, free-standing circular crib next to the door into the big room.

The floor was hard packed red clay. There were no interior furnishings except for two ash beds.

Materials from the floor vouch for the special nature of the building and the activities it housed. There were ony a handful of stone artifacts (Webb 1983:Table 8) but a substantial quantity of broken pottery, nearly two-thirds of which was decorated, mainly with brushing (Pease and Bossier types) (Webb 1983:Table 7). Webb claimed these were serving vessels—food was not prepared inside the great house but brought to those gathered there. Yet, the predominance of brushed pottery suggests that food was carried inside in the same pots it was cooked in, likely because they were bigger and there were many hungry mouths awaiting. The food wasn't bad, either—choice cuts of venison being the entree. Leftovers from eating were responsible for most of the trash inside; bone orts and smashed vessels littered the floor. Shell carving was the other main indoor trash-making activity. Scores of small, cut-and-drilled pieces of shell—rejects from making shiny ornaments—were scattered around the ash bed closest to the door.

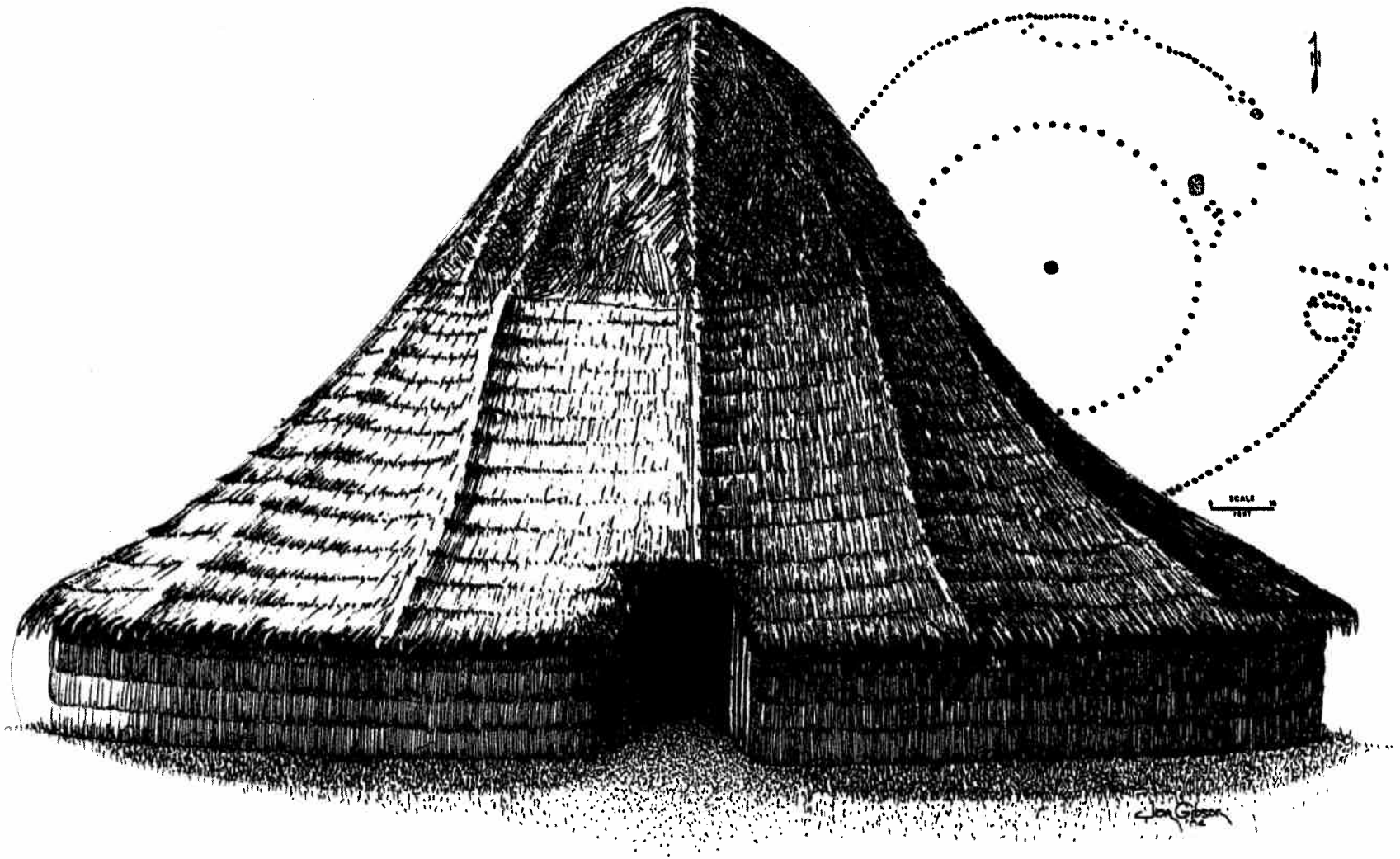

Figure 4. Werner great house. Reconstruction based on house plan (Webb 1983:Figure 10). Pen and ink by Jon L. Gibson.

Webb (1983:226) opined that the building was a ceremonial lodge, the residence of a caddi or a public council house (see Figure 4), presided over by a caddi, where food was catered to personages sitting there in the semi-darkness fathoming the great mysteries or meting out justice. I wonder if it might not have been the capitol house for the entire Red River Bossier nation, maybe a holy sanctuary for the Gran Xinesi himself (Griffith 1954), or an assembly house for warriors (Swanton 1942:149, 184), whose blood-curdling threats to do bodily harm to their enemies must have raised the rafters—perhaps, one of the reasons the lodge was out of earshot of wives and daughters.

Three Creeks is also unique in Bossierdom but in a completely different way than Werner. Three Creeks is a town zoned for residence and public service. Other Bossier sites, including those with one or two mounds or cemeteries, are villages or temporary campsites. Three Creek's five large mounds enclose a public plaza and are themselves encircled by residential zones of incompletely determined extent (Girard 2002). So, here there are public and sacred platforms surrounded by private and profane living areas, the traditional design for leveraging and displaying social inequalities all across the Southeast—raised stages for personages busied with ritual matters while on village grounds below ordinary folks carried on daily routine; the lower plane more befitting of their social station and birthright. The verticalness of the mounds expresses differences in rank and privilege. Narrow spaces on mound summits are accessible only to the special few, leaving the less-privileged masses with perpetual cricks in their necks and constant reminders in their psyches of just how important those few people really were who moved freely about on the mound tops. Yet, the enclosed central plaza, which is on the same plane as the village area, is of and for the public, a place where ordinary folk mix with those of high station during social gatherings—dances, feasts, ballgames, and other mixers. What inequalities mounds wrought, plazas overcome, at least for fleeting moments.

Randolph Widmer (2004) makes a strong argument for mounds being lineage monuments, built by or for lineages to validate their genealogy and memorialize their founders. As I contemplate Three Creeks, I find Widmer's elegant proposal compelling, but like most things in archeology, proving the case requires history that we simply do not have. Since I think the lineage and its inherent capacity for expanding family ties by creating collateral kin lies at the root of Bossier structure everywhere, not just at Three Creeks, I conclude this exercise by looking at what effects lineages would have had on Bossier ceramic similarities and differences. Before I get into that, let me give my conclusions first in case you are not convinced by the data and interpretations: Lineage structure is the primary shaper of Bossier materiality, territoriality, and sociality.

Bossier Tribal Sociality

Lineages mean tribes, and tribes are flexible means for organizing kin-based groups who live in a territory primarily defined by commonalities in identity, custom, language, ideology, cosmology, and, to varying degrees, history (Anderson 2002, 2004; O'Shea and Milner 2002:200; Fowles 2002:15). Tribes do not have strong central authority or control nor do they inculcate generationally persistent inequalities, other than those based on age, gender, and ability. Tribal coherence is provided by inter-group social interaction, participation in inter-group ceremonies and events, and, importantly, inter-marriage with other local groups, which creates collateral relatives and further broadens and strengthens ties among them (Fowles 2002:18). This intercourse serves to transfer information, which we archeologists pick up as similar pottery styles.

What makes me think Bossier sociality was tribal?

First, Bossier had a well-defined territory all of its own—the Pineywoods hills lying between the Red and Ouachita rivers. Just how much farther north and west Bossier territory extended, I do not know exactly, but this I know: Bossier lands did not cross the Ouachita to the east. They came close enough for scouts to have seen gar slapping their tails in the green waters below but not one foot farther (Gibson 1983:325-331; Gibson et al.1992; Kidder 1988, 1990). Throughout this 20,000 km^2 expanse, the only sites and materials from the time period are Bossier (Gibson et al. 1992). At least one Bossier site, Goat Hill (16LA26) (Gibson 1966:219-220), teeters on the banks of lower Little River, the gateway into lower Mississippi lands; its inhabitants may have even watched Plaquemine fishers going and coming on the river below their village. And a few brave but lost Bossier souls escaped high water atop Crooks Mound (16LA3), across Catahoula Lake from the mouth of Little River (Ford and Willey 1940).

As for common identity, we need look no further than the distribution of Bossier ceramics across this expanse. No matter whether north, south, east, west, or in the middle, Bossier pottery is Bossier pottery. There is no mistaking Bossier assemblages for those of any other cultural formation, at least, not in terms of the long-duration co-occurrence of its major diagnostic pottery styles. There seems to be some bleeding between Bossier and Plaquemine styles on the southern margins of Bossier lands (Ford 1951; Webb 1961), but that is simply a fact of life among small, not fully settled groups who lived fairly close to each other near the common border of their respective territories. It is not that their traditions were breaking down as much as it is miscegenation in the borderlands. Our typology makes it seem more blatantly political than the social dynamic of information exchange ever was.

North Louisiana hill country was practically devoid of natives when the first European explorers came looking for guides and translators (Perttula 1992; Swanton 1942), so we really do not know what language Pineywoods Bossier folks used, but materiality and sociality strongly depend on language—easily understood information transfers. So much so, in fact, that I am still agape by the goodness of fit I recently discovered between distinctive Plaquemine pottery clusters and language groupings in the lower Mississippi Valley (Gibson 2003). Since Red River Bossier people assuredly spoke a Caddoan dialect and were participants in the long Caddoan tradition (Webb and Gregory 1978; Webb 1948), I have no reason to doubt that Pineywoods Bossier groups were linguistically and ethnically Caddoan too.

Thus, it appears that territory, identity, and language—the primary defining factors of tribalism—were all coextensive, attesting to Pineywoods Bossier's tribal foundation.

I cannot stress enough that local communities, which participated in Bossier tribalism, drew on a common legacy in dealings with each other, especially communities living beyond daily face-to-face truck (O'Shea and Milner 2002:201). Yet, in the absence of an overriding central authority, local groups kept their autonomy—they set homeland boundaries, mapped onto familiar resources, and carved out their own unique identities within the broader, ever-changing tribal structure. Against this backdrop, variability in material culture prevails, especially in the details. For pottery, we are talking about distinctive attributes, not broad themes of decoration and technology (O'Shea and Milner 2002:213), which are carried far and wide and through the generations by traditionally established, long-lasting interaction rates. It is the breadth of territory and centuries-long duration of Bossier that best exemplifies Bossier tribalism.

Generally similar but locally distinctive patterning is precisely what my analysis detects in Bossier ceramics on the broad scale. Too bad we do not have ample attributes in hand to analyze assemblages on a more detailed level; until we do we are going to have to be content using proportional assemblage profiles as interim surrogates.

Letting Your Babies Grow Up to Be Bossierites

What makes tribalism inherently expansive but organizationally and structurally fragile is baby making (Widmer 2004), and many things go into making babies. Kinship is one. Kinship among the ethnic Caddo of the seventeenth century and later was lineage/clan-based (Parsons 1941; Swanton 1942). Lineages assuredly did not start with the coming of the White Man but had been around for a while, certainly long enough to have been a main organizing principle for Bossier communities at least a couple of centuries before. Caddo peoples used the same terms of reference for certain collateral and blood relatives of the same generation, which indicates that they viewed these terminologically merged relatives as holding similar and familiar positions—positions warranted only when both sets of relatives live in the same village (Widmer 2004). Widmer makes the case that it requires a consistently high birth rate—mothers need to let four of their babies grow up to be Bossierites and make babies of their own—for lineage-based systems to maintain and reproduce themselves. Otherwise, lineages will revert to clans, or if their demographic and economic support is yanked out from under them, their members even may forego co-residence and wind up emphasizing nuclear family relationships. The bottom line: It takes a goodly number of people and favorable economic conditions to make lineage-based kinship work for long.

But what does tribal structure—the lineage in particular—have to do with Bossier materiality, especially the sharing of pottery styles and composition of assemblages across the Pineywoods? Simply this: incest taboos ensure that marriages in small autonomous groups must, at some point, take place between men and women from separate groups, a compact that brings together two formerly separate families to form a new corporate arrangement. This is the only way for small autonomous groups to produce collateral kin, and between-group marriage ensures steady movement of people between communities, spreading Bossier gospel like the wind in the pines.

Proximity and local history are the primary factors behind the geographic extent of Bossier marriages. We can fully expect more marriages between friendly neighboring groups than between disliked neighbors or strangers, at least at first. Yet, in face of a stable or declining population, marriages would become progressively more distant. In a growing population, they would continue to be localized. What effects would these marriages have had on pottery distribution? That, too, seems relatively straight forward: There would be look-alike assemblages on the local level with similarities (associations) becoming more attenuated with increasing distance. Thus, associations, tight or attenuated, and their relative locations ought to give us the geography of Bossier interaction, the shape of Bossier history.

The Ceramic Shape of Pineywood Bossier History

I discovered four highly-associated ceramic associations, or clusters: the middle Castor Creek cluster, the lower Red Chute cluster, the upper Black Lake Bayou cluster, and the Willow Chute-Corney Creek cluster. The Castor Creek cluster from the southeastern corner of Bossier country, close to hard-line Plaquemine territory, is not really very closely associated with the other clusters or even nearby components. Its closest associations are with Corney Lake on Corney Creek and Floyd Creek on Bayou Dugdemona, and its most attenuated are with the lower Red Chute cluster, Mill Creek near Lake Bistineau, and Quarles Lake next door on Bayou Dugdemona (see Table 3). Interestingly, the negative relationship with Quarles Lake in the neighboring Dugdemona drainage is quantitatively higher than any of the others.

The lower Red Chute cluster is most similar to the upper Black Lake Bayou cluster and to Marston on Loggy Bayou, the issue of Lake Bistineau, and Corney Lake (see Table 3). Similarity with Marston is anticipated because Marston and the lower Red Chute sites are not that far apart on interconnected streams. Additionally, the

lower Red Chute and upper Black Lake Bayou clusters, while located in different but adjoining and paralleling drainages, are more similar to each other than either is to the middle Castor cluster (see Table 3). The similarity with Corney Lake, however, is unexpected because Red Chute ultimately discharges into the Red River, while Corney Creek, a major tributary of Bayou D'Arbonne, drains into the Ouachita River. These sites are on opposite sides of the Red-Ouachita drainage divide. The lower Red Chute cluster is most unlike the Willow Chute sites of Werner and Vanceville, even though Willow Chute runs into Red Chute some 35 km north of Sinner, the northernmost component of the lower Red Chute cluster (see Table 3). The lower Red Chute cluster is also distinctive from nearby Mill Creek and distant Chickasaw, but not as much as from Werner and Vanceville (see Table 3). Mill Creek figures as one of the most distinctive components compared to all four clusters.

The upper Black Lake Bayou cluster is not only similar to the lower Red Chute cluster but is actually more similar to the Dugdemona sites of Quarles Lake and Floyd Creek, as well as distant Corney Lake (see Table 3). That is strange, too, because the two Dugdemona sites, Quarles Lake and Floyd Creek, are not at all alike. The upper Black Lake Bayou cluster is most unlike Werner, then Vanceville, followed by J. C. Montgomery I on Bayou Dorcheat, one drainage farther west, and then the odd-ball again, Mill Creek (see Table 3). Actually, as the crow flies, the headwaters of Black Lake Bayou are not far from the headwaters of Bayou Dugdemona, but Corney Creek is on the other side of the Red-Ouachita drainage divide.

The Werner-Vanceville-Lindsey association is not really similar to any other cluster. Its closest similarities, though very faint, are with components scattered across different watersheds—Marston on Loggy Bayou, Montgomery on Bayou Dorcheat, and Morrow's Pear Field on lower Bayou Castor—seemingly serendipitous resemblances (see Table 3). The Werner-Vanceville-Lindsey association is most unlike Greer on upper Black Lake Bayou and Quarles Lake on Bayou Dugdemona (see Table 3).

These four clusters are the only statistically viable associations among the 16 sample sites, but I provide the associative strengths among all the sites (see Tables 3-4). Table 4 harbors the broad picture of Bossier ceramic relations. Just one technical note: the table provides a quantitative measure of the overall affinity of each site for all others, and the bigger the value, the more distinctive the site—a scale of measured similarity or, if you prefer, of contrariety (see Table 4). Quarles Lake is the kingpin, the site most unlike all the rest; Floyd Creek is on the opposite end of the scale, the site most like others. Strange indeed considering Quarles Lake and Floyd Creek are both on Bayou Dugdemona!

The measured strengths of similarities and differences in Bossier pottery assemblages inculcate Bossier tribalism and its lineage structure. I could not have asked for a better demonstration. The most highly correlated clusters typically are confined to small localities within the same drainage, and these statistical groupings most likely correspond to largely autonomous tribal segments, loose, local multi-village networks, which provide the spousal pool necessary for lineage creation, maintenance, and reproduction. Mid-level similarities closely parallel increased distances between sites indicating more distant marriages and less intensive or more sporadic interactions—feasts, ballgames, and other occasions. Yet, even at these greater distances of 35 to 50 km or more, Bossier potteries retain recognizably traditional styles. It is assemblage proportions that differ, which reverberates once more with local freedom and autonomy—tribal segments sitting proudly on their little own piece of land, doing things when and how they want, the way they want within general conventions of identity and good taste. Even the most dissimilar components are just more of the same, except that they are farther apart and less likely to have had direct interactions.

It is likely that Bossier population fell on the cusp of demographic requirements for creating and sustaining a viable lineage organization (Widmer 2004), sometimes numbers were adequate, sometimes not. Where

population dipped too low to grow lineages, it is reasonable to assume that those people got pulled into the expanding lineages of neighboring groups. Such absorption could explain the apparent "vacant lands," as well as the varying degrees of correlation among ceramics. Confinement of highly correlated clusters to single drainage basins is a fact of life among pedestrian tribal peoples living in a hilly terrain dissected by unconnected streams, most of which were too snaggy and blocked by fallen timber to have floated canoes anyway. It is also a pedestrian fact that sites from the most distant or hardest-to-get-to corners of Bossier country tend to have the most loosely associated pottery assemblages, but there are exceptions.

Bossier tribalism is not upturned by the presence of mounds in the Red River floodplain. They can be seen as ceremonial centers servicing one or more nearby communities; the best warrant for mutual ceremonial participation being the office of Xinesi, a sacred position held by a widely respected and feared demigod. Village-less mounds, as well as one- and, more particularly, two-mound villages further advocate multi-community engagement in ceremonial affairs, but joint ceremonialism does not detract from elemental tribalism. If anything, it provides social glue, especially in a locality where population was rather sparse, scattered, and probably declining.

Corney Creek, on the other hand, supports a community of a different stripe. Five mound villages within a 50 km stretch might, at first glance, seem no different than along Red River, but two of those villages, Three Creeks and Scott Place Mounds, have five mounds each, and Three Creeks is a super center, its imposing earthworks incorporating more moved dirt and hard work than the rest of the Corney Creek sites put together. The fact that the two biggest centers are on opposite ends of the Corney bottom leads me to suspect that they were rival centers, which vied for supporters among out-of-town neighbors—each becoming a loose, open-ended network of folks bound together by marriages, collateral kin ties, and collective participation in mound building and other center rituals. If, five lineages vied for dominance in these towns, then socio-political organization is fundamentally different from the happy ceremonial collective on Red River. It looks like Three Creeks and its chief competitor, Scott Place Mounds, managed to engender a centralized grip on some aspects of their respective community organizations, likely through aggrandizing actions of certain well-positioned and charismatic lineage heads. Held together by lineages but constantly tugged at by competitive struggles to rise to the top of their social and political world, Corney peoples organized their lives around their politics, while the rest of the Bossier world marched to a less politicized cadence. There is rich history on the Corney, including a long tradition of mound building that reaches back before Hedgepeth and Watson Brake, but the Corney story awaits telling another day.

Notes

1. Jeffrey Girard performed a multiple dimension scaling analysis of the data presented in Table 4 in order to see graphically how well the sites clustered. He writes, "fits your discussion well" (Jeffery Girard, 2004 personal communication).

2. Girard believes time is the primary factor behind ceramic differences. He has generously shared his advance thinking on this matter, which results largely from his on-going work with new collections from Vanceville and more than three dozen other sites on Willow Chute. I should let Jeff give the details but the crucible of his thinking is that sites like Colbert and Greer are early Bossier components; Sinner, Pease, and High Island are Middle Bossier, and Mill Creek (and perhaps Marston) is Late Bossier. He does not buy the idea that proportional differences in stylistic categories represent different social groups—which is my underlying assumption—and instead proposes that subtle differences in design elements carry greater weight; he opines:

"My thinking has been that quantitative approaches...are better for looking at continuous temporal change; and qualitative approaches will yield better information about social variation" (Jeffrey Girard, 2004 personal communication). What I failed to make clear was that my analysis was first qualitative before it turned to number crunching. I purposely eliminated all "earlier" Coles Creek and "later" engraved styles from represented collections—the very elements Jeff cites as time-sensitive. Why? I wanted to concentrate on those widespread styles that form Bossier's ceramic core, the representational heart of Bossier tradition, the markers of Bossier identity. My belief is that a broad-brush qualitative-quantitative analysis like the one herein is more likely to expose broad-scale social differences, such as tribal identity and its formational history, while a refined attribute analysis is likely to expose small-scale differences, such as those related to individual potters, individual families, or small co-resident collectivities within tribes.

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Table 1. Sherd frequencies of diagnostic pottery styles from 16 Bossier components in North Louisiana. Frequencies, straight-up; percentages in parentheses.

SITES	X-hatch engraved	Brushed-incised	Ridged	Linear punctated	Rim incised	Brushed	TOTAL
Chickasaw	0	6 (13)	1 (2)	0	13 (29)	25 (56)	45
Colbert	6 (6)	4 (4)	8 (8)	7 (7)	59 (61)	13 (13)	97
Corney L.	7 (9)	8 (10)	0	7 (9)	32 (40)	27 (33)	81
Floyd C.	1 (1)	21 (17)	10 (8)	3 (2)	63 (50)	28 (22)	126
Greer	1 (3)	1 (3)	3 (10)	2 (6)	20 (65)	4 (13)	31
High Is.	3 (3)	18 (20)	18 (20)	2 (2)	37 (42)	10 (11)	88
Lindsey	4 (8)	21 (40)	0	0	6 (12)	21 (40)	52
Marston	26 (2)	246 (23)	295(28)	18 (2)	125(12)	352 (33)	1062
Mill Creek	8 (3)	36 (11)	160 (51)	7 (2)	38 (12)	66 (21)	315
Montgo I	10 (1)	275 (25)	216 (20)	78 (7)	14 (1)	508 (46)	1101
Morrow	1 (2)	9 (20)	0	0	13 (30)	21 (48)	44
Pease	7 (2)	72 (23)	58 (18)	17 (5)	138 (43)	31 (10)	323
Quarles	8 (3)	31 (10)	9 (3)	14 (5)	237 (77)	7 (2)	306
Sinner	6 (2)	62 (22)	40 (14)	28 (10)	125 (44)	23 (8)	284
Vanceville	6 (3)	84 (47)	5 (3)	1 (1)	18 (10)	65 (36)	179
Werner	223 (7)	1399(44)	34 (1)	88 (3)	28 (1)	1376(44)	3148
TOTAL AVG*	317 (4)	2293 (31)	186 (12)	6 (4)	530 (13)	424 (35)	7282 (99)

*Column totals divided by 16, the total number of sites in sample, gives area-wide average for each style

Table 2. Deviations of individual sites from area-wide averages. Numbers represent cell averages of styles at individual sites subtracted from area-wide averages. All averages taken from Table 1.

SITES	X-hatched engraved	Brushed-Incised	Ridged	Linear Punctated	Rim Incised	Brushed
Chickasaw	-4	-18	-10	-4	+16	+21
Colbert	+2	-27	-4	+3	+48	-22
Corney Lake	+5	-21	-12	+5	+27	-2
Floyd Creek	-3	-14	-4	-2	+37	-13
Greer	-1	-28	-2	+2	+52	-22
High Island	-1	-11	+8	-2	+29	-24
Lindsey	+4	+9	-12	-4	-1	+5
Marston	-2	-8	+16	-2	-1	-2
Mill Creek	-1	-20	+39	-2	-1	-14
Montgomery	-3	-6	+8	+3	-12	+11
Morrow	-2	-11	-12	-4	+17	+13
Pease	-2	-8	+6	+1	+30	-25
Quarles	-1	-21	-9	+1	+64	-33
Sinner	-2	-9	+2	+6	+31	-27
Vanceville	-1	+16	-9	-3	-3	+1
Werner	+3	+13	-11	-1	-12	+9

Table 3. Exhaustive comparison of style average differences from North Louisiana Bossier sites. Every site is compared with every other site in the sample.* Values are taken from Table 2.

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
Chickasaw		-4	-18	-10	-4	+16	+21	
	Colbert	+2	-27	-4	+3	+48	-27	
		6	9	6	7	32	43	103
	Corney	+5	-21	-12	+5	+27	-2	
		9	3	2	9	11	23	57
	Floyd	-3	-14	-4	-2	+37	-13	
		1	4	6	2	21	34	68
	Greer	-1	-28	-2	+2	+52	-22	
		3	10	8	6	36	43	106
	High Island	-1	-11	+8	-2	+29	-24	
		3	7	18	2	13	45	88
	Lindsey	+4	+9	-12	-4	-1	+5	
		8	27	2	0	17	16	70
	Marston	-2	-8	+16	-2	-1	-2	
		2	10	26	2	17	23	80
	Mill Creek	-1	-20	+39	-2	-1	-14	
		3	2	49	2	17	35	108
	Montgomery	-3	-6	+8	+3	-12	+11	
		1	12	18	7	28	10	76
	Morrow	-2	-11	-12	-4	+17	+13	
		2	7	2	0	1	8	20
	Pease	-2	-8	+6	+1	+30	-25	
		2	10	16	5	14	46	93
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		3	3	1	5	48	54	115
	Sinner	-2	-9	+2	+6	+31	-27	
		2	9	12	10	15	48	96
	Vanceville	-1	+16	-9	-3	-3	+1	
		3	34	1	1	19	20	78
	Werner	+3	+13	-11	-1	-12	+9	
		7	31	1	3	28	12	82

*Negative numbers are avoided by simply dropping the minus signs after subtracting each site's signed values from Chickasaw's signed values. Chickasaw's values are only given once at the top of the table, and all other sites' values are subtracted from Chickasaw's. The sum of the differences are given in the column on the far right providing a quantitative measure of similarity between the paired sites.

Key to abbreviations: XHat, Cross-Hatched Engraved; BruIn, Brushed-Incised; Rid, Ridged; LinPu, Linear Punctated; Inc, Rim Incised; Bru, Brushed.

Table 3. *(Continued)*

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
Colbert		+2	-27	-4	+3	+48	-22	
	Corney	+5	-21	-12	+5	+27	-2	
		3	6	8	2	21	20	60
	Floyd	-3	-14	-4	-2	+37	-13	
		5	13	0	5	11	9	43
	Greer	-1	-28	-2	+2	+52	-22	
		3	1	2	1	4	0	11
	High Island	-1	-11	+8	-2	+29	-24	
		3	16	12	5	19	2	57
	Lindsey	+4	+9	-12	-4	-1	+5	
		2	36	8	7	49	27	129
	Marston	-2	-8	+16	-2	-1	-2	
		4	19	20	5	49	20	117
	Mill Creek	-1	-20	+39	-2	-1	-14	
		3	7	43	5	49	8	115
	Montgomery	-3	-6	+8	+3	-12	-11	
		5	21	12	0	60	11	109
	Morrow	-2	-11	-12	-4	+17	+13	
		4	16	8	7	31	35	101
	Pease	-2	-8	+6	+1	+30	-25	
		4	19	10	2	18	3	56
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		3	6	5	2	16	11	43
	Sinner	-2	-9	+2	+6	+31	-27	
		4	18	6	3	17	5	53
	Vanceville	-1	+16	-9	-3	-3	+1	
		3	43	5	6	51	23	131
	Werner	+3	+13	-11	-1	-12	+9	
		1	40	7	4	60	31	143
Corney		+5	-21	-12	+5	+27	-2	
	Floyd	-3	-14	-4	-2	+37	-13	
		8	7	8	7	10	11	51
	Greer	-1	-28	-2	+2	+52	-22	
		6	7	10	3	25	20	71
	High Island	-1	-11	+8	-2	+29	-24	
		6	10	20	7	2	22	67
	Lindsey	+4	+9	-12	+4	-1	+5	
		1	30	0	1	28	7	67
	Marston	-2	-8	+16	-2	-1	-2	
		7	13	28	7	28	0	83
	Mill Creek	-1	-20	+39	-2	-1	-14	
		6	1	51	7	28	12	105
	Montgomery	-3	-6	+8	+3	-12	-11	

Table 3. *(Continued)*

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
		8	15	20	2	39	9	93
	Morrow	-2	-11	-12	-4	+17	+13	
		7	10	0	9	10	15	51
	Pease	-2	-8	+6	+1	+30	-25	
		7	13	18	4	3	23	68
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		6	0	3	4	37	31	81
	Sinner	-2	-9	+2	+6	=31	-25	
		7	12	14	1	4	25	63
	Vanceville	-1	+16	-9	+3	-3	+1	
		6	37	3	2	30	3	81
	Werner	+3	+13	-11	-1	-12	+9	
		2	34	1	6	39	11	93
Floyd		-3	-14	-4	-2	+37	-13	
	Greer	-1	-28	-2	+2	+52	-22	
		2	14	2	4	15	9	46
	High Island	-1	-11	+8	-2	+29	-24	
		2	3	12	0	8	11	36
	Lindsey	+4	+9	-12	-4	-1	+5	
		7	23	8	2	38	18	96
	Marston	-2	-8	+16	-2	-1	-2	
		1	6	20	0	38	11	76
	Mill Creek	-1	-20	+39	-2	-1	-14	
		2	6	43	0	38	1	90
	Montgomery	-3	-6	+8	+3	-12	+11	
		0	8	12	5	49	24	98
	Morrow	-2	-11	-12	-4	+17	+13	
		1	3	8	2	20	26	60

Table 3. *(Continued)*

	Pease	-2	-8	+6	+1	+30	-25	
		1	6	10	3	7	12	39
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		2	7	5	3	27	20	64
	Sinner	-2	-9	+2	+6	+31	-27	
		1	5	6	8	6	14	40
	Vanceville	-1	+16	-9	-3	-3	+1	
		2	30	5	1	40	14	92
	Werner	+3	+13	-11	-1	-12	+9	
		6	27	7	1	49	22	112
Greer		-1	-28	-2	+2	+52	-22	
	High Island	-1	-11	+8	-2	+29	-24	
		0	17	10	4	23	2	56
	Lindsey	+4	+9	-12	-4	-1	+5	
		5	37	10	6	53	27	138
	Marston	-2	-8	+16	-2	-1	-2	
		1	20	18	4	53	20	116
	Mill Creek	-1	-20	+39	-2	-1	-14	
		0	8	41	4	53	8	114
	Montgomery	-3	-6	+8	+3	-12	+11	
		2	22	10	1	64	33	132
	Morrow	-2	-11	-12	-4	+17	+13	
		1	17	10	6	35	35	104
	Pease	-2	-8	+6	+1	+30	-25	
		1	20	8	1	22	3	55
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		0	7	7	1	12	11	38
	Sinner	-2	-9	+2	+6	+31	-27	
		1	19	4	4	21	5	54
	Vanceville	-1	+16	-9	-3	-3	+1	
		0	44	7	5	55	23	134
	Werner	+3	+13	-11	-1	-12	+9	
		4	41	9	3	64	31	152

Table 3. *(Continued)*

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
High Island		-1	-11	+8	-2	+29	-24	
	Lindsey	+4	+9	-12	-4	-1	+5	
		5	20	20	2	30	29	106
	Marston	-2	-8	+16	=2	-1	-2	
		1	3	8	0	30	22	64
	Mill Creek	-1	-20	+39	-2	-1	-14	
		0	0	31	0	30	10	80
	Montgomery	-3	-6	+8	+3	-12	+11	
		2	5	0	5	41	35	88
	Morrow	-2	-11	-12	-4	+17	+13	
		1	0	20	2	12	37	72
	Pease	-2	-8	+6	+1	+30	-25	
		1	3	2	3	1	1	11
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		0	10	17	3	35	9	74
	Sinner	-2	-9	+2	+6	+31	-27	
		1	2	6	8	2	3	22
	Vanceville	-1	+16	-9	-3	-3	+1	
		0	27	17	1	32	25	102
	Werner	+3	+13	-11	-1	-12	+9	
		4	24	19	1	41	33	122
SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
Lindsey		+4	+9	-12	-4	-1	-5	
	Marston	-2	-8	+16	-2	-1	-2	
		6	17	28	2	0	3	56
	Mill Creek	-1	-20	+39	-2	-1	-14	
		5	29	52	2	0	9	97
	Montgomery	-3	-6	+8	+3	-12	+11	
		7	15	20	7	11	16	76
	Morrow	+2	-11	-12	-4	+17	+13	
		2	20	0	0	18	18	56
	Pease	-2	-8	+6	+1	+30	-25	
		6	1	18	5	31	20	81
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		5	30	3	5	65	28	136

Table 3. *(Continued)*

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
	Sinner	-2	-9	+2	+6	+31	-27	
		6	18	10	10	32	22	136
	Vanceville	-1	+16	-9	-3	-3	+1	
		5	7	3	1	2	6	24
	Werner	+3	+13	-11	-1	-12	+9	
		1	4	1	3	11	14	34
Marston		-2	-8	+16	-2	-1	-2	
	Mill Creek	-1	-20	+39	-2	-1	-14	
		1	12	23	0	0	12	48
	Montgomery	-3	-6	+8	+3	-12	+11	
		1	2	8	5	11	13	40
	Morrow	-2	-11	-12	-4	+17	+13	
		0	3	4	2	18	15	42
	Pease	-2	-8	+6	+1	+30	-25	
		0	0	10	3	31	23	67
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		1	13	25	3	65	31	138
	Sinner	-2	-9	+2	+6	+31	-27	
		0	1	14	8	32	25	80
	Vanceville	-1	+16	-9	-3	-3	+1	
		1	24	25	1	2	3	56
	Werner	+3	+13	-11	-1	-12	+9	
		5	21	27	1	11	11	76
SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
Mill Creek		-1	-20	+39	-2	-1	-14	
	Montgomery	-3	-6	+8	+3	-12	+11	
		2	14	31	5	11	25	88
	Morrow	-2	-11	-12	-4	+17	+13	
		1	9	51	2	18	27	108
	Pease	-2	-8	+6	+1	+30	-25	
		1	12	33	3	31	11	91
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		0	0	48	3	65	19	135
	Sinner	-2	-9	+2	+6	+31	-27	
		1	11	37	8	32	13	102
	Vanceville	-1	+16	-9	-3	-3	+1	
		0	36	48	1	2	15	102
	Werner	+3	+13	-11	-1	-12	+9	
		4	33	50	1	11	23	122

Table 3. *(Continued)*

SITE	Compare	XHat	BruIn	Rid	LinPu	Inc	Bru	Index
Montgomery		-3	-6	+8	+3	-12	+11	
	Morrow	-2	-11	-12	-4	+17	+13	
		1	5	20	7	29	2	64
	Pease	-2	-8	+6	+1	+30	-25	
		1	2	2	2	42	36	85
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		2	15	17	2	76	44	156
	Sinner	-2	-9	+2	+6	+31	-27	
		1	3	6	3	43	38	94
	Vanceville	-1	+16	-9	-3	-3	+1	
		2	22	17	6	9	10	66
	Werner	+3	+13	-11	-1	-12	+9	
		6	19	19	4	0	2	50
Morrow		-2	-11	-12	-4	+17	+13	
	Pease	-2	-8	+6	+1	+30	-25	
		0	3	18	5	13	38	77
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		1	10	3	5	47	46	112
	Sinner	-2	-9	+2	+6	+31	-27	
		0	2	14	10	14	40	80
	Vanceville	-1	+16	-9	-3	-3	+1	
		1	27	3	1	20	12	64
	Werner	+3	+13	-11	-1	-12	+9	
		5	24	1	3	29	4	66
Pease		-2	-8	+6	+1	+30	-25	
	Quarles Lake	-1	-21	-9	+1	+64	-33	
		1	13	15	0	34	8	71
	Sinner	-2	-9	+2	+6	+31	-27	
		0	1	4	5	1	2	13
	Vanceville	-1	+16	-9	-3	-3	+1	
		1	24	15	4	33	26	103
	Werner	+3	+13	-11	-1	-12	+9	
		5	21	17	2	42	34	121
Quarles Lake		-1	-21	-9	+1	+64	-33	
	Sinner	-2	-9	+2	+6	+31	-27	
		1	12	11	5	33	6	68
	Vanceville	-1	+16	-9	-3	-3	+1	
		0	37	0	4	67	34	142
	Werner	+3	+13	-11	-1	-12	+9	
		4	34	2	2	76	42	160

Table 3. *(Continued)*

Sinner		-2	-9	+2	+6	+31	-27	
	Vanceville	-1	+16	-9	-3	-3	+1	
		1	25	11	9	34	28	108
	Werner	+3	+13	-11	-1	-12	+9	
		5	22	13	7	42	36	125
Vanceville		-1	+16	-9	-3	-3	+1	
	Werner	+3	+13	-11	-1	-12	+9	
		4	3	2	2	9	8	28

Table 4. A glance at associational strengths among Pineywoods Bossier sites*

	Chi	Col	Cor	Flo	Gre	HI	Lin	Mar	MC	Mon	Mor	Pea	QL	Sin	Van	Wer
Chi		103	57	68	106	88	70	80	108	76	20	93	115	06	78	82
Col	103		60	43	11	57	129	117	115	109	101	56	43	53	131	143
Cor	55	60		51	71	67	67	83	105	93	51	68	81	63	81	93
Flo	68	43	51		46	36	96	76	90	98	60	39	64	40	92	112
Gre	106	11	71	46		56	138	116	114	132	104	55	38	54	134	152
HI	88	57	67	36	56		106	64	80	88	72	11	74	22	102	122
Lin	70	129	67	96	138	106		56	97	76	56	81	136	98	24	34
Mar	80	117	83	76	116	64	56		48	40	42	67	138	80	56	76
MC	108	115	105	90	114	80	97	48		88	108	91	135	102	102	122
Mon	76	109	93	98	132	88	76	40	88		64	85	156	94	66	50
Mor	20	101	51	60	104	72	56	42	108	64		77	112	80	64	66
Pea	93	56	68	39	55	11	81	67	91	85	77		71	13	103	121
QL	115	43	81	64	38	74	136	138	135	156	112	71		68	142	160
Sin	96	53	63	40	54	22	98	80	102	94	80	13	68		108	125
Van	78	131	81	92	134	102	24	56	102	66	64	103	142	108		28
Wer	82	143	93	112	152	122	34	76	122	50	66	121	160	125	28	

*Site Abbreviations. Chi, Chickasaw; Col, Colbert; Cor, Corney; Flo, Floyd; Gre, Greer; HI, High Island; Lin, Lindsey; Mar, Marston; MC, Mill Creek; Mon, Montgomery; Mor, Morrow; Pea, Pease; QL, Quarles Lake, Sin, Sinner (repent); Van, Vanceville; Wer, Werner

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