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Foreword

This volume is dedicated to Curtis Tunnell, the first State Archeologist in Texas and the former executive director of the Texas Historical Commission. I had the privilege to work at that agency from 1981 to 1996 and quickly learned of Curtis' wide range of interest in all things Texan. These interests ranged from Texas' prehistory, history and folklore to its people and their diversity, as well as its variable flora, fauna, and geography. In this volume, Dan Utley's *Memoriam* of Curtis aptly describes and pays tribute to the wide range of his interests. Nonetheless, Curtis was foremost an archeologist, and the bibliography that Pat Mercado-Allinger (the current State Archeologist) and I did illustrates his many contributions to that field.

As the bibliography shows, Curtis the archeologist was fascinated with all prehistoric and historic groups who once occupied Texas, regardless of their geographic position. He worked on prehistoric Caddoan sites in deep East Texas, was active in the excavations of the historic French settlement on the Texas Gulf Coast as well as underwater explorations in that same region, paleoindian sites on the Southern Plains, and Spanish mission sites in Central Texas, to name a few. Because of this wide range of interests, I believe that he would find enjoyment in each of the various papers presented in this volume. The report on the Musk Hog Canyon field school by Dickens and Moore would be one that he would have welcomed. Curtis had a deep interest in the western areas of the state, and Musk Hog, surveyed by the Society when there was a great deal of chronology building in the state, was a place he knew and remarked about as those of us at the Commission traveled with him to west Texas. The paper by Bruseth, Durst, and Gilmore acknowledges his assistance and his abiding interest in their efforts to verify (or not) Presidio La Bahia at site 41VT4. Tim Perttula's paper on historic Caddoan sites in Houston County would have intrigued Curtis with thoughts about their settlement patterns and relationships with the Spanish. Pat Mercado-Allinger's article on Alibates caches would have made him smile. Pat is the current State Archeologist and she and Curtis share a long time interest in caches and the behavior that leads to caches. Moreover, they share a long time interest in the Panhandle of the state, the region that nurtured Curtis as a young boy. The brief article on Sam Whiteside, an Avocational, is included here because Curtis presided over the Commission during the time that they built the Archeological Steward program, and he strongly supported the Avocational community in the state. Finally, the article by Alan Skinner on his unusual "field of rocks" is just the sort of intriguing site that would have delighted Curtis and would have made him want to learn more. Thus, the *Bulletin* is dedicated to Curtis Tunnell and his contributions to the field.

I would also, in this venue, express my appreciation to the individuals who reviewed articles. Their assistance was invaluable. Finally, the advice and comments of my assistant editors, Myles Miller and Timothy K. Perttula, were welcome and I could not have done this volume without their help. I hope that this volume and the next will come close to their outstanding tenures as Bulletin editors.

ENDNOTE

The following quote from Curtis is from an email he sent to friends and collegues on December 1, 2000. It was sent from Fort St. Louis.

> Last night we worked late removing the burial of the two skeletons of French people killed by the natives and buried by Spanish in the DeLeon expedition.
>
> At dusk the sky was marbled with orange and blue. Thousands of Sand-hill Cranes came over on their way to the nesting grounds. They were in magnificent V-shape formations and diagonal lines. They were so low that we could hear the sssshhh of their wings. They were singing haunting warbling songs. The spectacle lasted for over 30 minutes. We all stood around in silent awe. I could imagine LaSalle and Joutel and the French colonists standing around on this very ground in the mid 1680s and watching this same scene. I hope we can reconstruct the colonist's stories in an appropriate way.
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> CT

Archeological Survey at Musk Hog Canyon in Crockett County, Texas

The 1976 Texas Archeological Society Field School

William A. Dickens and William E. Moore

ABSTRACT

In 1976, the Texas Archeological Society conducted its annual field school at Musk Hog Canyon in western Crockett County, Texas. This report describes the results of the field survey which identified 513 prehistoric sites in the canyon system. Site types include burned rock middens, burned rock scatters, chipping or quarrying stations, hearths, lithic scatters, mortar holes, rock shelters, rock art panels, and a burial. The conclusions regarding the age and function of the sites at Musk Hog Canyon are based solely on the lithic assemblage and site types. Projectile point types collected during the survey represent prehistoric occupation from the Early Archaic period through the Late Transitional Archaic period. A single *Angostura* point fragment suggests prehistoric groups may have been in the area prior to the Early Archaic. Three main activities are indicated by the projectile points and debitage. These are bifacial reduction aimed at projectile point and tool manufacture, hunting, and plant harvesting and processing. The lithic assemblage suggests that the various activities performed at Musk Hog Canyon are typical of the Lower Pecos region.

PART I: SURVEY OVERVIEW

The Texas Archeological Society (TAS) conducted its 15th annual field school during the week of June 12-19, 1976. The location was Musk Hog Canyon in western Crockett County, Texas (Figure 1). The actual number of participants was not recorded (Richmond et al. 1985:156). This field school was designed to collect data regarding the location and type of prehistoric sites by field survey and subsurface testing. During the testing phase, five sites were excavated; four burned rock middens (41CX103, 41CX218, 41CX238, 41CX241) and one rock shelter (41CX133). The preliminary results of this phase were reported by Harry J. Shafer and Gary L. Moore (n.d.). A detailed analysis of the excavated sites was reported by William E. Moore (1980) in his Master's thesis and in a previous TAS Bulletin (Moore 1983:13-81). In addition to locating and documenting previously unrecorded sites in the project area, TAS survey crews collected data from 74 sites (41CX120–41CX138; 41CX140–41CX152; 41CX154–41CX179; 41CX211–41CX226) recorded by the Texas Highway Department in 1975.

This article is the first formal report of the survey portion of the 1976 field school and contains the first in-depth analysis of Musk Hog Canyon lithics other than those discussed by Moore (1980, 1983). The survey was briefly discussed by Shafer and Moore (1976) in a TAS newsletter and in a summary of TAS field schools from 1962-1982 by Richmond et al. (1985:156-160).

Projects other than survey and excavation were conducted during the field school. Experimental baking and consumption of lechuguilla, sotol, and yucca were performed by the Young Archeologist Group. Botanical transects in predesignated areas of the canyon system were made by Vaughn M. Bryant, Jr. and James Phil Dering. Also, matrix samples from a rock shelter (41CX168) were collected by Harry J. Shafer and Vaughn M. Bryant, Jr. for plant macrofossil analysis (Dering and Shafer 1976). Complementing the field survey was a rock art recording crew under the supervision of John W. Clark.

Proposed construction of Interstate Highway 10 posed a threat to an area known to contain important archeological sites. In fact, the area was determined eligible by the Keeper for the National Register of Historic Places in 1977. Musk Hog

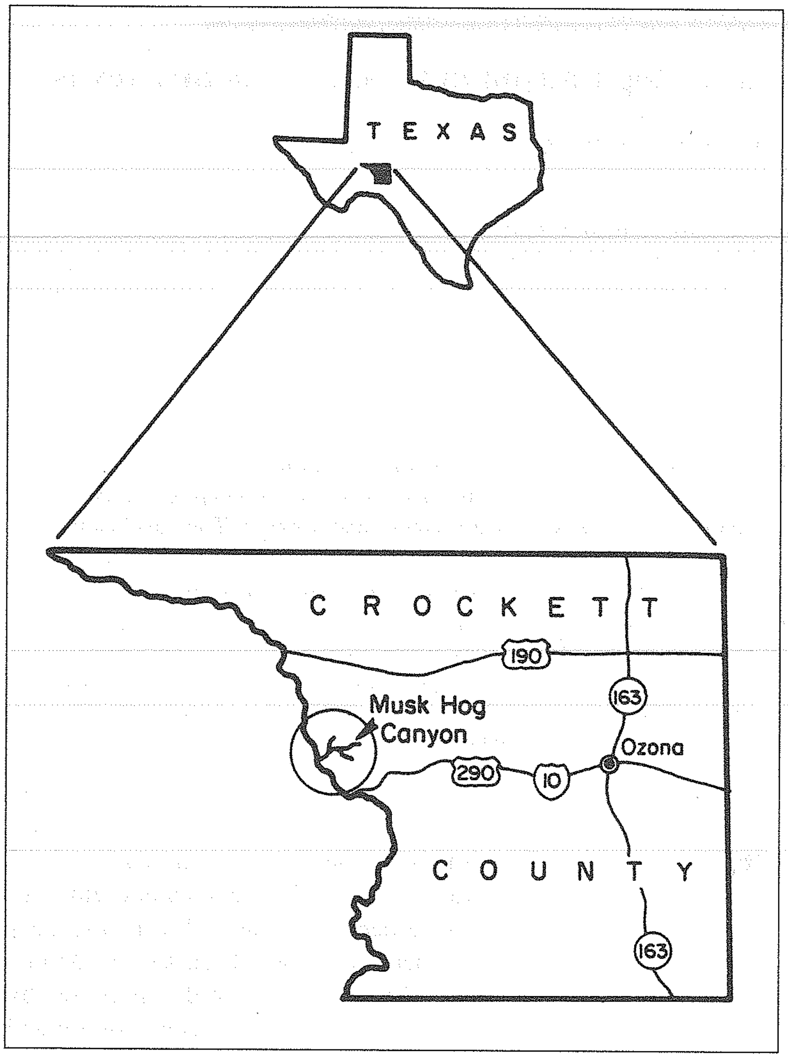

Figure 1. General Location Map.

Canyon is a unique assemblage of archeological sites that represents a significant segment of Archaic territorial ranges and provides a rare opportunity to sample a data base of this magnitude. Realizing that the destruction of a large number of archeological sites in Musk Hog Canyon could result in the loss of a cultural pattern not known at this time to be duplicated in the archeological record, TAS decided to include the entire canyon in the field school in order to salvage as much information as possible.

Dr. Harry J. Shafer was the Principal Investigator for the field school and supervised the excavation crews as Project Archeologist under Texas Antiquities Permit Number 117 issued to the TAS. He was assisted by Gary L. Moore who directed the survey crews. The area to be surveyed was divided into sectors with sector chiefs and crew chiefs in charge of the various survey crews. Glenn T. Goode (Sector B), Jim Word (sectors C & E), and Bill Richmond (sectors A & D) served as sector chiefs, while Bill McClure, Jack Hedrick, Roy Dickerson, Lou Fullen, Ed Mokry, Norma Hoffrichter, Emmett Shedd, Jim Smith, Gene Griffen, and Bob Vernon performed the duties of Crew Chief.

Copies of the site forms completed by TAS are on file at the Texas Archeological Research Laboratory (TARL) in Austin, Texas. The rest of the project records and those artifacts discussed in this article have been curated at TARL.

ARCHEOLOGICAL BACKGROUND

Although previous investigations in Crockett County and the surrounding region are numerous, few systematic investigations have been carried out in Crockett County prior to the 1976 field school. Prior to the first study of Musk Hog Canyon and vicinity by professional archeologists in 1970-1971, Crockett County had only 241 recorded archeological sites (TARL site files). Although some of the sites in the county had been tested, most were documented by surface-collected materials, and many had been recorded individually by avocational archeologists. According to Luke (1983:7), "Scientific archaeology began in Crockett County in 1966 when the Texas Archeological Society held its annual summer field school during which the Dunlap Complex was investigated" (Word 1971). Other professionals to investigate sites in the county include Dessamae Lorrain (1968), Aaron D. Riggs, Jr. (1968a, 1968b, 1968c, 1969, 1974), and Arnold E. Sommer (1968, 1972). Lorrain (1968) conducted a salvage-oriented project at several rock shelters and two burned rock middens in northwestern Crockett County. Her work is important as it provides an early synthesis of the material culture of the region.

Archeological investigation of the Musk Hog Canyon system began with an archeological survey of 140 miles of right-of-way proposed for Interstate Highway 10 in Crockett, Kimble, Pecos, and Sutton counties by the Texas State Department of Highways and Public Transportation (now Texas Department of Transportation) in 1970-1971 by Daymond D. Crawford (1973). Three prehistoric sites (41CX104 - 41CX106) found during that survey were recorded in Musk Hog Canyon. These sites consist of a series of hearths located on small draws and a terrace of the Pecos River. Site 41CX106, a cluster of hearths about 600 feet from several crescent middens, was considered to contain research potential and was examined in 1975 by personnel from the Texas Highway Department (Luke 1983:33).

In 1974-1975, Musk Hog Canyon was again visited by archeologists from the Texas Highway Department. In 1974, a survey was conducted by Gary L. Moore and Glenn T. Goode (Jarvis and Crawford 1974). Site records at TARL reveal that seven sites (41CX112 - 41CX116, 41CX118 - 41CX119) were recorded during the 1974 investigation which, according to Goode (personal communication to William E. Moore, January 22, 1991), was an informal inspection of the kinds of resources present, not a formal survey. The 1975 investigation was directed by Gary L. Moore with help from Glen Doran, Marshall Eiserer, Bruce Fullem, and Glenn T. Goode. An examination of the site files at TARL shows this survey recorded 76 archeological sites (41CX41; 41CX120 - 41CX179; 41CX211 - 41CX226). In addition to the survey, two hearths (41CX106) and one burned rock midden (41CX216) were tested, and a number of sites were inventoried (Luke 1983:33). Later, the feature at the burned rock midden at site 41CX216 was designated 41CX216A.

In 1977, a large scale testing project in Musk Hog Canyon was conducted by the Texas Highway Department (Luke 1983:13). Bruce Fullem served as Crew Chief and was assisted by Marshall Eiserer, Glenn T. Goode, Clive J. Luke, and Eugene Smith. The investigation was based on a research design developed by Fullem. This project focused on sites within the highway right-of-way. Four concentrations of archeological features were documented and extensively investigated. The interested reader is referred to the works of Moore (1980, 1983) for a review of the excavated sites at Musk Hog Canyon, Luke (1980, 1983) and the various reports present in the *References Cited* of this article for additional overviews of Crockett County and the Lower Pecos archeological region.

ENVIRONMENTAL SETTING

Musk Hog Canyon, one of the many canyon systems dissecting the Edwards Plateau, is about 2.9 km (1.8 miles) east of Sheffield in western Crockett County, Texas and is situated on the northern fringe of the Chihuahuan desert. Characterized by a broad floodplain about 3.22 km (2 miles) wide at its mouth east of the Pecos River, the canyon drains to the southwest, gradually narrowing at its head to a steep, rugged gully nearly 183 meters (600 feet) above the valley floor. Many smaller header canyons, extending to the north and south from both sides of Musk Hog Canyon, drain adjacent parts of the mesa top into Musk Hog Canyon itself.

Crockett County is located on the western edge of the Edwards Plateau just to the east of the Stockton Plateau in southwestern Texas. The Pecos River, which winds for about 1300 km (800 miles) from its headwaters in the Santa Fe Mountains of New Mexico to its confluence with the Rio Grande about 50 km (30 miles) from Del Rio, Texas, separates the two plateaus. In fact, the Stockton Plateau is considered by Johnson (1931) as an extension of the Edwards Plateau.

Geologic formations in this region are in the Comanche series of the Cretaceous system. The limestone mantle in western Crockett County is thin, and the local drainage systems have cut into the rock producing a region of canyons, rock overhangs, and wide valleys (United States Soil Conservation Service 1956:3-4).

Crockett County is located in what Blair (1950 defines as the Balconian Biotic Province. The climate is warm and is classified as dry, semiarid mesothermal (Blair 1950:113). The temperature varies from 32.2 degrees Centigrade (90 degrees Fahrenheit), or higher in the summer, to an average of 11.6 degrees Centigrade (53 degrees Fahrenheit) in the winter. Sudden cold fronts, known as "northers," cause rapid and frequent temperature changes. Annual rainfall averages 46.5 cm (18.33 inches), but this varies considerably, with a record low of 17.3 cm (6.82 inches) in 1952 and a record high of 98.89 cm (38.98 inches) in 1957 (Wiedenfeld and McAndrew

1968:30). The vegetation of this region is described by Blair (1950:113):

> The most characteristic plant association of the Balconian is a scrub forest of Mexican cedar (*Juniperus mexicana*), Texas oak (*Quercus texana*), stunted live oak (*Quercus virginiana*), and various other less numerous species. This association occupies the more dissected parts of the area to the near exclusion of others, and it occurs throughout the area of the Balconian. Mesquite is distributed throughout the Balconian and, to the west, it and the live oak become the most conspicuous woody vegetation. The floodplains of the streams are occupied by a mesic forest of large live oaks, elms, hackberries, and pecans.

Tharp (1952:50-56) includes Crockett County in his Foothill-Mesa-Valley Region of Trans-Pecos Texas. He (Tharp 1952:50) defines the region in the following:

> Region 10 occupies not only all of Texas west of the Pecos River but an area extending westward beyond the Pecos. Topographically it lies at elevations below the oak savanna. Physiographically it is very diverse; and this diversity, reflected in the vegetation, renders its separation into four subregions desirable for clarity of treatment. They are as follows: (a) the sotol-lechuguilla hills; (b) the mesa slopes, (c) the intermesa valley flats; and (d) the intermountain valleys.

The sotol-lechuguilla hills consist mainly of sotol (*Dasylirion* spp.) and lechuguilla (*Agave lechuguilla*). Interspersed in the sotol and lechuguilla cover, especially east of the Pecos River, are local areas with admixtures of guajillo (*Acacia berlandieri*) (Tharp 1952:50). Also present are marble-fruit prickly pear cactus (*Opuntia strigil*), sacahuista (*Nolina texana*), and various grasses. The sotol-lechuguilla hills:

> comprise bold foothills with steep slopes, representing the present state of erosional dissection of the cretaceous limestone through which the Rio Grande and its tributaries are cutting their way. For the most part the hills are either conical or rather sharp ridged; but an occasional one is topped by a vestige of cap rock, a level stratum of hard, resistant limestone which farther north is a topographic feature of the "Mesa Country" (Tharp 1952:50).

The next region is what Tharp refers to as the mesa slopes. The mesa slopes were undoubtedly of economic importance to the aboriginal inhabitants but have seldom, if ever, been described in the archeological literature (Lorrain 1968:8). An important vegetation community exists at the base of the cap rock where rock shelters are commonly found.

> Scrub woody vegetation is usually impenetrably dense at the base of the cap rock, especially on north and east exposures, where greater moisture content in the soil, together with protection from the drying effect of winds, results in ranker growth of mesic species and the accumulation of more humus in a richer soil (Tharp 1952:51-52). According to Tharp (1952:52), oak (*Quercus* sp.), juniper (*Juniperus* spp.), hackberry (*Celtis* spp.), catclaw (*Acacia* and *Mimosa* sp.), Texas Mountain laurel, or mescalbean (*Sophora secundiflora*), shrub sparge, or candelilla (*Euphorbia antisyphilitica*), shrub (or bush) Croton (*Croton fruticulosus*), two sumacs (*Rhus* spp.), Mexican buckeye (*Ungadia speciosa*), Mexican (or Texas) persimmon (*Diospyros texana*), white brush (*Aloysia gratissima*), and Condalia (*Condalia* sp.) combine to form thickets so dense that they exclude all but shade-loving herbs.

The upper slopes carry thinning stands of woody growth that become progressively scrubbier as they extend downward from the base of the cap rock, with Pinchot's juniper (*Juniperus pinchotii*) the most conspicuous species (Tharp 1952:52).

Lower slopes become more gradual near the flats. Here, cedars are replaced by midget buckthorn (*Rhamus* sp.), catclaw (*Acacia* sp.), ocotillo (*Fouquieria splendens*), allthorn (*Koeberlinia spinosa*), and Condalia (*Condalia* sp.) (Tharp 1952:52).

> Passing on to subregion 10b, the mesa slopes, a word of explanation is in order regarding the choice of this restrictive

> term rather than the more inclusive term mesa. *Mesa* is a Spanish word meaning table, and the Mesa Region takes its name from the abundance of flat-topped hills which rise several hundred feet above the broad intervening valley flats. The peculiar topography is due to a horizontal stratum of erosion-resistant limestone twenty to thirty feet thick which "caps" the softer underlying strata. The sides fall away from the base of the perpendicular margin of cap rock, steeply at first, but becoming gentler lower down toward the intermesa valleys. The sizes of the mesas vary from mere fragments, each with only a vestige of cap rock to those whose tops comprise scores of square miles. . . the smaller mesas, true to their appearance from the valleys below, have essentially flat tops; but the larger ones have undulating surfaces bearing considerable residual gravelly soil which supports a vegetation very similar to that of the intermesa valley flats (10c) (Tharp 1952:51).

The intermesa valley flats are dominated by creosote bush (*Larrea divaricata*) and blackbrush (*Acacia rigidula*) in varying combinations and densities. In exceptionally favorable areas, mesquite (*Prosopis grandulosa*), white brush (*Aloysia gratissima*), and other species more common farther east, occur in stands usually sufficiently open to constitute savannas. On these savannas, communities of buffalo grass *Buchloe dactyloides*) thrive, frequently in almost pure stands (Tharp 1952:52). Farther removed from drainage channels, the grasses occupying the open spaces in the predominately creosote-bush stand are also thinly scattered (Tharp 1952:54).

The broad intermountain valley is essentially grassland, but with yucca (*Yucca* spp.), cholla (*Opuntia imbricata*), and broomweed (*Xanthocephalum* sp.) widely distributed and frequently conspicuous. Shrubby species of several affinities are more sparsely represented, mainly along the drainage systems; desert willow (*Chilopsis linearis*), walnut (*Juglans* sp.), juniper (*Juniperus* spp.), small-leaved sumac (*Schmaltlzia* [now *Rhus*] *microphylla*), octillo (*Fouguieria splendens*), Apache plume (*Fallugia*), allthorn (*Koeberlinia spinosa*), *Clematis, Coldenia, Aloysia, Condalia,* and *Viquiera stenloba* are some of the more common (Tharp 1952:54).

An abundance of fauna thrive in the Balconian Province. The following were observed by field parties in the northwestern part of Crockett County during the 1966 and 1967 field seasons:

> ringtail, raccoon, ground squirrel, rock squirrel, jack rabbit, cottontail, deer, beaver, skunk, several species of bats, rock wren, green heron, mourning dove, bluebird, vulture, several hawks, lizards, rock rattlesnakes, diamond-back rattlesnake, pink racer, fishes, and freshwater mussel (Lorrain 1968:11).

Blair (1950:113-114) lists 57 species of mammals, 16 species of lizards, and 36 species of snakes in his discussion of the Balconian Biotic Province. Larger mammals, including puma (*Felis concolor*), wolf (*Canis* sp.), black bear (*Ursus americanus*), antelope (*Antilocapra americana*), and bison (*Bison bison*), probably were common in prehistoric times, but have been eliminated or drastically reduced in number.

Given the data above, Musk Hog Canyon itself can be divided into 15 topographic zones (Figure 2). It is these zones that surveyors were asked to identify when recording sites during the field school.

OBJECTIVES AND METHODS

This article documents the field survey of the 1976 field school as thoroughly as possible given the quantity and quality of information available to the authors. This project covered a vast area and evaluated a large number of sites. It is our intention to present the results of the 1976 field school to the Society and archeological community at a level that will not only be informative in terms of what was accomplished, but that will hopefully stimulate additional research in this area. A detailed analysis of the lithic materials collected is provided, but this is not a definitive account of all phases of the project.

This article was prepared after a thorough review of literature relevant to the project area and an examination of field school records such as daily journals, site forms, and correspondence. The site records at TARL were reviewed, and key field school participants were interviewed.

Two major sources of data were utilized in the writing of this article. They are the site form and

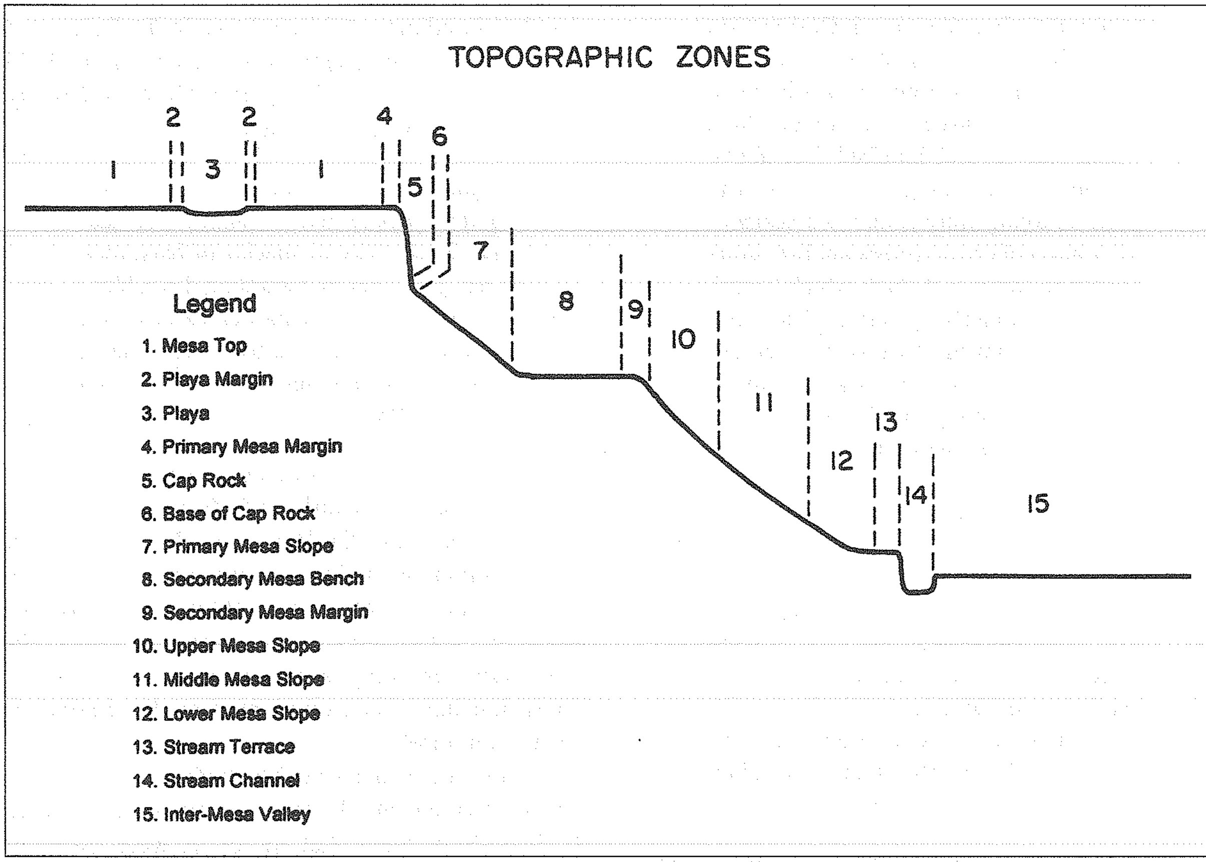

Figure 2. Topographic Zones.

the lithic artifacts from the various sites recorded by TAS survey crews. The site forms (n=514) were used to create a data base which documents sites located and recorded by TAS personnel. Site Number, Site Type, Site Size, Topographic Zone, and Elevation are the fields in the data base. These fields were sorted and counted to produce data regarding numbers and percentages of sites according to their relation to topographic zones and other relevant information. A copy of the disk containing the data base file was submitted to TAS with the intention of eventually housing it at TARL in order to make this information available to other researchers.

Those lithic artifacts housed at the Center for Ecological Archeology, Texas A&M University were analyzed for this article. According to project records, samples of floral and faunal materials, snails, mussel shell (including a pendant), charcoal, fire-cracked rock, and chert samples were also collected during the field school. These artifacts, however, were not present at the Center and are not discussed in this report.

SURVEY PROCEDURES

The objectives of the survey were to complete a nearly 100% investigation of the canyon in order to record all visible archeological sites, determine the spatial pattern of these sites, and describe them according to their environmental setting. Previous surveys, mainly related to the proposed construction of Interstate Highway 10, had revealed that Musk Hog Canyon contained a large number of archeological sites which would be destroyed or otherwise affected by the planned construction (Crawford 1973). Rather than relying on sampling methods which would provide only a percentage return, it was decided that an effort should be made to examine all archeological sites within the canyon system.

Prior to the 1976 field school, a specially designed site survey form had been printed for use in the Musk Hog Canyon survey. Unique to this form were spaces for sector, topographic zone, and type of site expected to be found during the survey. The form, which provided for a checklist of site types, topographic zones, and observed artifacts, speeded up recording time and provided a more uniform data return for future analysis. Survey crews were advised of the various site types expected to occur in the canyon area. Definitions of these sites were taken from previous work along Interstate Highway 10 by the Texas Highway Department (Crawford 1973:7-8) and are described later in this article.

Topographic maps were used to divide the canyon into sectors for more efficient personnel distribution. In all, five sectors (A-E) were created. Each sector was assigned a Sector Chief who was responsible for directing field operations in his/her sector. Working under the sector chiefs were the crew chiefs who conducted the actual field operations along with their respective survey crews. Survey crews were responsible for recording all required site information which included elevations and plotting on the topographic maps. At the end of each field day, the sector chiefs and crew chiefs turned in the completed survey forms and recorded their sites on a master map. Artifacts were inventoried by the Laboratory Chief, Greer Smith, and all material was checked by Marge Fullen who plotted the longitude and latitude of each site and assigned permanent site numbers to the survey forms. Each evening a meeting was held between the Archeological Director, sector chiefs, and crew chiefs to discuss the results of the day's work and to plan for the next day. It should be stated here that each feature (i.e., multiple hearths or hearths within ring middens) were recorded as separate sites (Ed Mokry, 1980 personal communication).

Site Types By Topographic Zones

Seven prehistoric site types were recognized in Musk Hog Canyon. The 513 prehistoric sites identified by TAS include 39 rock shelters, 192 hearths, 165 burned rock middens, 31 lithic scatters, 12 chipping or quarrying sites, 8 mortar holes, 65 burned rock scatters, and 1 unidentified type (41CX531), possibly a grave. Rock art was observed at five rock shelters (41CX280, 41CX359, 41CX361, CX609, and 41CX642), and the remains of a human burial was seen on the surface of one rock shelter site.

Rock Shelters

Rock shelters are overhangs occurring in cavities found in limestone ledges. Although they usually occur at the base of the cap rock (Topographic Zone 6 as shown in Figure 2), this site type was also found in zones 5, 10, and 12. They are usually found along bluffs and escarpments where conditions are suitable for solution cavities and overhangs to occur. The dimensions of these sites vary, but widths beyond 50 feet are rare in Musk Hog Canyon. Evidence of occupation may occur in the form of smoke stained ceilings as well as burned limestone rock, ash, and cultural debris in the shelters and on the talus slope in front of the shelters such as that at 4CX133.

Rock art is sometimes preserved beneath the overhangs of some rock shelters. Polished bedrock, bedrock mortars and metates, and grooves and striations cut into the rock are other features associated with shelters.

Twenty-nine rock shelters are concentrated in zones 5 and 6 (see Figure 2), while 4 are in Zone 10 (Figure 2) and 3 are in Zone 12 (see Figure 2). Information regarding zone was not available for three sites. Except for one burned rock midden (41CX239), rock shelters are the only site type present below the cap rock and its base (zones 5-6). Site 41CX239 is described on the site form as located on the bank of a drainage that cuts through the cap rock. It is presumed that this site actually belongs to Zone 4 on top of the cap rock.

As mentioned above, rock shelters are often found along bluff edges where the possibility for solution cavities or rock overhangs is greatest. They have been located between 2090 and 2620 feet elevation. The size of rock shelters in the project area ranges from small at 6 square meters to rather large at 300 square meters. No data are available for three sites, and one site form (41CX364) contains information for three shelters; the size of the individual shelters was not available. The average size of shelters in the sample is 45.5 square meters. Twenty-one sites (72%) are 20 square meters or greater and less than 100 square meters. Ten sites (34%) are less than 20 square meters, and four (13%) are 100 square meters or greater.

The presence of sotol and other plant remains at the Eiserer Shelter (41CX133) are evidence that this site was used, at least in part, for plant processing (Moore 1983:73). Plant processing in shelter sites has been demonstrated in other areas, most notably Hinds Cave (41VV456) in southwest Texas (Dering 1979).

Terraces

The area most utilized in terms of numbers of prehistoric site locations is the stream terrace (Zone 13) with 125 sites. Site types in this zone include 66 hearths, 39 burned rock middens, 14 burned rock scatters, 6 lithic scatters, and 1 mortar hole site. The Inter-Mesa Valley (Zone 15) is the lowest zone in the canyon system, has 18 sites. They are 7 burned rock middens, 5 hearths, 4 burned rock scatters, 1 lithic scatter, and 1 possible grave.

Zone 13 is followed, in terms of site numbers, by the Lower Mesa Slope with 110 sites recorded, namely 51 hearths, 25 burned rock middens, 12 chipping/quarrying stations, 11 burned rock scatters, 7 lithic scatters, and 3 rock shelters. The rest of the mesa slope contains 85 sites in zones 10 and 11. Only 10 sites are recorded for the secondary mesa margin (Zone 9), but 77 sites were found on the secondary mesa bench (Zone 8).

On the higher elevations, the site density decreases as only 31 sites were recorded in the four zones present (zones 1-4). The majority of sites in this area occur on the mesa top (Zone 1) and consists of 9 hearths, 7 burned rock middens, 7 burned rock scatters, and 2 lithic scatters. Along the primary mesa margin (Zone 4) six sites, all hearths, were observed.

Hearths

Crawford (1973:7), who surveyed along Interstate Highway 10 (including Crockett County), defined hearths as "circular concentrations of burned limestone rock fragments occupying an area from three to seven feet in diameter." Numbers vary with single isolated hearths at some sites and as many as six at others. The depth of these hearths is usually restricted to the thickness of the blocks and slabs of limestone rock utilized in their construction, about six inches. They are often found in association with burned rock accumulations or scatters (Crawford 1973:7).

Hearths are ubiquitous throughout Musk Hog Canyon, as field school participants located them in all zones except the playa and its margin and the steep bluff areas of the cap rock and its base. Also, they recorded hearths as separate sites even when directly associated with a ring midden or part of a cluster of hearths. The presence of burned rock at the Eiserer Shelter (41CX133) and known hearths at other rock shelter sites in the southwest suggest they may be found in shelters and along the cap rock and its base as well. They are reported at elevations from 2050 to 2750 feet above sea level. As mentioned above, the three hearths reported in the stream channel probably belong to the adjacent zones instead. Since hearths may be used for a number of activities such as cooking or keeping warm, they should not be expected to be restricted to specific zones.

The size of hearths in Musk Hog Canyon varies from 1-16 square meters, but small sites between 1 and 6 square meters are most typical. Size data were computed for 175 of the 192 sites defined as hearths. Of this number, 156 sites (81 percent) fall within the range of 1-6 meters in size. Approximately two-thirds of this total (n=103) are between one and two meters in size. Those not computed represent sites with multiple hearths for which individual site dimensions were not known. Artifacts were not common at this site type and usually consist of discarded lithic materials such as debitage and broken tools.

Burned Rock Middens

Circular or crescent-shaped mounds of burned limestone rock fragments signal the presence of a burned rock midden. Sites with burned rock as the major feature are very common in the area. According to Shafer (1971:6), dense accumulations of crescent rings, or circular concentrations of angular fragments of burned limestone, were the most frequent kind of open cultural deposit observed in Sanderson Canyon with the exception of simple hearths.

This site type has been observed to range in diameter from 20 to 50 feet with a central thickness of up to three feet (Black and Ellis 1997). The ground surface surrounding the middens is commonly littered with additional burned rock fragments and other cultural debris. Hearths have been observed in association within the immediate area to the south and west of these middens. Burned rock middens are often situated on or near the banks of creeks or large draws.

Burned rock middens also occur in many of the zones in the canyon, but were most numerous on the secondary mesa bench and down the mesa slope to the stream terrace. They are reported at elevations between 2050 and 2720 feet above sea level. The presence of rock suitable for midden construction was probably a major factor in the location of these sites, as we agree with Phil Dering (1999) that it would be much easier to transport materials to be cooked in a midden than to move large numbers of rocks.

A variation of the burned rock midden is the ring midden (also referred to as doughnut middens, circle mounds, cooking mounds, cooking pits, sotol pits, earth ovens, circular middens, midden circles, and mescal pits) that consists of burned limestone fragments concentrated around either a slight or very pronounced central depression. Such middens also vary from twenty to fifty feet in diameter. The thickest portion of the mounded burned rock ring usually occurs to the north or northeast of the central depression. Morphological variations of ring middens in Texas include (1) crescent-shaped ring middens which display a high, thick curve which grades to ground level at each point of the crescent tips, (2) crescent middens with one or more shallow mounded piles of burned limestone rock fragments within the open end of the crescent forming a somewhat circular pattern, (3) a closed ring of burned rock, and (4) a round or oval midden with a central pit indicated only by a flatness or very slight depression on the top.

The general consensus of archeologists with experience at this site type is that ring middens, crescent middens, and other circular burned rock accumulations in southwest Texas functioned as areas of plant processing and baking using an earth oven principle. They are believed to represent, in most cases, the accumulated debris of the exploitation and preparation of certain vegetable matters, primarily yucca and mescal stalks (Moore 1980, 1983). This has been supported by ethnographical studies and archeological evidence (Moore 1980, 1983).

Field school site forms report burned rock middens as large as 2400 square meters. Since many of these sites are found in association with large lithic scatters recorded as separate sites, it seems likely that the size of many of the larger ones is based on data observed over a wider area. The size of site 41CX335, for example, is given on the site form as 2400 square meters! However, the site map clearly shows a midden area within a larger lithic scatter. It appears that the actual burned rock midden is approximately 48 square meters in size. Morphological variations found by TAS personnel include ring, crescent, oval, and circular forms. Few artifacts were found in the actual middens; the majority being scattered around the edge of these sites. Artifacts recovered include dart points, arrow points, oval unifaces, burin struck pieces, miscellaneous tool forms, and debitage.

Lithic Scatters

This site type consists of flint or chert debitage scattered over the ground surface. Some lithic scatters are associated with, or in close proximity to, other site types such as burned rock mounds or middens. Cultural materials commonly observed include debitage, cores, and finished and unfinished tools. The size of this site type may vary from only a few meters to several thousand square meters. Lithic scatters in Musk Hog Canyon are confined to the surface and have little or no depth.

Lithic scatters also tend to occur most often in those zones with the heaviest concentration of burned rock middens. This is indicative of the availability of raw materials in these zones and the presence of other use areas found in association with or near the burned rock middens. Lithic scatters occur between 2000 and 2720 feet elevation, and burned rock scatters are found between 2060 and 2720 feet. The size of lithic scatters varies from three meters[3] at 41CX260 to 6000 square meters at 41CX352. This site type seems to represent localities where Indians tested cobbles of naturally occurring chert exposed on the surface for quality and, in some cases, manufactured or repaired stone tools. Probably most of the chert considered suitable for knapping was transported in the form of cores or blanks to other sites where finished tools were made. Since lithic scatters were often found over large areas in which other site types were recognized, it is difficult to determine accurate boundaries at the level of investigation carried out during the 1976 field school. It may be very difficult, for example, to separate a lithic scatter and a burned rock scatter that occur on the same landform. This problem is illustrated by site 41CX648. At this location, a lithic scatter covers an area of 4225 square meters. Within this area 3 burned rock middens, 1 burned rock scatter, and 7 hearths were observed. Sites defined as burned rock scatters on the site forms vary in size from 2 square meters to 3750 square meters. The smaller examples probably most accurately reflect concentrations of burned rock, while the larger ones combine burned rock with lithic scatters. The site description on the site form for 41CX206 states for example, that this site consists of "burned rock and flint scatter on point of ridge" and is 3750 square meters.

Chipping/Quarrying Sites

These sites occur where ledge flint or nodules of flint or chert are exposed. At these locations, raw material was available for the manufacture of chipped stone tools. Here, flint or chert was quarried and utilized. Lithic debris in the form of cores, flakes, and rough bifaces are common at these sites. Some archeologists may refer to these sites as lithic scatters.

All of the sites identified as chipping/quarrying sites were located in zones 7-12 with none in Zone 9, the Secondary Mesa Margin. They are reported at elevations between 2150 and 2420 feet. Quarrying sites are, of course, restricted to the presence of raw materials suitable for flintknapping. Virtually every location where chert eroded from seams in the limestone and became naturally scattered on the slopes below showed signs of quarrying. Chipping stations may be areas where flint or chert was transported from a quarry to an area to be reduced into stone tools. The fact that the majority of these sites is found in zones of heavy burned rock mound concentrations suggests raw materials were collected from nearby exposures and brought to the site; the manufacture of stone tools was another activity carried out near or at burned rock midden sites. Perhaps tool refurbishing was done while plants were baking in the earth ovens.

Little data regarding site size exists. The sample is small with only 12 sites, and site area figures exist for only five. Of this number, one is 10 square meters, one is 14 square meters, one is 1000 square meters, and two are 3000 square meters. The larger ones, 1000 square meters and larger, may represent vast areas of exposed chert that were utilized to obtain raw materials or represent repeatedly used localities. In these sites, examples of tested cobbles and unfinished tools are common. Sites 41CX346 and 41CX559 are listed as quarries on the site forms, and 41CX305 is described as a working area on a flat bench. The problem of large areas of exposed chert is discussed by Bob Vernon in his field notes for Sector B. He states that the "slopes from elevation 2240 to 2280 were virtually a continuous flint quarry with evidence of testing and collection." In these areas, core reduction was observed in the lithic sample but no indication of "further or more refined knapping" was seen.

Mortar Holes

Mortar holes are areas where grinding or other activities associated with plant processing took place. The repeated action of another rock, usually a rock mortar, into natural bedrock or a limestone boulder created a depression or hole that remains as the only evidence of this activity. This type of site may be represented by a single mortar hole or a cluster of holes of various sizes and depths. They are often found on ledges above streams in close proximity to the mouths of rock shelters, or in rock shelters. Isolated mortar holes or groups of mortar holes are typically recorded as a site; however, when found in rock shelters they may be recorded as a feature of the rock shelter.

At the Eiserer Shelter (41CX133), mortar holes were found along the south wall. These features were on and near a highly polished rock bench. Three mortar holes were noted in front of rock shelter site 41CX595. These features are, of course, restricted to areas where limestone exists that can be used for this activity. Rarely, is a mortar hole found in a boulder or rock that is not part of limestone bedrock. In Musk Hog Canyon, the only multiple occurrence of this site type is along the Secondary Mesa Branch, an area of high site density exhibited by 21 hearths, 22 burned rock mounds, and 22 burned rock scatters. Mortar holes are not large with diameters ranging from 14 to 27 cm. Only three site forms include data regarding depth; 10, 24, and 17 cm. The field journal for Sector A states that six mortar holes were found in a ledge above a midden. They were 15-20 cm in diameter and 25-30 cm deep. One site (41CX591), listed as a mortar hole, is actually a metate in limestone bedrock. The depression of the metate measures .5 x 1 meter. Its depth was not calculated. Mortar hole sites have been located at elevations between 2050 and 2420 feet.

Rock Art

Rock art sites are found on bluffs and overhangs and are sometimes found in rock shelters. At 41CX133, rock art was found in the form of red and yellow monochrome pictographs.

Miscellaneous

One site (41CX531) is listed on the site form as a possible grave. According to the field journal for

Sector A, this site consists of a "slab or rock that was standing upright and looked like a headstone, or could be." It was recorded as a site in the field with the understanding there is no proof that it is a grave site. It was located in the middle of a lithic scatter.

DISCUSSION

It is estimated that 90 percent of the Musk Hog Canyon drainage system was surveyed during the 1976 field school (Shafer and Moore n.d.:1). Based on TAS site forms turned in by the 1976 field school, 513 prehistoric sites (41CX234 - 41CX295; 41CX297 - 41CX683; 41CX685 - 41CX748) were found and added to the archeological record for Crockett County, and one historic site (41CX446) was documented.

Definite patterns emerge from the data regarding sites and their relation to the various topographic zones within the canyon system (Table 1). In topographic zones 8-13, 407 (79 percent) of the 513 recorded prehistoric sites are located. Only one site (41CX240), a burned rock midden, is reported in Zone 2, the Playa Margin. As expected, no sites are present in the playa itself (Zone 3); however, seven sites were recorded in the stream channel (Zone 14). Three of these sites are hearths with two (41CX373 - 41CX374) consisting of burned limestone river cobbles in the river bank and one (41CX427) believed to be a cracked rock hearth of limestone in the wall of the creek bank. Four sites in the stream channel are burned rock middens (41CX369 - 41CX372). Some of these sites may actually belong to the stream terrace (Zone 13) or Inter-Mesa Valley (Zone 15), although Bill Richmond (personal communication to William E. Moore, January 22, 1991) stated that hearths and middens were found on gravel bars in the channel itself. The four burned rock middens are more suspect. Two (41CX369 - 41CX370) are described on the site form as probable middens. All four consist of limestone and river cobbles exposed in the river bank. Scattered lithics at 41CX372 are the only artifacts reported at these sites.

The archeological data from Musk Hog Canyon indicate a wide use of the various landforms and

Table 1. Sites According to Topographic Zone.

Zone	Hearth	Lithic Scatter	Mortar Hole	Rockshelter	Burned Rock Midden	Burned Rock Scatter	Chipping/ Quarrying Station	Historic Site	Possible Grave	Total
01	9	2	–	–	7	7	–	–	–	25
02	–	–	–	–	I	–	–	–	–	1
03	–	–	–	–	–	–	–	–	–	–
04	6	–	–	–	–	–	–	–	–	6
05	–	–	–	13	1	–	–	–	–	14
06	–	–	–	16	–	–	–	–	–	16
07	1	1	–	–	3	–	1	–	–	6
08	21	6	4	–	22	22	2	–	–	77
09	3	2	1	–	4	–	--	–	–	10
10	3	3	–	4	10	3	3	–	–	26
11	20	2	1	–	27	4	5	–	–	59
12	51	7	–	3	25	11	12	1	–	110
13	66	6	1	–	38	14	–	--	–	125
14	3	–	–	–	4	–	–	–	–	7
15	5	1	–	–	7	4	–	–	1	18
00	4	1	1	3	6	1	–	–	–	16
Total	192	31	8	39	165	66	12	1	1	514

natural resources. Virtually every topographic zone was utilized in one form or another. Site types are typical of small bands of prehistoric hunting and gathering groups who foraged for their existence and obtained their food and other materials during seasonal rounds. Excavated sites show that plants were important but not used exclusively. Animals were exploited, and large numbers of mussel shell probably represent another type of food collected during food gathering trips. Based on data from the Lower Pecos region, it is reasonable to expect that the basic subsistence pattern in the Musk Hog Canyon area was practiced by similar groups for at least 5000 years and possibly as long as 9000 years.

Burial practices are not well known, and only one example, consisting of unprovenienced bones on the surface of a rock shelter, was found in the study area.

PART II
LITHIC ANALYSIS
INTRODUCTION

The Musk Hog Canyon lithic assemblage consists of 216 artifacts and 359 pieces of debitage. The artifacts include 22 projectile points, 81 bifaces, 73 unifacially modified flakes, 1 chopper, 1 engraver, 1 gouge, 2 knives, 3 perforators, 9 burin spalls, and 23 cores. These were all surface collected from 62 individual sites. These sites included lithic scatters, quarries, fire-cracked rock scatters, burned rock middens, and rock shelters. Table 2 is a complete listing of these sites and listing of the type of site along with the number and type of artifacts recorded for each.

A discussion of each category is provided with an explanation of the reasons for the methods and conclusions of the analysis performed. In addition, charts and/or tables are provided for each of the appropriate categories.

The procedure for collecting artifacts during the field school was to select only those artifacts considered diagnostic or representative of the site where it was found. This means that only the most obvious artifacts seen by individuals of the survey crew were collected. In some cases, only a small number of representative pieces were selected for collection, leaving the majority on site (Harry Shafer, personal communication to William A. Dickens). Therefore, some bias was created as to what artifacts were selected for collection. This is particularly evident within the debitage sample in which only the large, more obvious flakes were collected. In addition, years of natural factors, such as rock collapse, natural fires, and animal trampling have greatly affected the condition of many of the artifacts. For example, the surfaces of many of the tools have been altered through breakage and soil or wind actions which makes it difficult or near impossible to determine with certainty the type of use-wear present. Finally, probable collecting by hunters and/or artifact collectors has, over time, reduced the number of diagnostics (i.e., projectile points, present at the time of the survey).

All artifacts present in the collection were analyzed. Each artifact included in this analysis was assigned an individual number for reference purposes. These numbers are used in conjunction with the official site numbers when present. An exception is the single *Angostura* point that was not found at a site, but was an isolated find. Therefore, the only reference to this artifact is the individual number, 177.

Projectile Points

There are 22 projectile points that were recovered from 17 different sites in the Musk Hog Canyon survey. Nineteen are identifiable as to type, and three are too fragmented to identify. All are dart points that include the following 13 types: *Angostura, Gower, Bandy, Pandale, Langtry, Val Verde, Palmillas, Conejo, Marcos, Ensor, Figueroa, Frio*, and *Paisano*.

The following is a discussion of the various artifacts that were recovered. Table 3 is a complete listing of the projectile point types by site and chronological age, and Table 4 is a compilation of the metrical measurements for each of the individual projectile point's attributes.

Angostura (N=1, Figure 3a)

The basal portion of a single projectile point identified as *Angostura* was recovered during the surface survey. It has no specific site location but its position when found was recorded as 30E 41' 28" and 101E 47' 25".

The *Angostura* point is a widely distributed form that is found throughout most of Texas. It was first described by Jack Hughes who found it and

Table 2. Site Types and Associated Artifacts.

Site	Site Description	Associated Artifacts
41CX138	Hearth, Fire-Cracked Rock Scatter	1 Edge Modified Flake
41CX168	Rockshelter	2 Bifaces 1 Core 2 Edge Modified Flakes 1 Burin Spall 55 Flakes
41CX169	Rockshelter	1 Edge Modified Flake
41CX176	?	2 Flakes
41CX245	Burned Rock Midden	I Edge Modified Flake
41CX252	Hearth, Fire-Cracked Rock Scatter	1 Biface
41CX254	Rockshelter, Fire-Cracked Rock Scatter	2 Dart Points 8 Flakes
41CX255	Rockshelter, Lithic Scatter	1 Biface 1 Core 2 Edge Modified Flakes 6 Flakes
41CX262	Burned Rock Midden	1 Core
41CX267	Rockshelter, Fire-Cracked Rock Scatter	1 Dart Point 2 Bifaces 1 Core 1 Edge Modified Flake 31 Flakes
41CX279	Burned Rock Midden	2 Bifaces 4 Edge Modified Flakes 24 Flakes
41CX281	Rockshelter, Fire-Cracked Rock Scatter	1 Dart Point
41CX284	Lithic Scatter	1 Biface
41CX291	Lithic Scatter	2 Dart Points 2 Bifaces
41CX294	Burned Rock Midden	1 Edge Modified Flake
41CX305	Lithic Scatter	1 Core
41CX306	Lithic Scatter	1 Edge Modified Flake
41CX316	Burned Rock Midden	1 Edge Modified Flake
41CX338	Rockshelter, Fire-Cracked Rock Scatter	I Core
41CX342	Hearth (Large, Fire-Cracked Rock Scatter)	1 Flake
41CX344	Fire-Cracked Rock Scatter, Lithic Scatter	1 Dart Point 3 Bifaces 5 Cores 2 Edge Modified Flakes

Table 2. *(Continued)*

Site	Site Description	Associated Artifacts
41CX347	Lithic Quarry (Flint Outcrop)	1 Flake
41CX348	Rockshelter, Fire-Cracked Rock Scatter	1 Flake
41CX349	Lithic Scatter (Chipping Station)	1 Biface 2 Edge Modified Flakes 1 Flake
41CX350	Rockshelter (Collapsed)	1 Dart Point 3 Bifaces 1 Edge Modified Flake 24 Flakes
41CX354	Burned Rock Midden, Lithic Scatter	1 Biface 3 Flakes
41CX355	Burned Rock Midden, Lithic Scatter (Small)	1 Flake
41CX359	Rockshelter, Fire-Cracked Rock Scatter	1 Edge Modified Flake
41CX360	Talus Slope (Shelter?)	2 Bifaces 1 Edge Modified Flake 1 Flake
41CX362	Rockshelter, Fire-Cracked Rock Scatter	3 Bifaces 3 Cores 1 Edge Modified Flake 8 Flakes
41CX364	Rockshelter (Series)	3 Dart Points 4 Bifaces 1 Edge Modified Flake 7 Flakes
41CX390	Fire-Cracked Rock Scatter, Hearth	1 Biface
41CX392	Fire-Cracked Rock Scatter, Hearth	1 Biface
41CX394	Burned Rock Midden	1 Dart Point 3 Bifaces 1 Edge Modified Flake 1 Flake
41CX402	Rockshelter (Collapsed), Fire-Cracked Rock Scatter	1 Dart Point 11 Bifaces 3 Cores 18 Edge Modified Flakes 5 Burin Spalls 95 Flakes
41CX405	Lithic Quarry (Flint Outcrop)	7 Flakes
41CX411	Hearths (Multiple), Lithic Scatter	1 Dart Point 1 Core 1 Edge Modified Flake 6 Flakes
41CX428	Burned Rock Midden	3 Bifaces

Table 2. *(Continued)*

Site	Site Description	Associated Artifacts
41CX448	Mortar Holes	1 Biface
41CX456	Fire-Cracked Rock Scatter, Lithic Scatter	1 Flake
41CX464	Hearth	1 Flake
41CX465	Fire-Cracked Rock Scatter	1 Flake
41CX471	Rockshelter and Talus Slope	2 Bifaces 2 Edge Modified Flakes 2 Flakes
41CX473	Hearths (Multiple)	1 Edge Modified Flake
41CX476	Burned Rock Midden, Fire Pit, Fire-Cracked Rock Scatter, Lithic Scatter	1 Dart Point
41CX477	Burned Rock Midden, Lithic Scatter	1 Biface
41CX486	Burned Rock Midden (Destroyed and Scattered)	1 Biface 2 Edge Modified Flakes 1 Flake
41CX488	Lithic Scatter	1 Edge Modified Flake
41CX489	Lithic Chipping Station	2 Flakes
41CX490	Lithic Scatter	2 Edge Modified Flakes 4 Flakes
41CX495	Rockshelter (Partial Collapse), Fire-Cracked Rock Scatter	15 Bifaces 5 Cores 6 Edge Modified Flakes 25 Flakes
41CX502	Hearth (Part of a Series, Site Ws 500-518)	1 Biface
41CX592	Burned Rock Midden	2 Dart Points
41CX600	Burned Rock Midden, Lithic Scatter	1 Edge Modified Flake
41CX611	Burned Rock Midden	1 Dart Point
41CX629	Lithic Quarry	2 Bifaces
41CX630	Rockshelter, Fire-Cracked Rock Scatter	4 Bifaces 6 Edge Modified Flakes 9 Flakes
41CX636	Hearths (Eroded)	1 Biface
41CX642	Rockshelter, Fire-Cracked Rock Scatter	1 Dart Point
41CX670	Burned Rock Midden	1 Core 1 Edge Modified Flake
41CX704	Rockshelter, Lithic Scatter	1 Dart Point 7 Bifaces 1 Core 7 Edge Modified Flakes 2 Burins 15 Flakes

Table 3. Projectile Points by Site and Chronological Period.

Site	Artifact Number	Point Type	Time Period
41CX254	158	Unknown	—
41CX254	159	Marcos	Late/Transitional Archaic
41CX267	160	Langtry	Middle Archaic
41CX281	161	Ensor	Transitional Archaic
41CX291	162	Langtry	Middle Archaic
41CX291	163	Ensor	Transitional Archaic
41CX344	164	Figueroa	Transitional Archaic
41CX402	165	Bandy-Like	Early Archaic
41CX411	166	Pandale	Early Archaic
41CX364	167	Ensor	Transitional Archaic
41CX364	168	Frio	Transitional Archaic
41CX364	169	Val Verde	Middle Archaic
41CX392	170	Paisano	Transitional Archaic
41CX394	171	Palmillas	Middle/Late Archaic
41CX476	172	Ensor	Transitional Archaic
41CX592	173	Conejo	Late Archaic
41CX592	174	Gower	Early Archaic
41CX611	175	Langtry	Middle Archaic
41CX642	176	Frio	Transitional Archaic
41CX?	177	Angostura	Late Paleoindian
41CX704	178	Unknown	—
41CX350	179	Unknown	—

Agate Basin points at the Ray Long site at the Angostura Reservoir in South Dakota in 1948 where he called it the *Long* point (Zimmerman 1985:53-54; Perino 1985:15). Later, it was renamed *Angostura* by Richard Wheeler (1954:1).

These points vary widely and often exhibit extensive re-sharpening which adds to the confusion However, they are typically lanceolate or leaf shaped with straight to slightly convex edges. The base is narrow (contracting) with ground edges and a concave to irregularly straight basal edge. The flake pattern is usually oblique with blade edges that are often beveled or, in many cases, steeply retouched (Suhm and Jelks 1962:167; Perino 1985:15, Turner and Hester 1993:73). *Angostura* points date to the Late Paleo-Indian period and they have been found in Texas to be associated with a deposit dated at 8805"75 B.P. at 41BX831 to a later date of 5484-5328 B.C. from Baker Cave, although the latter date is probably a little recent (Turner and Hester 1993:73).

The remaining basal portion of the Musk Hog example (artifact number 177) is typical of the type. The base has ground edges, is slightly contracting with a concave basal edge, and the small portions of the blade that remain indicate the blade was extensively re-sharpened. It is made of a semi-translucent gray-brown chert whose surface is partially patinated a blotchy gray-white. The current condition of the point is the result of an impact fracture which not only snapped the point in two, but splintered both of the lateral edges.

Table 4. Projectile Point Attributes.

Site	Artifact Number	Point Type	Length (mm)	Basal Width (mm)	Shoulder Thickness (mm)	Juncture Width (mm)	Stem Width (mm)	Width (mm)	Length (mm)	Condition
41CX??	177	Angostura	31.2	20.8	5.7	17.0	23.2	16.8	15.7	Proximal
41CX592	174	Gower	64.8	26.4	7.9	19.1	26.4	20.8	14.2	Whole
41CX402	165	Bandy-Like	31.1	31.3	7.4	18.5		19.3	10.1	Proximal
41CX411	166	Pandale	48.5	21.1	8.4	14.7	21.3	14.1	18.9	Tip Missing
41CX267	160	Langtry	42.7	25.1	4.6	18.7		20.1	11.4	Proximal
41CX611	162	Langtry	45.4	35.2	8.2	10.3	35.2	18.9	19.9	Tip Missing
41CX611	175	Langtry	57.7	37.3	10.9	14.5	37.3	20.3	18.5	Corner(s) Missing/Tip Missing
41CX364	169	Val Verde	51.9	21.9	4.1	14.1	21.9	8.5	16.7	Whole
41CX394	171	Palmillas-Like	33.5	21.4	4.0	12.2	21.4	10.2	9.9	Proximal
41CX592	173	Conejo	31.0	30.0	4.8	17.0	30.0	16.0	8.8	Whole
41CX254	159	Marcos	32.5	35.7	6.3	26.2		22.7	12.2	Proximal
41CX281	161	Ensor	43.3	26.4	6.8	25.0	24.3	16.7	11.6	Corner(s) Missing
41CX291	163	Ensor	32.1	21.7	5.8	21.7	21.7	18.7	9.1	Tip Missing
41CX364	167	Ensor	40.8	18.0	5.6	13.7	18.0	11.2	11.3	Whole
41CX476	172	Ensor	31.5	22.9	6.2	17.9	22.9	15.3	10.8	Corner(s) Missing/ Tip Missing
41CX344	164	Figueroa	31.4	21.0	5.6	13.4	21.0	10.8	10.8	Whole

Table 4. Projectile Point Attributes.

Artifact Site	Point Number	Length Type	Width (m m)	Thickness (m m)	Basal (mm)	Shoulder Width	Juncture Width (mm)	Stem Width (mm)	Length (mm)	Condition (mm)
41CX364	168	Frio	24.9	22.1	4.8	19.5	22.1	13.0	9.3	Proximal
41CX642	176	Frio	42.7	23.2	5.7	17.0	23.2	16.8	9.8	Corner(s) Missing/ Tip Missing
41CX392	170	Paisano	55.3	28.5	7.4	28.3	28.5	22.4	9.1	Whole
41CX254	158	Unknown	30.0	19.8	5.6	–	–	–	–	Proximal/ Corner(s) Missing
41CX704	178	Unknown	26.4	18.3	6.1	–	–	–	–	Distal
41CX350	179	Unknown	31.2	11.7	4.3	–	–	–	–	Other

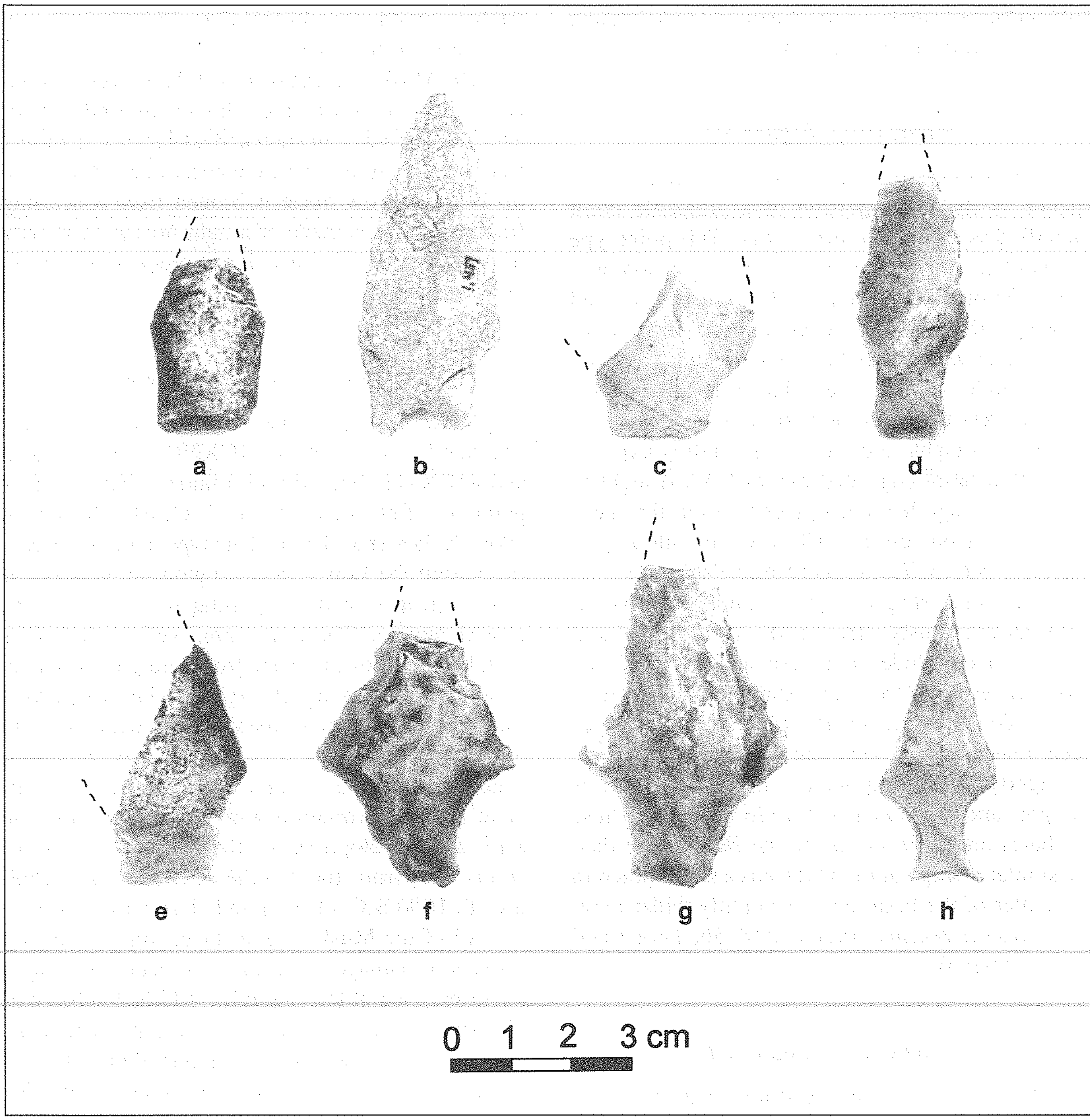

Figure 3. Dart Points: (a) *Angostura;* (b) *Gower;* (c) *Bandy*-Like*;* (d) *Pandale*; (e-g) *Langtry*; (h) *Val Verde.*

Gower (N=1, Figure 3b)

This artifact is a complete point and was found at 41CX592, a burned rock midden. *Gower* points are found in central and south central Texas (Hester 1980:100-101; Turner and Hester 1993:128) and were first described by Harry Shafer (1963:64, 72) at the Youngsport site. This type is characterized as a crudely made point with straight to convex blade edges, a short parallel-edged stem, and a deep concave basal edge made by flake removals from one side (Turner and Hester 1993:128). Some confusion and controversy exists concerning this type dealing primarily with type variants. Perino (1985:154), for example, reports six variations and that many re-sharpened points often resemble worn-out *Pedernales* points. The age of *Gower* points, however, have been assigned to the Early Archaic period between 6000 B.C. to 4050 B.C. (Perino 1985:154; Turner and Hester 1993:128).

Other than a slightly longer blade, the Musk Hog Canyon example (41CX592-174) is fairly typical of the type description. It is made of a grainy gray-white chert and not as crudely made as some, although the slightly patinated surface is covered with numerous small step fractures, and one shoulder is more prominent than the other.

Bandy (N=1, Figure 3c)

This artifact recovered from 41CX402, a rock shelter, is the basal portion of a projectile point identified as a *Bandy* or *Bandy*-like. This point type is found in the Lower Pecos region of southern Texas (Turner and Hester 1993:78). It is described as being a thin corner-notched point having a triangular blade with edges that may be concave, convex, straight, or re-curved. The barbs are strong with notches that may be narrow V-shaped or U-shaped to straight, and the base is slightly expanding with a basal edge that ranges from straight to concave. Its age has been placed within the Early Archaic period, circa 5050 B.C. to 4000 B.C. (Perino 1991:15; Turner and Hester 1993:78).

The Musk Hog Canyon example (41CX402-165), as previously mentioned, is only the basal portion that includes the base and most of one shoulder resulting from a bending or snap fracture. It is made of a white chert with a surface that has been polished from wind and soil action. The base is slightly expanding with a basal edge that is straight, and the notch is a wide U-shape. These attributes are more similar to the *Bandy* type than the similar *Conejo* point which has a slight notch in the center of the basal edge, a slightly wider base, and narrower notches (Perino 1991:56; Turner and Hester 1993:96).

Pandale (N=1, Figure 3d)

This example, recovered from 41CX411, a site composed of multiple hearths and a lithic scatter, is a dart point with its distal tip missing and is identified as a *Pandale* point. *Pandale* points were first described in 1954 by Suhm, Krieger, and Jelks (1954) and named by J. Charles Kelley. They are found within the Pecos-Rio Grande confluence area, and decrease towards central Texas (Suhm and Jelks 1962:231). These points are characterized by having blades that are "twisted" from the opposite beveling of the blade and stem. Shoulders are angular to rounded, the base is straight to slightly expanding with basal edges that may be convex to concave (Perino 1985:288). Suhm and Jelks (1962:231) first dated the *Pandale* point at 2000 B.C. to A.D. 700 or 800, but currently it is placed within the Early Archaic period, circa 4000 B.C. to 2500 B.C. (Turner and Hester 1993:168).

The Musk Hog example (41CX411-166) is typical of the type, having the "classic" twisted appearance of the blade and stem and a slightly expanding base with a slightly concave basal edge. The distal tip of the narrow blade is broken from a bending fracture, and it is made of a light brown chert with its surface partially discolored reddish-pink from exposure to heat.

Langtry (N=3, Figures 3e-g)

These examples were recovered from sites 41CX267 (rock shelter), 41CX291 (lithic scatter), and 41CX611 (burned rock midden). The *Langtry* point was first identified by J. Charles Kelley in 1940 (Kelley et al. 1940). This type is found primarily within the Lower Pecos region but may occur less frequently in the adjoining south and south-central regions. These are thin, well made points with blade edges that vary from straight, concave, to re-curved, having strong, angular, to barbed shoulders. The stem is tapered, often with alternate beveling, terminating in a slightly beveled basal edge that may be straight or concave; however, there is much variation with its proportions, the base, and development of the shoulders. *Langtry* points date from the Middle Archaic, circa 2500 B.C. to 1000 B.C. (Turner and Hester 1993:143).

All of the Musk Hog artifacts contain varying degrees of damage resulting from bending or snap fractures. Two of the examples (41CX291-162 and 41CX611-175) are typical of the type with contracting stems and strong angular shoulders, although both are somewhat thick and crude. The third artifact (41CX267-160) is thin and well made but is less typical having a wider base and less prominent shoulders. Artifacts 41CX291-162 and 41CX611-175 are made of gray-brown chert with slightly patinated surfaces, and 41CX267-160 is made of a yellow-brown/light gray-brown mottled chert with its surface colored pinkish-red from exposure to heat.

Val Verde (N=1, Figure 3h)

This complete artifact was recovered from 41CX364. *Val Verde* points were first described by Mardith K. Scheutz (1956:141) from excavations at the Shumla caves in Val Verde County. This point type is found in the Lower Pecos, lower Rio Grande, and Coahuila, Mexico regions. It is a thin point, similar to the *Langtry* type that has a triangular blade with straight to slightly concave or recurved edges, an expanding stem with broad concave sides that extend from the shoulder to the base, and a straight to concave basal edge. The sides of the stem are often alternately beveled. The age of this type has been placed in the Middle Archaic, circa 2500 B.C. to 1000 B.C. (Perino 1991:234; Turner and Hester 1993:192).

The Musk Hog example (41CX364-169) is complete and is a very well made example typical of this type. It contains a nice "needle" tip; the stem is formed by the typical broad concavities, the sides are alternately beveled, and the basal edge is concave. It is made of a nice grade of yellow-brown chert that exhibits little of the natural influences such as patina or wind and soil polishing.

Palmillas-like (N=1, Figure 4a)

This point was found at 41CX394, a burned rock midden. The *Palmillas* point was named by Richard MacNeish from artifacts found in northeastern Mexico and described by Suhm, Krieger, and Jelks (1954:462). In Texas, *Palmillas* points are found from East Texas south to the Coastal Plain and west to the Lower Pecos region and, finally, into northeastern Mexico. They are characterized as being leaf-shaped; the blade has straight to convex edges, obtuse to strongly barbed shoulders formed by shallow notches, and a stem that is rounded, almost bulbous. They date from the Middle to Late Archaic (Perino 1985:287; Suhm and Jelks 1962:229; Turner and Hester 1993:167).

The Musk Hog Canyon example (41CX394-171) is a small point that has both the distal tip and part of its stem and one shoulder broken off.

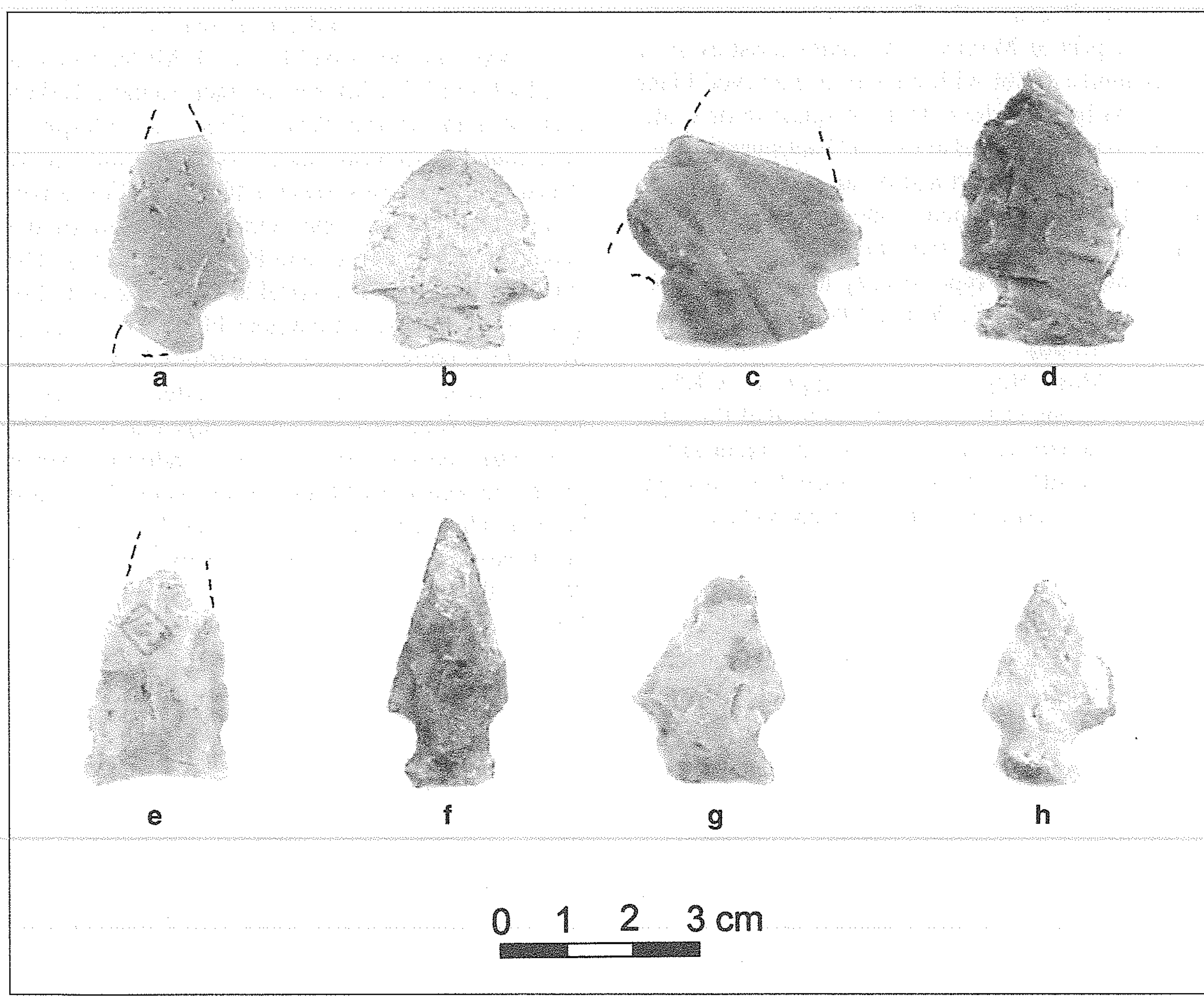

Figure 4. Dart Points: (a) *Palmillas*-Like; (b) *Conejo*; (c) *Marcos*; (d-g) *Ensor*; (h) *Figeueroa*.

The one undamaged shoulder is strongly barbed, and the remainder of the stem is slightly bulbous. Although the blade appears to be shorter than the type description suggests, the other characteristics support a similarity to the *Palmillas* type. Considering the damage and the various attributes noted on the remaining portion, it is believed that a *Palmillas-like* designation is more appropriate. Interestingly, it is made of a light colored quartzite that has a slight pinkish-red color that is a result from exposure to heat.

Conejo (N=1, Figure 4b)

This small point was recovered from 41CX592, a burned rock midden, and has been identified as a *Conejo type*. These points were first described by LeRoy Johnson, Jr. (1964:32-33) from artifacts found at the Devil's Mouth site in the Amistad Reservoir in Val Verde County. They are found in the Lower Pecos to the Big Bend region and the adjacent part of Mexico. The characteristics are a subtriangular point with convex to recurved blade edges, barbed shoulders that are squarish or sometimes rounded and tend to be at a "backswept angle," and the stems are short and broad, slightly expanding with a shallow notch in the center of the basal edge. They date from the Middle to the Late Archaic based on the type locality at Devil's Mouth (Johnson 1964:32-33; Perino 1991:56; Turner and Hester 1993:96).

The Musk Hog Canyon example (41CX592-173) is a classic example, and is typical of the type. It is a complete well made point. The material is a light gray-white chert with a surface that is a slight pinkish color resulting from exposure to heat.

Marcos (N=1, Figure 4c)

The basal portion of a point identified as a *Marcos* type was found at site 41CX254, a rock shelter and fire-cracked rock scatter. The *Marcos* point was first described by Suhm, Krieger, and Jelks (1954:442). This type is found from the Lower Pecos throughout Central Texas to the middle Brazos River Valley and from the central coastal plain into South Texas. This is a broad triangular point with straight, slightly convex or recurved blade edges, deep corner notches formed by notches cut inward from the corners, strong barbs, and an expanding stem that is short and broad with a slightly convex basal edge. It dates from the Late to Transitional Archaic, circa 600 B.C. to A.D. 200 (Perino 1985:240; Suhm and Jelks 1962:209; Turner and Hester 1993:147-148).

The example from Musk Hog Canyon (41CX254-159) is the basal portion resulting from a bending or snap fracture. One shoulder is missing, and the other is damaged. The stem is short and broad, expanding and with notches that are cut from the corners. It is made of a light gray-brown chert that has parts of its surface and edges colored pink from heat exposure.

Ensor (N=4, Figures 4d-g)

Four examples of *Ensor* points were found at sites 41CX281 (rock shelter and fire- cracked rock scatter), 41CX291 (lithic scatter), 41CX364 (a series of rock shelters), and 41CX476 (a multiple site composed of a burned rock midden, a fire pit, fire-cracked rock scatter, and a lithic scatter). The *Ensor* point was first described by E. O. Miller and Edward Jelks (1952:172) from artifacts found at Belton Reservoir in Central Texas. This is a widespread type found in Central Texas, south into the Lower Pecos, and decreases towards the Guadalupe River and eastward to the upper Sabine River (Suhm and Jelks 1962:189; Turner and Hester 1993:114). The *Ensor* type is a highly variable form that is distinguished by having a triangular blade with straight to slightly convex edges, corner-notched to side-notched with a broad stem that often expands as wide as the shoulders and a basal edge that is straight to slightly concave or convex. In addition, some projectile points resembling Ensors have a V-shaped basal notch and are sometimes called "*Ensor-Frios*" or "Frensors," a term often used by collectors. It dates to the Late to Transitional Archaic, circa 1000 B.C. to A.D. 600-1000 (Perino 1985:125; Suhm and Jelks 1962:189; Turner and Hester 1993:114).

The four Musk Hog examples (41CX281-161, 41CX291-163, 41CX364-167, 41CX476-172) are typical examples. All are slightly damaged, with damage limited to the distal tips (impact fracture) and ends of the barbs. These are small to medium sized points with side notches. The bases on 41CX291-163 and 41CX476-172 have slightly convex basal edges, and 41CX281-161 and 41CX364-167 are straight. Artifacts 41CX364-167 and 41CX476-172 are made of a light gray-brown chert, 41CX281-161 from a darker gray-brown chert, and

41CX291-163 is of a light gray-white chert. Impact fractures are evident on 41CX281-161, 41CX291-163, and 41CX476-172 as well as some surface and edge coloring due to exposure to heat present on 41CX291-163 and 41CX476-172.

Figueroa (N=1, Figure 4h)

A single example of the *Figueroa* type was recovered from site 41CX344, a fire-cracked rock and lithic scatter. This point type was first described by LeRoy Johnson (1964:36-37) from examples found at the Devil's Mouth site at Amistad Reservoir in Val Verde Count. They are small triangular points with broad side notches that may be shallow to as deep as they are wide, strong barbs, straight to convex blade edges. The point has an expanding stem with a basal width often as wide as the shoulders and straight to convex basal edges. They date to the Transitional Archaic, circa 200 B.C.- A.D. 600 (Perino 1991:76; Turner and Hester 1993:118).

The Musk Hog Canyon example (41CX344-164) is fairly typical of the type, differing only in the basal width which is slightly less than its shoulder width. It is made of a light gray-white chert and contains no evident damage other than minor soil and wind abrasion.

Frio (N=2, Figure 5a-b)

Two dart points, examples of the *Frio* type, were recovered from sites of 41CX364, a series of rock shelters, and 41CX642, a rock shelter and lithic scatter. This point type was first named by J. Charles Kelley (1947:124) from artifacts collected at the Lehmann Rock Shelter who called it the "*Frio Flared*

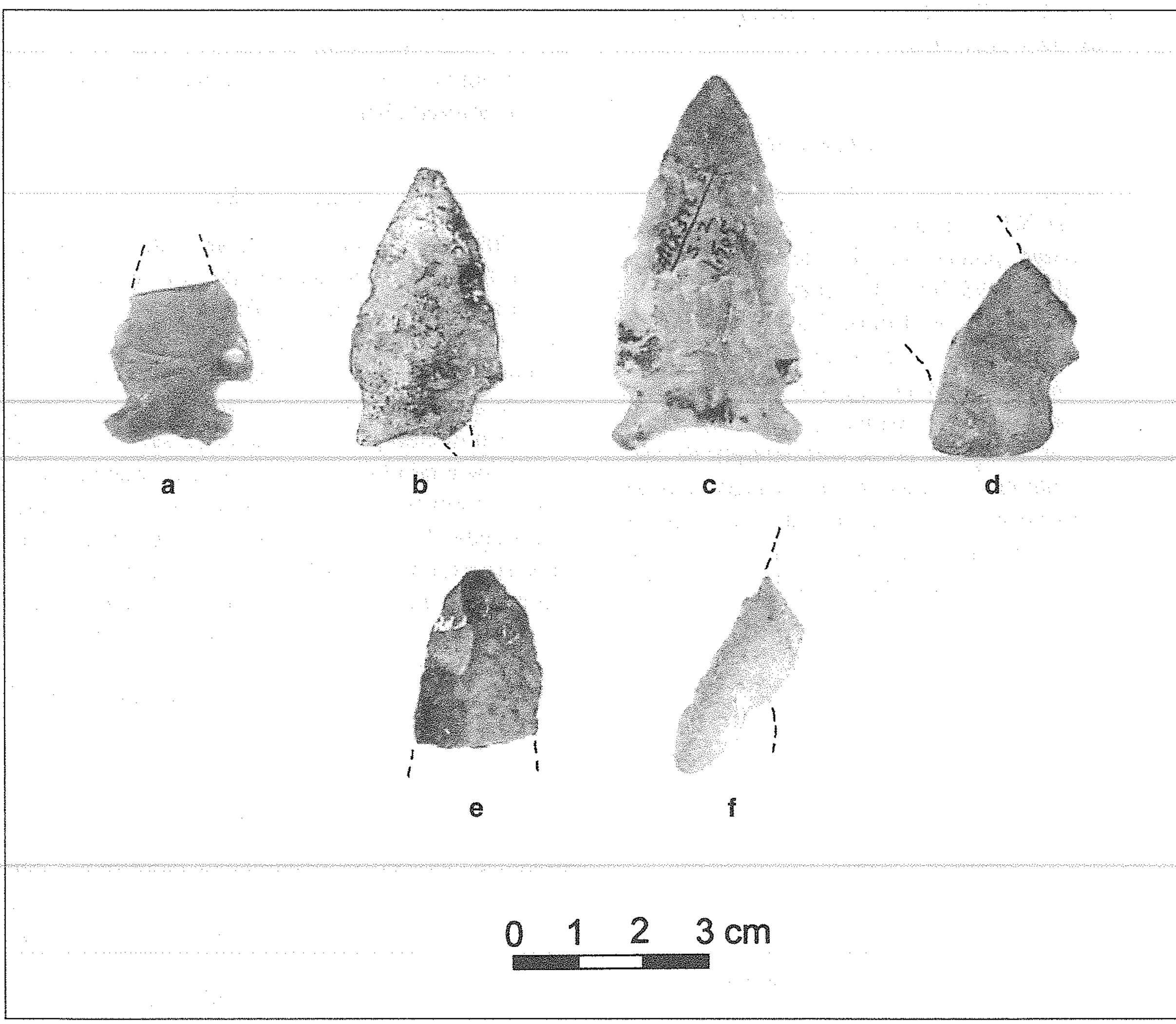

Figure 5. Dart Points: (a-b) *Frio*; (c) *Paisano*; (d-f) Unknown.

Stem." This is a widespread type being found from the Lower Pecos into south and central Texas. It is characterized as a triangular point having a short, widely expanding stem with a prominent recurved basal edge and rounded corners. The blade edges are straight to slightly convex with wide side notches or corner notches and angular to barbed shoulders. They date from the Transitional Archaic, circa 200 B.C. to A.D. 600 or later (Suhm and Jelks 1962:195; Perino 1985:140; Turner and Hester 1993:122).

The Musk Hog Canyon examples (41CX364-168, 41CX642-176) are typical of the type. Both have the recurved basal edge and rounded corners with deep side notches. The barbs are very prominent on 41CX364-168 and less so on the 41CX642-176 artifact. Number 41CX642-176 is complete, while 41CX364-168 has suffered an impact fracture. Number 41CX364-168 is made of a light brown chert heavily polished from soil and wind erosion, and 41CX642-176 is made of a mottled light gray-dark gray chert.

Paisano (N=1, Figure 5c)

A single dart point of the *Paisano* type was found at 41CX392, a fire-cracked rock scatter and hearth. *Paisano* points were first described by Thomas C. Kelly (1963:203-205) from artifacts found during excavations at Roark Cave in Brewster County, Texas. This type occurs throughout the Trans-Pecos and Big Bend regions. This is another variable form, but it is typically characterized as being a long triangular point with straight to convex edges that may or may not be serrated, shallow with almost no side notches, and a deep concave or U-shaped basal edge with "eared" or rounded corners. It dates to the Transitional Archaic, circa 200 B.C. to A.D. 600-800 (Suhm and Jelks 1962:227; Perino 1991:159; Turner and Hester 1993:165).

The Musk Hog Canyon example (41CX392-170) is nicely made and is typical of the type. The side notches are deep to shallow, and the basal edge is concave. No damage is apparent, and it is made of a yellow-brown and dark gray mottled chert with some surface reddening resulting from heat exposure.

Unknown Types (N=3, Figure 5d-f)

Three fragmented artifacts (41CX254-158, 41CX350-179, 41CX704-178) that cannot be typed were recovered from sites 41CX254 (rock shelter and fire-cracked rock scatter), 41CX350 (collapsed rock shelter), and 41CX704 (rock shelter and lithic scatter). Artifact 41CX254-158 is a severely burned and heat spalled example. Both lateral edges, including one entire shoulder and part of the other, are missing. The remainder of the basal portion resembles the *Bandy* or *Conejo* types, but not enough remains to be certain. It is made of a yellow-brown chert, but the surface is almost totally colored red from the heat.

Number 41CX350-179 is the shoulder of a deep, notched point, such as occurs on the *Castroville* type, and measures 14.1 mm in length. It is made from a yellowish chert that has been turned a pinkish-red color from exposure to heat.

Number 41CX704-178 is the distal portion. The tip contains a twisted appearance from opposite edge beveling that is similar to *Pandale* points, but this could also have occurred from the re-sharpening of some other form. It has been heavily discolored from heat, but it appears to have been made of a dark colored chert.

Bifaces (N=81)

This category includes those artifacts that represent the various reductive stages of bifacial tool manufacture. A biface is defined as a stone implement that has been flaked from opposing surfaces (Sanders 1990:19) or flaked from the edge onto both faces of a cobble, tab, or flake. During bifacial tool manufacture, the raw material, such as a chert cobble or a tabular piece of chert, is shaped into a desired form by passing through a series of reductive stages. These stages are assigned, in the simplest type sequence, as Biface I or flake blank (Figure 6a-c), Biface II or edged biface (Figure 6d-g), Biface III or thinned biface (Figure 7a-d), Biface IV or preform (Figure 7e-j), and the finished form. Often, material flaws (knapping failures such as severe hinge and step terminations and breakage) may occur at any one of these stages resulting in the cessation of further reduction (Andrefski 1998:31). Not all reductive strategies follow this sequence, and occasionally one or more stages can be skipped. If, for instance, a large and relatively thin macroflake was selected as the beginning blank, initial thinning may be sufficient to bring the biface rapidly to a later stage. This would effectively eliminate a thicker middle stage that would have to be dealt with if a thick cobble or tab were selected. In

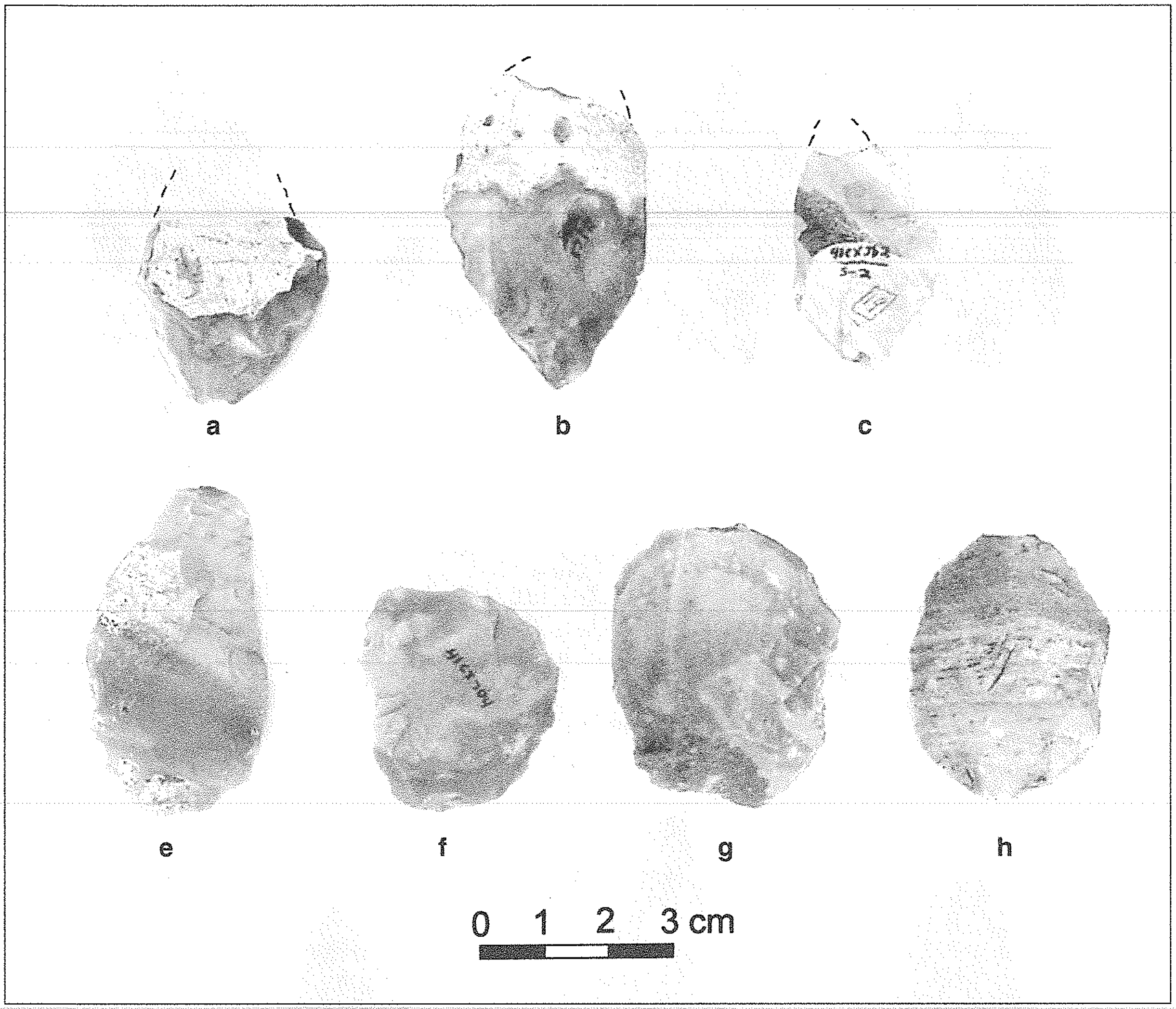

Figure 6. Bifaces: (a-c) Biface Stage I; (d-g) Biface Stage II.

addition, some other tool forms may be selected from one or more of these stages.

Each artifact was examined for its stage of reduction, possible reason for abandonment, and possible use-related wear. Each stage and the associated bifaces are described below, and a listing of the various metric measurements recorded is provided in Table 5.

Biface I (N=3, figure 6a-c)

This category represents the first or initial stage of reduction in which artifact shape has not been altered much beyond the original form of the flake blank. Archeologically, this is the earliest stage that can be reliably defined; however, it is often difficult to determine what the knapper intended to make unless a complete sequence of worked and unfinished pieces is found with examples of the finished product (Whittaker 1994:201).

Primary modification during this stage is often restricted to the lateral margins (sides) or the removal of nonconformities, such "humps" or projections. In addition, the knapper must always be aware of material flaws, such as cracks, inclusions, or damage from natural influences, such as fire. If it is determined that such problems cannot be overcome, reduction ceases, and the material is discarded. Flake scars are often deep and randomly oriented, indicating flake removal by hard-hammer percussion. Cortex is often left on one or more surfaces, and the presence of this cortex can aid in determining whether the original blank was a flake or nodule. In sum, much reduction at this stage is oriented toward removal of cortex, initial shaping and evaluating, and/or the removal of any material flaws.

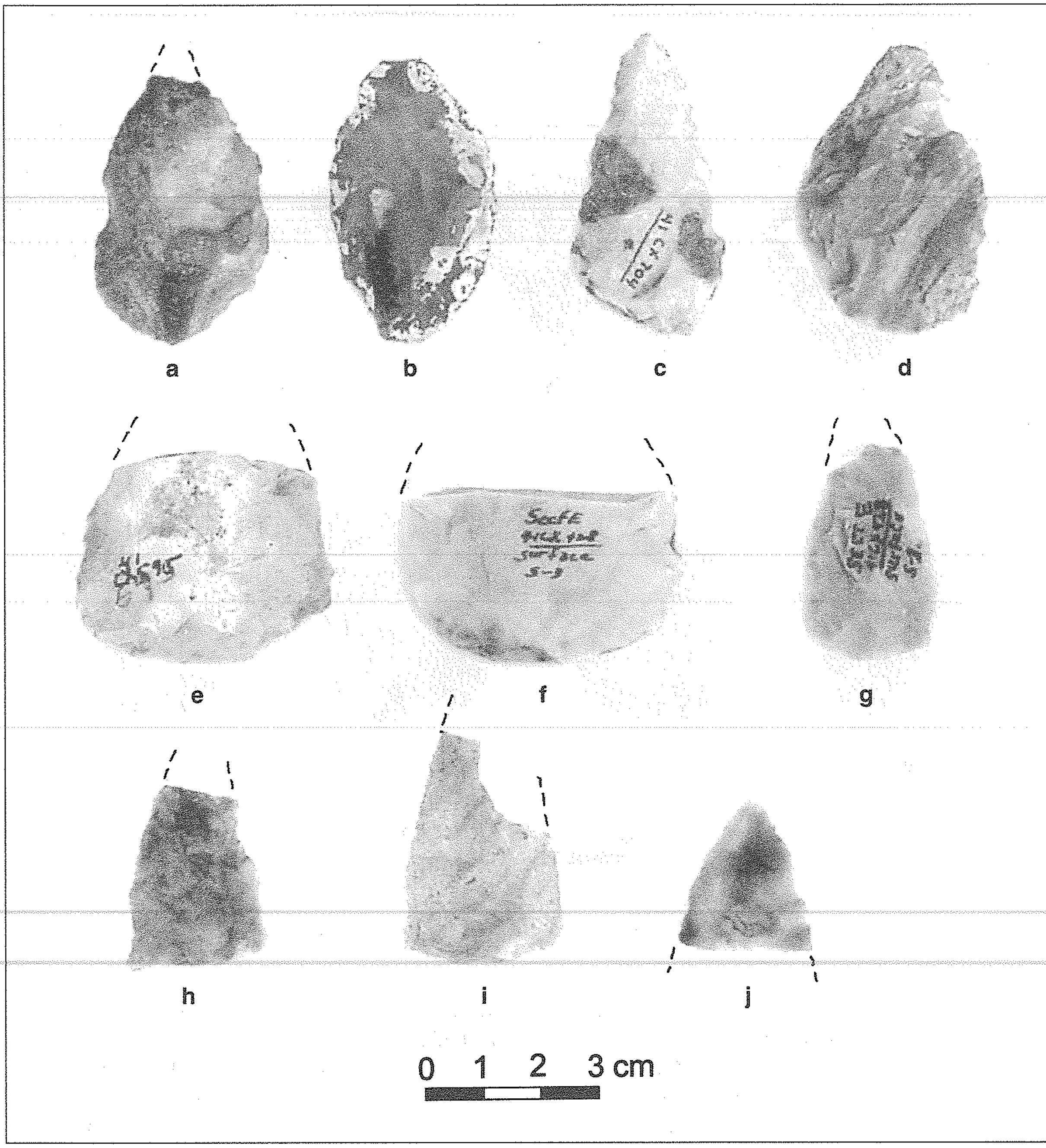

Figure 7. Bifaces: (ad) Biface State III; (e-j) Biface Stage IV.

Three Biface I examples were recovered (Table 5), all from different sites: 41CX362 (41CX362-19), 41CX350 (41CX350-14), and 41CX595 (41CX595-137). Number 41CX595-137 is complete and is made on a small cobble. It still retains some cortex on one end, and all remaining cortex has been removed by several large flakes. Some of these flakes ended in severe hinge fractures resulting in a stacked ridge. This is the probable reason for its abandonment. The other two are both broken from snap fractures. Number 41CX350-14 is made on a small chert cobble, while 41CX362-19 is made on a naturally spalled fragment of a piece of tabular chert. Only 41CX362-19 does not show effects from heat exposure.

Biface II (N=25, Figure 6d-g)

Biface II artifacts represent more advanced reduction in thinning and overall shaping than Biface I

Table 5. Biface Attributes.

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX252	1	40.7	25.4	8.8	Bi-Convex	Percussion Overface*	Unknown	None	Medial	None	IV
41CX255	2	32.8	29.7	9.6	Piano-Convex	Percussion Overface	Unknown	None	Proximal	None	II
41CX267	3	58.5	47.8	18.0	Plano-Convex	Percussion Overface	Ovoid	One Face	Complete	None	II
41CX279	4	48.9	34.6	10.6	Plano-Convex	Percussion Overface	Ovoid	None	Proximal	None	III
41CX279	5	50.0	39.5	10.9	Bi-Convex	Percussion Overface	Ovoid	One Face	Medial/ Proximal	None	III
41CX284	6	47.7	34.6	13.9	Bi-Convex	Percussion Overface	Eccentric	None	Medial/ Proximal	None	III
41 CX291	7	46.9	28.3	6.6	Bi-Convex	Percussion Overface	Triangular	None	Medial/ Distal	None	IV
41CX291	8	24.7	37.3	7.4	Plano-Convex	Percussion Overface	Unknown	None	Proximal	None	III
41CX344	9	40.9	28.0	8.8	Bi-Convex	Random Percussion/ Pressure	Eccentric	None	Medial/ Proximal	None	IV
41CX344	10	70.1	41.7	15.6	Bi-Convex	Percussion Overface	Unknown	None	Complete	None	II
41CX344	11	19.9	24.6	7.0	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Proximal	None	IV

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX350	12	55.1	33.9	20.0	Bi-Convex	Percussion Overface	Eccentric	One Face	Medial/ Proximal	None	II
41CX350	13	48.1	25.6	12.0	Bi-Convex	Percussion Overface	Unknown	None	Unknown	Color Change Both Sides	II
41CX350	14	39.6	41.9	12.7	Plano-Convex	Percussion Overface	Ovoid	One Face	Proximal	Pot-Lidded or Crazed	I
41CX354	15	36.0	31.9	11.2	Plano-Convex	Percussion Overface	Lanceolate	One Face	Medial/ Proximal	None	II
41CX360	16	33.2	33.6	7.4	Plano-Convex	Percussion Overface	Unknown	None	Distal	None	III
41CX360	17	42.7	28.4	9.0	Plano-Convex	Random Percussion/ Pressure	Ovoid	None	Medial/ Proximal	None	II
41CX362	18	41.9	45.6	14.5	Plano-Convex	Percussion Overface	Ovoid	One Face	Proximal	None	II
41CX362	19	50.8	31.0	17.7	Plano-Convex	Percussion Overface	Unknown	One Face	Medial/ Proximal	None	I
41CX362	20	15.7	23.6	6.8	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Proximal	None	IV
41CX363	21	52.8	24.5	6.1	Bi-Convex	Random Percussion/ Pressure	Triangular	One Face	Complete	None	IV
41CX364	22	53.8	30.9	12.8	Bi-Convex	Percussion Overface	Ovoid	None	Complete	Pot-Lidded or Crazed	I

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX364	23	57.5	32.2	10.5	Bi-Plano	Random Percussion/ Pressure	Ovoid	None	Lateral	None	IV
41CX364	24	40.5	37.6	8.7	Bi-Plano	Random Percussion/ Pressure	Unknown	None	Proximal	None	IV
41CX390	25	54.0	34.5	9.1	Bi-Convex	Random Percussion/ Pressure	Ovoid	One Face	Medial/ Distal	Color Change Both Sides	IV
41CX394	26	34.1	26.7	6.5	Plano-Convex	Random Percussion/ Pressure	Triangular	None	Distal	None	III
41CX394	27	35.9	24.2	6.3	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Medial/ Proximal	Color Change Both Sides	IV
41CX394	28	28.7	18.5	6.1	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Medial/ Proximal	Color Change Both Sides	IV
41CX402	29	32.8	36.6	11.0	Plano-Convex	Random Percussion/ Pressure	Unknown	None	Proximal	None	II
41CX402	30	34.3	24.8	6.7	Plano-Convex	Random Percussion/ Pressure	Unknown	None	Proximal	None	II
41CX402	31	32.6	27.8	7.9	Bi-Convex	Random Percussion/ Pressure	Unknown	None	Medial	Pot-Lidded or Crazed	IV

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX402	32	21.7	25.8	4.7	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Proximal	Partial Surface or Edge Coloring	IV
41CX402	33	39.5	34.3	9.1	Piano-Convex	Random Percussion/ Pressure	Unknown	None	Medial/ Proximal	Partial Surface or Edge Coloring	III
41CX402	34	27.0	34.7	11.3	Plano-Convex	Percussion Overface	Ovoid	One Face	Proximal	Pot-Lidded or Crazed	II
41CX402	35	30.8	42.3	12.5	Bi-Convex	Percussion Overface	Ovoid	None	Medial/ Proximal	Partial Surface or Edge Coloring	III
41CX402	36	44.0	34.0	9.7	Bi-Convex	Percussion Overface	Ovoid	None	Medial/ Distal	Partial Surface or Edge Coloring	III
41CX402	37	72.8	47.2	15.2	Bi-Convex	Percussion Overface	Ovoid	None	Complete	Pot-Lidded or Crazed	II
41CX428	38	32.2	50.5	8.3	Bi-Plano	Random Percussion/ Pressure	Ovoid	None	Proximal	None	IV
41CX428	39	37.3	24.1	7.2	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Medial/ Proximal	None	IV
41CX428	40	32.4	25.8	4.7	Bi-Convex	Random Percussion/ Pressure	Unknown	One Face	Medial	Partial Surface or Edge Coloring	IV
41CX448	41	78.7	45.6	17.3	Bi-Convex	Percussion Overface	Ovoid	None	Medial/ Distal	None	II

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX471	42	70.0	41.4	17.3	Bi-Convex	Percussion Overface	Triangular	None	Complete	None	II
41CX477	43	55.6	35.0	9.0	Plano-Convex	Random Percussion/ Pressure	Ovoid	None	Complete	None	III
41CX486	44	55.6	43.0	12.7	Plano-Convex	Percussion Overface	Lanceolate	None	Complete	None	II
41CX471	45	37.2	17.8	7.3	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Complete	Partial Surface or Edge Coloring	III
41CX502	46	26.1	26.1	5.8	Plano-Convex	Percussion Overface	Unknown	None	Medial	Pot-Lidded or Crazed	III
41CX595	48	51.2	49.2	15.9	Plano-Convex	Percussion Overface	Triangular	One Face	Distal	Partial Surface or Edge Coloring	II
41CX595	49	28.5	49.1	10.9	Plano-Convex	Percussion Overface	Ovoid	None	Proximal	Color Change Both Sides	III
41CX595	50	47.8	43.2	13.7	Undetermined	Percussion Overface	Ovoid	One Face	Medial/ Proximal	Pot-Lidded or Crazed	II
41CX595	51	53.3	32.0	11.8	Plano-Convex	Percussion Overface	Ovoid	One Face	Complete	Color Change Both Sides	III
41CX595	52	39.2	46.9	7.1	Bi-Plano	Random Percussion/ Pressure	Triangular	None	Proximal	Color Change Both Sides	IV

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX595	53	27.5	23.7	4.3	Bi-Convex	Random Percussion/ Pressure	Triangular	None	Distal	None	IV
41CX595	54	33.0	30.8	7.2	Bi-Convex	Random Percussion/ Pressure	Triangular	None	Distal	Pot-Lidded or Crazed	IV
41CX595	55	31.2	25.4	8.7	Plano-Convex	Random Percussion/ Pressure	Triangular	None	Distal	Pot-Lidded or Crazed	III
41CX595	56	40.5	26.4	7.2	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Medial/ Proximal	Partial Surface or Edge Coloring	IV
41CX595	57	46.5	22.7	7.2	Plano-Convex	Random Percussion/ Pressure	Triangular	None	Complete	Partial Surface or Edge Coloring	IV
41CX629	58	28.0	26.6	5.5	Bi-Convex	Random Percussion/ Pressure	Triangular	None	Medial	Partial Surface or Edge Coloring	IV
41CX629	59	47.5	37.8	7.4	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Complete	Color Change Both Sides	IV
41CX630	60	42.8	27.3	7.9	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Complete	Color Change Both Sides	IV

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX630	61	58.0	36.0	9.1	Bi-Convex	Random Percussion/ Pressure	Triangular	One Face	Distal	None	IV
41CX630	62	37.9	31.4	15.9	Bi-Convex	Percussion Overface	Lanceolate	None	Complete	None	II
41CX636	63	61.2	37.7	15.6	Bi-Convex	Percussion Overface	Ovoid	None	Complete	None	II
41 CX704	64	49.8	40.3	12.6	Plano-Convex	Percussion Overface	Lanceolate	None	Complete	None	II
41CX704	65	46.7	41.2	12.5	Plano-Convex	Percussion Overface	Lanceolate	One Face	Complete	None	II
41CX704	66	76.0	34.6	11.0	Bi-Plano	Percussion Overface	Ovoid	None	Lateral	Pot-Lidded or Crazed	III
41CX704	67	28.5	41.1	9.9	Plano-Convex	Percussion Overface	Ovoid	One Face	Proximal	None	II
41 CX704	68	41.3	28.8	5.8	Bi-Convex	Random Percussion/ Pressure	Ovoid Crazed	One Face	Medial	Pot-Lidded or	IV
41 CX704	69	48.4	33.6	10.4	Bi-Convex	Random Percussion/ Pressure	Eccentric Crazed	None	Proximal	Pot-Lidded or	III
41CX704	70	58.0	28.1	7.7	Bi-Convex	Random Percussion/ Pressure	Ovoid	One Face	Complete	None	III

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX349	71	24.2	25.5	8.2	Bi-Convex	Random Percussion/ Pressure	Ovoid	None	Proximal	None	III
41CX595	133	69.6	39.0	11.5	Plano-Convex	Random Percussion/ Pressure	Ovoid	One Face	Complete	Partial Surface or Edge Coloring	II
41CX595	134	36.4	34.3	8.5	Plano-Convex	Random Percussion/ Pressure	Unknown	None	Proximal	Edge Spatting	III
41CX595	135	55.3	38.5	7.5	Bi-Plano	Random Percussion/ Pressure	Ovoid	One Face	Other	Edge Spatting	II
41CX595	136	42.0	16.7	6.3	Bi-Convex	Random Percussion/ Pressure	Unknown	None	Lateral	Edge Spatting	IV
4 1 CX595	137	60.5	43.7	24.6	Bi-Convex	Percussion Overface	Ovoid	Both Faces	Complete	Pot-Lidded or Crazed	I
41CX168	183	30.6	22.3	6.5	Undetermined	Percussion Overface	Unknown	None	Medial	Edge Spalling	IV
41CX267	184	44.0	16.7	7.1	Undetermined	Random Percussion/ Pressure	Unknown	None	Lateral	Edge Spalling	III
41CX402	185	30.9	23.6	5.4	Bi-Convex	Random Percussion/ Pressure	Unknown	None	Medial	Edge Spalling	IV

Table 5. *(Continued)*

Site	Artifact Number	Maximum Length (mm)	Maximum Width (mm)	Maximum Thickness (mm)	Cross-Section	Flaking Technique	Shape	Presence of Cortex	Condition	Evidence of Heating	Biface Stage
41CX630	186	28.8	18.7	8.1	Bi-Convex	Random Percussion/ Pressure	Unknown	None	Lateral	Edge Spalling	III
41CXI68	187	46.1	49.6	13.9	Plano-Convex	Percussion Overface	Unknown	One Face	Distal	None	II
41CX402	195	65.3	50.2	14.4	Bi-Plano	Percussion Overface	Triangular	Both Faces	Complete	Partial Surface or Edge Coloring	II

*Percussion flaking over one or more surfaces.

artifacts. Flake scars are still basically random, but are generally oriented toward an intentional bifacial form. The intention at this stage is to initiate thinning. In the previous stage, primary flaking was concentrated along the edges. In the Biface II stage, flake removals were flaked across the surface of the biface, and most of the cortex has been removed.

Twenty-five Biface II examples were recovered from sixteen different sites (Table 5). The conditions of these bifaces vary with 11 complete artifacts, 5 proximal ends, 2 distal ends, 4 proximal-medial portions, 1 medial-distal portion, and 2 unknown fragments. Knapping error was the probable reason for the failure of eight artifacts containing bending/snap or perverse type fractures. Three failed due to material flaws and, although eight bifaces contain evidence from heat exposure, only three of these were damaged by fire. Severe step and hinge terminations are noted on most of the complete artifacts and are the probable reason for their abandonment. The materials used are of small local chert cobbles or naturally spalled fragments from ledge cherts.

Two artifacts (41CX360-17 and 41CX402-29) have been altered by the burination of one or both of their lateral edges (Figure 11f-g). This was accomplished by forming a striking platform by removing the distal tip, either on purpose or as a result of a previous manufacture failure. Spalls (Figure 11h-o) can then be flaked from this platform along the lateral edges forming a sharp cutting edge at the corner of the fractured edge created by the distal removal. This edge can then be used in various activities such as scraping or incising (Keeley 1980). Both lateral edges of 41CX360-17 and one of the edges of 41CX402-29 were thus spalled. Although the opposite edge of 41CX402-29 resembles a burin removal, it was obviously broken from a bending type fracture.

Both of the burinated artifacts (41CX360-17 and 41CX402-29) and one additional example (41CX402-195) contain minor unifacial modifications on one of their edges. Reasons for these modifications vary from a possible functional use as a scraping edge, a set-up for further reduction, or as a result of natural causes. Due to the fact that these were all found on the surface, it is difficult to separate out definite purposeful retouch and/or use-wear from that created by long exposure on the surface. With this in mind, the edge on 41CX360-17 does appear to have been utilized as a scraper, while the edge on 41CX402-195 was probably flaked to set up the edge for additional reduction. The edge on 41CX402-29 is too battered to make any definite conclusion.

Biface III (N=23, Figure 7a-d)

This stage of reduction is basically a refinement of the shape and thickness of the biface while maintaining as much width as possible. In this stage, the random flake scars noted in Biface I and Biface II stages are more uniform and oriented toward the midline, sometimes extending to the opposite edge of the biface. The result is that the biface's shape becomes more uniform with a flatter cross-section and thinner edge angles (Whittaker 1994:202). Twenty-three Biface III artifacts were recovered from 15 sites. A complete listing of the sites, measurements, and biface conditions is provided in Table 5. The conditions include 5 complete artifacts, 6 proximal portions, 3 distal portions, 1 medial fragment, 3 lateral fragments, 1 medial-distal, and 4 medial-proximal fragments. Manufacture failure appears to be the primary cause of fracture with 12 containing bending/snap fractures. Fourteen contain evidence of heat exposure through surface coloring or pot-lidding, but edge spalling and severe pot-lidding significantly damaged only seven of them. No material failures are evident. No determinations could be made for the abandonment of the complete artifacts other than a few step terminations (which do not appear to be formidable) or possibly their small size with the largest measuring 58 mm.

The cortex remaining on some examples suggests that most are made on small chert cobbles and a few on naturally spalled ledge cherts. One artifact (41CX284-6) was made on an overshot flake, probably created from cobble splitting, and another (41CX291-8) is made on a thick macro-flake.

As with the previous stage, several of the Biface III artifacts may have been utilized. The edge of two (41CX394-26, 41CX502-46) suggests, they may have been utilized as knives, and a third (41CX704-69), having a unifacial pressure flaked proximal edge, may have been used as a scraper.

Biface IV (N=30, Figure 7e-j)

At this stage, the biface has been sufficiently thinned and shaped into a clear lanceolate or triangular form. The flake scars are broad, shallow, and flat and range in size from small to fairly large. It is during this stage that pressure flaking becomes prevalent, especially during final thinning and edge shaping. Basically, this is the final reductive stage for projectile points and other bifacial tools. For those tool types requiring hafting, only final hafting modifications are needed, such as notching or stem forming, basal thinning, or edge grinding. Other edge modifications, such as serrating and beveling, may also be initiated or finished at this time or later during the course of the tool's use-life.

Thirty examples of Biface IV were recovered from 14 sites (Table 5). The conditions represented include 3 complete artifacts, 6 proximal, 3 distal, 5 medial, 2 lateral, 7 medial-distal, and 4 medial-proximal fragments. Three artifacts (41CX252-1, 41CX344-9, and 41CX428-39) exhibit impact fractures, and they may actually be fragments of finished projectile points or knives. These are all fairly thick with some crude surface irregularities or are too small to identify. Without some other form of an identifiable element, such as the remnant of a stem or notching, they cannot be positively identified as such: therefore, they are grouped here as Biface IV examples.

Seventeen of these bifaces contain evidence of exposure to heat. Seven have been heat fractured and the remaining ten have all or portions of their surfaces turned to a pink or red color. One artifact (41CX364-24) failed due a material flaw, and 16 failed because of transverse breaks or snaps.

The three complete examples all exhibit some form of use. One (41CX630-60) appears to have been utilized as a gouge (Figure 8a). The basal edge has been beveled by utilizing the natural curvature of one side of the flake blank and pressure flaking the other surface. The other two examples (41CX364-21 and 41CX595-57) show evidence of being used in cutting activities. Both have edges that have been re-touched and contain numerous step terminations and/or stacking.

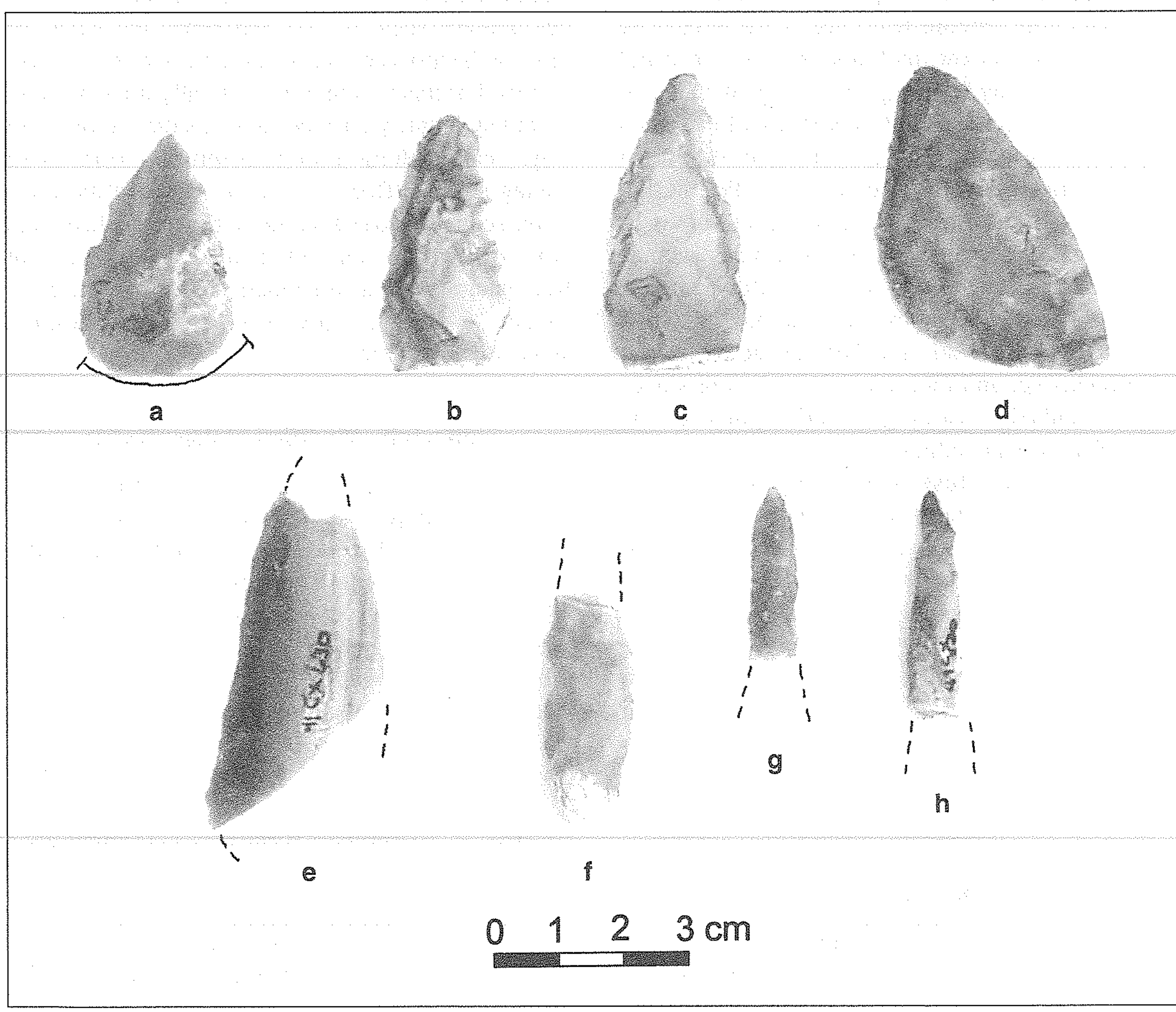

Figure 8. Bifacial Tools: (a) gouge; (b-c) bifacial knives; (d-e) scraper/knife; (f-h) perforator fragments.

Two additional fragmented artifacts (41CX364-23, 41CX630-61) contain unifacial pressure retouched edges. These edges are uniform, well rounded, and have edge angles of 44° and 48°, suggesting possible use in some cutting and scraping activities.

Other Bifacial Tools (N=8)

Relatively few other bifacial tools other than projectile points were recovered (Figure 8). These include a gouge (Figure 8a) found at 41CX630 (a rock shelter and fire-cracked rock scatter), 2 knives found at 41CX364 (a series of rock shelters), and 41CX495 (a partially collapsed rock shelter and fire-cracked rock scatter), 2 knives (Figure 8b-c) and/or scrapers (Figure 8d-e) found at 41CX364 (a series of rock shelters) and 41CX630 (a rock shelter and fire-cracked rock scatter) that have already been discussed in the Biface IV section above, and 3 additional artifacts identified as portions of perforators.

Perforators (Figure 8f-h) are characterized by having a long, narrow, and tapering "bit" or distal end. The base may be elongate like the bit end, or it may be the proximal end of another tool form, such as a projectile point. These tools were utilized in both perforating and drilling activities. Perforating activities include such tasks as punching holes in green and finished hides or woven articles such as baskets and matting. Such uses leave little evidence on the tool other than some possible polishing and rounding of the distal end. Drilling activities are more intensive, and tool damaging often produces abrasion and edge crushing as well as polish on the tool's distal tip and edges.

One of the Musk Hog Canyon examples (41CX595-183) is the proximal half of an elongated form, and the other two (41CX350-180 and 41CX595-181) are the distal ends. The distal tips and edges of the latter two are both heavily pressure flaked with strongly rounded tips. The edges range from sharp to heavily rounded and, in the case of 41CX595-181, one of its edges contains a number of step fracture terminations. Heat fracture fragmented 41CX595-181, and use related activities probably caused the breakage of the other two.

Edge-Modified Tools (N=75)

This category includes 73 unifacially modified flakes (Figures 9-11), one large unifacial modified chopper/knife (Figure 12), and one incising or perforating tool (Figure 11e). These tools range from simple, expedient tools to more modified and longer curated forms. Basically, expedient tools are those having modifications that are the result of use-related activities. They are usually made on simple flakes and/or discarded after the task is completed. These tools were used for a variety of tasks, such as cutting, sawing, planing, and scraping.

The more modified types are those tools whose edges have been re-touched with light pressure or percussion flaking. These modifications were preformed to strengthen or re-sharpen an edge. These may also be expedient tools, although some may be retained for extended periods of use-life. In addition, some of these tools may be used for several functions during its use-life, or for several functions simultaneously (Frison 1979:263-264). However, since the Musk Hog Canyon material was recovered from the surface where it had been exposed for very long periods of time to the natural elements such as an undulating terrain, rocky soil, and trampling by various animals such as deer and goats, the edges of most of the tools contained some damage from these factors. For this reason it was virtually impossible to definitely identify un-modified expedient tools with edge wear resulting from purposeful use from those having natural effects. Therefore, most of the tools discussed in this category are of the re-touched edge type. However, even within this category damage from natural post-abandonment factors made it difficult to identify any specific uses beyond scraping and cutting activities.

Unifacially Modified Flakes (N=73)

Seventy-three unifacially modified flakes (Table 6) were recovered from 31 sites. Sixty-three of these flake tools are complete, and the remainder are broken into various pieces. Sixty-four percent of these tools are made on small round to ovoid flakes with lesser preferences for eccentric (11 percent), square (8 percent), triangular (7 percent), lanceolate (3 percent), or rectangular shaped flakes (1 percent). Sizes range from a 27-69 mm in length, 21-86 mm wide, and 5.5-21 mm thick with a mean of 44.1 x 39.0 x 11.4 mm.

The most common flake selected, amounting to 64% of the total, has a cross-section that was Plano-convex or flat on one side and curved outward on the other. Bi-plano forms or those flattened on both sides totaled 21 percent. The Biconvex form, or those that curve outwards on both sides, amounted to only 11 percent. In addition,

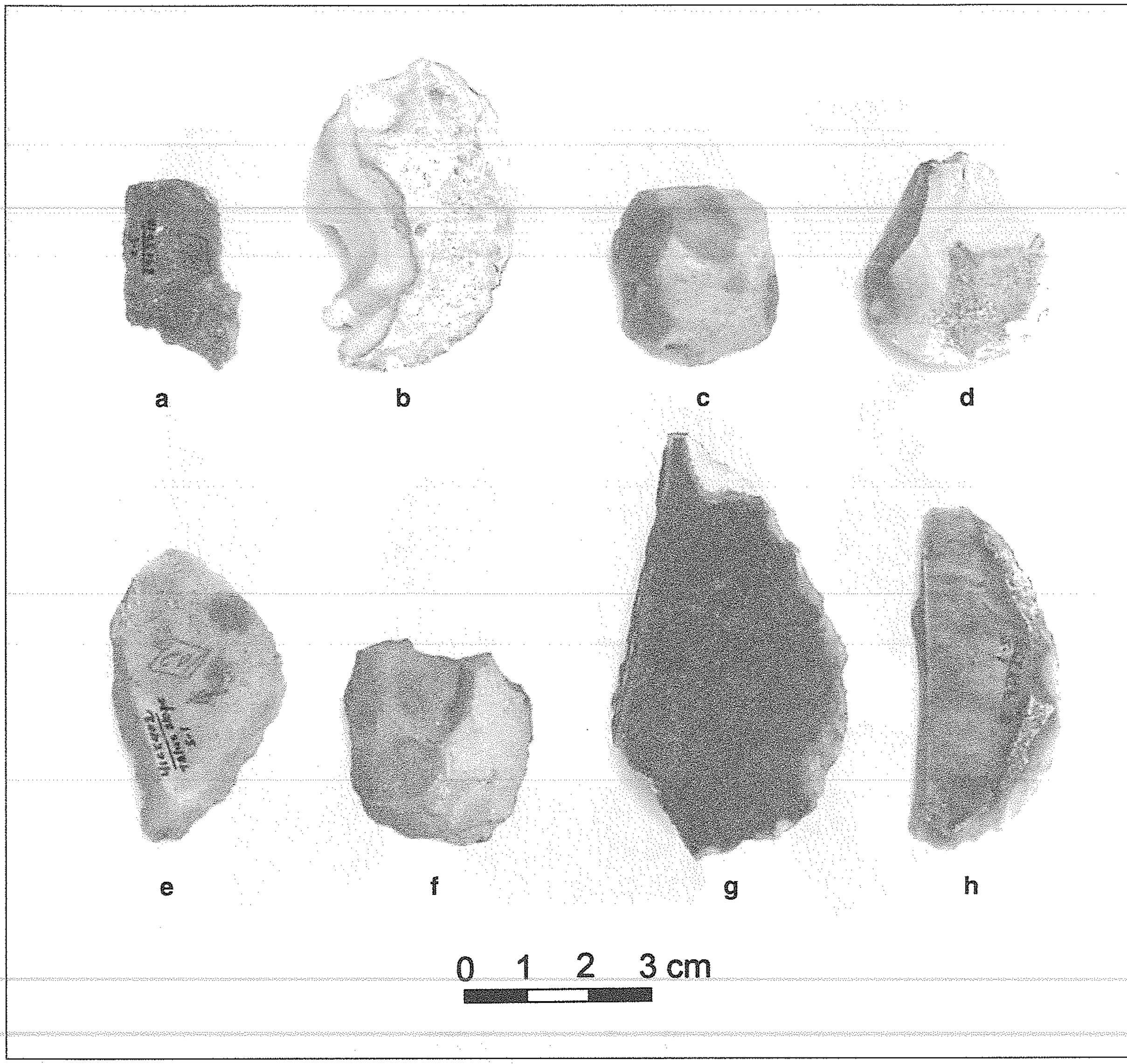

Figure 9. Miscellaneous Uniface Scrapers showing variances in edge and surface morphology.

most were thicker at one end and thinner at the other. The presence of cortex varied with primary flakes, or those with 90 percent plus cortex averaged 49 percent of the total. Interior flakes, or those without cortex, were 38 percent; secondary flakes, or those with varying amounts of cortex up to 90 percent, averaged only 1 percent. However, flakes with cortex present on one or more of their lateral sides averaged 11 percent. Flakes were probably selected according to the task at hand and/or for convenience of holding from both general debitage and flakes purposely made for edge modification.

The type of initial flake selected is often difficult to determine because many of the edges have been modified, removing evidence of origin. However, the majority, if not all, of the cortical flakes were probably chosen from general debitage produced during bifacial reduction or were purposely produced from nodules or tabular pieces of chert. Many are irregular shaped with thick "squared" edges, and some contain remnants of patina indicating an older, often naturally flaked, surface. Flakes produced from natural spalls or fragments of thin tabs of chert often contain an older surface patina on one or more of its surfaces that have been heavily weathered from long exposure to the elements.

Occasionally, a portion of an edge or other surface is covered with an old crack stain. This stain is yellowish-brown in color that was formed

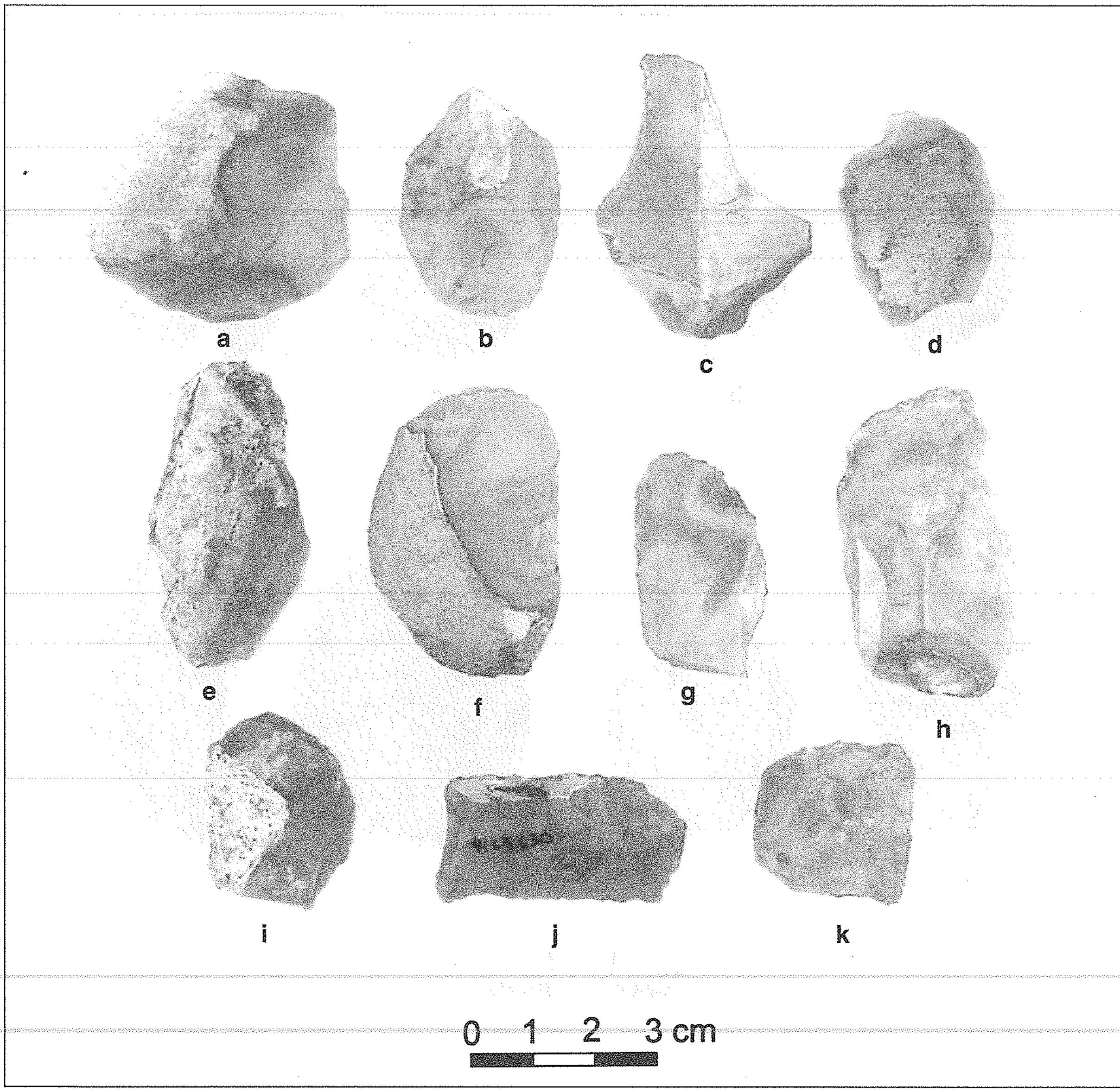

Figure 10. Unifacial Flake Tools: (a-e) scraping tools; (f-h) scraping/cutting tools; (i-k) cutting tools.

by water seeping into cracks present within the chert while still in its original matrix. This water brings in various minerals which, over time, stain the surface as the water evaporates. As the chert nodule or tab is exposed, it will usually break, either as it is exposed or through subsequent freeze and thawing episodes, along this plane, thus exposing the stained surface. These cracks with their stained surfaces are often encountered during reduction, many of which can cause failure or inhibit further reduction.

As previously mentioned, some flakes were also purposefully produced. Most were obtained by flaking cores made from large cobbles, tabs, or chunks of chert. Some, however, were made in a specific manner from specially selected nodules of chert. Elongated, round to oval shaped forms of nodules are commonly encountered throughout the Lower Pecos region. These were often flaked in a sequence (Figure 11a-d), much like a loaf of bread and are called sequent flakes (Shafer 1971:31). They can be identified by having a strong bulb of percussion on the ventral surface and a deep negative bulb scar on the other. In addition, one or more edges may be covered with cortex, hence their original classification as "cortex flakes" (Epstein 1963:28). Seven modified edge flakes from Musk Hog were identified as sequent flakes.

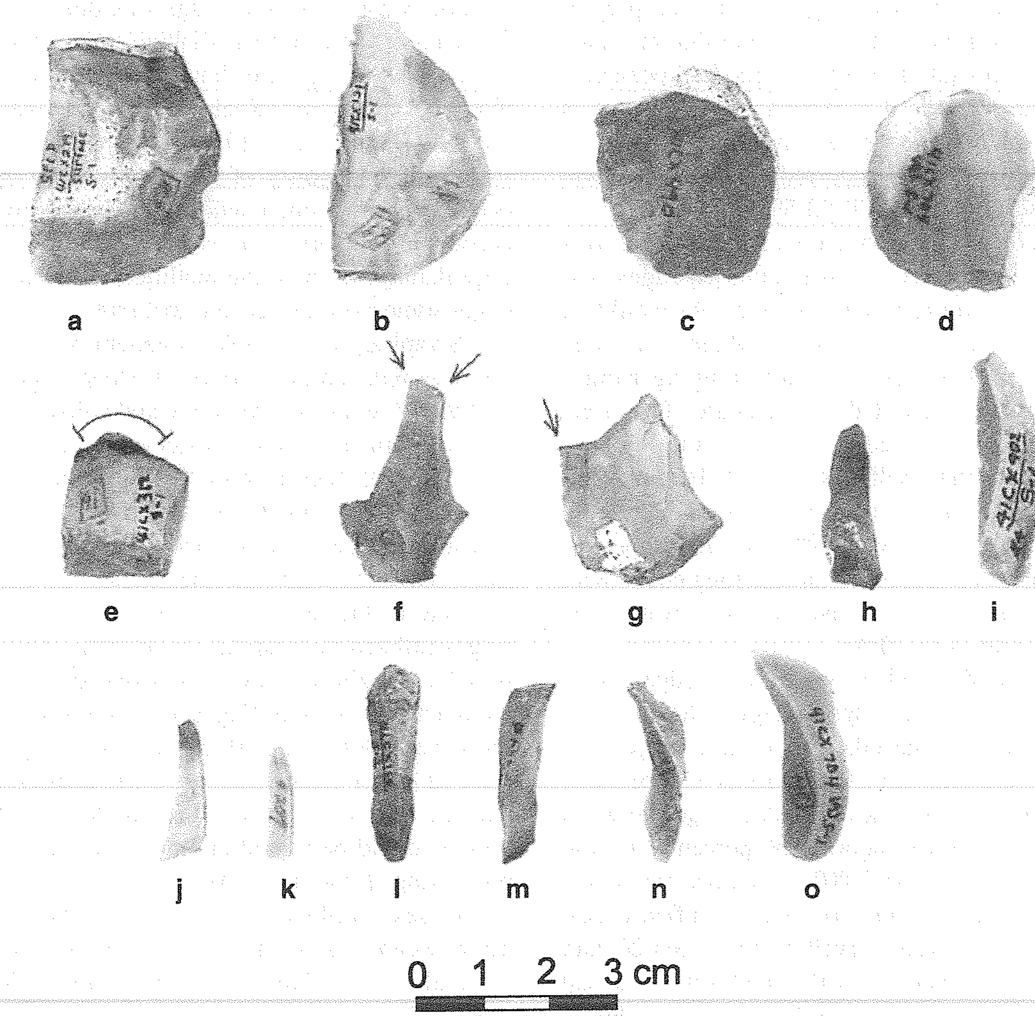

Figure 11. Miscellaneous Unifacial and Bifacial artifacts: (a-d) sequent flake scrapers; (e) engraver; (f-g) burinated bifaces; (h-o) burin spalls.

However, it is possible others were made on sequent flakes but subsequent modification and breakage prohibits their identification.

All of these tools are made of chert with the exception of 41CX394-94, which is made of fine-grained quartzite. The cherts selected varied in texture and color, i.e., dark gray, yellow-brown, to a light gray-white. Most of these cherts appear to have been small nodules or cobbles and/or chunks of more tabular forms. Flakes were removed by hard-hammer percussion which often produces a strong swelling or bulb below the platform. Some ventral modifications of these flakes often involved the removal of this bulb, which was probably preformed for holding purposes. In addition, many flakes were selected that have a slight downward curving edge on some portion of the flake. Occasionally, when this was not possible, the ventral edge was flaked to create or accentuate a slight curvature. The part of the edge to be utilized was then unifacially flaked with light hard-hammer percussion or sometimes with pressure re-touch. Although 41 (55 percent) of these tools showed some form of heat damage (i.e., surface coloring, pot-lidding, edge spalling, or total fracture), not one was determined to have been purposefully heat treated. Chert tools and flakes showing evidence for purposeful heat alteration traditionally have remnants of a surface that has been colored a red color, as a result of ferric impurities, combined with a glossy surface. Flakes removed from a heat altered core or blank will have a glossy surface present only on the ventral surface, showing that the flake had been removed after heat altered had occurred. On the other hand, if a flake's entire surface is colored, or contains crazing or pot-lidded, this is an indication that heating occurred after their removal and/or discard (Dickens 1993:59, 1995).

Forty of the flakes had only one edge that was modified, but 29 were modified on two edges, and 6 had three or more modified edges. As would be expected within such an assemblage, the edge angles were also highly variable ranging from a low of 14° to a high of 86°. The angles for single edged artifacts centered between 30° and 70° with slightly more than half (59 percent) between 50° and 70°. However, some contained a single edge that varied as much as a 40°. This situation was usually noted on examples having long edges with irregular surfaces, or those flaked towards the thickened end of the flake.

Those modified edge tools with two edges modified tended to have one edge averaging slightly more acute angles than the other. One edge ranged between 30° and 80° with the majority (71 percent) between 40° and 70°. The other edge ranged between 60° and 90° with the majority (50 percent) of these falling between 60° and 80°. A similar trend was noted for those with three or more modified edges. The angles were evenly distributed between 20° and 30° for one edge, between 40° and 50° for the second edges, and between 50° and 80° for the third edge.

It must be noted that this range of edge angles was not as clearly divided among the artifacts as the above calculations suggest. Rather, some contained two or more edges with angles that are approximately the same, often differing by only a few degrees, while the range of others is much greater. In addition, it was noted that edge thickness was a determining factor on the angle of the edge flaked, which often varied with the irregularity of a flake's surface. Simply put, thicker edges tended to contain angles that are steeper than those made on thinner edges, all of which varied with a flake's edge and surface morphology. Regardless of this, it is evident that these angles, whether they are acute or near 90°, were desired and intentionally flaked (or re-touched) to that angle and, as such, utilized for a specific task.

Since most of the surfaces and edges of these tools have been altered due to their long exposure on the surface, it was difficult to make any definite determinations of use-wear. The various attributes of surface polish, striations, edge rounding, crushing, unifacial or bifacial micro-flaking, micro-flake scar type, and edge angle are all useful attributes in determinations of tool use (Keeley 1980). However, all of these attributes were affected by exposure on the surface. The majority of post-depositional damage occurs in a random manner and, taking this into account, a comparison of the type and occurrence of edge damage on both the modified and unmodified edges some patterns became apparent.

Scraping, for example, is generally recognized on tools with unifacial retouch, steep edge angles (35° to 90°) with edge rounding and polish restricted to the leading or contact aspect (edge surface), and edge damage occurring on the opposite aspect to the tools movement (Keeley 1980:38). This means that as an edge is drawn across an object micro-flake damage occurs on the surface of the edge opposite to the direction of the tool's movement. Edges utilized in scraping are usually uniform but may be straight, concave or convex, depending on the intended function. Edges utilized for hide working for example, are uniform with no irregularities such as small projections or sharp corners. Hides cut due to a sharp projection during the scraping process could be ruined or, at least impede further processing (Edholm and Wilder 1997).

Edges employed for cutting and/or sawing activities are usually thinner flakes with more acute, generally less than 45° edge angles (Keeley 1980:110-111). However, thicker flakes with steeper angles may also have been desired. For example, cutting (or scraping) of meat or plants may produce fluids which, as the task proceeds, makes holding a thin flake difficult. In such cases, the selection of a thicker flake would provide a more secure hold. In addition, if a cutting task is intensive, a steeper or more beveled edge may add strength to the edge, thus providing a more durable cutting edge that requires less maintenance such as re-sharpening. Edge damage on cutting tools is also more bifacial in nature resulting from the edge being drawn across an object. If present, striations would be parallel to the edge, and polish may be present on both surfaces (Keeley 1980:36-58).

Of course, all these attributes will vary according to the type of object a tool is utilized on. edges used on wood, wet or dry hides, meat, antler, bone, and plants all produce specific types of wear and/or damage. For example, tools utilized on plant harvesting and processing activities often have a more

Table 6. Uniface Tool Attributes.

Site	Artifact Number	Shape	Presence of Cortex	Condition	Number of Edges Utililized	Edge Angle 1	Edge Angle 2&3	Function and Edge Character
41CX138	72	Circular	None	Complete	2	39°	59°	Scraping (I Jagged Edge)
41CX168	73	Eccentric	None	Complete	1	62°	–	Scraping (I Jagged Edge)
41CX168	74	Circular	One Face	Complete	1	41°	–	Cutting (Wavy Edge)
41CX169	76	Eccentric	None	Complete	2	47°	68°	Scraping (Wavy and Jagged Edge)
41CX245	75	Circular	One Face	Medial/Proximal	3	75°	34° 21°	Scraping and Cutting
41CX254	77	Circular	One Face	Complete	1	34°	–	Scraping (Uniform Edge)
41CX255	78	Ovoid	One Face	Complete	1	46°-62°	–	Scraping (Uniform Edge)
41CX255	79	Elongate	One Face	Complete	1	66°	–	Cutting
41CX267	190	Ovoid	One Face	Complete	1	44° - 77°	–	Scraping (Uniform Edge)
41CX279	80	Circular	One Face	Complete	3	54°	65° and 74°	Scraping (Jagged Edge)
41CX279	81	Circular	One Face	Complete	2	45° -68°	58°	Scraping and Cutting
41CX279	83	Circular	On Edge	Lateral	1	39°	–	Scraping (Sequent Flake)
41CX294	82	Unknown	One Face	Complete	1	56°	–	Scraping (Uniform to Jagged Edge)
41CX306	84	Ovoid	One Face	Complete	1	48°	–	Scraping (Jagged Edge)
41CX316	85	Circular	One Face	Complete	All	29'	41° and 64°	Scraping (Uniform-Wavy Edge)
41CX344	193	Circular	One Face	Complete	2	68°	67°	Scraping (Uniform -Wavy Edge)
41CX344	194	Circular	One Face	Complete	1	57°	–	Scraping (Uniform Edge)
41CX349	86	Circular	None	Lateral	3	27°	58° and 52°	Scraping (Ragged-Uniform Edge)
41CX349	87	Circular	One Face	Complete	2	61°	51°	Scraping (Wavy Edge)

Table 6. *(Continued)*

Site	Artifact Number	Shape	Presence of Cortex	Condition	Number of Edges Utilized	Edge Angle 1	Edge Angle 2&3	Function and Edge Character
41CX350	88	Circular	None	Complete	2	71°	36°	Scraping (Uniform Edge)
41CX359	89	Ovoid	On Edge	Complete	1	89°	–	Scraping (Uniform Edge)
41CX360	90	Triangular	One Face	Complete	1	27°-31°	–	Scraping (Jagged Edge)
41CX362	91	Elongate	None	Complete	1	52°	–	Perforating/Incising
41CX364	92	Circular	None	Complete	2	84°	38°	Scraping (Uniform Edge Sequent Flake)
41CX392	93	Elongate	One Face	Complete	1	49°	_	Scraping (Uniform Edge)
41CX394	94	Ovoid	One Face	Complete	1	33'	–	Scraping (Wavy Edge)
41CX402	95	Triangular	On Edge	Proximal	2	70°	–	Scraping (Uniform Edge)
41CX402	96	Ovoid	None	Complete	2	62°	76°	Scraping (Jagged-Uniform Edge)
41CX402	97	Ovoid	One Face	Complete	1	56°-66°	–	Scraping (Uniform Edge)
41CX402	98	Ovoid	None	Complete	2	72°	64°	Scraping (Uniform Edge)
41CX402	99	Circular	None	Complete	1	41°	–	Scraping (Jagged Edge)
41CX402	100	Triangular	One Face	Distal	2	600	43°	Scraping (Uniform Edge)
41CX402	101	Circular	None	Lateral	1	42°-64°	–	Scraping (Uniform Edge)
41CX402	102	Ovoid	None	Complete	2	65°	29°	Scraping and Cutting (Ragged-Uniform Edge)
41CX402	103	Circular	None	Complete	All	44°	49° and 56°	Scraping (Uniform-Wavy Edge)
41CX402	104	Circular	One Face	Complete	2	65°	61°	Scraping (Uniform Edge)
41CX402	105	Circular	None	Complete	3	41°	35° and 69°	Scraping (Uniform-2 and Jagged-1 Edges)
41CX402	106	Elongate	One Face	Complete	1	35°	–	Scraping ? (Uniform Edge)

Table 6. *(Continued)*

Site	Artifact Number	Shape	Presence of Cortex	Condition	Number of Edges Utililized	Edge Angle 1	Edge Angle 2&3	Function and Edge Character
41CX402	107	Circular	One Face	Complete	2	41°	39°	Scraping (Uniform Edge)
41CX402	196	Triangular	One Face	Complete	1	66°	–	Scraping (Uniform Edge)
41CX402	197	Eccentric	One Face	Complete	2	79°	71°-85°	Scraping (Uniform-Jagged Edge)
41CX402	198	Eccentric	One Face	Complete	1	69°	–	Scraping (Uniform Edge)
41CX402	199	Eccentric	None	Proximal	2	69°	82°	Scraping (Uniform-Jagged Edge)
41CX402	200	Ovoid	One Face	Complete	2	58°	49°	Scraping (Uniform-Jagged Edge)
41CX411	201	Ovoid	One Face	Complete	2	56°	74°	Scraping? (Crude)
41CX471	108	Circular	On Edge	Complete	2	74°	41°	Scraping and Cutting (Uniform Edge, Partial Bifacial)
41 CX471	202	Unknown	One Face	Lateral	1	37°	–	Scraping ("w"-Shaped Edge)
41CX473	109	Eccentric	One Face	Complete	2	78°	85°	Scraping (Uniform Edge)
41CX486	110	Ovoid	None	Complete	2	67°	47°	Scraping (Uniform-Wavy Edge)
41CX486	III	Ovoid	One Face	Complete	2	69°	73°	Scraping (Uniform-Jagged Edge)
41CX488	112	Circular	None	Proximal	1	66°	–	Scraping ?
41CX490	113	Ovoid	On Edge	Complete	2	38°	68'	Scraping (Jagged-Wavy Edge)
41CX490	115	Circular	On Edge	Complete	1	64°	–	Scraping (Wavy Edge)
41CX595	114	Ovoid	None	Complete	2	61°	42°	Scraping (Uniform Edge)
41CX595	116	Unknown	None	Lateral	1	41°-59°	–	Scraping (Uniforrn Edge)
41CX595	117	Unknown	None	Medial/Proximal	1	63°	–	Scraping (Wavy and Arched Edge)
41CX595	118	Circular	One Face	Complete	1	59°	–	Scraping (Wavy Edge)

Table 6. *(Continued)*

Site	Artifact Number	Shape	Presence of Cortex	Condition	Number of Edges Utililized	Edge Angle 1	Edge Angle 2&3	Function and Edge Character
41CX595	119	Ovoid	None	Lateral	1	28°-45°	–	Scraping and Cutting (Uniform Edge)
41CX595	203	Eccentric	None	Complete	1	41°-82°	–	Scraping ("w"-Shaped Edge)
41CX600	120	Elongate	One Face	Complete	2	66°	48°	Scraping and Cutting (Uniform-Jagged Edge)
41CX630	121	Elongate	On Edge	Proximal	2	14°	–	Cutting
41CX630	122	Ovoid	None	Complete	1	27°	–	Scraping (Arched Edge)
41CX630	123	Triangular	None	Complete	1	50°		Scraping (Wavy Edge)
41CX630	124	Unknown	None	Medial	1	53°	–	Scraping (Uniform Edge)
41CX630	125	Circular	One Face	Complete	2	74°	86°	Scraping (Uniform and Partial Bifacial)
41CX630	204	Eccentric	On Edge	Complete	2	57°	61°	Scraping
41CX704	126	Ovoid	One Face	Complete	1	34°	–	Cutting
41CX704	127	Square	None	Proximal	2	Too Small	Too Small	Cutting
41CX704	128	Lanceolate	One Face	Complete	2	71°	66°	Scraping (Uniform Edge)
41CX704	129	Lanceolate	None	Complete	2	48°	44°	Scraping (Uniform -Jagged Edge)
41CX704	130	Circular	None	Complete	1	51°	–	Scraping (Uniform Edge)
41CX704	131	Circular	One Face	Complete	1	37°	–	Cutting
41CX704	205	Circular	One Face	Complete	1	60°	–	Scraping

ragged, serrated or denticulated edge (Jensen 1994:62-63) and may contain a very smooth, highly reflective gloss, known as sickle sheen (Keeley 1980:60), while those used in hide processing (mentioned above) would be more uniform and contain a bright, rough, greasy-like luster (Keeley 1980:52).

Utilizing the above attributes, it was determined that 61 of the Musk Hog unifacially modified tools were used in scraping activities (Figure 9a-h; Figure 10a-e), 6 in cutting tasks (Figure 10i-k), and 6 were used for both cutting and scraping (Figure 10f-h). The thinner portions of some of the modified edges are "jagged," ranging from a simple "W" or multiples of a "W" shape to those with a more random and ragged pattern. Many, if not most of these, occur on flakes having additional working edges that are steeper and more uniform. This suggests that the tool may have been utilized for different tasks, or possibly for different stages of the same task.

Chopper (N=1, Figure 12)

This large tool was found at 41CX670, a burned rock midden, and is made on a square slab of very grainy chert or a fine-grained sandstone. The material contains a typical cortex on its dorsal surface and a patinated cortex-like surface on its ventral surface. It is 112.4 mm long, 107.6 mm wide, and 28.3 mm thick. The modification is made on one of the corners and "wraps" around both adjacent edges. The proximal end is square and unmodified. The modification consists of a series of percussion flakes overall with minor light percussion flaking on the left side and distal end. The distal end contains some batter in the form of edge crushing and step fracture terminations. This step fracturing is more evident on the ventral surface. The grainy nature of the stone gives the impression that it is somewhat soft and, as a result, all edges are heavily rounded. The primary function was probably a chopping type of task, but the secondarily modified edge, which is more acute than the others, suggests that it may also have served in some cutting activities as well.

Figure 12. Uniface Chopper/knife.

Engraver/incisor (N=1, Figure 11e)

This small tool was found at 41CX364 (a series of rock shelters) and is made on a fragment of an early stage biface. The fragment is square-shaped, is 23.2 mm long, 29.0 mm wide, and 9.7 mm thick. The modification is primarily unifacial, but the entire projection is heavily rounded and crushed, especially at the base of the projection, giving it an appearance of being bifacial. It does not appear to have been utilized in a twisting fashion, but in a more incising movement, which may have included movements both in line with the edge and opposed to it, such as in a "grooving" function. This caused the edges to become blunt and fracture onto both surfaces. The surface has been altered a pinkish-red color from exposure to heat and may have been the cause for the initial fracture.

Burin Spalls (N=8)

Burin spalls are small, thin, narrow flakes that have been removed from the edge, not the surface, of a larger flake or tool. These are often crescent-shaped due to the contour of the initial flake's edge. There are two forms of burins; primary and secondary. The primary type are those detached from an edge and the secondary type are those removed subsequently as described by Bandy et. al. (1980:137). It must be emphasized that thermal edge spalling also creates a similar flake. These can be identified from true burin spalls by having no platform or bulb (if complete) and a ventral surface that is glossy and often undulates in random fashion.

Burin spalls are not the intended tool, rather it is the flake or other preform from which the spall was removed that is the important part. Two (41CX360-17, 41CX402-29) of the Musk Hog bifaces, discussed earlier in the Biface II section, have had both their edges spalled. The junction or corner of the fractured edge formed by the removal of the spall forms a sharp cutting edge for incising or scraping activities.

The Musk Hog Canyon burin spalls (Table 7) were recovered from three sites. One is from 41CX168, a rock shelter, five are from 41CX402, a collapsed rock shelter and fire-cracked rock scatter, and two are from 41CX704, a rock shelter and lithic scatter. All platforms are plain and exhibit no preparation, such as abrasion or isolation, and the bulbs of percussion range from diffuse to strong. Four (41CX168-206, 41CX402-208, 41CX402-210, and 41CX402-211) are primary types, while the remaining five are secondary types. Surface coloration from exposure to heat is present on two artifacts (41CX402-211 and 41CX704-212). Not one shows any purposeful edge modification or use-related wear.

Cores (N=23)

Cores are defined as a mass of material that is modified by a worker to a desired shape that will allow for the removal of a definite type of flake or blade (Crabtree 1972:54). This means that a selected piece of material, such as a chunk or cobble of chert, is prepared by flaking portions of its edge into a platform from which a desired flake could be removed, or by removing similar flakes from a natural occurring edge or platform. Once a desired flake is removed, it may be necessary to reform the edge into another platform that would be suitable for the removal of additional flakes. The process is repeated until the material (i.e., chert cobble) is used up.

Flakes can be removed at random, from all edges (radial), from one direction (uni-directional, or two directions (bi-directional). Random removals are flaked from various potions of the edge on either the dorsal or ventral surfaces. These cores take little preparation, and flakes are usually removed based on the shape and type of material used. Radial cores are flaked around the entire edge. Unless the material is large, flakes removed from this type are small or these may be flakes removed from one surface to prepare a platform for the removal of a large flake from the other surface. As the name implies, uni-directional types are flaked from one direction. These are usually encountered with only a few flake removals, but some may be extensively flaked in a series of removals such as in polyhedral blade cores. Bi-directional cores are similar to uni-directional types except that an additional direction is flaked. This flaking may be from the opposite end or from one of the lateral edges.

Twenty-three cores were recovered from 13 sites (Figures 13-14) within Musk Hog Canyon (Table 8). These include 17 complete artifacts, four proximal or distal fragments, and two lateral fragments. All appear to have been made on small local cobbles or chunky blocks of ledge chert. Some cortex or portions of the natural surface (i.e., older naturally flaked and patinated surface) remain on 17 artifacts; however, eight of these contain cortex only on their lateral edges. Eleven show some exposure to heat, such as surface and/or edge coloring and pot-lidding or crazing.

Core types include three uni-directional, four bi-directional, seven radial (Figure 13f; Figure 14a-d), and nine random (Figure 13b-e; Figure 14e-g). Cross-sections include eight that are plano-convex, three bi-convex, nine bi-plano, and three irregular. All of these cores were flaked for the production of flakes. These ranged from those with only one or two flakes removed to others that were heavily flaked over their

Table 7. Burin Spall Measurements.

Site	Artifact Number	Length (mm)	Width (mm)	Thickness (mm)
41CX168	206	38.6	8.5	4.1
41CX402	207	23.4	8.5	4.1
41CX402	208	22.2	4.8	2.0
41CX402	209	28.0	6.6	7.5
41CX402	210	32.5	10.8	6.5
41CX402	211	46.0	13.3	5.5
41CX704	212	35.7	7.8	5.6
41CX704	213	36.2	10.8	6.3

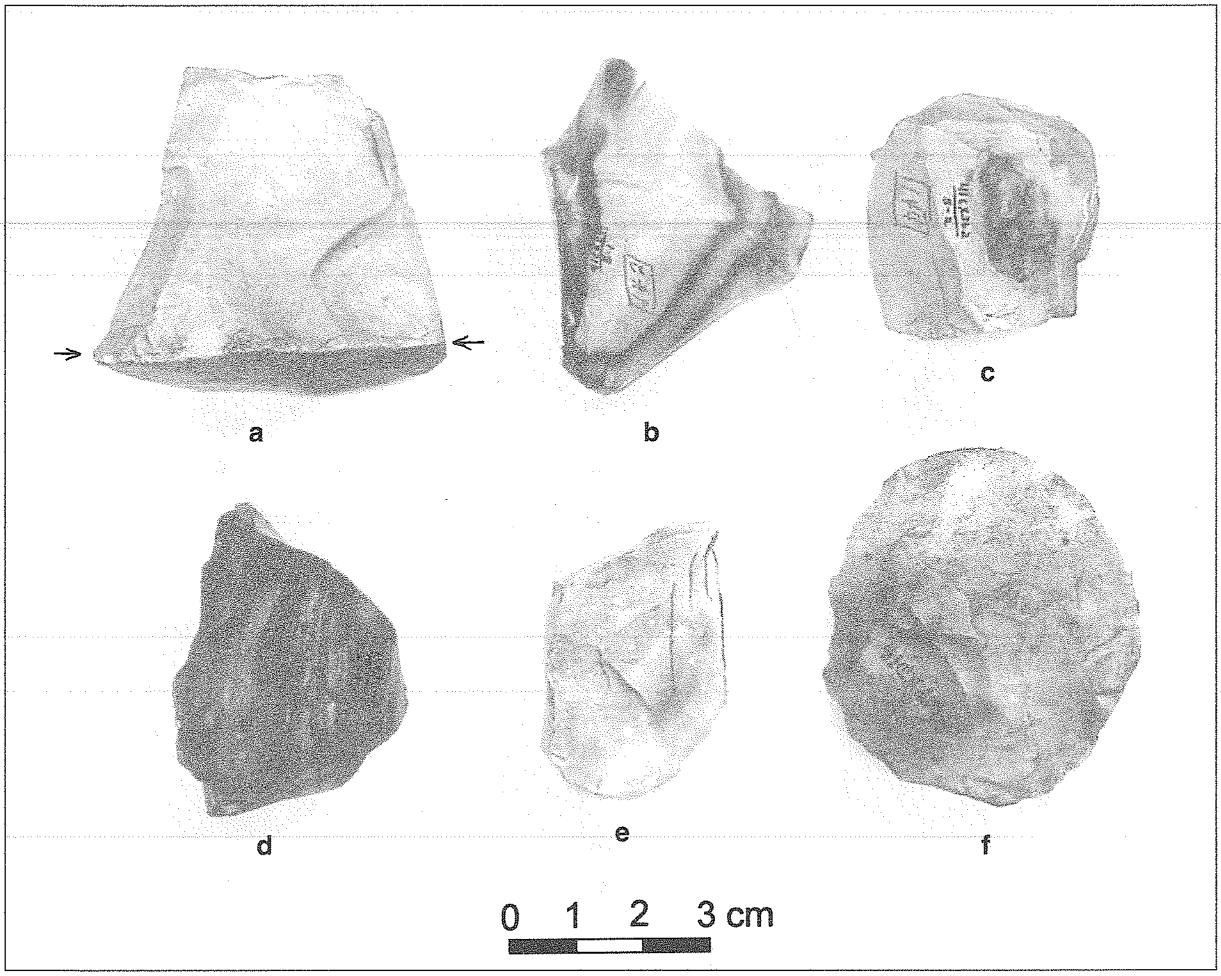

Figure 13: Cores: (a) rejected core possibly used as pulping plane; (b-e) random flaked cores; (f) radial flaked core.

entire surfaces. Cores utilized for sequential flake production, discussed previously, would be represented as being a broken elongated or cylindrical shaped cobble containing a strong negative bulb scar on the fractured surface. However, not one of these was collected and, as such, they are not represented in the assemblage.

Debitage (N=359)

Debitage is defined as the residual lithic material resulting from tool manufacture that is representative of the various stages of progress of the raw material from the original form to the finished stage (Crabtree 1972:58). The analysis of flake debitage is an invaluable tool in determining a number of activities and strategies that were conducted at a particular site. To accomplish this, a number of attributes were coded and recorded for a statistical evaluation.

This process began with the size grading of each flake. It has been established that flakes are reduced in size with each stage of the reductive process (Ahler 1989; Stahle and Dunn 1982). This means that in the initial reductive stages, such as the removal of cortex, material irregularities (i.e., humps, flaws, thick edges, etc.) flakes are usually large and often thick. As the process continues, the flakes become smaller and thinner until the final stage where the flakes are very small. To determine the size of the flakes they were passed through a series of eight nested screens obtained from the United States Standard Sieve Series. Screen sizes included: (1) 50 mm (2 inch); (2) 37 mm (1 1/2 inch; (3) 25 mm (1 inch); (4) 19 mm (3/4-inch); (5) 12.5 mm (1/2-inch); (6) 9.5 mm (3/8 inch); (7) 6.3 mm (1/4-inch); and (8) <6.3 mm (<1/4-inch). Additional debitage variables coded for include material type, presence/absence of cortex, and heat treatment. The type of raw material is useful in

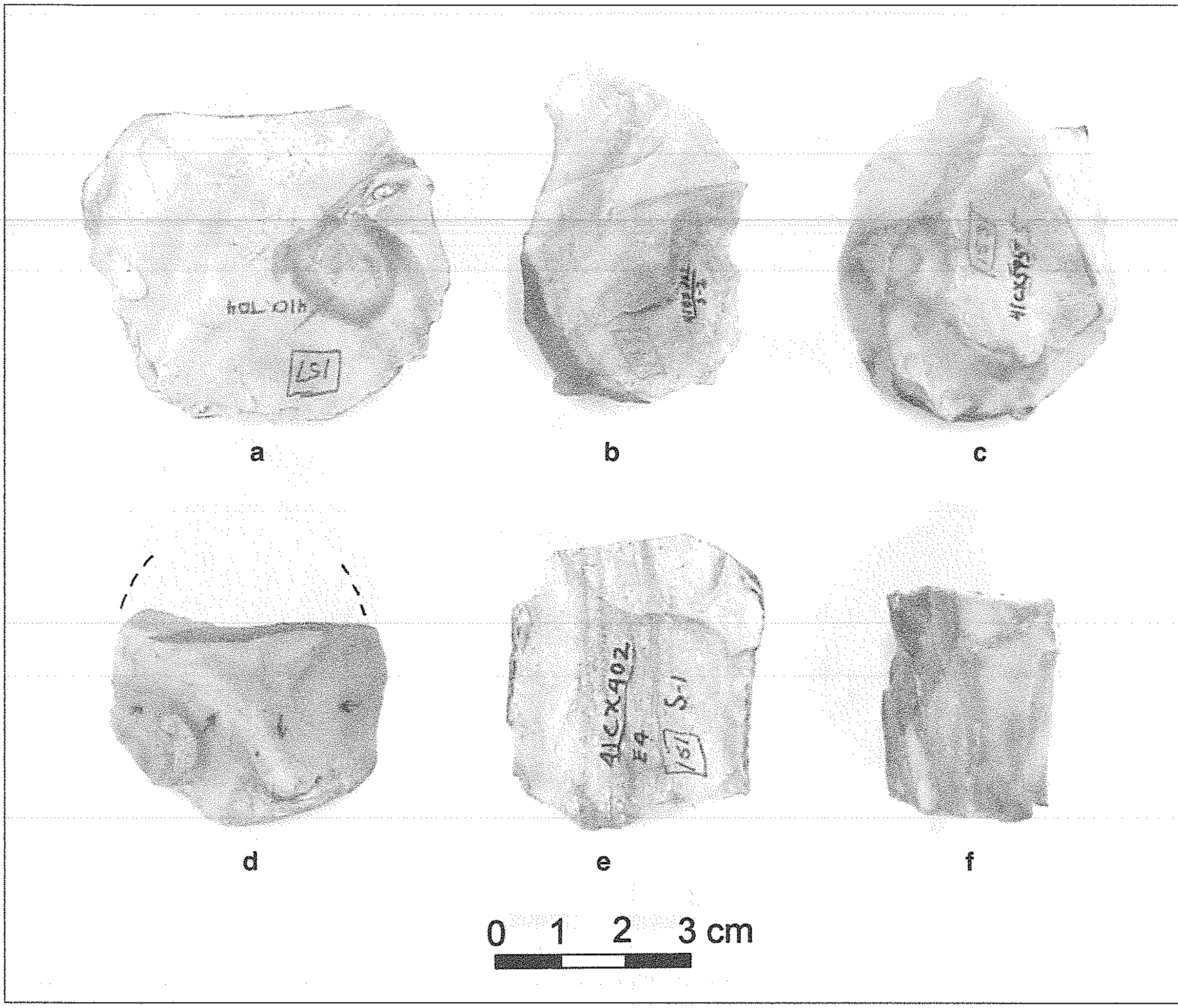

Figure 14. Cores: (a-d) radial flaked cores; (e-f) random flaked cores on blocky chert.

determining the method and range of material procurement, preparation, reduction, and ultimate morphology (Dockall 1991; Shafer 1971). For example, round cobbles, flat tabs, and thick blocky chunks require a different reductive strategy. Or, if the material is resistant to reduction, either through its size or material "toughness," limitations would be placed on how far reduction could proceed or what type of tool could be produced.

The presence and amount of cortex also helps determine the type and degree of reduction applied to a core or flake. For example, the raw materials found in the project area appear to be small cobbles or blocky chunks covered with a hard "rind" or cortex. This cortex ranges from a thick and "cork-like" type to a thinner less porous form. Neither are strong enough nor will they allow for controlled flaking and, in the case of the thicker cork-like forms, percussion flaking is inhibited through its softer, more shock absorbent nature. Therefore, this material must be removed for a successful reduction. An exception to this, is the presence of cortex found on alluvial gravels which often contain a thin and hard cortex which does not usually inhibit flake removals and does not have to be removed. As the material is reduced, this cortex is proportionately removed until finally removed. Three cortex categories were established and include: (1) primary flakes or those containing 90-100% cortex, (2) secondary or flakes having less than 90%, and (3) interior flake or those with no cortex (occasionally some interior flakes may retain cortex on one or more lateral edges).

The identification of heat alteration can help determine whether purposefully annealing has occurred or if heating was from some other factor.

Table 8. Core Measurements and Flaking Patterns.

Site	Artifact	Condition Number	Length (mm)	Width (mm)	Thickness (mm)	Flaking Pattern
41CX168	138	Complete	69.1	71.3	51.1	Random
41CX255	188	Proximal or Distal Fragment	35.0	42.5	16.3	Radial
41CX262	139	Complete	60.6	65.9	19.5	Radial
41CX267	189	Proximal or Distal Fragment	29.5	34.5	19.2	Uni-Directional
41CX305	140	Complete	59.0	45.7	23.5	Bi-Directional
41CX338	192	Proximal or Distal Fragment	43.8	33.4	13.8	Uni-Directional
41CX344	141	Complete	61.8	39.5	19.3	Bi-Directional
41CX344	142	Complete	60.7	60.8	27.3	Random
41CX344	143	Lateral Fragment	56.0	44.4	22.1	Random
41CX344	147	Complete	66.0	45.8	43.7	Random
41CX344	148	Complete	45.7	35.1	21.0	Bi-Directional
41CX362	144	Complete	54.6	49.3	34.5	Radial
41CX362	145	Complete	72.0	43.9	28.6	Bi-Directional
41CX362	146	Complete	55.8	40.9	17.8	Radial
41CX402	149	Complete	57.0	38.8	19.6	Random
41CX402	150	Complete	64.6	33.3	19.4	Uni-Directional
41CX402	151	Complete	56.7	49.4	38.0	Random
41CX411	152	Proximal or Distal Fragment	60.7	43.8	18.6	Random
41CX595	153	Complete	72.0	56.4	39.4	Radial
41CX595	154	Lateral Fragment	68.8	38.9	26.9	Random
41CX595	155	Complete	40.7	36.1	25.1	Random
41CX670	156	Complete	75.1	65.0	32.7	Radial
41CX704	157	Complete	66.0	73.5	31.4	Radial
Mean (Complete Artifacts)			59.8	50.0	28.7	

For example, if heating was a purposeful strategy for reduction, flakes containing one colored surface and glossy on the other surface, the flake was removed after the parent material was heated. This is because, as a core or biface blank is heated, its surface will turn either a red or a pinkish color due to some iron content within the chert. This coloration, however, will only alter the surface, while the interior usually becomes slick and glossy. Thus, if the flake is colored on both surfaces, it is an indication that it was subjected to heat after its removal from a core or biface blank.

The type of bulb of percussion is also useful in determining the type of percussor employed. Hard hammer percussion, for example, is usually identified with flakes having large or strong bulbs, while flakes having a flattened, more diffuse bulb is indicative of a soft hammer type (Crabtree 1972:8-9; Whittaker 1994:188-189). However, both forms can occur, albeit infrequently, in either case. For example, hand held cobble splitting, i.e., holding a small cobble in one's hand and striking it (on an appropriate spot) with a hard hammerstone, will often split the cobble leaving a very flat surface with no apparent bulb.

The previous discussion is designed for a normal evaluation of debitage recovered from more controlled excavations. The debitage from Musk Hog Canyon was collected under a strong bias since all flakes collected were found on the surface and were selected based on the collector's ability to distinguish flakes from other surface debris. This selection was based on a flake's visibility, size, and/or an individuals perception of what is a flake. The latter bias often resulted in non-flakes collected as well as some flakes probably remaining un-collected. In addition, many sites are represented by only a few flakes. For example, 24 sites had less than nine flakes collected (nine sites had only one flake collected), and only six had 20 or more flakes collected. This results in a somewhat skewed assemblage for normal flake (debitage) analysis. Thus, the information derived from such an analysis is basic at best.

Looking at the debitage as a whole, the cortex represented is divided into 19 primary flakes, 141 secondary flakes, and 199 interior flakes. The low number of primary flakes indicates that little initial reduction was preformed at the sites with most reduction being preformed on later stages. The indication here is that material selected for reduction was acquired at other places, i.e. quarries, and only the more refined rough flaked cobbles and or large flakes were brought to the various sites for finishing. This is a typical strategy for lithic procurement; that is, material suitable for tool production was tested and "roughed out" at a quarry site and then taken to either a quarry or base camp (if close) for final finishing (Dickens and Dockall 1993:64-65). Such a strategy allows for the elimination of flawed material to be selected out before transport to a base camp. After all, no one wants to expend time and energy carrying around useless material.

Another explanation may account for the lack of primary flakes. Biface reduction is only a part of the lithic manufacture being preformed. In fact, it appears that most of the tools produced are various unifacial tools. These are usually made on large flakes of various thicknesses. For production, flakes are detached from cobbles or tabular chunks of chert. Only the initial flake removed to set up further flake removals would be covered with cortex. All subsequent removals would be removed after this initial flake with little attention paid to further cortex removal. This is evidenced by many flakes retaining cortex on the platform or marginal edges. Such a reductive strategy is noted in the sequent flake production described previously. If a fractured chunk of tabular ledge chert (common to the region) is selected, the sides of the chunk may only be patinated or crack stained with cortex present only on the dorsal or ventral surface.

The size of the debitage recovered (Table 9) indicates that most of the flakes fall within size grades 3 (1 inch) and 6 (3/8 inch). The size grades represented from the six sites with 20 or more flakes collected (i.e., five rock shelters and one fire-cracked rock scatter) are within the smaller grades 4 through 6, with grade 5 being the most abundant. This suggests that early tool manufacture was prevalent; that is, after the chosen material was brought to a site, the larger flakes would have been removed first with reduced flake size produced as reduction continued. Smaller flakes are also produced during tool re-sharpening and re-juvenation procedures. However, the lack of larger numbers of these smaller flakes can probably be attributed to collecting bias as these activities were most likely to have been preformed.

Only 124 flakes recovered do not contain evidence of burning. The remaining 234 flakes contain heat damage that ranges from a slight coloring to more extensive pot-lidding and thermal fracture. This damage can be attributed to both natural surface fires and their associations with the burned rock features and fire-cracked rock scatters.

DISCUSSION

The previous discussion of the analysis of the Musk Hog Canyon lithic assemblage provides an interesting insight into the prehistoric use of the area. The projectile points are perhaps the best indicator for a temporal use within the study area. The earliest period of use, as indicated by the *Angostura point*, is during the Late Paleoindian period. This continued from the end of Paleoindian times to the Transitional-Archaic period with the heaviest occupation during the Middle and Transitional Archaic periods.

Table 9. Total Debitage by Size Grade.

Size Grade	Size (mm)	Size (inches)	Number of Flakes
1	50	2	1
2	37	1 1/2	3
3	25	1	52
4	19	3/4	93
5	12.5	1/2	175
6	9.5	3/8	26
7	6.3	1/4	8
8	< 6.3	< 1/4	0
		Total	358

The various projectile points represented (*Bandy, Pandale, Langtry, Val Verde, Palmillas, Ensor, Figueroa, Marcos, Paisano, Frio*, and *Conejo*) are all typical types found within Crockett County and the Trans Pecos region (Epstein 1963; Ross 1965; McClurkan 1966; Riggs 1968a, 1968b, 1968c, 1974; Prewitt 1970; Word and Douglas 1970; Shafer 1971; Sommer 1972; Dibble 1997). To date, no definite chronology (utilizing diagnostic projectile points) for Crockett County has been proposed (Luke 1983:8). The present dart point sequence for the region was developed from excavation and survey work done in Amistad Reservoir (Story and Bryant 1966). Previous studies in Crockett County have accepted the Amistad chronology for the projectile sequence based on the fact that the same point types occurring there also occur in Crockett County (Luke 1983:8).

The Amistad projectile point sequence proposed by Story (Story and Bryant 1966) established seven prehistoric periods and one historic period. The prehistoric periods begin with the Paleoindian period (Period I) and are characterized by *Plainview, Golondrina, Angostura, Lerma,* and *Folsom* point types followed by Period II (6000-9000 B.P.) with *Gower, Early Barbed*, and *Uvalde* types; Period III (5500-6000 B.P.) with *Nolan* and *Pandale* types; Period IV (3000-5500 B.P.) with *Langtry, Almagre*, and *Val Verde* types, Period V (2000-3000 B.P.) with *Montell, Castroville, Shumla, Marshall*, and *Marcos* types; Period VI (1000-2000 B.P.) with Ensor, Frio, Paisano, and Figueroa types; Period VII (1000-400 B.P.) with *Clifton, Perdiz*, and *Toyah* types. The projectile point types for periods I-VII are dart point types and those for Period VII are arrow point types.

A refinement of this chronology was developed by Collins (1974) for Arenosa Shelter (41VV99) where he sub-divided Story's periods into additional periods. These are Period A (Story's Period I) where he divided it into a Paleoindian period and Archaic period; Period B (Story's Period II), Period C (Story's Period III), Period D (Story's Period IV), periods E,F,G (Story's Period V), Period H (Story's Period VI), and Period J (Story's Period VII).

In addition to these subdivisions, Collins assigned subsistence strategies for each period. These include large game bison hunting for the Paleoindian period and an Archaic-based economy dominated by small game hunting and gathering for the Archaic period within his Period A. Period B is still dominated by small game hunting and gathering, but some unifaces, bifaces, hammerstones, manos, and other miscellaneous cobble artifacts begin to show up. Period C retains the small game hunting and gathering activities, but unifaces now outnumber bifaces by almost three to one, abraded stone objects and pitted stones appear, albeit sporadically, as well as a few drills and choppers. Period D continues with the small game hunting and gathering activities, an increase in choppers, some abraded stones, and few drills. Periods E-G now include some bison hunting with the other hunting and gathering activities. Handaxes appear, choppers decrease, and only a moderate number of abraded stones occur. For a short duration around 2500 B.P. an environmental shift occurred where the climate changed to cooler, wetter conditions enabling bison to inhabit the region until drier conditions returned (Luke 1983:10).

Collins did not differentiate between his periods F and G at Arenosa except between *Shumla* points for F and *Marcos* points for G. Bifaces now outnumber unifaces ten to one, choppers and abraded stones are rare to infrequent, and pitted stones occur only in small numbers. The subsistence strategy is back to small game hunting and gathering but now includes fishing. Period H is similar to G with bifaces reduced to five to one over unifaces. Collins's final Period J is characterized with unifaces now as abundant as bifaces, with a reliance on hunting and gathering.

Collins also noted that the use of plants, such as agave and sotol, became dominant in the Archaic (Period C) in addition to small game hunting. An analysis of pollen by Bryant and Shafer (1977) and Dering (1979) from Hinds Cave (41VV456) show that plants begin to appear in use around 8500 B.P. with basically the same plant species being utilized until historic times.

Although there have been no specific studies of burned rock middens or fire-cracked rock scatters within the immediate region, some excellent studies from west central Texas (Black and Ellis 1997) have been conducted. The findings from those studies can be assumed to be similar to the use of burned rock middens and fire-cracked rock scatters within Musk Hog Canyon. The primary use of these features is for cooking and food processing activities. Ellis (1997:60-66) describes the various methods of food preparation utilizing heated rocks. These include baking, steaming, roasting, grilling, broiling, searing/charring, frying, boiling, blanching, and smoking/drying activities which may occur either as a single activity or in various combinations of activities at the same time or at different times.

Burned rock middens are constructed in a number of ways, depending on the intended method of use. Essentially, they begin through the excavation of a small basin or pit. This is followed by placing heated or unheated flat rocks lining the base of the pit. If unheated, wood is burned over them to heat them up. In some cases the pit may be filled only with charcoal or hot embers that are in turn covered with soil with burned rocks being placed only on top as a cap (Ellis 1997:60). Food to be cooked is placed either on top of the soil or directly on the coals, covered over with more soil, and more heated rocks are placed on top or additional fires may be started over the top. The most common foods prepared in these features are plants from the *Agave* family, such as sotol and yucca, but prickly pear and bulbs from the lily family were also prepared (Black and Ellis 1997:9). Once the cooking process is completed, the food is uncovered by removing the rocks, which are thrown around the perimeter of the pit. The heated rocks usually fractured into small chunks from the heating process, and if the pit is to be reused, or an additional one built nearby, new rocks must be added. After repeated use, these heat fractured rocks and depending upon the type of food, may result into large mounded, U-shaped, "ring-shaped," or scattered accumulations.

Burned rock middens from Central Texas have been in use for 6000-7000 years (Black and Ellis 1997:9). Many of these middens were used over and over again for long periods of time, often encompassing a number of time periods. This is often noted in the different types of projectile points commonly found associated with these features. There were a number of projectile point types found associated with the Musk Hog Canyon burned rock middens and fire-cracked rock scatters. These ranged in time from the Early Archaic to the Transitional Archaic periods. The earliest point form recovered was the *Gower*. This type, known from the Early Archaic, predates the accepted times for most burned rock middens and probably represents an isolated hunting loss rather than a direct association with any feature. Other projectile point forms found associated with the Musk Hog middens include *Pandale* (Early Archaic), *Palmillas-like* (Midlate Archaic), *Langtry* (Middle Archaic), *Conejo* (Late Archaic), and *Ensor, Figueroa*, and *Paisano* (all from the Transitional Archaic).

Rock shelters, lithic scatters, and quarries were the other site types found within Musk Hog Canyon. Reviewing Table 2, it can be determined that the most abundant numbers and types of artifacts recovered were from rock shelters. This is understandable as these areas were the primary occupation areas. These are the areas in which the most intensive and long term habitation occurred and are the places that were the most attractive for habitation to peoples from the first of the regions inhabitants to the last. The projectile points recovered from the 18 rock shelters recorded include *Bandy*-like (Early Archaic), *Langtry* (Middle Archaic), *Ensor* (Transitional Archaic), *Frio* (Transitional Archaic), and *Marcos* (Late-Transitional Archaic).

Thus, the various rock shelters within Musk Hog Canyon have been occupied from at least the Early Archaic through the Transitional Archaic periods.

The different stages of bifaces recovered show that the entire range of bifacial reduction is present, albeit at varying quantities and at different sites within Musk Hog Canyon. Most of the 81 bifaces recovered were Biface II, III, and IV types with only three categorized as a Biface I type. This indicates that selected bifaces were brought from quarries as already tested and rough flaked, or as large flakes to the rock shelters for final tool manufacture. Some bifacial reduction (in lesser amounts) was also noted at a few of the burned rock middens, fire-cracked rock scatters, and lithic scatters. These findings are perfectly understandable as many of the activities surrounding these sites would also require the use of lithic tools, and their manufacture and maintenance would be an ongoing activity at these sites, as well as at the base camps.

The debitage supports the findings of middle to late stage bifacial reduction. As discussed in the debitage section, only a small number (19) of primary flakes were noted. The majority of the flakes are secondary (141) and interior (199) type flakes with 346 (out of 359) falling within size grades 3 through 6. These findings indicate reduction of moderately sized bifaces or cores containing little cortex. Unfortunately, the collecting bias of the survey failed to include any significant amounts of the smaller debitage that could provide evidence for additional reduction and/or tool maintenance activities that may have been present. However, based on the probable long term occupation of many of the sites and the types and amounts of artifacts collected, such activities can be assumed to have occurred as a natural result of lithic manufacture and use.

The unifacially modified flakes represent the largest tool category recovered. These are very interesting tools. They were found in abundance on virtually all the sites tested in Musk Hog Canyon (Moore 1980, 1983). Therefore, their function(s) must have been one of continual repetition. It was determined, from the Modified Edge discussion, that most of these tools were used in scraping activities. Also, many contain utilized edges that have a varying range of edge angles, some with a purposefully modified jagged edge on the more acute angles. Since these are essentially expedient type tools, it does not seem likely that so many were picked up and reused for different tasks when they could be easily and quickly manufactured from the abundant flake debris obviously present within and around these sites. Rather, these varying edge angles were probably being employed for one or more functions of the same task. The question is: what tasks would utilize unifacially modified flakes having varying angles, and in some cases, a jagged edge on the more acute edges? Due to the exposed nature of these tools, no identifiable use-wear pattern for a specific task can be determined, therefore, any conclusion for their use can only be speculative at best.

However, one of the most abundant tasks common to that region is fiber extraction. Cordage and its varying uses and forms is one of the most abundant artifact types recovered from the dry shelters and caves within the Lower Pecos region. One of the best plants locally available for this is yucca. Fibers extracted from yucca are very fine, and it would be necessary to collect large numbers to produce the amounts required for cordage production. Fortunately, there are a number of ethnographic observations available and experiments that have been preformed that can help provide some insight into fiber extraction (McPherson 1987:40; McGregor 1992; Abril 1999:27-28; Miller 2002:86; Blankenship 2003:46-48; Iglesia 2003:74-79). While ethnographic accounts have always been a valuable source of information surrounding past behaviors, experimental archeology is also becoming an invaluable tool. For example, it is very easy to come up with an explanation for some tool or feature usage or explaining a manufacturing technique. However, when applying these ideas to a real use, they are often found to be ineffective at best. This is where the use of experimental archeology is becoming a very useful tool.

Yucca provides excellent cordage, being very strong and easy to work (McPherson 1987:40). The primary step is to de-pulp the leaves to expose the fibers. The various methods that include roasting, pounding and drying, or soaking the leaves in water or while green to begin this process (McPherson 1987:40; Abril 1999:27-28). De-pulping can be accomplished utilizing only one's thumbnail, but modern experiments have shown that the sap of many agave leaves, yucca included, contains a caustic substance as well as a compound in the sap that causes dermatitis (Abril 1999:27). Therefore, some tool would be preferred to aid in de-pulping, especially in the large numbers and time required to produce the amounts of fiber needed. Wood, bone, or flint could all be easily utilized for this (McPerson 1987:40; Abril 1999:29).

Whichever method of preparation is used, pulp would be removed by pushing or pulling a tool along the length of the yucca leaf. If flint were used, a flake having a steeper, more beveled edge would be easier and more efficient to use. Such a form would be held at an angle as opposed to straight up, which would be required on tools having more acute edges. Another form of de-pulping tool could be made from a large core or core-like cobble having a flat ventral surface. This surface could be pushed over the surface of the leaf effectively removing the pulp. One such tool from Musk Hog Canyon is depicted in Figure 13a.

Once the pulp has been removed, the leaves are "retted," a process which separates the fibers from the leaf. On dried leaves this can easily be accomplished by simply pulling the leaves apart to expose the fibers. Alternately, it has been observed that the Digueno peoples of southern California prepared their leaves by roasting them for about thirty minutes and then the pulp was scraped away by using sea shells having naturally serrated edges (Abril 1999:27) Thus, the portion of a tool having a more acute edge with a jagged or denticulated edge could have been used during the retting process. It would certainly save time if this process could be accomplished with a single tool, as opposed to several. Granted, this is a purely speculative explanation, with no specific evidence noted on the Musk Hog examples to support it. However, enough experimental and ethnographic evidence does exist to suggest this to be a plausible use for these unifacial tools.

CONCLUSIONS

The lithic assemblage for Musk Hog Canyon represents a number of activities that include tool manufacture, hunting (projectile points), and plant processing. This assemblage was collected from the surface of sixty-two different sites that included lithic scatters, quarries, fire-cracked rock scatters, burned rock middens and rock shelters. Due to the scattered nature of the artifacts, sites, and the paucity of artifacts recorded from many of the sites (some sites were recorded without any artifacts recovered), the canyon should probably be evaluated as a single unit made up of a number of smaller sites representing a group of interrelated activities rather than a number of individual sites.

The projectile point types represent occupation from the Early Archaic period through to the Late Transitional Archaic period. Thirteen projectile point types were identified and all are regional types. A single fragment of an *Angostura* point was recovered from an un-recorded area and indicates that some use of the canyon may have occurred prior to the Early Archaic. Typical bifacial reduction activities aimed at projectile point and flake tool manufacturing are predominant.

Besides hunting, the next most important activity, as evidenced by the large number of burned rock middens and fire-cracked rock scatters, is plant harvesting and processing. Tools utilized for these activities are flakes that were manufactured from cores and/or biface reduction debris into unifacial tools. These were used in various scraping/cutting activities, probably revolving around some plant processing tasks, such as fiber extraction.

The survey recorded several chert quarries, as well as some lithic scatters, indicating that the chert utilized was probably procured locally. It was not made clear whether these lithic scatters were solely from lithic manufacture debris or if they were part of a chert outcrop or quarry. The cherts ranged in a number of colors and textures, and appear to occur in two primary forms, either as small cobbles or weathered ledge cherts. These cobbles and other cherts were fairly small and many contain inherent problems, such as pressure cracks and inclusions. Some surface fires may also have contributed to the overall condition of these cherts.

In sum, the analysis of the lithic assemblage shows that the various activities and tasks preformed within Musk Hog canyon are typical of the Lower Pecos region as a whole. The lithics support the idea that hunting was predominant, and that plant and food processing activities revolving around burned rock features were also a major activity. Although these activities were probably carried out concurrently throughout the canyon, the most consistent occupation appears to have been centered within the rock shelters.

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In Memoriam—Curtis Tunnell

Dan Utley

Curtis Dale Tunnell[1] (Figure 1) was a tireless time traveler, perhaps more comfortable with the ancients than he was with the moderns, among whom his lot was cast. He was born in Turkey, Texas, in the shadow of the hawk, on January 24, 1934. He grew up in a shotgun house, as he noted, "down behind the ice plant," and he learned at an early age to discern and appreciate the life rhythms of his homeland. As he remembered:

> I was born into a family of rock hunters in a rock hunting heaven. Snow white bands of gypsum in scarlet red cliffs were seen at every turn. Rainbow colored bits of flint littered the surface. Magnificent desert roses could be dug from creek banks. Green shelterbelts crisscrossed the country. Plum thickets in sandy creeks were heavy with Chinese-red fruit. Petrified wood, mammoth teeth, buffalo bones, and other treasures were scattered about for the taking. I never knew anything drab or monotonous.

The cultural landscape Curtis experienced as a young boy was one of cowboys and cotton, and the values and lessons of each shaped his life in dramatic ways. His family roots went deep in the rolling hills of Hall County, and his maternal ancestors, the Gibson's, donated the Turkey townsite. The natural landscape had no less a hold on him, and it continually drew him in a westerly direction, even when he was far from home. As he wrote:

> My earliest memories are of looking toward the west and seeing the sculptured purple silhouette of the Caprock. This rugged escarpment of the plains beckoned steadily, from the twin Quitaque Peaks on the south to Eagle's Point on the north. This vista always made my mind take flight. In the remote depths of the canyons, I would find trails last trod by Native Americans. The region was so remote and unspoiled that one could hike back in time.

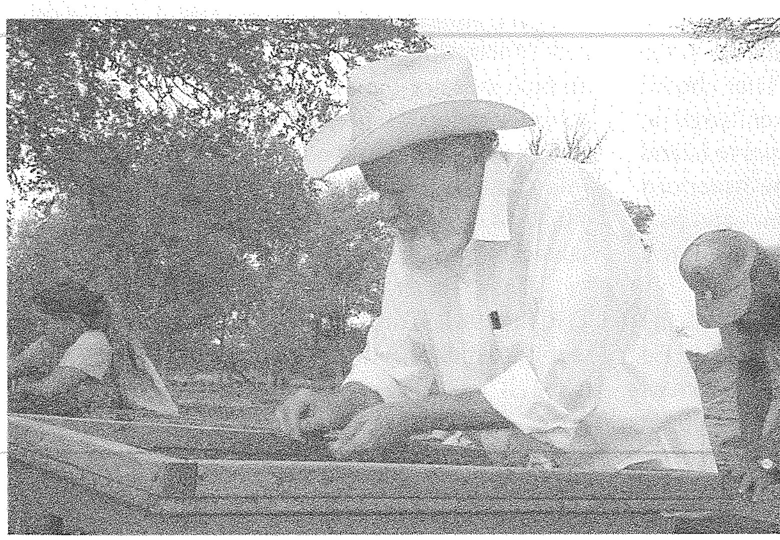

Figure 1. Curtis Tunnell, former execute director of the Texas Historical Commission screening during the excavations at Fort St. Louis, 41VT1 (photograph courtesy of the Texas Historical Commission).

Curtis learned at an early age the value of work, and all work to him throughout his life was honorable. As a young man, he picked and chopped cotton, swept the floors of the Gem Theatre, fixed flats at the Downtown Service Station, cooked red-top stew at the Busy Bee Café, and offloaded mail from the midnight train at the Turkey depot, where he said, " I was just some nameless kid with a mail wagon in the middle of the night in a rural Texas town."

Thankfully, that image did not define his life. As a young man, he realized that he was, indeed, somebody, and that his hometown was, indeed, someplace special. His heritage was rich and fascinating, and he marveled at the complexities instead of the generalities of his surroundings. In Turkey, he made friends with migrant workers, gypsies, bootleggers, jake-legged drinkers, real cowboys from the Mill Iron and JA ranches, and a man named Chief Bernard, who was, perhaps, as Curtis observed, more Mexican than Indian. And, in the transplanted Old South society of the time, he came face to face with the senseless barriers cultures sometimes build—barriers he would spend the rest of his life dismantling.

Curtis Tunnell was a man who appreciated, and even celebrated, diversity. It was the touchstone of his existence and the signature of his life as a seeker of knowledge. In all that he did, he brought people together, nurtured their unique character, took a genuine interest in their lives, searched their souls for understanding, and spread love and happiness and hope to all. As a result, his friends came from all walks of life and each touched him as much as he did them.

Graduating as valedictorian of his class in 1951, Curtis borrowed fifty dollars and hitchhiked to Canyon to enter West Texas State College. To make ends meet, he took a job at the Panhandle-Plains Historical Museum, where his initial assignment was to mop the terrazzo floors at night. At WTSC, he met archeologist Jack Hughes, who would become his lifelong mentor and friend. The two men traveled vast areas of the Texas Panhandle together, surveying, recording, and investigating ancient sites, and in the course of the travels, Curtis chose to become an anthropologist.

After graduating with a bachelor's degree and completing his OCS training, Curtis enlisted in the United States Navy and served as an officer aboard the USS *Kishwaukee*, a gasoline tanker based at Pearl Harbor, Hawaii. His ship ferried fuel to island locales then fresh in the memories of the American people—Midway, Guam, and Kwajalein—and participated in atomic testing at the Bikini and Enewetak atolls.

Following military service, Curtis entered the University of Texas and under the direction of Ed Jelks, worked on archeological salvage crews across the state at sites such as McGee Bend (Sam Rayburn Reservoir), Diablo Canyon (Lake Amistad), and Canyon Lake. He also spent a summer in Kansas excavating early Pawnee sites. In Austin, Curtis expanded his musical appreciation beyond the western swing of fellow Turkey resident Bob Wills to include the likes of Janis Joplin,[2] who performed at Threadgill's, and Lightening Hopkins, a regular at the Eleventh Door. Music would be central to Curtis's existence throughout his life, and his tastes were broad and eclectic, as long as the music was soulful and honest.

Following completion of his master's degree at UT, Curtis left Texas for work at the University of Illinois. There, he directed salvage projects and participated in intensive investigations at such places as the Cahokia Mounds. One summer, he worked among the Hopis in Northern Arizona and learned about dendrochronology. While at Illinois, he also me his future wife, Nancy Kott, whom he always referred to as his sweetheart.

Curtis returned to Austin permanently in 1963 to become the curator of anthropology at the Texas Memorial Museum (TMM). At TMM, he worked with Bill Newcomb at Mission San Lorenzo and again at Amistad, where he developed an appreciation for ancient rock art. In 1965, he moved across town to become the first Texas State Archeologist under the old Texas State Building Commission. Four years later, both the job and Curtis transferred to the Texas State Historical Survey Committee, which became the Texas Historical Commission. He would remain with the agency until his retirement thirty years later.

As state archeologist, Curtis participated in investigations at Spanish missions and presidios, federal military installations, early farmsteads, and the Folsom-age Adair-Steadman site. He braved the waters of the Rio Grande in a canoe to record archeological resources present in the Big Bend canyons and filmed and documented the last practitioners of vanishing crafts, arts, and cultural practices on both sides of the Texas-Mexico border. He was instrumental in the passage of the Antiquities Code of Texas to protect archeological sites and historic shipwrecks and went with state troopers to recover the 1554 shipwreck treasures from a commercial salvager's warehouse in Indiana.

When Truett Latimer left as the head of the THC in 1981, Curtis Tunnell became the agency's second executive director. Under his leadership, the THC developed the Texas Main Street Program, established the Texas Preservation Trust Fund, placed over 4,000 historical markers, added 766 properties to the National Register of Historic Places, established Texas Archeological Awareness Month, presided over $600 million in tax act projects, restored the historic Gethsemane Lutheran Church as the agency's library and archives, oversaw preservation of the Governor's Mansion and the State Capitol, created the Los Caminos del Rio Project along the Rio Grande, began a statewide cemetery preservation program, and initiated planning for what would become the Texas Historic Courthouse Preservation Program. In the course of his years as director, Curtis boasted that he worked with seven governors, "and hugged the next of one." In his spare time, he collected oral histories and folklore, traveled back roads through all counties of the state, documented vernacular architecture, wrote poetry, crafted Indian jewelry, protested war, injustice, and inequality, played the guitar, collected folk arts and crafts, published extensively on a wide range of topics, and danced the Texas two-step with his sweetheart every chance he got. He never did anything drab or monotonous.

Curtis was, by his very nature, a teacher, and he greatly enjoyed revealing the secret places and hidden history of our state to those fortunate enough to be his traveling companions. Journeys with Curtis were like graduate school field trips, and the ones in which I participated over the years included, among many other things, neglected family cemeteries, an open Terlingua mineshaft, onion pickers along the Rio Grande, East Texas peckerwood sawmills, a stained glass window in a San Diego church, a honey plant in Presidio, creosote bushes, Ozona road cuts, ancient wind driven sand dunes at Big Lake, a combination service station/library in Redford, and countless renditions of songs his mother taught him. And we harvested wild blackberries, pecans, and plums, stopped at interesting roadside cafes, toured countless local museums, and visited dozens of county stores, many of which have closed over time, never to open again. All the time, Curtis was furthering the mission of the THC, meeting and planning with local preservationists and political officials to preserve and interpret "the people's history." Long before the "new social history" was a popular concept, Curtis already understood the value of inclusive history from the bottom up and from the inside out.

The first time I ever traveled with Curtis, we stopped in a small town east of Austin to photograph a garage he had seen on an earlier trip. We drove down an overgrown alley behind a fine Victorian house to get close to the building, which was patched in places will old license plates. When he finished making his photos and notes, he said, "You know, lots of folks will photograph the home, but we need to make sure people don't forget about the garage." Curtis deeply cared about the records we leave, and he wanted future generations to have the most complete view of our past as possible. He tried to avoid generation gaps where he could, professionally, philosophically, and personally.

And then there were the lessons of life, the personal frames of reference Curtis shared along the way. Driving into a dilapidated, but still open, filling station, he would say, "Let's give this old boy some state money." Or speaking of a political idea that failed to garner support, he noted, "It's like dropping a brick in a well and never hearing the splash." He might stop the car in the middle of the highway to watch a snake cross the road and then discuss the sanctity of all life, or listen to conjunto music on the radio and observe, "That would bring tears to a wild hog's eyes." And good barbecue, he said, "Makes you want to run around the house and whinny like a horse." The world was a marvelous place to Curtis Tunnell, and nothing was too remote or too minute to be worthy of his attention and fascination. My time spent with him was always thought-provoking, uplifting, and life-changing.

In the late 1990s, Curtis and the THC embarked on a monumental archeological project which continues to this day. He helped plan the THCs intensive excavation of the French *barque longe, La Belle*, La Salle's doomed ship wrecked off Matagorda Island in 1686. The excavation, which made international news, led in part to a related investigation at the site of Fort St. Louis, a project currently underway in Victoria County. It was there Curtis devoted much of his time following his retirement from the THC in 1999, serving as senior advisor on the project. The work was tedious and physically taxing, but Curtis's thoroughness as a scientist, both in the field and in the lab, set the professional pace and tone for the investigations. He was in his element when he was researching, and his retirement years were among the happiest and most productive of his career.

Curtis Tunnell passed away unexpectedly at his Austin home on April 13, 2001. At a memorial service on May 18, his ashes were placed in the north wall columbarium of the Texas State Cemetery, a site he helped restore in recent years. He is survived by his wife of thirty-one years, Nancy Knott Tunnell, his brother, Gary Tunnell of Vancouver Island, BC, an accomplished anthropologist in his own right, and several nephews and cousins. He leaves behind, also, myriad individuals touched profoundly by his generosity, his exuberance, his kindness, his scholarship, and his sensitivity.

Along the braided trail he cut in the cultural bedrock, Curtis Tunnell walked with presidents, governors, migrant workers, preservationists, business leaders, children, Mexican villagers, ranchers, artisans, veterans, fiddle players, farmers, judges, mayors, educators, tribal elders, *curanderas*, geologists, cowboys, free spirits, a Grey Ghost, and countless thousands of people all over the world who had more than just a little bit of Texas in their souls. It is a testament to his legacy that they all considered him their true friend, and that, to him, was the greatest accomplishment of his well spend life.

A special web site *(http:curtistunnellmemorial.thc.state.tx.us)* highlights Curtis's many accomplishments and features a memory bulletin board. Those wishing to honor his legacy may send donations to the Curtis Tunnell Memorial Fund, Friends of the Texas Historical Commission, P.O. Box 13497, Austin, 78711. The fund will be used to provide grants for research in oral history, archeology, and ethnography.

END NOTES

1. This memoriam first appeared in the *Southwestern Historical Quarterly*, vol CV, no. 1, 2001, and is republished here with their permission.

2. It is interesting (and perhaps serendipitous) to note that Truett Latimore, the first Executive Director of the Texas Historical Commission, claims that Janis Joplin resided for a brief period in the El Rose Apartments that now house the Archeology and Architecture Divisions of the Texas Historical Commission, the agency that Curtis later led.

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Curtis Tunnell and the Discovery of the Palisade Trench at Presidio La Bahía

James E. Bruseth, Jeffrey Durst, and Kathleen Gilmore

ABSTRACT

From the fall of 1999 to January of 2002 the Texas Historical Commission excavated the Keeran site, 41VT4. The site contains the remains of La Salle's French colony established in 1685 and of Presidio La Bahía, which was established by the Spanish in 1722. Archival records indicate that the Spaniards had constructed an elaborate European-style fortification with a 16-point star-shaped palisade wall defining the perimeter. An important element of the field research was to determine if the Spaniards had indeed carried out the construction of this sophisticated fortification. A major goal was to locate the setting trench for the palisade wall and to document the trench and its contents. Curtis Tunnell, who had been retained by the project as a senior advisor, was a critical influence during the accomplishment of this task.

INTRODUCTION

This paper discusses the efforts undertaken at the Keeran site to find evidence of the palisade wall that protected the Spanish Presidio La Bahía, which was established over the remains of La Salle's French Fort St. Louis. Archival evidence indicated that a 16-point star-shaped palisade wall was built by the Spaniards as part of the construction of the presidio when they occupied the site in 1722. Finding the setting trench associated with the palisade wall was considered a key part of the project, since doubts had been raised about whether the presidio was ever built. Locating the palisade trench would show conclusively that it had been constructed. As described below, finding the trench proved very difficult and took many months of intensive field investigation. Of particular importance in the search was the assistance of Curtis Tunnell, former executive director of the Texas Historical Commission and senior advisor to the Keeran site excavation project.

Excavation of the site began in the fall of 1999 and continued uninterrupted until the end of January 2002, a total of 29 months. The senior author (Bruseth) served as principal investigator, and the second author (Durst) served as project director beginning in 2001, succeeding previous project director Mike Davis. Third author Kathleen Gilmore served as a project senior advisor.

At the start of the field excavation in 1999, large quantities of artifacts and features were anticipated, based on the pioneering work at the site in 1950 by Glen Evans, who found thousands of artifacts. Evans' work was reported in 1973 by Kathleen Gilmore, who noted that the vast majority of the artifacts were Spanish Colonial but a small number were French in origin. The 1999 fieldwork showed that densities were extremely variable, and, in fact, during the first few weeks of excavation only a few artifacts were found, none of which were French. This caused much consternation about whether the Keeran site was in fact the location of La Salle's French fort as well as the Spanish Presidio La Bahía. Where had the thousands of artifacts been found during Evans' work in the 1950s? Could he have excavated most of the archeological deposits? A map of Evans' excavation units clearly showed that only a small portion of the site was dug, and it seemed highly unlikely that this small sample would have removed most of the artifacts.

Finally, after several weeks of excavation across a large area of the site, denser artifact deposits were found. Most of these areas contained artifacts of Spanish origin presumably from the occupation associated with Presidio La Bahía. A few areas, though, contained French artifacts, and these tended to be clustered along the northern half of the site adjacent to Garcitas Creek.

Although historical documents indicated that a palisade trench should be present, months of work had failed to find any evidence of it. Considerable debate broke out among the project managers about the reason for this, with Bruseth arguing that the trench must exist since the archival evidence was so clear about the Spanish digging it, and Davis insisting that it had never been built. Several heated discussions ensued that served only to polarize the positions all the more. A calming and more neutral influence was maintained by Gilmore, who argued that more time was needed to sort it out. About this time Curtis Tunnell joined the field project. He also believed that the palisade trench had been built, but thought that it might prove difficult to locate. Despite the various opinions, the search for evidence of the palisade continued for many months.

A major factor greatly complicating the search was the site's soil. The ground has been non-aggrading for much of the Holocene, and artifacts deposited on the surface have worked their way 10 to 30 cm into the soil by bioturbation. Therefore, no stratigraphy existed to separate French from Spanish deposits.

Coupled with this difficulty, the site soil is a black clay, classified as the Lake Charles series (Miller 1982:22) overlying a whitish-gray clay subsoil. Across much of the site, the black clay extends down a meter or more, and in these locations it was almost impossible to identify features. When a pit or posthole was dug into the ground, dark-colored soil was placed into the already dark soil, and no visible contrast was present. In a few areas the whitish-gray underlying deeper clay zone is about 30 to 50 cm below the surface, and here features could be detected. The shallow, lighter clay is the product of soil gilgais that form from alternating wetting and drying of the soil. The gilgais move the deeper, lighter-colored soil upward in the soil profile. Cultural features that have penetrated this lighter clay are today observable. However, the spatial extent of the shallow, lighter clay areas was limited, and in most of the site, feature detection was impossible.

The lengthy field season helped to overcome the clay soil problems. Time was available to trace out areas where higher artifact densities existed and to identify locations where the subsoil was sufficiently light for features to be visible. As it turned out, the spatially variable artifact densities reflected short-term use of the site by the French (less than five years) and the Spanish (less than 10 years). Each occupation lasted for a sufficiently short period that the same patterns of artifact discard were maintained on the landscape. Once this was understood, the pattern of spatially discrete deposits could be used to understand the layout of the French and Spanish occupations. And despite a lack of cultural stratigraphy, a general spatial separation was evident in the distribution of French and Spanish artifacts that allowed samples to be collected from each component.

A total of 2,790 m^2 was ultimately excavated, which allowed the Spanish and French uses of the site to be understood (Figure 1). If we had not had the luxury of a 29-month-long field season, however, and only the initial fieldwork during the fall of 1999 had occurred, the site likely would have been considered to have too little integrity left for further study and to be no longer significant. As a point of comparison, how often are similar—and inaccurate—site appraisals made based on very limited field testing during cultural resource management investigations?

HISTORICAL BACKGROUND

In the late winter of 1684 the French explorer Robert Cavelier, Sieur de La Salle, cruised along the shore of the Gulf Coast in search of the mouth of the Mississippi River. Missing his mark by several hundred miles to the south, the explorer finally, in the spring of 1685, decided to establish a small colony along a small waterway today known as Garcitas Creek. The colony, called Fort St. Louis, was situated in country then claimed by Spain and in what is today the central Texas Gulf Coast. Before the foundations for the colony were even laid, the Spanish Crown learned about the French plans to colonize the northwestern Gulf of Mexico from captured French sailors who had abandoned La Salle's expedition during a stopover in the Caribbean (Weddle 1973:6–13).

News of the impending French colonization spurred the Spanish Crown to initiate an intensive search, by both land and sea, for the French settlement in order to stop the French incursion. The Spanish failed to locate the French site for several years, until the spring of 1689 when Spanish General Alonso de León finally located it. De León's success was eclipsed by the Karankawa Indians, who several months earlier had attacked and killed most of the remaining colonists save a few children

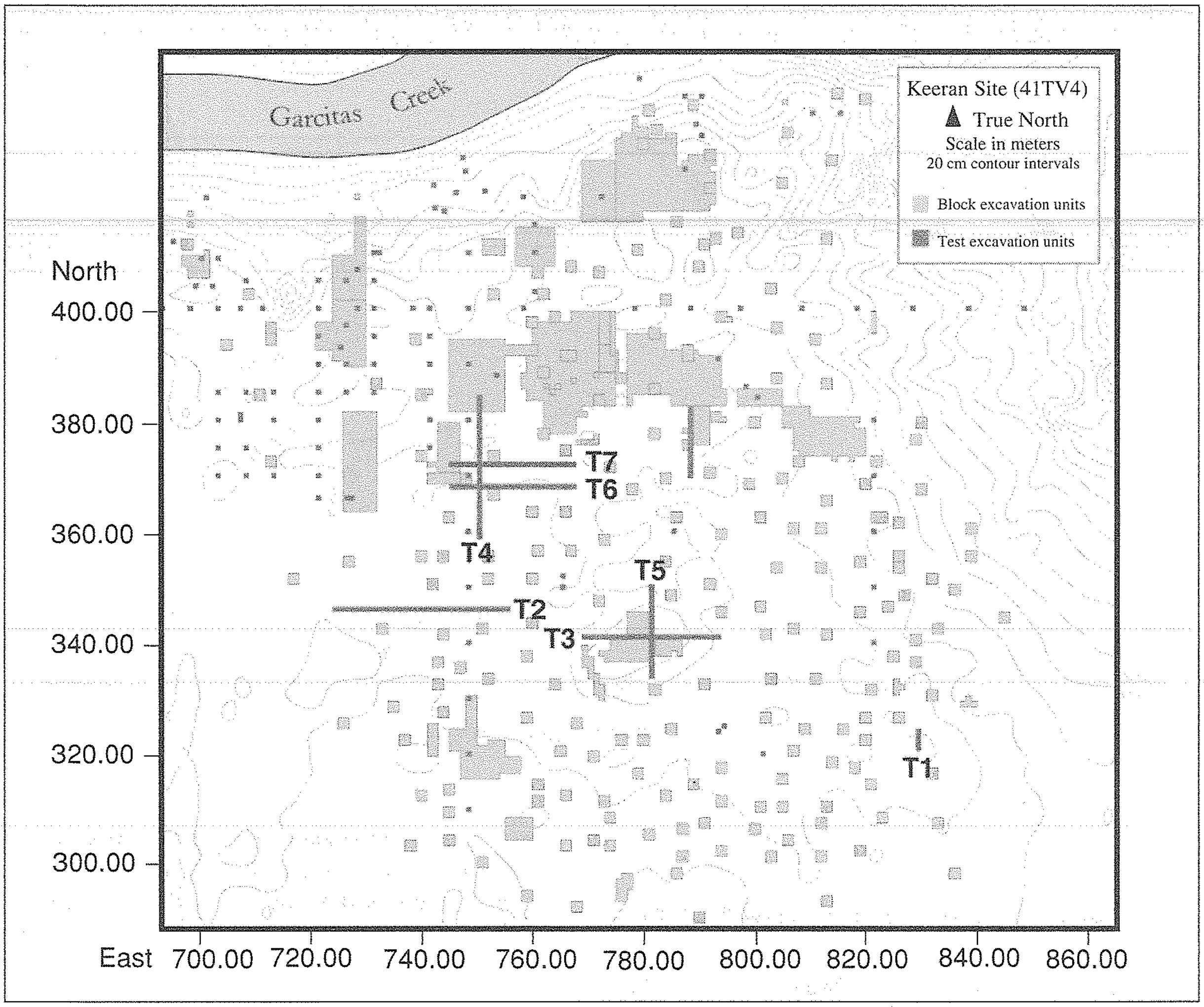

Figure 1. Map of 1999–2002 excavations at the Keeran site.

whom they took captive. A member of de León's expedition drew a rough sketch map of the French colony after the expedition returned to Mexico (Figure 2; Chapa 1997:130).

In April of 1690 de León returned to Fort St. Louis with instructions to set fire to it (Bolton 1959:369). A few months later, on October 12, 1690, another Spanish expedition, commanded by Francisco de Llanos and Captain Gregorio de Salinas, was sent by sea to investigate a report of two buoys seen in the Bay of Espíritu Santo. The buoys turned out to be large pieces of driftwood. On this journey the distinguished naval engineer Joseph Manuel de Cárdenas y Magaña executed a very detailed map of Lavaca Bay and Garcitas Creek, which showed the exact location of the French fort. This map was located in the archives of Spain during the early-20th century by historian Herbert E. Bolton (Bolton 1924).

The Spanish made plans during the 1690s to place a military outpost at the location where La Salle had established his colony. Archival records show that the site was visited several times during the ensuing years, but it would be more than 30 years before the Spanish would return to establish Presidio La Bahía directly atop the ruins of the French colony.

On April 4, 1721, 40 soldiers under the command of Captain José Domingo Ramón arrived at the site and established a temporary camp, naming it Nuestra Señora de Loreto en la Bahía del Espíritu Santo, today popularly called "La Bahía." In the spring of the following year, construction of an elaborate and permanent fortification began under the direction of the Marqués de San Miguel de Aguayo. Aguayo himself laid out the lines for the foundation of the presidio before departing (Aguayo 1722). The chronicler of the expedition was Juan Antonio de la Peña, who noted,

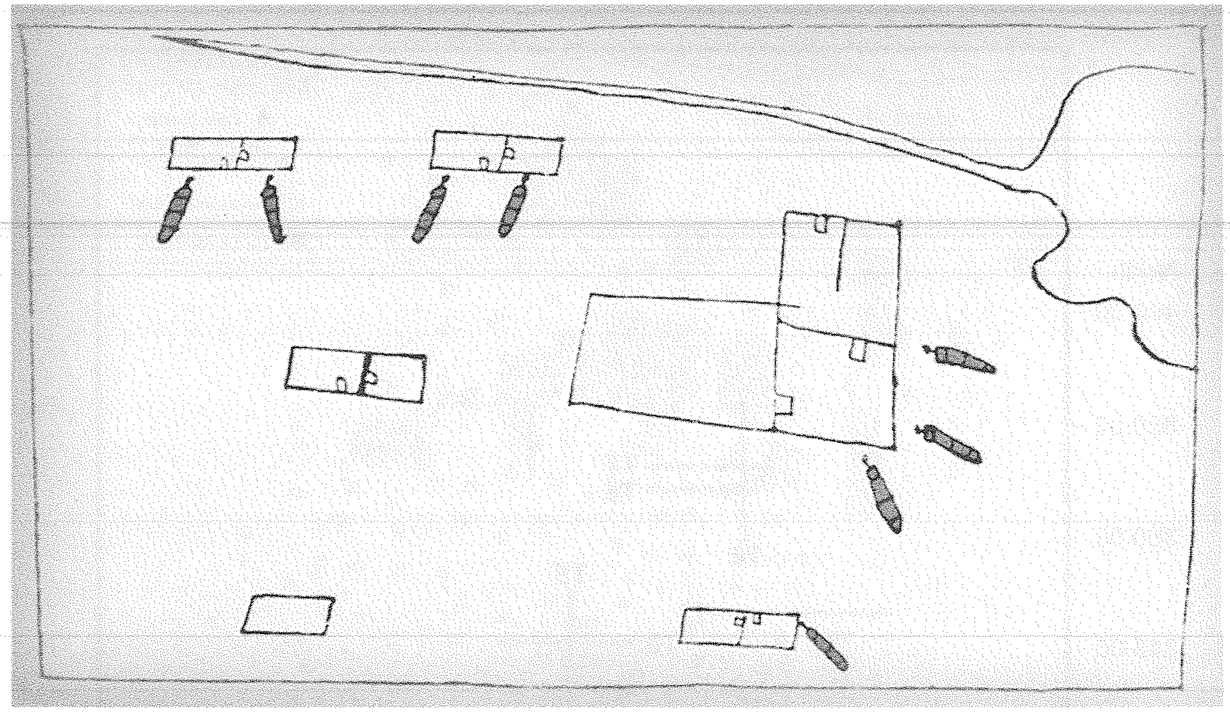

Figure 2. Spanish map of Fort St. Louis in 1689 showing the eight French cannons.

> On digging the foundations for the fortress, we found nails, pieces of gun locks, and fragments of other items used by the French. The foundation for the octagonal fortress was laid in 15 days. (Santos 1981:78)

After completion of the fortification, Aguayo settled an additional 50 soldiers and their families at the presidio. The location and the elaborate layout of the presidio were to serve as a warning and a deterrent to the French, discouraging any attempts at another colonization effort. That same year, Mission Espíritu Santo de Zúñiga was placed across the creek from the presidio (Gilmore 1973:18).

Several colonial period plan maps of the presidio have been recorded in recent years. The maps depict an elaborate 16-pointed star-shaped palisade wall with an octagonal arrangement of residential and military structures contained within (Figure 3). Mission Espíritu Santo was moved farther inland in 1726 to a more favorable location on the Guadalupe River (Bustillos y Zevallos 1726). Archival evidence, however, shows that the presidio location on Garcitas Creek continued to be occupied until 1730 when its demolition was ordered (Mediavilla y Ascona 1730). Project archivists Kay Hindes and David McDonald are responsible for locating documents that provide the terminal date for the presidio.

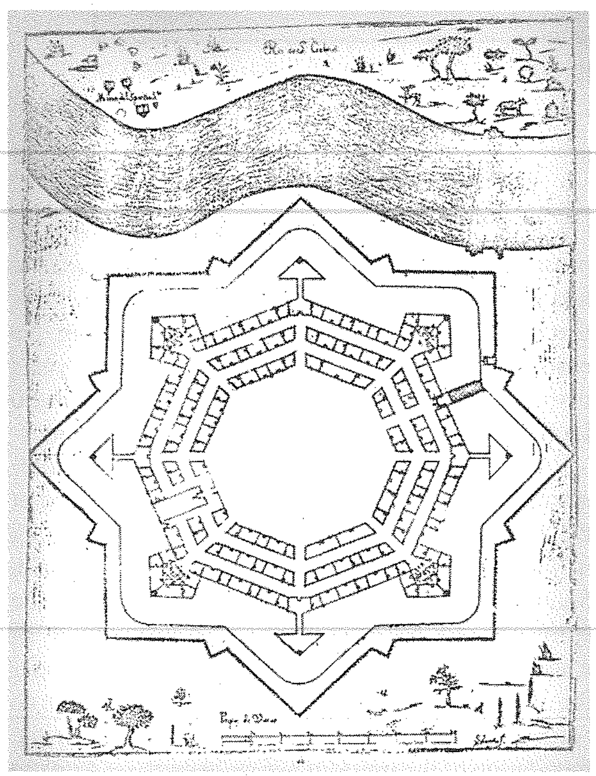

Figure 3. The Marqués de San Miguel de Aguayo's plan of Nuestra Señora de Loreto Presidio de La Bahía.

TWENTIETH-CENTURY INVESTIGATIONS

The ashes of Presidio La Bahía lay cold for almost 200 years before Bolton discovered Cárdenas' map of the Garcitas Creek and Matagorda Bay area in the Archivo General de Indias of Seville. The late-17th-century map identified Matagorda Bay and the creeks that feed into the bay in great detail and also plotted the location of La Salle's fort. Bolton surmised that, based on this information, he would be able to locate the French fort and thereby the Spanish presidio built directly over it. He traveled by train to the small town of Placedo, Texas, about 18 km from the site, and was taken by wagon to the nearby Keeran Ranch (Bolton 1924:171–189).

At the Keeran Ranch, he was introduced to the owner, Mr. Claude Keeran, who took Bolton to the place where the site was thought to be. At that location Bolton saw small pieces of blue-and-white Spanish ceramics on the ground. He also noted the remains of a low wall made of baked red clay that he speculated was part of the presidio (Bolton 1924:187). On the basis of the visible remains he saw, Bolton proclaimed that he had conclusively found the site of La Salle's French colony and Presidio La Bahía.

Despite Bolton's substantial evidence, controversy about the true location of the French and Spanish settlements continued, with many still disputing the Keeran Ranch location. In 1950, geologist and part-time archeologist Glen Evans with the Texas Memorial Museum was employed to resolve the question of whether the Keeran site was in fact the true location of Fort St. Louis and Presidio La Bahía (Gilmore 1973:1). Evans and a small crew were allowed to excavate at the site in an attempt to gain a clearer picture of the archeological deposits. Evans and his crew worked for about three months and unearthed thousands of artifacts; analysis of the artifacts was never undertaken and a report was not prepared. The only paperwork that exists today from Evans' 1950 work is a map showing the location of the field excavation units (Figure 4).

Evans was convinced that the fieldwork had established the site as the location of Fort St. Louis and Presidio La Bahía (Tunnell 1998:35). However, without analysis of the artifacts and a formal, or even informal, report of the project's findings, the controversy still raged.

It would not be for another 23 years that the artifacts from Evans' excavations were analyzed. In 1973 Kathleen Gilmore set to work to settle once and for all the issue of the identity of the site on the Keeran Ranch. Gilmore identified French and Spanish artifacts from the late-17th and early-18th centuries from the site (Gilmore 1973). More notably, she was able to specifically identify several examples of green-glazed ceramics from the Saintonge region of southwestern France and faïence from other locations in France, both clear diagnostic markers of La Salle's French settlement. She also was able to identify more than 10,000 Spanish majolica sherds and various other Spanish artifacts. It seemed as though her work offered irrefutable evi-

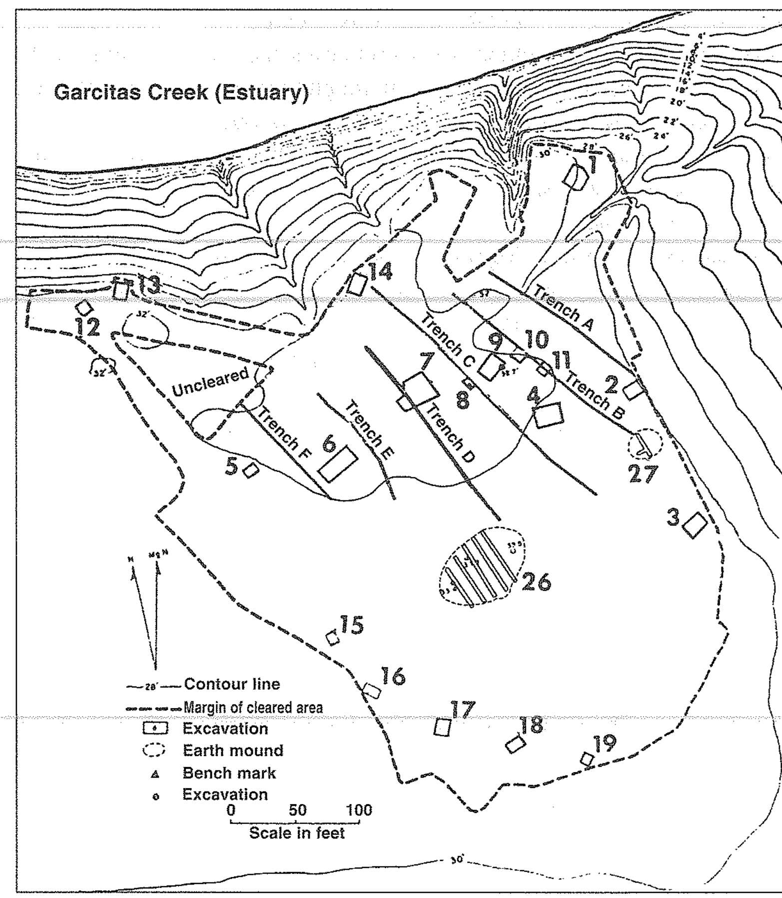

Figure 4. Map of the Keeran site in 1950 by the Texas Memorial Museum.

dence that Bolton's original conclusions were correct. However, information about the internal structure of either occupation was not available, since no field records, other than the site map, remained from the 1950 fieldwork. Using archival documents and the 1950 archeological evidence, Gilmore (1973:20–37) proposed a model of what the French and Spanish occupations should look like.

In 1996 a Keeran Ranch employee made a most remarkable discovery at the site: the cascabel end of an iron cannon. The Texas Historical Commission was contacted and subsequently excavated eight iron cannons, the very same cannons La Salle brought to guard his fort and the ones depicted in the Spanish map of 1689 (Tunnell 1998).

A MAGNETOMETER SURVEY PROVIDES CLUES ABOUT PRESIDIO LA BAHÍA

As part of the 1999 field investigations of the site, a magnetometer survey was conducted over the area investigated by Evans in 1950. In preparation for the survey, a 1.7-hectare area was cleared of brush and trees and gridded off. Geometrics Inc., a California company specializing in magnetometer manufacture and operation, was asked to conduct the survey. Staff from the company accomplished this by use of four cesium vapor sensors attached to a small, two-wheeled cart and connected to two Geometrics G-858 data loggers. A two-person crew operated the cart by pulling it across the site on two-meter grid intervals, with all four sensors simultaneously collecting information at the sampling rate of 10 measurements per second. At a normal walking gait, magnetometer readings were collected at 10-cm intervals, with individual survey lines situated 50 cm apart. This generated a total of 275,900 magnetometer readings taken across the site. The results of the magnetic survey are shown in Figure 5.

The map produced by the magnetometer survey provided an important clue about Presidio La Bahía. A roughly circular ring, about 80 m in diameter, was apparent in the central part of the magnetometer map. The ring consisted of numerous small dipole magnetic anomalies that represented small pieces of metal artifacts. Inside the center of the ring, relatively few magnetic anomalies were present, indicating an area with little fluctuation in natural soil magnetic susceptibility and generally lacking iron objects.

The magnetic ring seemed reminiscent of the octagonal plan of buildings in the presidio map from the Aguayo expedition. When the Aguayo plan was superimposed over the magnetometer map, a close correspondence in size between the ring and the octagonal arrangement of buildings was apparent (Figure 6). This information was important for two reasons. First, the ring appeared to represent magnetic variability associated with the presidio structures. Second, it suggested that some form of the octagonal presidio may have actually been built. The relatively clean area inside the ring was thought to possibly represent a plaza.

The next step in the investigation of the site was to conduct test excavations in and around the ring to obtain a sample of artifacts and to search for features. This resulted in the recovery of a number of Spanish colonial objects, including majolica and other ceramics, pieces of metal, burned clay, and faunal remains. The range of items indicated that the ring probably represented trash deposited inside and around the presidio structures.

During the spring of 2000 the general layout of the presidio buildings was apparent, but no features had been found to reveal details about their construction. We could not determine from the circular magnetometer ring whether the buildings were in an octagonal alignment, as shown on the Aguayo map, or in a more circular pattern. The lack of features was due directly to the nature of the site soil, as described above. The magnetometer ring did provide a general idea of where the presidio palisade wall should be, however, and hand-dug and mechanical trenches were excavated in areas to search for it. During the summer of 2000, when this work was being carried out, south Texas was suffering from a severe drought, and the soil at the site had dried so much that the black clay became brick-hard. A lack of soil moisture and the endless bright, sunny days made detection of subsurface features all the more difficult, and no evidence of the palisade wall was found.

During this time debate continued about the palisade wall, with Bruseth remaining convinced that it had to be present. Davis argued that Peña's diary and Aguayo's account included deliberate lies and that the elaborate presidio was never built. And up to this time, the archeology seemed to corroborate his belief. Curtis weighed in, arguing that some type of palisade must have been constructed. Otherwise why would the archival "ruse" go so far as to mention finding nails, gun parts, and other things

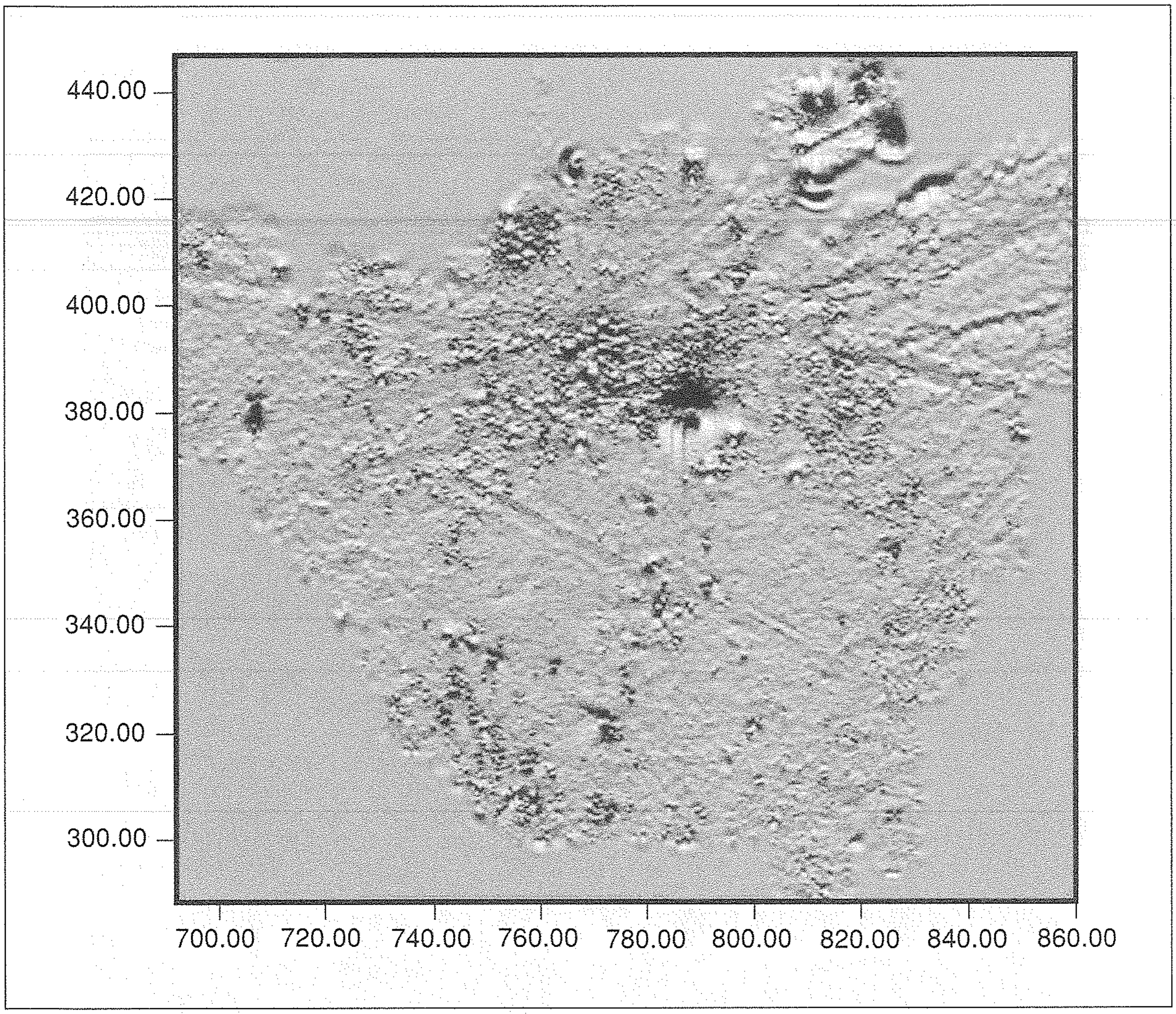

Figure 5. Magnetometer map of Presidio La Bahía (scale is in meters).

used by the French during excavation of the trench? It seemed a bit far-fetched that these types of details would be fabricated. Other project staff decided to keep quiet on the topic in an effort to promote harmony.

While the magnetometer ring provided a rough scale for the overall presidio, and from this we could hypothesize where the palisade wall should be, the exact location of any given wall segment remained elusive. This was because an almost infinite number of possibilities existed for the location of any individual wall piece, depending on the rotation of the 16-point star. We simply had no evidence of whether the major points of the presidio plan were oriented to true north, magnetic north, or something else.

A breakthrough in the search occurred more than a year into the project during the fall of 2000. The drought had broken, and ample rains added moisture to the soil. Many cloud-filled days ensued and allowed subtle changes in soil color to be observed. Conditions were now right to again search for the palisade trench. This time luck was with the project when archeological crew member Mike Fulghum noticed a dark, linear soil discoloration in the northern edge of the site. Several large block excavations had been placed there, but they were dug during the dry parts of the year, and we had missed the soil discoloration. After excavation of the artifact-bearing deposits, generally the upper 30 cm, all units were deepened to nearly one meter to search for a French cemetery thought to be present somewhere on the site. While the cemetery was not found, soil conditions were right for Fulghum to see the linear pattern of soil discoloration. He

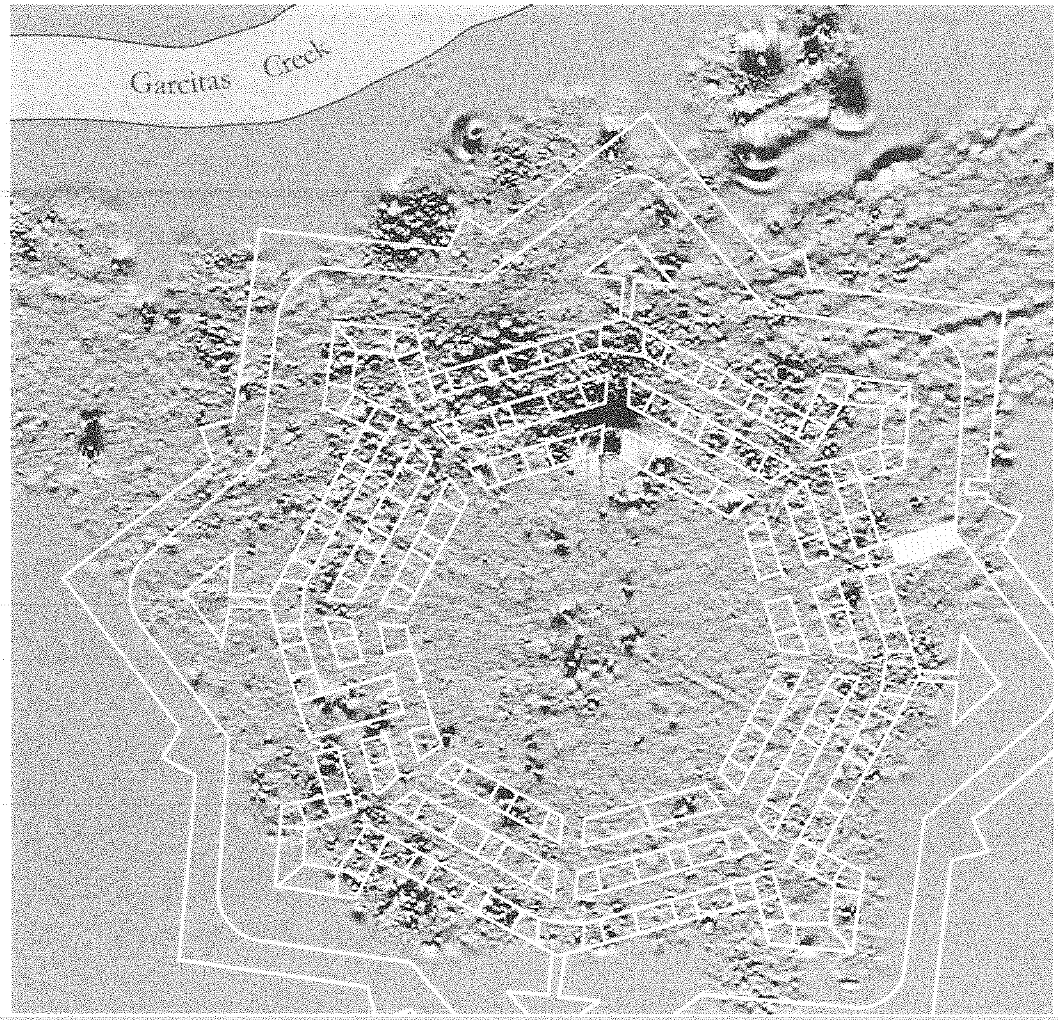

Figure 6. Aguayo's Presidio La Bahía overlaid on the magnetometer map.

notified Durst, who immediately understood the importance of Fulghum's discovery.

Upon closer inspection, the linear soil discoloration proved to be a series of post molds (Figure 7a). One possibility was that it represented part of a French stockade wall. However, the line was oriented northeast-to-southwest at about 225° from magnetic north, and if it were to extend to the southwest across the site it would cut through the center of the French occupation—a seemingly odd alignment for a stockade wall. Durst thought the post molds must be associated with one of the setting trenches for the presidio's palisade wall. When Bruseth was told about the find, he realized that finally we had the evidence necessary to accurately rotate the Aguayo map to obtain its proper orientation. We then could accurately predict where other wall segments should be located.

A short time later, work convened at the site to test the hypotheses that the post molds were part of the palisade and that we now could predict where other segments existed. For this work, Curtis' extensive experience in historical archeology, especially Spanish colonial archeology, was invaluable.

A location was staked out in the northern part of the site, about 30 m southwest from the line of post molds. We used a backhoe to scrape into the black clay down to about 30 cm below the surface, where the soil turned to a slightly lighter color and allowed for feature detection. The line of post molds gave us the orientation for the presidio but did not yet allow for a precise scale. Consequently, we were not able

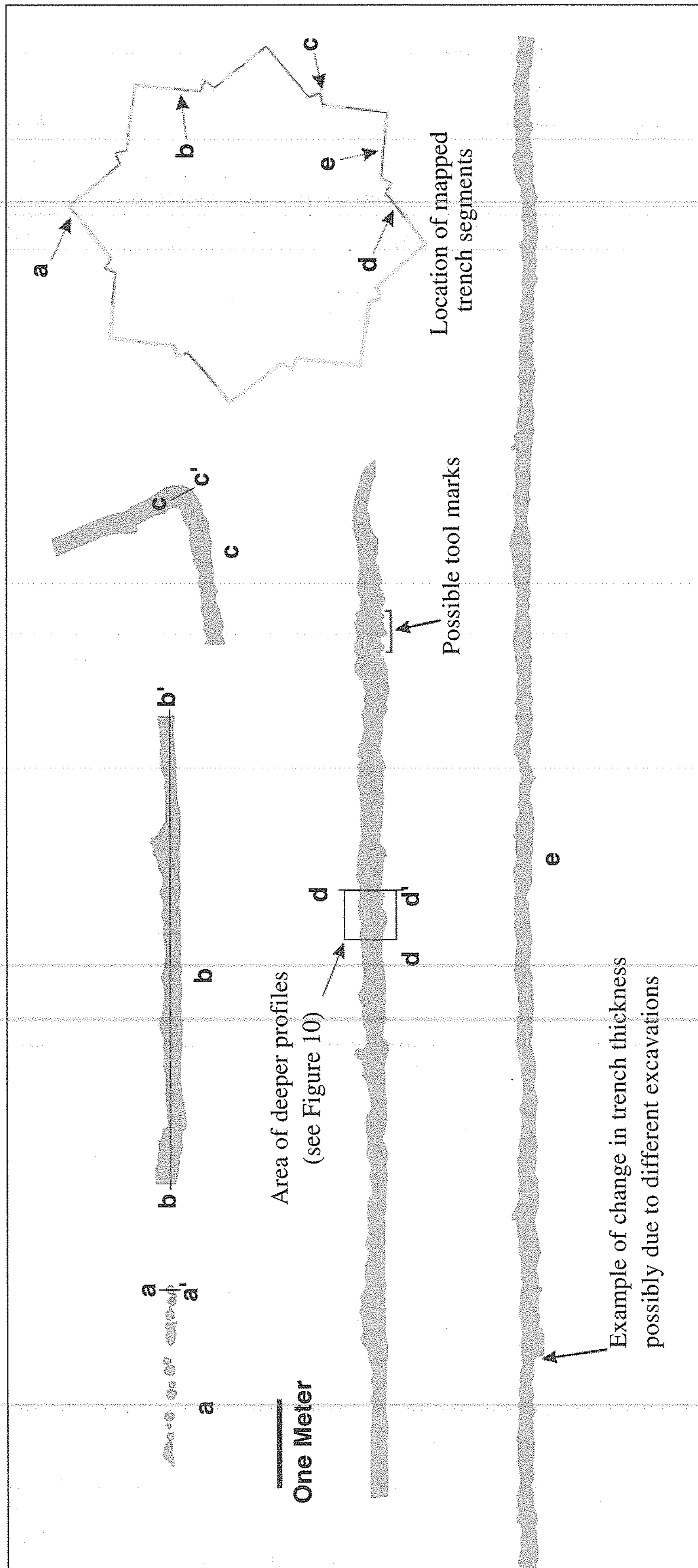

Figure 7. Detail of selected segments of the palisade wall trench (x-x') represents the locations of profiles shown in Figure 9.

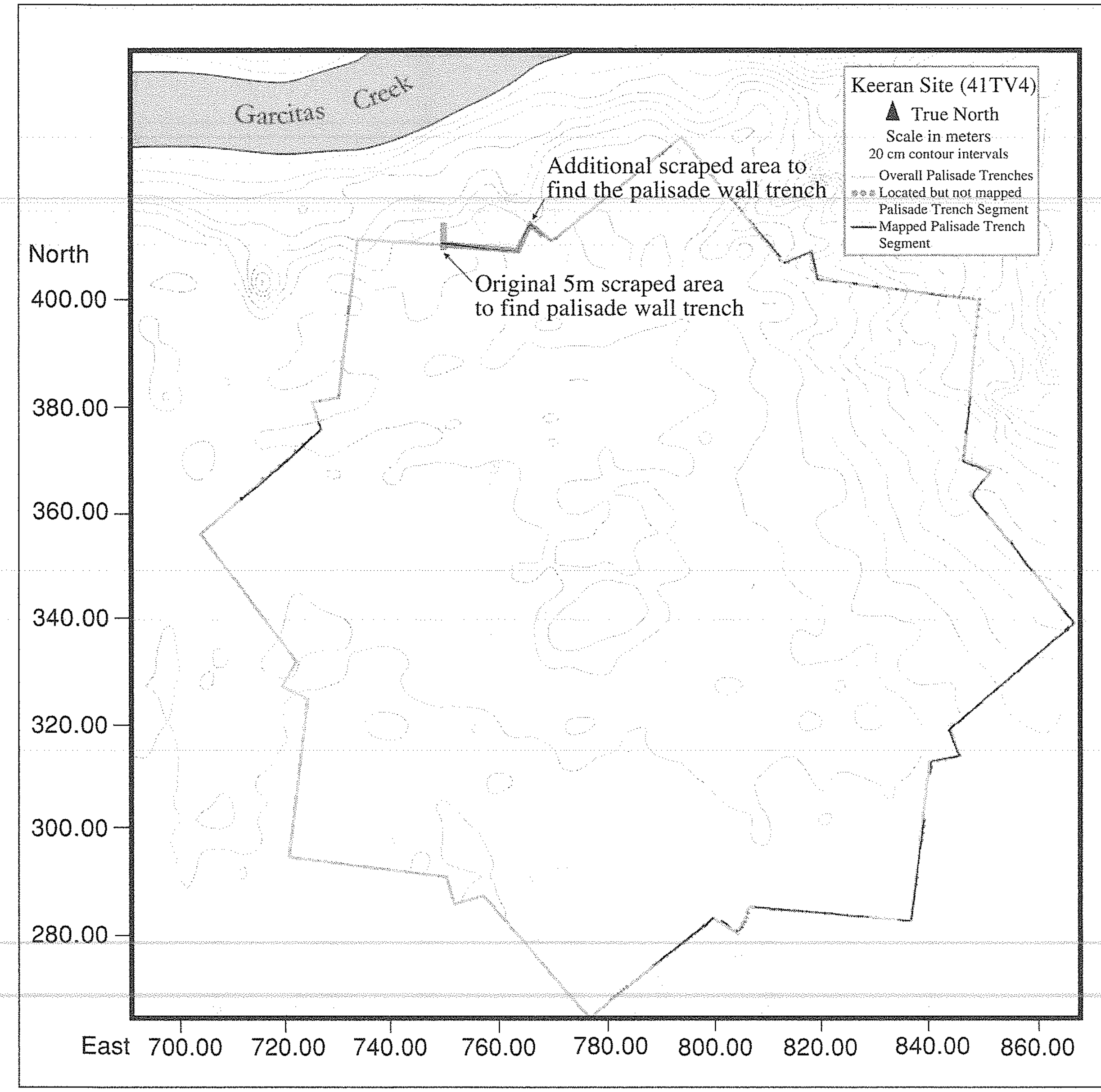

Figure 8. Located and mapped portions of the palisade wall.

to predict exactly where the trench should be located in the new area to be searched. We were confident, though, that we could estimate it to within about 5 m. We brought in a backhoe and began to scrape a meter-wide trench from north to south along a 5-m swath over the likely area (Figure 8). Toward the southern end of the trench we noticed a linear feature running east-west and perpendicular to the backhoe trench. While this was the right orientation for the palisade wall trench, it was only 25 cm wide—seemingly much too narrow to be part of the palisade wall. We imagined, on the basis of a similar wall trench at Presidio Los Adaes, which was 1.4 m wide, that the trench would be much wider (Gregory 1973:93). Moreover, the linear feature was not made up of individual post molds like those to the northeast. Could this be a disturbance caused by a tree root? We began to expand the excavation to the east to follow the linear feature. As we traced it out, it proved remarkably straight. Certainly this feature had to be cultural and not a tree root or other natural disturbance.

As we followed the feature to the east, it continued as a more or less 25-cm-wide line visible as slightly darker soil against the lighter subsoil. Although it subtly changed in width, it maintained itself as relatively straight and heading eastward.

We continued scraping for another 8 m, when the feature abruptly turned to the northeast. We then followed it in this direction for another 5 m, at which point the feature turned sharply, this time to the southeast. Suddenly we realized that we had in fact found one of the small star points for the palisade wall. The narrow width of the trench showed that it was dug only large enough for posts 20 to 25 cm in diameter to be placed in it. Now having most of a small star point fully delineated, we could measure this segment and put a precise scale on the entire Aguayo map. This in turn would allow us to accurately predict where other parts of the wall trench were located. Based on the scale depicted on the Aguayo map, we now could say that the vara used at the presidio by the Spaniards in 1722 was .885 m. The discovery showed that not only had a palisade trench been dug, but that its overall layout precisely followed the plan made by Aguayo. This interpretation was extremely significant to the project, as it finally established definitively that Aguayo's elaborate, 16-pointed, star-shaped presidio had been built.

Armed now with the ability to accurately predict other wall trench segments, we could check backhoe trenches that had been dug earlier in the field season. We had failed to see the palisade wall in these early trenches largely due to the dry soil conditions of early 2000. Now, by being able to precisely plot where the trench should be, and with the advantage of ample soil moisture in the fall of 2000, we could again search for it in the old trenches. This effort showed that we had, in fact, encountered the wall trench eight times in the northeastern part of the site during the spring of 2000, but simply could not see it under the conditions at the time. With the improved soil moisture of the fall, the trench was now readily detectable.

DESCRIPTION OF THE PALISADE WALL TRENCH

The stockade wall was labeled Feature 40 and was periodically investigated throughout the remainder of the project. About 45 percent of the wall trench was uncovered, and 38 percent was mapped (Figure 8). The portions of the wall trench that were not mapped tended to be segments under trees or around other obstacles. The wall trench could not be found along the southwestern portion of the site because of a lack of suitable contrast in the subsurface soil. While there remains a slight possibility that the southwestern portion of the palisade was never built, we believe instead that it was simply not visible in the subsoil. Before Curtis' untimely death in 2001, he stated that he thought he had found part of the trench in this area of the site. Unfortunately, he did not have time to map what he had found.

The combined linear length of all of the star segments is 570 m, and the diameter from a major star point to a major star point is 165.3 m. The wall trench centers around the magnetic ring, confirming that the ring is part of the presidio and that the artifacts that make up the ring represent trash deposited around buildings centered inside the palisade.

In plan view, the setting trench at the level of the backhoe scraped surface has very irregular sides. The irregularities are probably the combined result of tool marks from the digging process and the tendency of the dense Lake Charles clays to break off in chunks. Possible tool marks were observed in lobed projections from the trench wall edges, where it appears a pick or similar tool struck the ground slightly outside the intended trench area (Figure 7d). Curtis spent much of his time on the project uncovering and documenting the trench, and his drawings and notes represent a primary source of information about the feature.

The depth of the palisade trench varies from about 65 cm to nearly 1 m, with 95 cm the most common depth (Figure 9). The width of the trench varies from 20 cm to 45 cm, averaging about 30 cm. In a few places, the width inexplicably and abruptly changes, as if two different people had been digging segments of differing widths and then met to form a single wall segment (Figure 7e). In other instances the trench wall seems to veer slightly off a true line and then curve back. We suggest that in these instances someone was using a shovel and digging with his back to the segment to be excavated, occasionally stopping to look back and make course corrections. All the trench evidence suggests that the end points of each of the major star segments were laid out, probably with stakes, and then individual soldiers began digging between the staked points. Some soldiers appear to have dug wider trenches, while others dug narrower ones.

A suggestion was made that the ends of the star points might contain deeper and larger posts, since these corner points would bear a greater load. To test this idea, Curtis excavated a cross section through a corner of the trench in the southeastern part of the site area where the subsurface soil contrast was

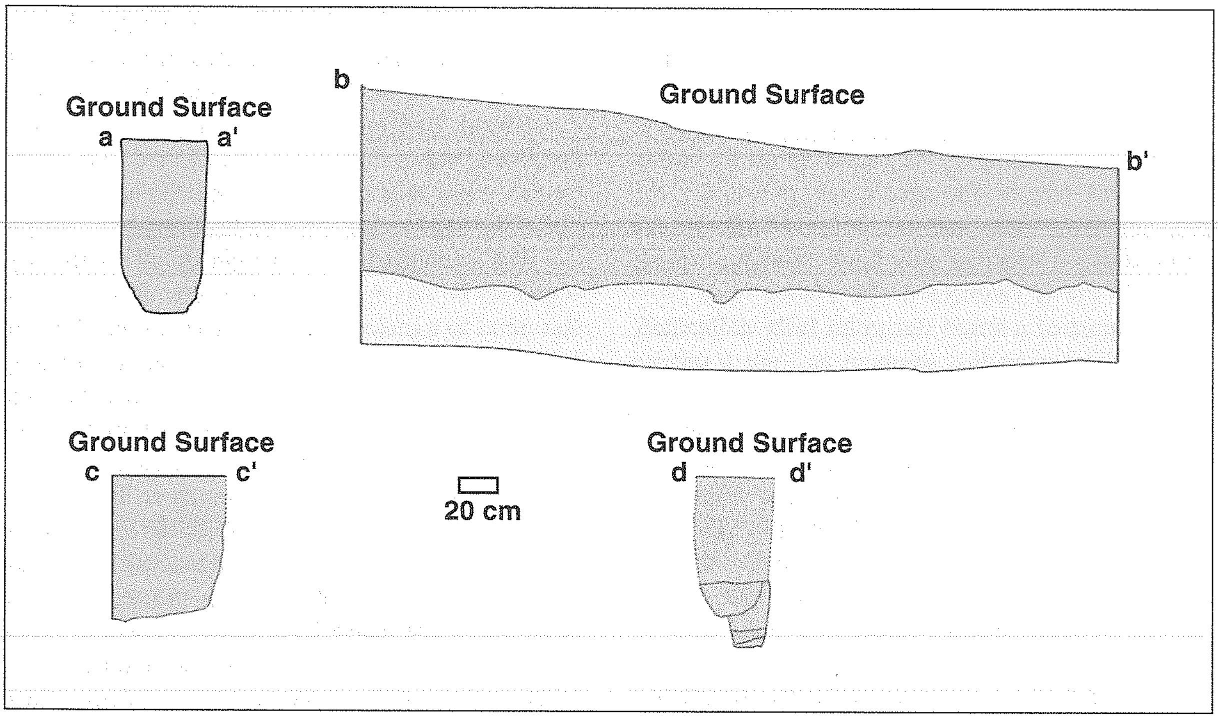

Figure 9. Profiles of selected portions of the palisade wall trench (see Figure 7 for locations of the profiles).

generally good. The profile from this work showed that the trench was not any deeper and that a post similar in size to the rest of the palisade wall posts was used (Figure 9, Profile c-c').

An apparent inconsistency remained between the line of post molds from the first segment of the palisade discovered in the northeastern part of the site and the other segments of the wall trench, which showed a wall trench instead of individual post molds. To understand why this might be the case, a segment of the wall was excavated deeper where soil contrast was particularly good (Figure 7d). This area measured 50 by 60 cm and began at the level of the scraped backhoe surface. Three plan views for this excavation unit are shown in Figure 10. The first is the wall trench as seen at 77 cm below the surface. The second is at 83 cm, where a single post mold is apparent, in addition to the wall trench, which has become slightly narrower. The third plan view is at 87 cm below the ground surface, where the wall trench has disappeared and only individual post molds are visible. This work shows that the palisade wall consisted of posts set tightly against each other in a line. The evidence also shows that when the wall setting trench was dug, the posts were pushed into the bottom with sufficient force to leave small but detectable impressions in the subsoil.

A final characteristic of the palisade trench noticed during scraping was the consistent inclusion of animal bone in the fill. A bone, usually of goat or bison (or cow), was found about every 5 to 7 m. A few other artifacts, such as majolica ceramics and an unidentified piece of metal, were occasionally found in the trench, but animal bone was found consistently. We are unclear about why the bone was so often encountered. It almost certainly represents animals eaten by the soldiers who dug the trench segments—perhaps the trench fill was simply a convenient place to dump the remains. Curtis speculated that the bones may have been intentionally placed in the trenches as some type of offering.

CONCLUSIONS

A major discovery during the 1999–2002 archeological work at the Keeran site was the layout of Presidio La Bahía. The presidio *was* actually built—opinions to the contrary notwithstanding—and remarkably it included the elaborate 16-point star-shaped palisade. Some minor modifications to Aguayo's original plan were made, such as constructing only a single row of buildings in the octagonal arrangement of structures, but the spatial

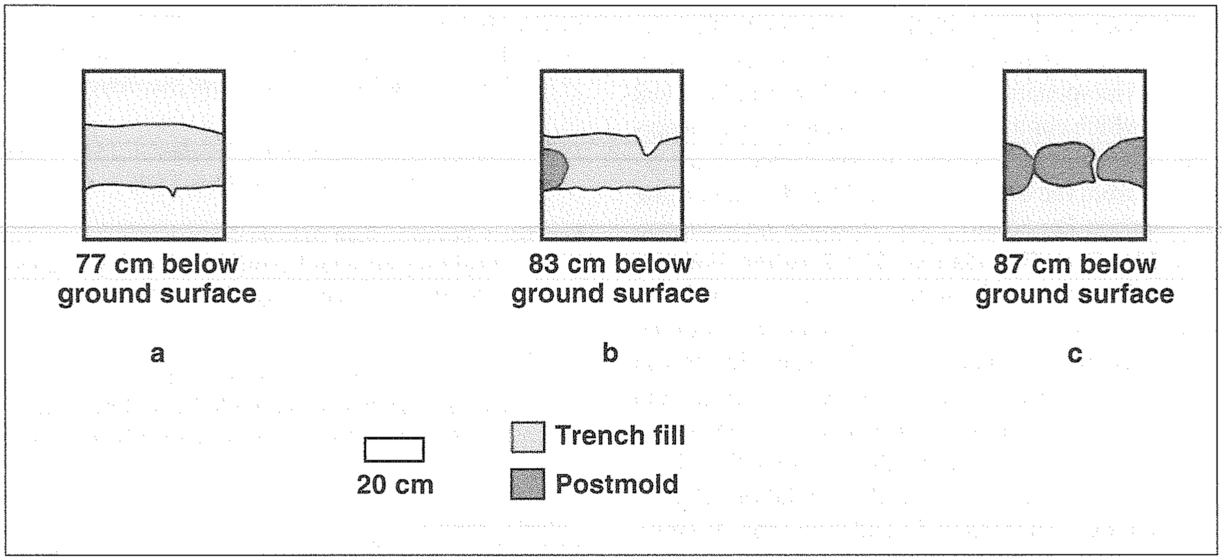

Figure 10. Plan views through selected portions of the palisade setting trench (see Figure 7 for the locations of the plan views).

pattern of artifacts clearly shows that an entire ring of structures was built. Its complex design makes Presidio La Bahía the most elaborate of any presidio constructed up to that time on the Spanish frontier from Florida to California.

Why was such an elaborate fortification needed in the remote reaches of the northern frontier of New Spain? This question may be answered by considering the late-17th-century conflict between Spain's attempt to guard its territorial interests in New Spain and France's desire to expand and settle additional portions of the New World. Spain was threatened by La Salle's 1682 discovery of the mouth of the Mississippi River and his subsequent attempt in 1685 to colonize the land that is today Texas. After numerous searches, in 1689 Spain eventually found the Fort St. Louis colony, but after it was already deserted. A short time later, tensions between France and Spain decreased and the threat of another French encroachment lessened.

Hostilities between France and Spain again rekindled in the early-18th century, and Aguayo was ordered to mount an expedition to prevent any new French incursion. Aguayo outfitted a large expedition of soldiers and supplies, largely at his own expense, to reoccupy the eastern parts of Texas and deter the French. He brought with him plans for missions and presidios to be constructed at critical points. The presidios were to be built using then state-of-the-art knowledge of fortifications. When the Aguayo expedition commenced in 1720, there were a single mission and a single presidio in Texas. When he completed his expedition in 1722, Texas was guarded by 10 missions, four formidable presidios, and 300 Spaniards, some with families.

The results of the field excavation at the Keeran site show that Aguayo constructed his elaborate 16-point star-shaped Presidio La Bahía, by far the most elaborate of the four presidios. Aguayo and the Spanish viceroy were concerned that France might try to reoccupy the bay near La Salle's fort, and therefore a large fortification was needed to deter this action. The very nature of the star shape shows that the intended foe was a European power equipped with 18th-century military tactics, not small bands of Indians shooting stone-tipped arrows. Presidio La Bahía stood ready to ensure that France would never reoccupy the Texas coast. The discovery of the palisade trench wall was the critical clue needed to appreciate the importance Spain placed on occupying the remote piece of land. Throughout all the efforts to find and document the palisade wall, Curtis Tunnell was a steadfast supporter and constant source of inspiration. He helped in countless ways to understand the true importance of Presidio La Bahía in Texas history.

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41HO64/41HO65, Late 17th to Early 18th Century Caddo Sites on San Pedro Creek in Houston County, Texas

Timothy K. Perttula, with contributions by Thomas E. Emerson and Randall E. Hughes

ABSTRACT

A unique collection of historic trade goods, primarily glass beads, from two sites along San Pedro Creek in East Texas not only document the settlement of the area by Caddo peoples in the late 17th and early 18th centuries, but raise the intriguing possibility that they represent part of the Nabedache Caddo community in which the Mission San Francisco de los Tejas (1690-1692) was established by the Spanish.

INTRODUCTION

Caddo archeological sites that date to the time of European colonization and settlement (ca. A.D. 1685-1800) of East Texas are rare as hen's teeth, with less than 100 known in the entire Caddoan area of East Texas, northwestern Louisiana, southwestern Arkansas, and southeastern Oklahoma (see Gregory 1993; Perttula 1992:156-157). Their rarity is due at least in part to a number of factors, including possible Caddo depopulation due to the introduction of European epidemic diseases; the limited use of metal detecting and other survey techniques designed to locate historic Indian sites in Texas (cf. Cruse 2004:123-124); and an apparent focus of archeologists on the prehistoric mounds and cemetery sites left by the Caddo peoples. Nevertheless, historic Caddo sites are found from time to time, more often than not by avocational archeologists and collectors than professional archeologists, and this paper concerns two such sites in Houston County, Texas, along San Pedro Creek in the Neches River basin in East Texas.

Historic Caddo archeological sites have a unique significance, both to archeological scholars as well as to the Caddo peoples. To me, this is because a Caddo historic site—particularly those that can be definitely linked with known sites and places mentioned in historic documents and maps (cf. Parsons et al. 2002)—brings us closer to the Caddo people and their history, as well as their imprint upon the landscape. It has been said that "archaeology cannot tell what the Indians of Texas called themselves, how they conducted their religious ceremonies, how they arranged marriages, why they did certain things, and what they felt was important and what was not" (La Vere 2004:26). All these things may be true, but I do not consider them as limitations to archeological studies of the Caddo in historic times. In fact, those words are not really relevant because the archeological deposits on a Caddo historic site are the only tangible and physical reminders left of the vibrant and dynamic history of the Caddo peoples, and of how they lived during times of momentous changes and upheavals brought on by contact and interaction with Europeans after the early 16th century. If we are truly interested in learning more about what life was like for Caddo groups living in East Texas in the late 17th and early 18th centuries—and place them at the center of the "historical action" (Ethridge and Hudson 2002:vii)—then we must seek out these long-forgotten places on the landscape, and bring that life to the surface. The historic Caddo sites I will tell you about in this paper have been long-forgotten, but once they were part of the hub of important Caddo communities.

The two sites discussed here, 41HO64 and 41HO65, are located in the area known to have been occupied by the Nabedache Caddo in the late 17th century; the Spanish also called them "Tejas," while the French called the Caddo in this area the "Cenis." In fact, the Caddo settlement along San Pedro Creek was commonly referred to by the Spanish and French through the late 18th century as San Pedro de los

Nabedachos (Bolton 1987:45). The village was the principal entranceway to the lands of the Hasinai Caddo tribes that lived in the Neches and Angelina river basins, and one of the routes of the Camino Real—Camino de los Tejas—came to and through this place from the late 17th century to the early 19th century (see McGraw et al. 1991; Corbin 1991). When Henri Joutel and other members of what was left of the La Salle expedition came to the Nabedache Caddo in March 1687 (where they stayed for two months), Joutel described the village as being as least one league (ca. 2.6 miles)[1] in length; on their way to the chief's house, the French "passed several huts that were grouped in hamlets; there were seven or eight of them, each with twelve to fifteen huts together with space between each other and fields around the huts" (Foster 1998:206).

The Spanish were determined to have effective control of the East Texas lands (while keeping the French influence minimal) and bring missions to the Caddo peoples, and in 1690 they established two missions: Mission San Francisco de los Tejas and Mission El Santisimo de Nombre Maria. The San Francisco de los Tejas mission was established "in the middle" of the Nabedache village along San Pedro Creek (Bolton 1987:41), and apparently about two leagues (ca. 5.2 miles) from the Neches. The other mission was established much closer to the Neches River itself. The two missions were abandoned by the Spanish in 1692 and 1693, but the location of the abandoned missions was remembered by subsequent missionaries and travelers that passed through the area and the Nabedache settlements on the way to other Caddo settlements east of the Neches River (see Corbin 1991:199). Juan Pedro Walker's 1806 map of the San Pedro Creek and Neches River area (McGraw et al. 1991:Figure 26) even showed "Ancienne Mission de San Pedro" astride the Camino de los Tejas.

From historical accounts, the Nabedache village was between 2-3 leagues (5.2-7.8 miles) from the Neches River crossing, but "farther from the village to the crossing of the river than to the river at its nearest point, for as early as 1691 it was found that the best crossing was downstream a league or more" (Bolton 1987:43). At their closest point, 41HO64 and 41HO65 are approximately 1.4 km or 0.8 miles from the confluence of San Pedro Creek and the Neches River, and they are on the west side of the creek. Corbin (1991:195 and Figure 28) and Foster (1998:192) both agree that the principal Nabedache Caddo village was on the west or north side of San Pedro Creek, not far from the Neches River.

HOW THE SITES WERE RECORDED

The two sites were recorded unofficially by Alex D. Krieger during a trip to the Neches River valley of East Texas in April 1944. According to Krieger's notes on file at the Texas Archeological Research Laboratory at The University of Texas at Austin (TARL), he and H. B. Stenzel "were searching for the location of Mission San Francisco de los Tejas, est. 1690. I believe that site 1 (a-c) on branch of San Pedro Creek is very likely." Site 1a is now recorded as 41HO6 in the files at TARL; Site 1b is 41HO64, and Site 1c is 41HO65. The latter two site numbers were assigned in February 1983 when Krieger's notes of the trip were re-located by TARL staff.

At that time, Krieger examined plowed fields on both sides of San Pedro Creek a mile or two from its confluence with the Neches River, and located several archeological sites on a broad alluvial terrace marked by Caddo pottery sherds and a few pieces of lithic artifacts; these sites were primarily on the west side of San Pedro Creek, on property owned by George A. Moore of Augusta, Texas.

The first site (1a or 41HO6) was in a level field near a spring branch that drained east to San Pedro Creek. When Mr. Moore plowed the property some years earlier (possibly 1940, according to Krieger's notes, or about 1933, according to Newell and Krieger [1949:14]), he found a small cannon of unknown kind. Krieger apparently found no other artifacts there; he, at least, did not mention them in his April 14, 1944 field notes.

To the south of the branch, but on the same broad landform, Mr. Moore had found several hundred glass beads, a ceramic pipe fragment, a Perdiz arrow point, and fragments of human remains at site 1b (41HO64) during plowing, along with a number of large basally-notched dart points. Some of the collection amassed by Mr. Moore apparently ended up in the Lively collection, which I discuss below. Mr. Moore also told Krieger that he had plowed "thru a group of 7 or 8 [burials]," which Mr. Moore thought "looked like a graveyard."

At this site, on a small sandy rise, Krieger noted fragments of human bone, along with sherds of the types Bullard Brushed, La Rue Neck Banded, Patton Engraved, Killough Pinched, and Maydelle Incised. Newell and Krieger (1949:14, fn39) noted these sherds indicated that the site had an historic Allen focus (phase) occupation (Allen phase sites are believed to date from ca. A.D. 1650-1800). Also found at the site were two glass beads and an end scraper. The catlinite pipe came from site 1c (41HO65), about 160 meters to the west of 41HO64, and also south of the spring branch. Krieger provides no specific information in his 1944 field notes about other artifacts that may have been found or noted there, other than a few fragments of human bone.

Another Caddo site (41HO67) recorded by Krieger on the same trip was situated about 150 m north-northeast of 41HO64. It had pottery sherds, and the TARL inventory sheet of artifacts from it mentions that two glass beads were in a surface collection from the site (Perttula 1993: Table 2.6.1).

THE COLLECTION HISTORY

At the time I came to document the collections from 41HO64/65, they were in the possession of a private individual living in Nacogdoches, Texas. In order to keep the collections together and have them accessible for research studies, this individual provided funds to purchase them from a Mr. Jackie Lively a few years ago. Mr. Lively had apparently also come into possession of the George A. Moore collection some years before, and also worked at the sites (probably in 1984), which he believed was an Indian cemetery associated with one of the Spanish missions in the Neches River valley (November 15, 1985 letter from Erwin Roemer to Dr. Dee Ann Story, on file at TARL). Lively had "dug up at least one human skeleton which had large quantities of blue glass trade beads in association. Lively also has collected metal artifacts from the site." More recent discussions with Erwin Roemer (July 2004 e-mail to the author) indicate that Mr. Lively had probably dug up three or four burials in one location at 41HO64.

In addition to the glass beads, Roemer also noted that there was a poorly preserved metal object in the Lively collection that was apparently found in association with one of the burials. It was about 15 cm long, and may have been a thin iron knife blade; this particular object was not in the collection when I came to document it in 2003.

When Alex Krieger first found the sites in 1944 he took a photograph of a collection of beads from 41HO64 and the catlinite pipe from 41HO65 (records on file at TARL). He sent copies of the photographs to experts to try to identify if they were the right age to be associated with the 1690 Mission San Francisco de los Tejas. Mr. Louis Caywood of the National Park Service (Santa Fe, New Mexico) provided information about the glass beads. He suggested that the beads were of Venetian origin and had been found on sites in North America dating to both the 17th and 18th centuries (September 18, 1944 letter to Alex D. Krieger, on file at TARL), as well as on mission sites of the same age as Mission San Francisco de los Tejas in Sonora, Mexico.

Krieger (January 29, 1945 letter to George A. Moore, on file at TARL) wrote to Mr. Moore with information on the beads, and he concluded that the beads "must be Spanish." He went on to say that "the beads you found [at 41HO64] were also used extensively by the early French and English traders, but certain special beads given to the Indians, with lines like candy stripes, are missing from your string. These beads were made in Venice, Italy, from about 1600 to 1800 A.D. If we are correct in believing that what you found in your field represents early Spanish mission settlements, then these beads agree with that." As I note below in the discussion of the beads in the Lively collection, there are only a few striped beads in the assemblage, and the occurrence of striped glass beads is more common in early-mid 18th century sites (see Smith 2002), particularly those occupied by the French or by aboriginal populations that traded with the French. The 41HO64 beads seem to fall earlier in time than the first quarter of the 18th century.

ARTIFACTS IN THE COLLECTION FROM THE TWO SITES

The collection is dominated by glass beads, with a small assortment of metal artifacts (gunparts and ammunition), a gunflint, a catlinite pipe, a ceramic pipe bowl from an elbow pipe, and three dart points. What artifacts may have specifically been associated with historic Caddo burials from 41HO64/41HO65 are not known.

Glass Beads

There are more than 7,640 glass beads in the collections from 41HO64, one of the larger collections from a Caddo site in the region; some of the beads are apparently from Mr. Moore's 1940s collection, and the remainder are from the Lively digging at the site. However, there is no detailed information available on which specific beads were found by either individual; a 1944 photograph in Alex Krieger's correspondence indicates that Mr. Moore had several hundred beads of the same size and colors as those now in the Lively collection.

According to what Mr. Lively told Erwin Roemer in 1985, the beads were found in close association with the Nabedache Caddo burials, apparently near the skulls of several. They may have been in loops or strands that were arranged or woven into the hair of the deceased individuals (Roemer, July 2004 e-mail to the author). The strands of beads that are illustrated herein were strung by Mr. Lively, and do not represents the kinds or lengths of beads that may have been strung together as burial accompaniments by the Caddo some 300 years ago.

There are a number of glass bead classification systems in use in North America, including Harris and Harris (1967), Kidd and Kidd (1970), Brain (1979), Karklins (1985), DeVore (1992), and Ross (2000). All have their merits and pitfalls, and Karklins (1985:86-87) discusses these as part of his description and classification of glass beads. I have relied principally on the classification scheme developed over the years by Kidd and Kidd (1970), as it is the most comprehensive, particularly with respect to the typology of drawn beads (Karklins 1985:86), and it is of considerable value in inter-site comparisons because the system is widely used to classify bead assemblages throughout North America, Europe, and other parts of the world.

All of the glass beads from 41HO64 are drawn beads (Kidd and Kidd 1970:48-49), either tubular or round in shape (Figure 1). The beads range from small to large in size; small beads are less than 4 mm in length and diameter, compared to 4-6 mm for medium-sized beads, and greater than 6-10 mm for large beads (Kidd and Kidd 1970). The large beads comprise only 4.2 percent of the beads in the Lively collection from the site. Only a few of the beads are surface decorated, although many of them are compound or multi-layered beads, including more than 350 Cornaline d'Aleppo beads (Figure 2).

The beads fall into four classes of drawn beads (see Kidd and Kidd 1970:50, 53) in the 41HO64 assemblage, with a number of different colors,

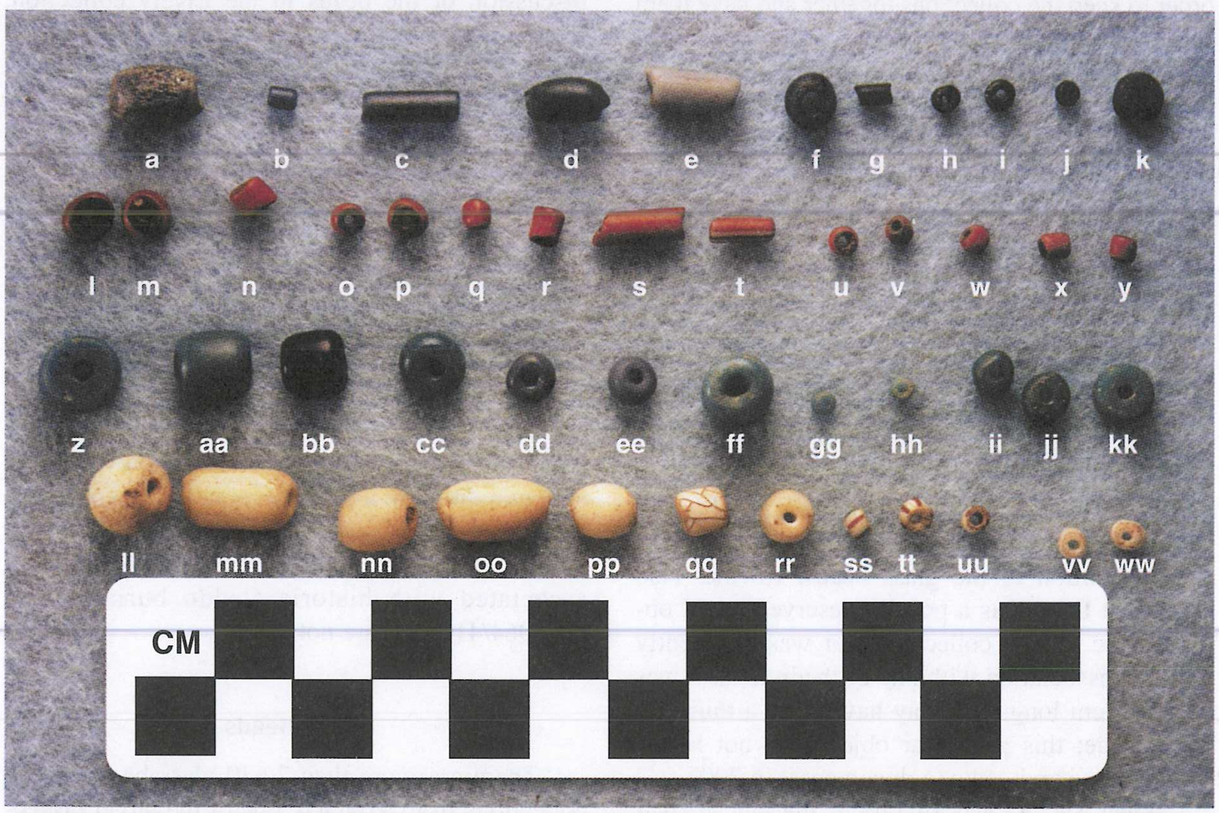


Figure 1. Glass bead varieties from 41HO64.

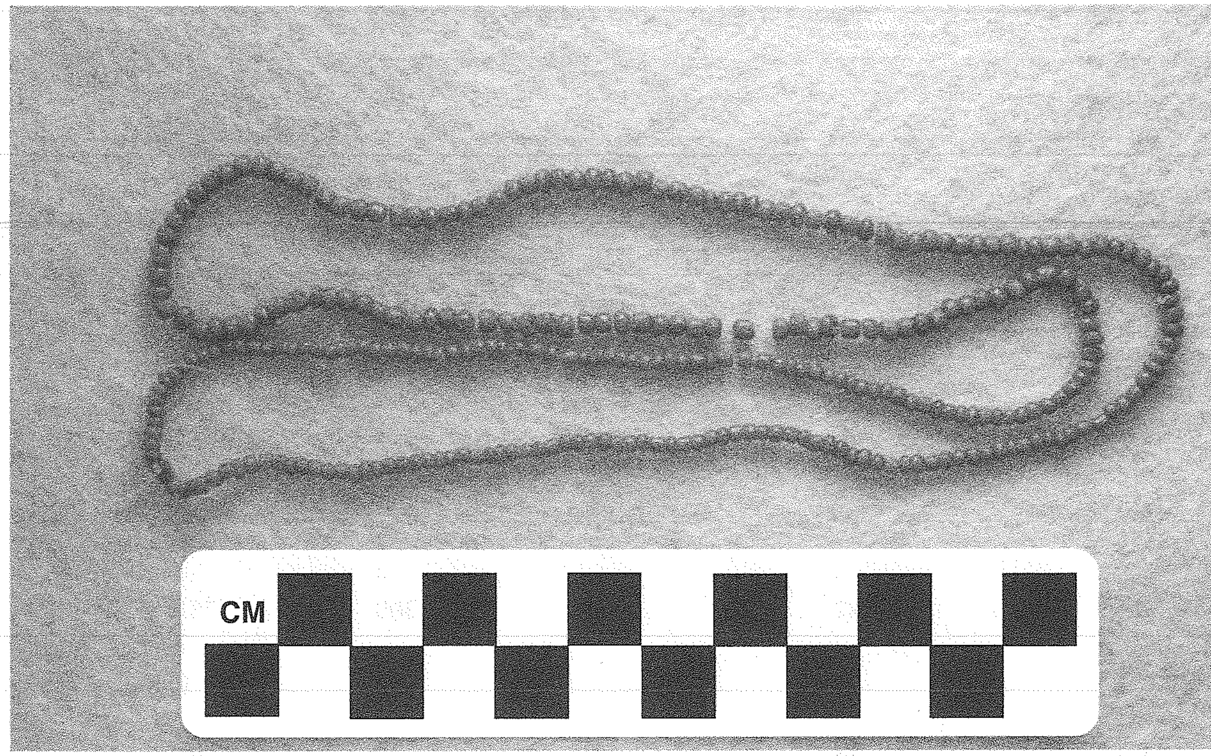


Figure 2. Cornaline d'Aleppo beads.

shapes, and types of glass (i.e., whether the glass is opaque, clear, or translucent):

Class I, tubular-shaped with simple or monochrome bodies;

Class II, non-tubular or rounded with simple or monochrome bodies;

Class III, tubular-shaped, with compound or multi-layered bodies;

Class IV, non-tubular or rounded with compound or multi-layered bodies.

All told, there are 22 varieties of glass beads from 41HO64 (Table 1 and Figure 1), which suggests a low diversity in the range of beads used by the Caddo or available to them, considering that more than 100,000 varieties of glass beads have been manufactured to date across the world (Karklins 1985:87). By way of comparison, the very large bead assemblage (n=186,200) from the Tunica Treasure has 96 varieties of glass beads (Brain 1979).

Two bead varieties comprise more than 92 percent of the sample: rounded beads that are either aqua blue (IIa39) or an opaque white (IIa13) (Figures 3-6) (see Table 1). As previously mentioned, another relatively important bead variety is the Cornaline d'Aleppo bead (IVa2) (see Figure 2); this bead represents almost 5 percent of the beads from the site.

Only five Class I beads, mostly medium to large-sized examples, are in the collection. They are black (see Figure 1g), white (see Figure 1e), an opaque blue, a clear navy blue (see Figure 1c), and clear dark navy blue colors.

The Class IIa beads are the predominant bead varieties at 41HO64, accounting for about 95 percent of the beads in the collection (see Table 1). The principal colors are an aqua blue (IIa39) (see Figure 1z-aa, cc-kk and Figures 4-5), in a range of sizes; mostly small opaque white (IIa13) (see Figure 1vv-ww and Figures 3, 5, and 6) beads, but also including a few medium to larger bead sizes (see Figure 1ll-nn, qq-rr), as well as an oval-shaped white bead (IIa15, see Figure 1oo-pp); and a clear navy blue (IIa55, see Figure 6) bead. The few remaining Class IIa beads are aqua blue (IIa36), ultramarine blue (IIa54, see Figure 1a), a translucent bright blue (IIa43), an opaque blue (IIa40), and an oval-shaped aqua blue (IIa38, see Figure 1d), along with a few black (IIa7, see Figure 1bb) beads (see Table 1).

Table 1. Glass bead varieties from 41HO64.

Variety (after Kidd and Kidd 1970)	Small	Medium	Large	N
Ia2	1			1
Ia5			1	1
Ia16			1	1
Ia19		1		1
Ia20			1	1
IIa7	10	1	11	11
IIa13	1172	149	2	1323
IIa15			3	3
IIa36	27	17	2	46
IIa38			4	4
IIa39	3582	1891	300	5753*
IIa40		7		7
IIa43	5		1	6
IIa54			1	1
IIa55	84	15	2	101**
IIb'5	1			1
IIb20	1			1
IIb28			2	2
IIb33/34	1			1
IIIa1	1			1
IIIbb1	1			1
IVa2	333	18	2	353
Totals	5225	2100	321	7646

*149 are medium to large barrel-shaped beads;
** five are small barrel-shaped beads

A distinctive but very rare group of the Class II drawn beads includes five Class IIb examples (see Table 1), all white in color. One example (IIb'5) has six red stripes on it (see Figure 1tt), while another has only three stripes (IIb20). Another larger white bead has three sets of navy blue stripes (IIb28), and the last (IIb33/34) has both red and green stripes (see Figure 1ss).

The Cornaline d'Aleppo beads are the only Class IV beads from 41HO64 (see Table 1) (see Figure 1l-r, u-y and Figure 2), and they are mostly small in size and rounded, with a exterior glass layer that is red and an interior glass core that is light gray in color. The one Class IIIa1 bead (see Figure 1s) is a tubular variety of Cornaline d'Aleppo, with a red outer color and a black core. The only other Class III bead (see Figure 1t) has a red exterior, a black core, and three white and black stripes on the exterior glass layer.

The Cornaline d'Aleppo beads are usually quite abundant in 18th century sites in French Louisiana and Spanish Texas (e.g., Brain 1979, 1988; Harris and Harris 1967). They are rounded drawn beads of compound construction, with an outer brick red or redwood (10.0R 4/8) layer and an inner layer of several different colors, including black, light gray, green, or blue (Kidd and Kidd 1970:Table 5). The tubular-shaped variety is a very common find on French and Spanish colonial-era sites in Texas and Louisiana (see Gregory and Webb 1965; Harris and

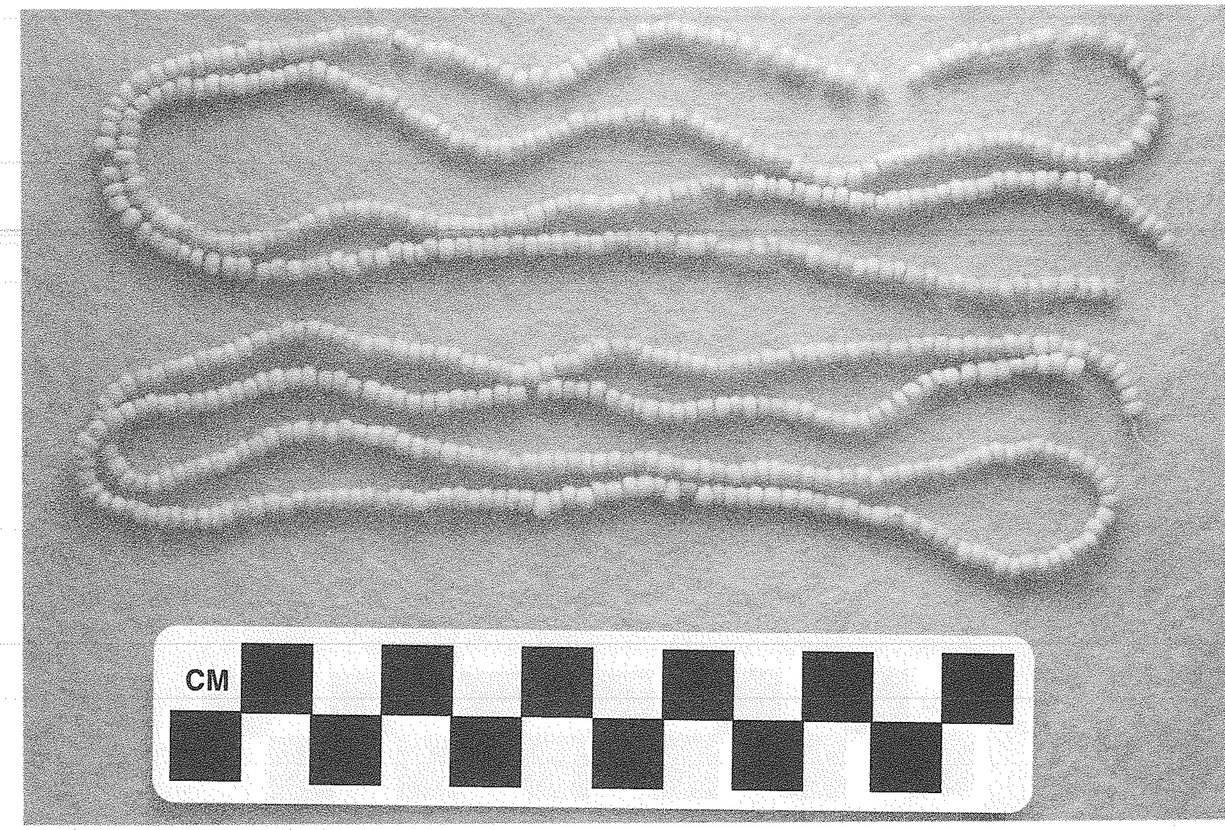


Figure 3. White drawn beads.

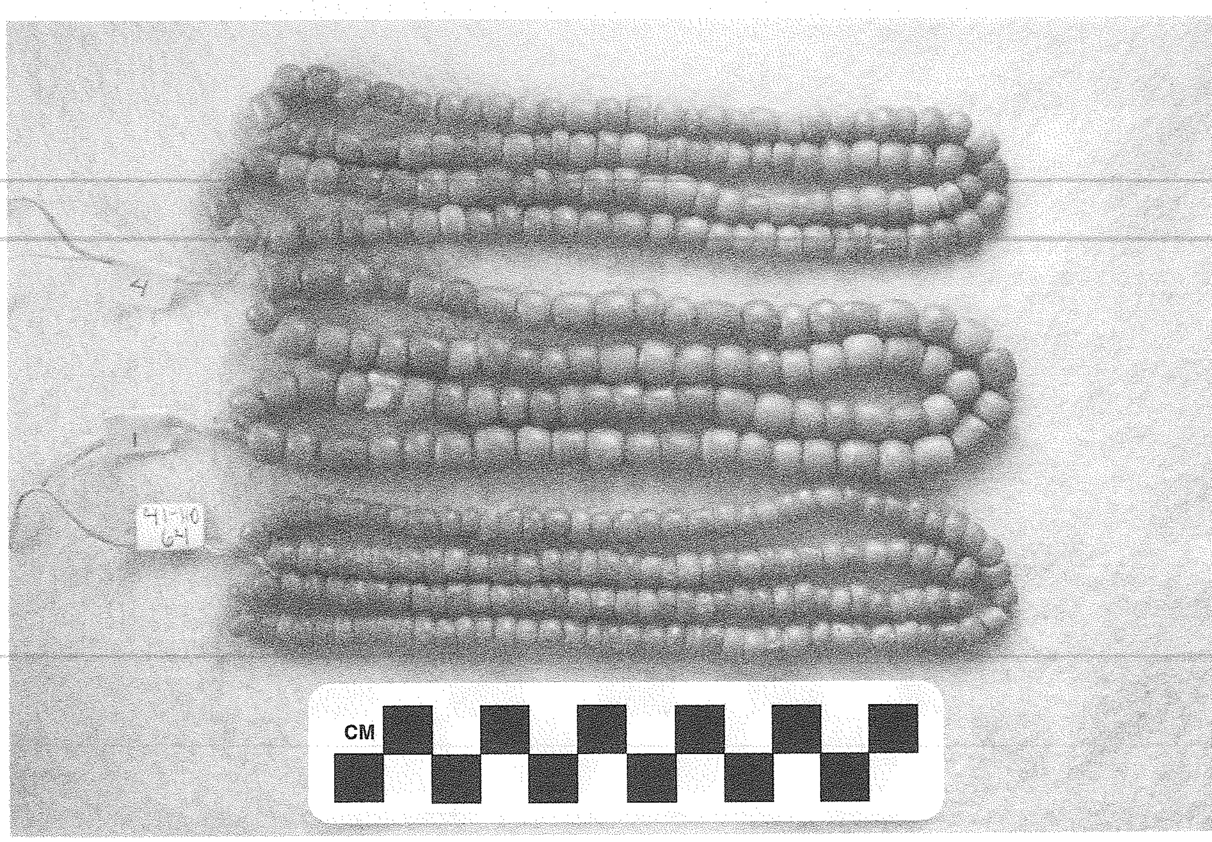


Figure 4. Aqua blue drawn beads.

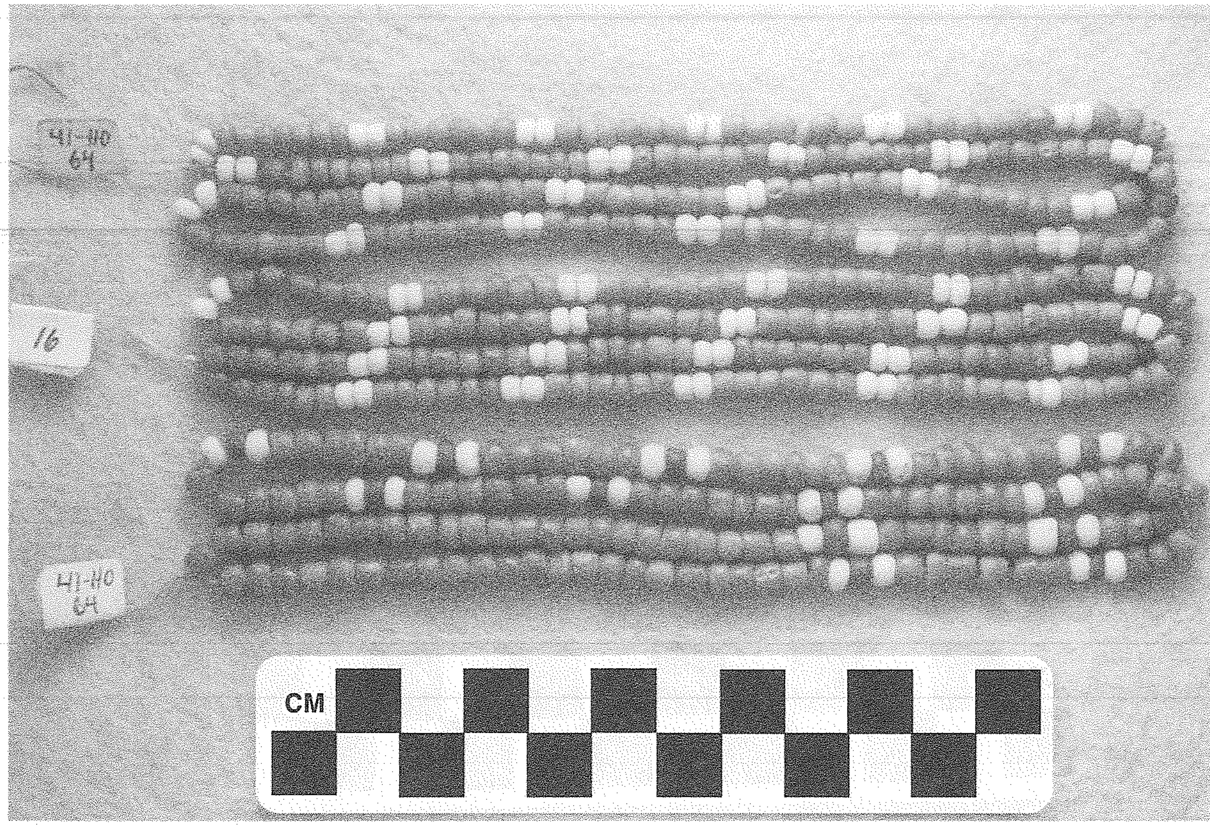


Figure 5. Strands of white, aqua blue, and Coraline d'Aleppo beads.

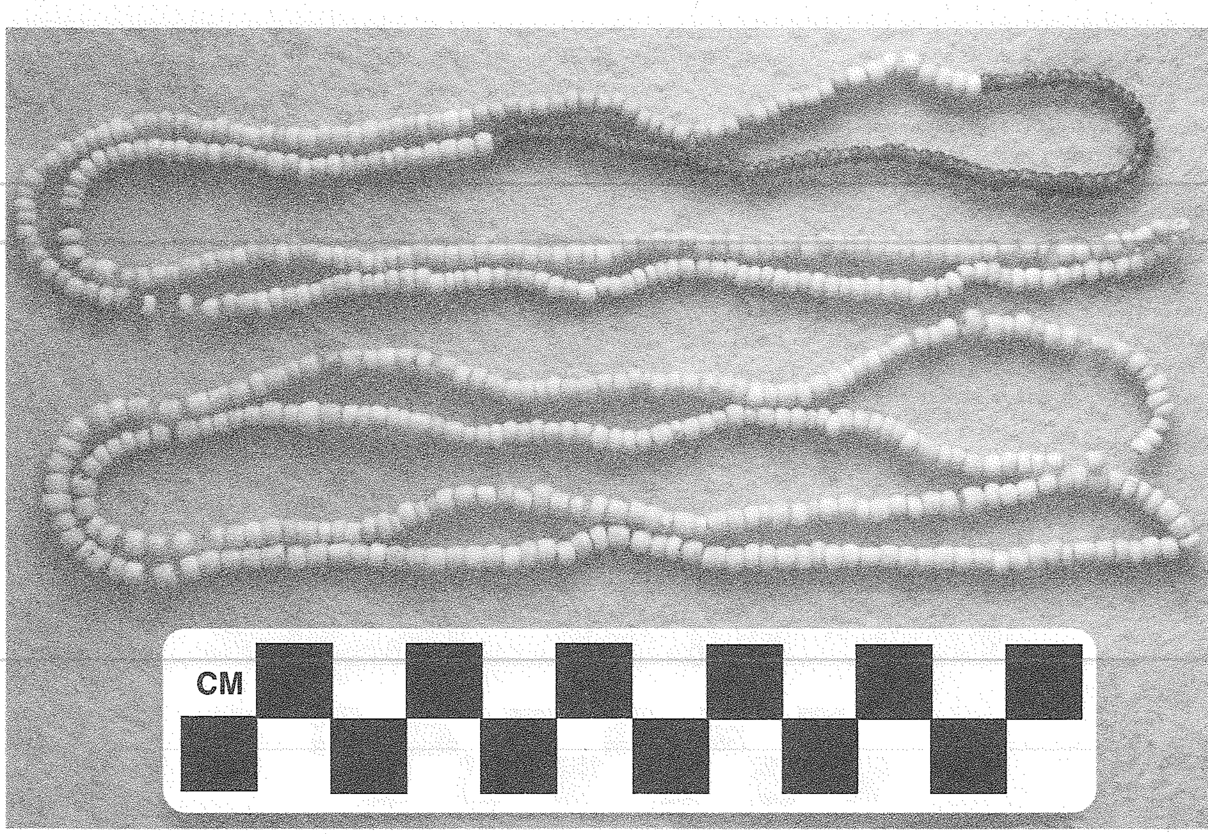


Figure 6. Strands of white and blue drawn beads.

Harris 1967; Brain 1979). Mitchem (1993:409-410) had noted from a late 17th century Spanish village context at the Apalachee town and mission of San Luis de Talimali in Florida that Cornaline d'Aleppo beads were reserved for use by the Spanish rather than as trade goods for the Indians, but this does not appear to be the case at 41HO64 from the little known about where the beads were found.

Beads were mentioned by Joutel on numerous occasions in his 1684-1687 journal, and these "trinkets" were apparently traded frequently to the Nabedache Caddo by the La Salle expedition members, including Joutel (Foster 1998:197, 204, 205, 208-209, 213, 220). The Nabedache Caddo apparently preferred the color blue (see Bolton 1987:133-134) for fabrics, and apparently also for the beads they used for ornamentation of their clothes and in necklaces. Glass beads, in general, however, are rare on Neches River Caddo sites, though, and include only a few large blue beads from Allen phase sites (Cole 1975:Table 19), including one site (41HO91) on San Pedro Creek (Erickson and Corbin 1996) in the specific vicinity of the Nabedache Caddo village visited by the La Salle Expedition, but on the east side of the creek, as well as 41HO64, where there are many large blue beads.

Are the beads from 41HO64 from late 17th century French and Spanish traders and soldiers, or are they from a period after the abandonment of the Mission San Francisco de los Tejas? One way to look at the chronological distinctiveness of the beads at the site and in the region is to examine the general sequence of bead types on late 17th century to 19th century sites in Texas and Northwest Louisiana. This sequence is based on comparative data on sites with large bead assemblages where the beads were classified using the Harris and Harris (1967) classification system (Table 2), and as such provides a way to determine how the 41HO64 bead assemblage compares with regional trends in bead use on Native American sites in the region, and how old the beads are. For this purpose, I have grouped the more than 180 bead types in the Harris and Harris (1967:139-155) scheme into eight broad groups based primarily on bead size, decoration, and method of manufacture (i.e., drawn or wire-wound beads). In the case of bead Groups VII and VIII (see Table 2), these represent a number of bead types that Harris and Harris (1967:157) suggest appeared in the bead trade during two specific temporal intervals (1767-1780 and 1780-1820); none of them are present at 41HO64.

The sites in Table 2 can be readily separated into three different and chronologically distinctive bead assemblages: those that date before 1700; a second group that dates from ca. 1700-1767; and a third that dates from ca. 1760-1850 (see Table 2). The first group is dominated by medium-sized to large white, blue, and black beads of simple construction, with less than 30 percent of the beads being small drawn beads of the same colors.

The 1700-1760 beads have more small drawn beads than do the pre-1700 sites, ranging from 56-72 percent, along with significant numbers of medium to large drawn beads (Group I) and drawn and tubular-shaped Cornaline d'Aleppo beads (Group V). Cornaline d'Aleppo beads in particular seem characteristic of many 18th century Texas Caddo and Wichita sites, more so than many other historic Native American sites in the southeastern U.S. Large striped and wound beads make their first appearance in the 1700-1760 sites—as is generally the case for colonial French Louisiana sites in the Southeast (Smith 2002)—with the exception of earlier 17th century striped beads from a few sites that appear to be of Spanish origin (see Smith 1983, 1987, 1990; Ricklis 1994).

There is a clear temporal trend in the bead assemblage data of the small drawn "garmet" or "embroidery" beads (Group IV) replacing the larger and heavier "necklace" beads (Groups I-III) by ca. 1750. This trend or shift in bead size has been previously noted by Gregory (1973) and Hunter (1990) in Texas and Louisiana 18th century aboriginal sites, and this overall bead size trend appears to culminate in the mid-19th century in Texas and Northwest Louisiana sites, along with the appearance after 1800 of large faceted beads (see Table 2). By the early 19th century, small drawn beads comprised more than 90-95 percent of the beads from this group of sites, and the larger beads were primarily faceted (see Table 2).

The 41HO64 glass beads include approximately 32 percent that are medium to large-sized drawn beads (bead Group I), only a trace of Group II striped beads, 4.6 percent Cornaline d'Aleppo beads (bead Group V), with the remainder (63 percent) being Group IV small drawn beads of various colors (see Table 1). In the Table 2 bead seriation, the 41HO64 bead assemblage fall readily between the Deshazo (Creel 1982) and Womack (Harris et al. 1965) site beads. Those two sites were occupied by different Caddo groups between ca. 1686-1730, and this 40+ year period may be a

Table 2. Chronological sequence of bead types from Texas and Northwest Louisiana sites, using the Harris and Harris (1967) bead classification system.

	Bead Groups								
Sites	I*	II	III	IV	V	VI	VII	VIII	Totals
Clements, pre-1700	97.8**	–	–	2.2	–	–	–	–	45
Atlanta State Park, pre-1700	72	–	–	28	+	–	–	–	1841
Womack, 1700-1730	40	3	0.6	56	0.5	–	–	–	2123
Deshazo, 1686-1714	25	+	–	66	8.4	–	–	–	4646
Roseborough Lake, 1720-1780	8	0.7	0.1	72	4.5	2.2	4	–	2958
Gilbert, 1740-1767	7	+	0.1	71	11.3	3.6	–	–	3453
Vinson, 1760-1790	1.2	–	0.1	66	19	9.2	0.6	1.2	2785
Walton, ?-1820	0.1	–	–	82	6.2	0.2	10.8	–	2392
Stansbury, ?-1840	+	–	–	91	+	–	–	–	2499
Canyon Creek, 1800-1850	0.8	–	2.7	92.5	4.0	–	–	–	2499

*Group I =large-medium-sized (No. 1-18); Group II =large-striped, No. 20-39; Group III =large wound and faceted, No. 40-43, 52-54; Group IV =small seed/drawn, No. 44-50; Group V =Cornaline d'Aleppo, No. 51, 55, 57, 59, 67-68, 86, 99; Group VI= small drawn beads, No. 79-84; Group VII=1767-1780 varieties, No. 64-65, 98, 101-104, 106-108, 115, 118, 128, 137-138, 155; Group VIII=1780-1820 varieties, No. 95, 100, 109, 111-114, 116-117, 119-120, 122, 124, 129, 132

** Percentage; + = trace

Sources: Creel 1982; Harris and Harris 1967; Harris et al. 1965, 1980; Jelks 1967; Lewis 1987; Miroir et al. 1973; Shafer et al. 1994; Smith et al. 1993; Stephenson 1970; Story 1985

reasonable approximation of either when Caddo groups were living at 41HO64, or the period of principal trading activities between the Caddo and French traders. Nevertheless, the ca. 1686-1730 temporal estimate is strong evidence that this site on San Pedro Creek was occupied by the Nabedache Caddo for at least 1-2 generations during the late 17th and early 18th centuries.

The character of the beads at 41HO64 was likely shaped by European views of what sorts of glass beads would be suitable for trading purposes, as well as what sorts of beads may have been available for trade. The most notable characteristic of the glass beads from 41HO64 is how they are dominated by medium to large translucent blue drawn beads, small and medium-sized opaque white drawn beads, and rounded Cornaline d'Aleppo beads; less than 0.1 percent of the 41HO64 beads are small opaque black beads, and a little more than 1 percent are small clear or translucent drawn black beads. There are only a very few decorated or polychrome beads, no solid red beads, very few tubular beads of any size, and no wire beads. Smith (1983, 1987) has noted the same prevalence of small monochrome beads, primarily blue in color, in 1630-1670 sites in the Southeast, with very few polychrome beads or red beads. Blue, white, and black beads of either simple or compound construction are the principal bead types at a wide range of late 17th to mid-18th century sites in Pennsylvania and New York; Illinois, Michigan, and Wisconsin; Louisiana, Mississippi, and Georgia; as well as Texas, and

Cornaline d'Aleppo beads are most common in Texas sites dating to the mid-18th century. Large wire beads make their appearance in the Northeast and Southeast after ca. 1687 (see Smith 2002; Wray 1983).

Gunparts and Ammunition

The gunparts and ammunition are the only metal artifacts in the collection from the two sites. The one gun part is an iron gun cock (Figure 7b), with a comb width (9.4 mm) of pistol-size (see Jelks 1967: Figure 27 and Figure 31h). The gun cock has a narrow tapered comb upon which a gunflint would sit; beveled basal edges; and a flat face; its overall height is 75 mm. There is a squarish hole in the gun cock base, and that hole held a screw to mount the gun cock to the lock plate of the gun.

The ammunition includes two pieces of lead shot (Figure 8a-b) and two lead balls. The lead shot had diameters ranging from 3.3-3.9 mm. They are spheroid in shape, with one flattened side, and with a dimple. Hamilton (1979:208) suggests lead shot pieces like those from 41HO64 were made by the French between ca. 1665-1769.

The lead balls are irregular and flattened (see Figure 8c-d), suggested they had been fired, and one (see Figure 8c) has evidence of sprue cutting on one edge. The other (see Figure 8d) is rounded and lipped. Diameters of the two lead balls range from 16.3-21.0 mm.

Gunflint

The one gunflint (see Figure 7a) was made from a honey-yellow to blond-colored flint, probably from a French source, although some native-made gunflints from the mid-18th century Gilbert site in Rains County, Texas (Jelks 1967: Figure 41c) resemble this one in overall shape and size. It is a unifacially worked gun spall (with the worked edge opposite the heel, see Kenmotsu [1990:Figure 7]), with a flat dorsal surface, no visible arris lip, and no obvious bulb of percussion on the ventral surface. The gunflint has four straight edges formed by the removal of small thinning flakes around the piece.

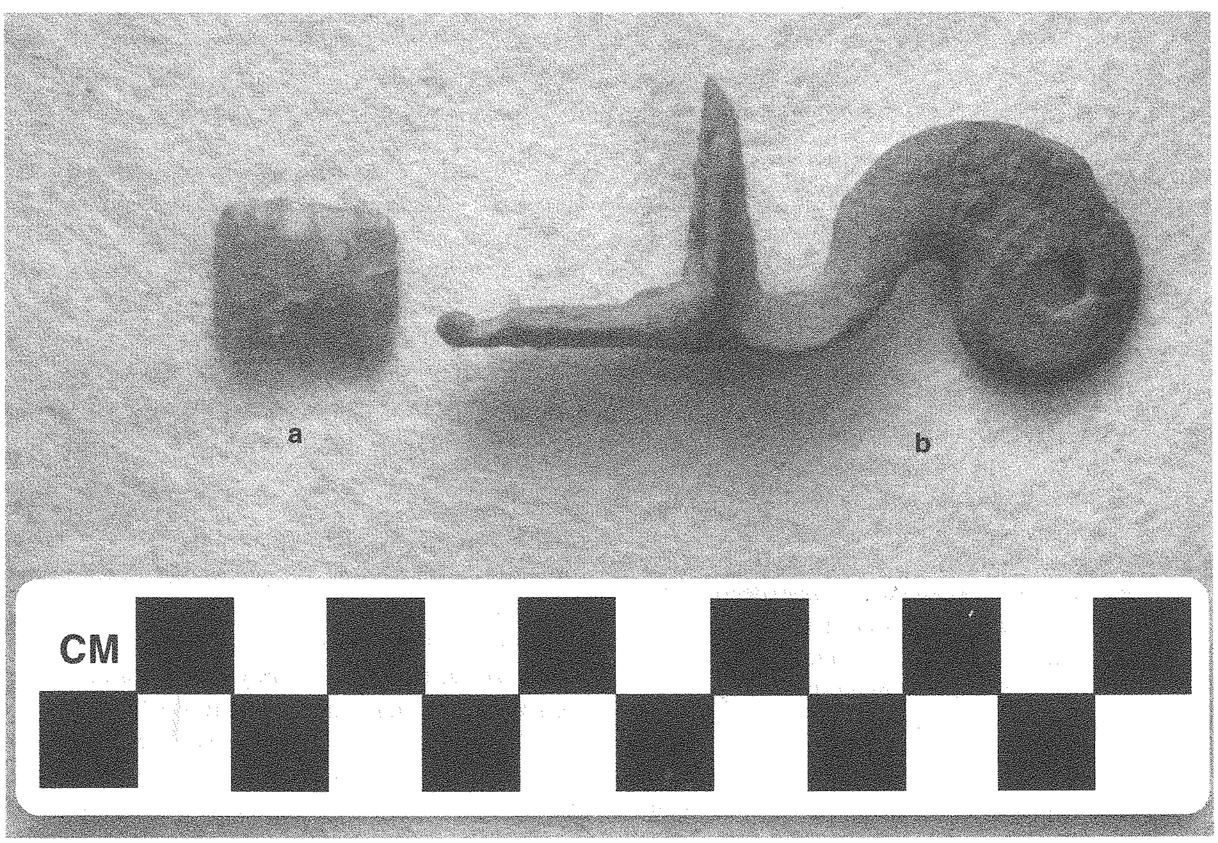


Figure 7. Gun cock and native-made gunflint.

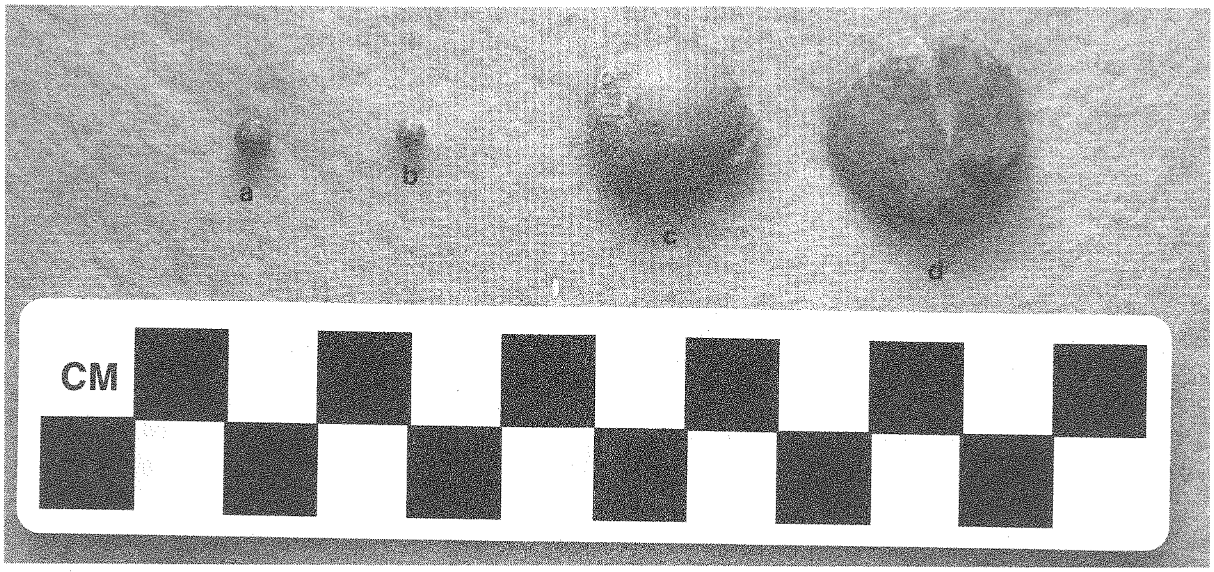


Figure 8. Lead shot and lead balls.

Catlinite Pipe, by Timothy K. Perttula, Thomas E. Emerson, and Randall E. Hughes

The catlinite pipe (Figure 9) is a calumet or peace pipe, and would have been used in greeting ceremonies and other rituals by the Caddo, as well as many other tribes living in the eastern United States. The Caddo must have obtained it from the French, as the French widely distributed these pipes to Native American groups in the late 17th and early 18th centuries. Specifically, the pipe from 41HO65 is the smokestack type of catlinite pipe (see Brain 1979:248).

Henri Joutel witnessed a calumet ceremony in 1687 among the Cahinnio Caddo (Foster 1998:254-255), who lived on the Ouachita River in southwestern Arkansas:

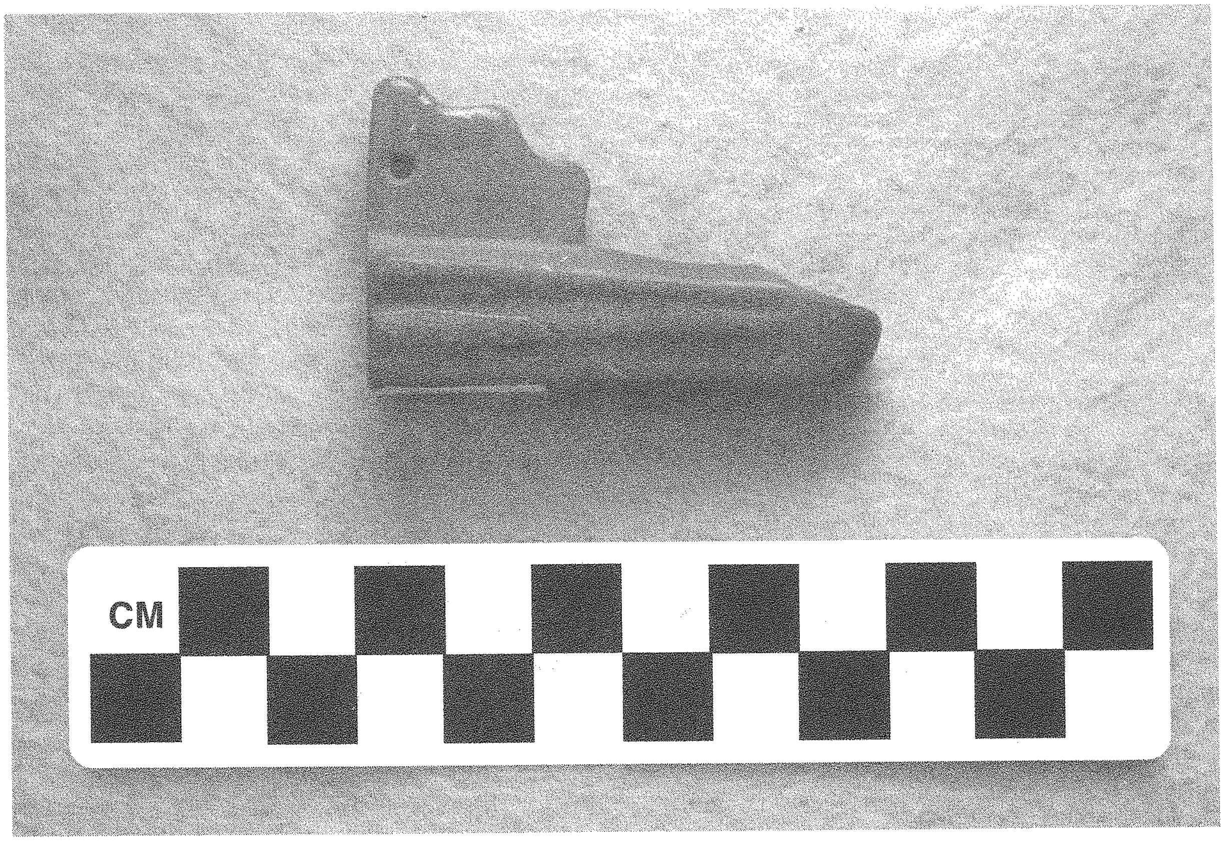
> In the evening, we attended a ceremony that we had not seen before. A group of elders followed by a few young men and some women came as a group singing at the top of their voices near our hut. The first one carried a calumet [or pipe] decorated with various feathers. Having sung for some time before our hut, they entered the hut and continued their songs for about a quarter of an hour.

The singing and ceremonies with Joutel and other members of his party continued throughout the night.

Then, in the early morning, while the singing continued, "the master of ceremonies took the calumet which he refilled with tobacco, lit, and presented to the Abbe. He drew back and advanced, without giving it to the Abbe, until this was repeated ten times. When he finally put it in the Abbe's hands, he pretended to smoke it and returned it to them. Next, the Indians made us all smoke, and they also all smoked in return, the music always continuing" (Foster 1998:254). The singing and ceremonial activities finally wound down around 9 A.M., according to Joutel, and the Caddo wrapped the calumet in a deer skin sack with "two forked sticks and a crosspiece of red wood," and then they offered the calumet to the Abbe. When they did, they told the French that with the calumet, the French "could go to all the tribes who were their allies with this token of peace and that we would be well received everywhere" (Foster 1998:255).

When Joutel's party came through East Texas in 1687, including the Nabedache Caddo villages along San Pedro Creek, they made no mention of the calumet (Foster 1998:255, fn 8). However, later journeys to these Caddo villages in 1716 and 1718 by Spanish soldiers and missionaries mention the performance of the calumet. Captain Diego Ramon wrote in the diary of his expedition that the calumet pipe was "adorned with many white feathers as a sign of peace among them" (Espinosa 1927:152).

The pipe has a short, but square stem in cross-section, with a prow protruding from the front of the stem (Figures 9 and 10). The prow also has notched projections along its ridge crest, as well as a 2.5 mm drilled hole near one end; the drilled hole may have



a

b

Figure 9. Catlinite pipe: a, side-view; b, top view.

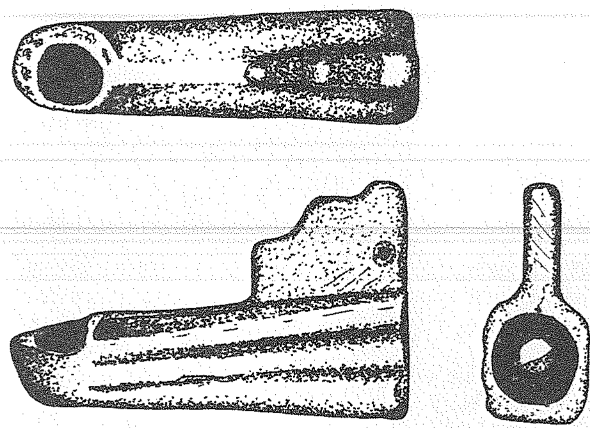


Figure 10. Drawing of catlinite pipe, side, top, and stem views; drawing by Nancy G. Reese.

been used to hold features. There are two broad incised lines etched into the stem, extending from the stem opening to near where the cylindrical bowl would have been attached; the bowl is missing, but it was 10.2 mm in diameter where it attached to the stem.

The red pipestone pipe from 41HO65 very closely resembles the catlinite material from the Pipestone National Monument area of southwestern Minnesota, although the actual piece could also be from a fragment found in glacial drift sources found some distance to the south. The Portable Infrared Mineral Analyzer (PIMA) spectroscopy of the pipe (cf. Emerson and Hughes 2001:154; Wisseman et al. 2002) completed by Thomas E. Emerson and Randall E. Hughes of the University of Illinois in comparison with a catlinite specimen from the Pipestone National Monument (Figure 11) shows a close geochemical correspondence and comparable absorption features.

On Figure 11, Hull spectrum units along the x-axis are in nanometers while the y-axis measures the reflectance (i.e., brightness) of the catlinite specimens. The correspondence in peaks is sufficient to indicate that the 41HO65 specimen is made from catlinite from the pipestone quarries centered at the Pipestone National Monument. We use the term "peak" for convenience; normal and derivative Hull quotient PIMA peaks are actually valleys below background. When normal spectra are converted to Hull quotient spectra, they are normalized to remove background differences by calculating a concave-

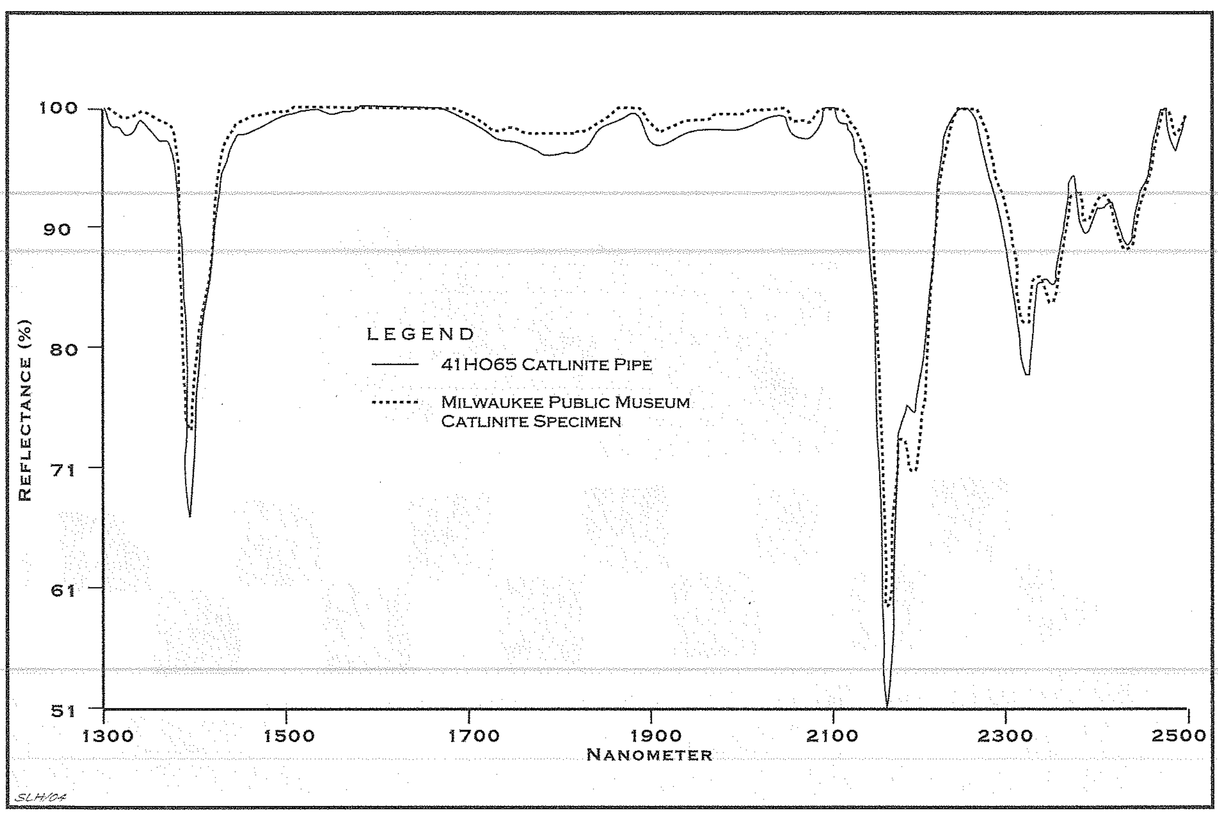


Figure 11. PIMA spectral comparison of 41HO65 catlinite pipe and Pipestone National Monument catlinite pipe from Milwaukee Public Museum (figure prepared by Sandra L. Hannum).

only background line for the normal spectra that is normalized to 100 percent for all wavelengths with the reflectance value of the most intense peak depth at the bottom of the spectral window.

Ceramic Pipe Bowl

The pipe bowl, noted by Krieger from Mr. Moore's collection from 41HO64, is from a short-stemmed elbow pipe with a broad bowl, typical of the style of clay pipes found in Allen phase contexts at the Deshazo site (see Napoleon 1995). The pipe bowl is covered with a series of closely-spaced cross-hatched engraved lines (Figure 12); one pipe bowl at the Deshazo site has a cross-hatched decoration, except the lines are incised rather than engraved (Napoleon 1995: Figure 53e).

The bowl is 33.2 mm in height, with an estimated exterior orifice diameter of 21.0 mm. The bowl walls are 6.1-7.0 mm thick, and they are thickest at the juncture of the bowl with the stem attachment; the pipe was broken at that juncture point.

Dart Points

Three dart points are in the collection from 41HO64/41HO65 (Figure 13). They have nothing to do with the historic Caddo settlement of the San Pedro Creek area, but do indicate that the area was used by Woodland and Archaic peoples from time to time.

The points are made from a gray chert, possibly available in Neches River stream gravels, but the generally small size of those gravels seem to preclude the possibility that the gray chert was obtained from local sources. The first point (see Figure 13a) is a large (83.9 mm in length) contracting stem dart point, very much resembling examples of the Pogo type (see Suhm and Jelks 1962: Plate 82b). The second, of Middle Archaic age, is a resharpened Calf Creek point (Figure 13b) made from a patinated gray chert. The third dart point is an expanding stem-corner-notched Ellis (see Suhm and Jelks 1962: Plate 94h).

CONCLUSIONS

Do 41HO64 and 41HO65, as well as 41HO6, represent part of the 1690 Mission San Francisco de los Tejas? Are they part of the Nabedache Caddo community that was dispersed for several miles along San Pedro Creek?

Alex Krieger (in Newell and Krieger [1949:13-14]) believed that the three sites on the west side of San Pedro Creek are "in a logical place for

Figure 12. Engraved ceramic pipe bowl.

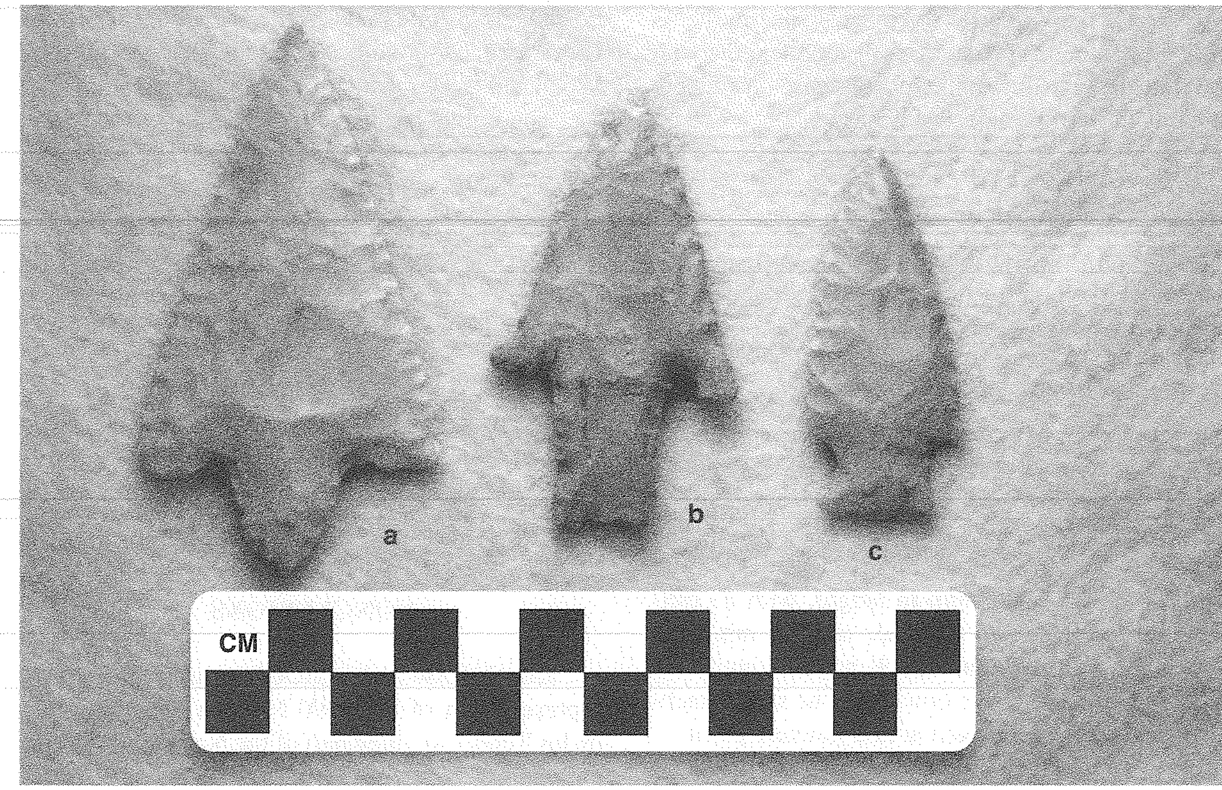


Figure 13. Dart points.

settlement and probably agreeable with Bolton's location of Nabedache." Corbin (1991:194-199) and Foster (1998:192) have also suggested that the Nabedache Caddo villages mentioned in various historical documents placed them on the west side of San Pedro Creek, not far from the Neches River. Bolton (1987:26-27), however, placed the Nabedache settlements, as well as Mission San Francisco de los Tejas, erroneously on the east side of San Pedro Creek. Krieger also had the following to say in his 1944 field notes about the historic Caddo settlement of the San Pedro Creek valley:

> Evidently houses were scattered irregularly along this side of San Pedro Creek, for the position is excellent. There was plenty of loose, easily tilled soil, creek very close, yet slopes of land afforded safety from flood. The east side of San Pedro is flat, marshy, choked with forest & brush, while west side is very favorable. . . The mission *might* have been anywhere from Moore's branch to the bluff at the San Pedro mouth. The historic material & Patton Engraved at site 1a, b, c point to a poss. location there. . .

Based on the historical and archeological information that bears on the question of the location of both the Nabedache Caddo settlements as well as Mission San Francisco de los Tejas, the historical information summarized by Corbin (1991) makes it clear that the Nabedache Caddo village was on the west side of San Pedro Creek, as was Mission San Francisco de los Tejas. The Spanish approached both places from the west along Camino de los Tejas.

Since the village was dispersed over more than 2.6 miles along the creek, and included more than 100 houses, the Nabedache Caddo occupations at 41HO6, 41HO64, and 41HO65, would have comprised only a very small part of the community, and at present we do not know if they are situated near the middle or center of the community, but that seems unlikely. As was mentioned earlier, the Mission San Francisco de los Tejas was established in 1690 near the center of the village and the caddi's (or chief's) house. The distances of one to three leagues (ca. 2.6-7.8 miles) between the location of the mission and the Neches River that were mentioned in various late 17th and early 18th century Spanish documents (see Bolton 1987:41, 43, 45), suggests that the 1690 Mission San Francisco de los Tejas is probably not at the same place as 41HO6, 41HO64, and 41HO65, but is farther upstream along San Pedro Creek, since these sites are less than one mile from the Camino de los Tejas crossing of the Neches River favored by Corbin (1991:Figure 28).

NOTES

1. According to Wade (2003:xxiv), after the 17th century, the Spanish league was "equivalent to 2.59 English statute miles." For this paper, one Spanish league is rounded up to 2.6 miles.

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The Hackberry Cache (41RB95)

An Alibates Cache from the Northeastern Texas Panhandle

Patricia A. Mercado-Allinger

ABSTRACT

Southern High Plains cache features provide important clues about the movement and activities of past occupants. The Hackberry Cache (41RB95), containing debitage, modified flaking debris, scrapers, bifacial knives and Late Prehistoric beveled knives, offers an important glimpse into the dispersal of raw lithic materials, lithic tool making, and storage behavior. This study presents information about the cache assemblage within the context of other Alibates agate caches from the region and other cultural considerations.

INTRODUCTION

On June 28, 1991, a cache feature containing a total of 222 artifacts and recorded as site 41RB95 was encountered eroding from a steep cutbank in Roberts County, Texas. All but two of the cache specimens were composed of the distinctive Alibates agate material. The cache feature was discovered during the course of reconnaissance-level survey investigations conducted on privately owned tracts north of the Canadian River in Hemphill, Hutchinson, Ochiltree, and Roberts counties. The project, referred to as the Canadian River Breaks Reconnaissance (CRBR), was carried out under the dual sponsorship of Courson Oil & Gas Company of Perryton, Texas and the Texas Historical Commission.

The stated purpose of the CRBR project was to gather data regarding the area landscapes and the archeological sites present therein, with a particular focus on the recovery of information about Paleoindian-age cultural remains. While the results of the CRBR investigations are detailed in a forthcoming report (Mercado-Allinger et al., in preparation), the relatively unique character of the cache discovery is deemed worthy of further consideration here.

INTERPRETING CACHING BEHAVIOR

In the context of archeological usage, a cache is a purposeful accumulation of cultural materials that is hidden for future recovery, use, and perhaps, trade. Cache features shed light on specific strategies adopted by hunter-gatherer groups and have been an area of interest to numerous researchers. However, many past cache studies were narrow and descriptive in their approach, primarily focusing on feature composition and content (Miller 1993). Fortunately, the trend in cache studies is to consider such important aspects as "geographic location, distance from the source of raw materials, related archeological sites, and spatial, structural, technological, and temporal affinities with similar caches" (Miller 1993.:2).

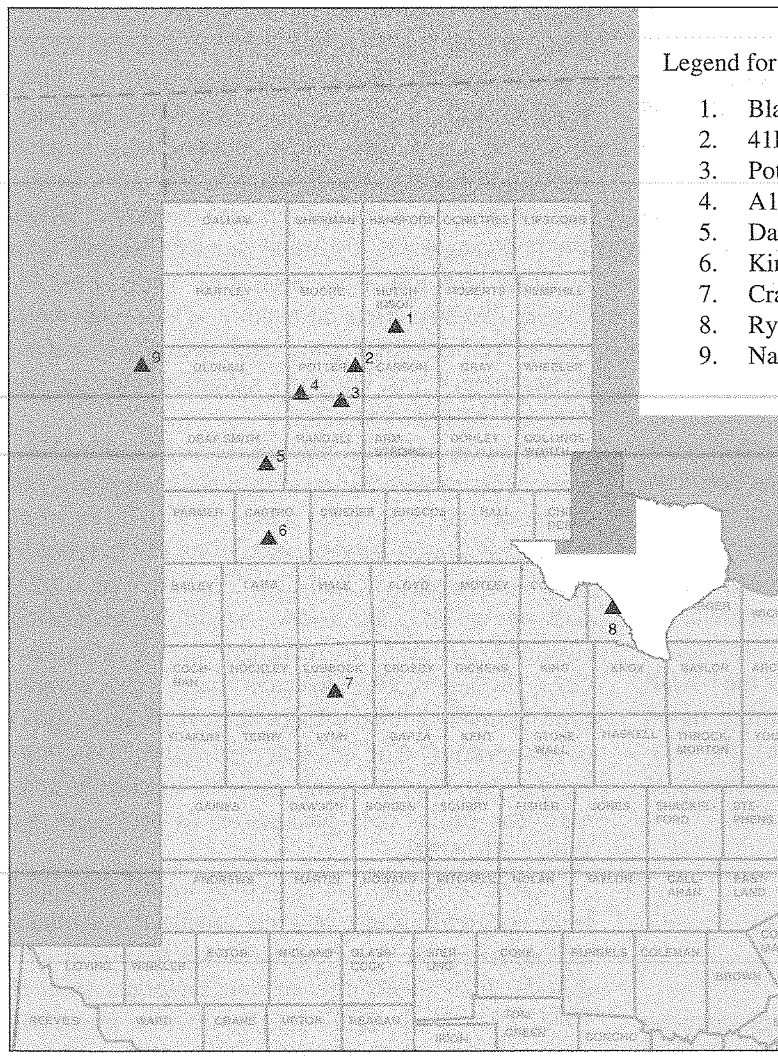
Caching behavior was often prompted by limited access to desired stone materials coupled with the perceived future need (Odell 1996:62). To meet these anticipated needs, collections of "insurance gear"—materials cached at a location where they will be needed and used—would be generated (Binford 1979:257). Interestingly, not all cache features fit this model. Alibates agate caches have been recovered from village sites at (Flaigg 2002) or near primary Alibates outcrops in the Texas Panhandle, possibly to ensure preservation of the contents for future tool production as proposed by Keller (1975:51).

Lithic procurement activities would normally have occurred during routine subsistence rounds, although special circumstances may have required specific trips to acquire desired materials (Keller 1975.:259). It is likely that more raw materials would be acquired and tools or "blanks" would be fabricated than were required to meet immediate needs and tools would be reworked in order to maximize their utility (Odell 1996:62). It is furthermore presumed that caches were intended to serve as temporary storage, distinct from burial offerings that would not have likely been retrieved for future use (Kornfeld et al. 1990:301; Tunnell 1978:1). While many cache discoveries occur as isolated features, some have been reported at occupation sites in the Texas Panhandle (Flaigg 2002; Keller 1975).

THE ENVIRONS OF THE HACKBERRY CACHE

The cache was found on the west bank of Point Creek, a drainage that flows southward from the High Plains escarpment to the Canadian River, in Roberts County, Texas (Figure 1). At this location, the stream valley exhibits characteristics typical of "Lower Breaks" landscapes of the Canadian River basin—the lower reaches of the canyons, where there are broad bottoms and well-developed, deep, alluvial terraces, of probable Late Holocene age.

Channel gradient courses in Lower Breaks contexts are more meandering than they are at higher elevations. Laterally migrating stream channels appear to have contributed to both vertical and horizontal accretion of these landscapes, with a complex series of paired and unpaired alluvial terraces. Indeed, the creek channel at the cache locale is somewhat braided, with various terraces and terrace remnants in evidence. Overall, the cache locale may be characterized as a broad valley deeply incised by intermittent drainages. A prominent,



Legend for Figure 1 (adapted from Flaigg 2002):

1. Black Dog Village; Keller 1975
2. 41PT75; Flaigg 2002
3. Potter County; Witte 1942
4. A1107; Slesick 1978
5. Dawn; Green 1955
6. King; THC Lab Record
7. Craft; Ballenger 1996
8. Ryan; Hartwell 1995, 1991, 1990
9. Nara Vista; Green 1955

Figure 1. Location of Alibates lithic caches, Texas and New Mexico.

unnamed tributary joins the main channel of Point Creek directly east of the cache site.

According to the Roberts County soil survey (Wyrick 1981), the soils of the immediate cache area belong to the Mobeetie fine sandy loam series. The *in-situ* remnants of the cache were found embedded in an alluvial brown sandy loam matrix. Site area vegetation include a variety of grasses, cacti, and sage. Wild plum trees were observed in the creekbed and a lone hackberry tree was found growing from the cutbank, near the cache feature. It is for this hackberry tree that the cache is named.

ALIBATES SOURCES

Silicified dolomite, commonly known as Alibates agate, is contained within the Quartermaster Formation and provided prehistoric peoples from Paleoindian to Late Prehistoric times with an important source of raw material for the production of stone tools (Holliday 1997:249–250; Banks 1990:91–92, Holliday and Welty 1981:207; Shaeffer 1958). Lt. James W. Abert described heavily quarried Alibates outcrops during his 1845 expedition for the U.S. Topographical Engineers (Carroll 1941:64), as "a plain strewed with agates, colored with stripes of rose and blue" (Wedel 1961:18). A portion of this area now comprises the Alibates Flint Quarries National Monument, southwest of modern-day Fritch, Texas.

Well-known sources for this distinctively banded and colorful material are found in Carson, Hutchinson, Moore and Potter counties in the Texas Panhandle. As noted by Bowers (1975:21-22, 62), there are two beds that include silicifed dolomite at these primary Alibates sources, separated by a layer of mudstone. The lower bed contains nodular and pebble forms of Alibates agate while massive ledges occur in the upper component (Bowers 1975:69). However, Alibates outcrops of silicified dolomite are discontinuous.

Surface weathering and fracturing renders the majority of exposed Alibates materials inadequate for knapping (Flaigg 2002:4). To access stone suitable for tool making, quarry pits were dug as much as six feet in depth and 10-12 feet in diameter (Bryan 1950:14). That this was a common procedure is evidenced by the multitude of quarry pits—550 identified by a one square mile survey (Ed Day, personal communication 1996, as reported in Flaigg 2002:4).

Certain authors have challenged common assumptions about the origin and dispersal of Alibates agate from the primary outcrops in the Texas Panhandle (Weehler 1974). In their report of survey investigations in the Washita River Valley, Brooks et al. (1985:149) noted that cobbles of Alibates agate "occur in gravels along the Arkansas, Canadian, and Washita rivers at least as far east as central Oklahoma."

Wyckoff (1989) was the first to undertake a systematic examination of the occurrence of Alibates clasts in gravels of the Canadian River in western Oklahoma. Numerous gravel exposures containing minor quantities—from less than 0.01 to 0.1—of Alibates materials (Wyckoff 1989:436) were identified from the inspection of three broad transects. Alibates clasts of suitable size, shape and quality for the production of tools were found among these deposits, with some of the Canadian Valley gravel exposures able to "provide the raw material for even the largest biface cores and beveled [sic] knives reported for late prehistoric village sites in the region." (Wyckoff 1989:441). Wyckoff (1989:444-445) even suggested that Alibates clasts found at the Oklahoma gravel deposits might in fact be more workable than the cobbles and boulders found near the bedrock outcrops due to the elimination of irregularly fractured or weakened materials as a result of battering by fluvial transport.

Distinguishing quarried versus "foraged" Alibates agate in archeological contexts presents a challenge for researchers. Wyckoff's efforts provide a useful reminder that the presence of Alibates artifacts does not necessarily represent evidence of trade from the primary quarries. This point is pertinent to the current study since the Hackberry Cache was found approximately 68 miles (110 km) downstream from the Alibates quarries. Because the CRBR investigations were reconnaissance in nature, it currently remains unknown if local gravel outcrops contain Alibates clasts of sufficient size and quality to have served as sources for the Hackberry Cache materials.

SOUTHERN HIGH PLAINS CACHES

Stone caches found in the Southern High Plains region are reported periodically in journal articles and reports of investigations. As noted by Wiseman et al. (1994), while caches of various kinds—chipped stone, ground stone, and even bone—are not uncommon in the area, they are unusual features worthy of inclusion in regional cultural syntheses. These published accounts reveal that Southern High Plains lithic cache finds vary in the materials used. For the purpose of this discussion, caches are categorized by material type.

While local sources of high quality lithic materials for the manufacture of chipped stone artifacts are known to occur in the Texas Panhandle-Plains, a surprisingly large number of reported caches encountered in the region are composed of non-local Edwards Plateau chert (Pope 1993; Pope and Hartwell 1991; Tunnell 1989, 1978; Harrison and Killen 1978; Green 1955; Witte 1942). Unpublished accounts document additional Edwards chert cache discoveries in the region (Texas Historical Commission [THC] files). Edwards chert caches have also been identified in eastern New Mexico and Oklahoma (Wyckoff 1984; Green 1963; Bryan 1950; Roberts 1942).

Local stone sources were also utilized for the purpose of fabricating caches. However, Tecovas jasper appears to have been chosen infrequently for this purpose, with the Mackenzie (Willey et al. 1978), Palo Duro and Crump Farm (Tunnell 1978) caches among the few examples of such features. These discoveries range from hundreds of flakes as in the cases of the Mackenzie (Willey et al. 1978) and Palo Duro (Witte 1942) caches, to a handful of bifaces and flakes such as the Crump Farm cache (Tunnell 1978:45).

Alibates agate, in contrast, appears to have been the preferred local lithic material chosen for cache production. Minor amounts of Alibates materials have even been found among Edwards Plateau caches found in the Southern High Plains region such as the Gibson (Tunnell 1978), McKee (Hammatt 1970, 1969), and King (THC n.d.) caches. Figure 1 illustrates the distribution of caches composed primarily of Alibates agate found in Texas and eastern New Mexico and that have appeared in publication. The Alibates Cache (41PT75) (Flaigg 2002), A-1107 (Slesick 1978), Black Dog Village caches (Keller 1975), and the Potter County Cache (Witte 1942) represent examples of caches encountered near the primary Alibates outcrops. Alibates caches have also been encountered in more distant locales, including the Dawn and Nara Vista finds (Green 1955) in the western Texas panhandle and eastern New Mexico, respectively. The focus of this article, the Hackberry Cache, was also encountered some distance from the primary Alibates sources, in the northeastern Texas Panhandle.

Researchers have also reported on Alibates caches found in Oklahoma, distributed across the length of the Oklahoma Panhandle (Lintz 1981, 1978), in western (Lintz 1981) and in central areas of the state (Hammatt 1970). The eight Oklahoma caches described by Lintz (1981) all included unmodified and/or retouched flakes. Of these, the Cold Springs Crossing, Johnson-Cline, Two Sisters-1 and Heerwald caches also contained at least one formal tool or tool fragment (Lintz 1978, 1981). Temporally diagnostic artifacts found among the contents of the Two Sisters-1 and Heerwald caches indicate Late Prehistoric associations (ibid.).

Alibates caches have been encountered as far north as Kansas. Several of these finds were found near the present-day southern state boundary, including the Helton-Harrell (Mallouf and Wulfkuhle 1991), Sailor-Helton (Mallouf n.d.), Comanche County (Lees and Reynolds 1989), and the Barber County (Stein n.d.) caches. Two additional Alibates cache finds have been documented in southwestern Kansas (Theis n.d.a, n.d.b.).

As indicated by Wyckoff (1989) and Brooks et al. (1985:149), it should not be automatically assumed that all Alibates materials derive from the primary outcrops in the Texas Panhandle since river gravels are known to contain Alibates clasts in the Arkansas, Canadian, and Washita river valleys. Further identification and examination of secondary sources is warranted to better ascertain which of the "distant" caches may have derived from these gravels rather than having been transported from the primary outcrops.

THE DISCOVERY AND RECOVERY OF THE HACKBERRY CACHE

The Hackberry Cache (41RB95) was discovered on June 28, 1991 in a deep alluvial terrace overlooking Point Creek (Figure 2). The CRBR survey team was in the area, searching for a Late Prehistoric Plains Village site that had been located previously but still required recording. It was during this search effort that the cache feature was found eroding from a nearly vertical cutbank. Some of the cache specimens were *in situ* while slopewash had displaced many others as much as 1.29 m downslope, toward the creek channel. Because of the disturbed condition of the cache and the likelihood of its complete loss to the next heavy rainfall, the CRBR survey team decided that the best course

Figure 2. Hackberry Cache site environs, view facing northward.

of action would be to excavate the intact portion of the feature and to recover as many of the displaced materials as possible. This work was accomplished the following day (June 29, 1991).

It should be noted that a thin, distinct occupation zone was detected at this location approximately five cm below the crest of the cutbank. Cordmarked pottery sherds, faunal bone scraps and scattered flakes were observed in this zone but no direct association could be clearly demonstrated between this occupational component and the cache. The recovery effort began with a thorough search of the cutbank surface for displaced artifacts that were clearly associated with the cache feature. These specimens were collected and bagged. The loose matrix found downslope of the intact portion of the feature was then screened for cache-related artifacts, using 1/8" hardware mesh. All artifacts recovered by this screening process were also collected and bagged. The loose fill surrounding the feature was then cleared away for profiling purposes. This fill was also screened for cache materials. Each displaced cache artifact was numbered, using a prefix of "2" to signify its secondary context.

The matrix overlying the intact portion of the cache feature was disturbed and unstable, requiring the removal of several of the artifacts from the *in situ* cluster to facilitate the profiling process. It seemed highly likely that many of the displaced specimens had been dislodged from this disturbed area. Although the cutbank surrounding the feature was carefully troweled, no pit outline was discernable. However, the *in situ* specimens were found in a tightly packed cluster, indicative of their placement into a pit (Figure 3).

Upon completion of the aforementioned tasks, the intact feature was then manually excavated. Each artifact was numbered consecutively using the prefix "1" to indicate their *in situ* origin. Details including artifact orientation, presence of calcium carbonate residues, and other characteristics were noted during this aspect of the recovery process. Once in the laboratory, the artifacts were examined, cleaned and catalogued.

The cache assemblage contains an array of colors and patterns typical of Alibates agate. While desirable, efforts to refit debitage pieces together with other cache artifacts have not yet been undertaken. It is considered to be highly likely that some of the debitage will be able to be refitted, thus revealing important information about the sequence of lithic reduction. Future examination of this cache assemblage will attempt to identify refits.

Contents and Characteristics of the Cache

A total of 222 cache artifacts were recovered, 42 of which were found *in situ*. Due to the lack of any clear discoloration surrounding the *in situ* artifacts, it remains unknown if the cache materials had been placed in a perishable container. While no cache pit outline was identified in the cutbank profile, the *in situ* contents of the cache appeared to have been buried in a small, basin-shaped pit, approximately 14 cm in diameter. Figure 3 shows the intact cache feature prior to excavation. In light of the disturbed nature of the matrix overlying the cluster, it was estimated that the top of the feature originated about 65.5 cm below the top edge of the cutbank.

The uppermost *in situ* artifact measured 73 cm below surface. A beveled knife was found at the base of the feature, 79.5 cm below surface. The tightly-packed chipped stone artifacts recovered from this feature remnant included three beveled knife fragments, one thin bifacial knife fragment, two scrapers, one modified blade, 19 modified flakes, one modified chip, and 12 pieces of debitage.

Interestingly, several of the *in situ* specimens were found arranged with dorsal surfaces facing the exterior of the pit feature. These findings strongly suggest that the intact portion of the cache represented the bottom remnants of the cache.

Figure 3. Intact cache feature prior to excavation.

The total weight of the 222 artifacts of the Hackberry Cache is 1.1764 kg (2.593 pounds). Other characteristics of the cache materials including artifact category, context and material type are summarized in Table 1. All but two of the cache artifacts were composed of Alibates agate. One of the modified flakes was fashioned from non-local Edwards Plateau chert and one of the unmodified chunks from opalite, a material that is available at locales along the margins of the eastern Caprock Escarpment. While many (n = 180; 81 percent) of the cache items were recovered from displaced contexts, the same classes of artifacts were recovered from the *in situ* cluster. The bulk of (n = 150; 68 percent) of cache materials consists of debitage, with lesser amounts (in descending order) modified debitage pieces, bifaces, and scrapers. Descriptions of the artifacts follow below.

Bifaces (n = 8)

Eight bifaces were found in both *in situ* and displaced contexts. Of these, three are beveled knives (Specimens 1-002, 1-009, and 1-042), all recovered from the intact cache cluster (Figure 4). All of the beveled knives are fragmentary, exhibiting snap, hinge, and/or step fractures.

The other bifaces are knife fragments (Figure 5), four of which were found among the displaced cache materials (Specimens 2-072, 2-080, 2-084, 2-085). Only one knife (Specimen 1-009) was recovered from the intact cache cluster. Extensive use wear and retouch is evident along the lateral edges of the majority of these knives. Rounding and polish is also present on the edges of Specimen 2-072, a distal tip fragment. Calcium carbonate residue is evident on Specimen 2-0785.

Scrapers (n = 3)

Two of the three scrapers came from the intact cache cluster (Specimens 1-015 and 1-026) and are depicted in Figure 6. The third scraper, Specimen 2-054, was found among the displaced cache materials and measures nearly twice the length and thickness of the other scrapers. While both Specimens 1-

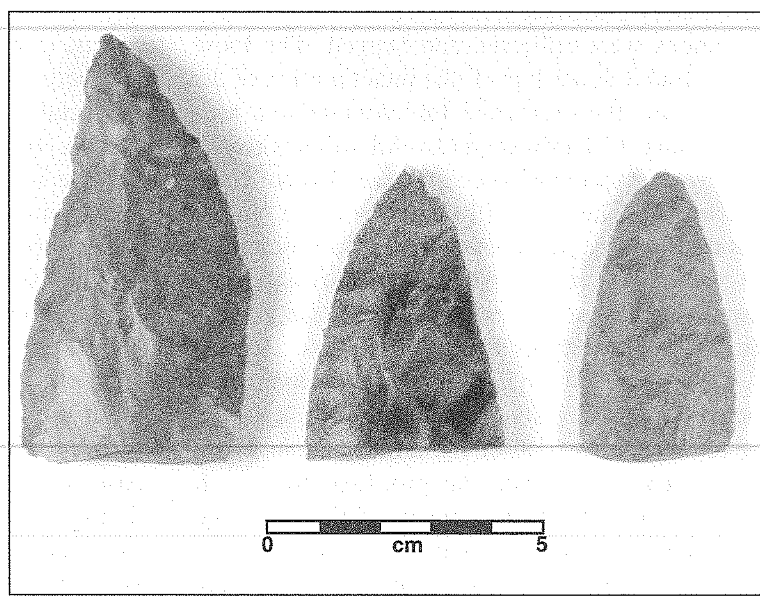


Figure 4. Beveled knife fragments (Specimens 1-104, 1-002, and 1-042, left to right).

Table 1. Hackberry Cache Artifacts
(n = 222)

Artifact category/use	Context		Lithic material		
	In situ	Displaced	Alibates agate	Edwards chert	Opalite
Bifaces (n = 8)					
Beveled knife fragments	3		3		
Knife fragments	1	4	5		
Scrapers (n = 3)	2	1	3		
Modified blades (n = 3)					
Cutting		1	1		
Scraping		1	1		
Undetermined use	1				
Modified flakes (n = 41)					
Cutting	4	4	7	1	
Scraping	12	15	27		
Scraping/cutting	2	2	4		
Scraping/graver		1	1		
Undetermined use	1		1		
Modified chips (n = 11)					
Cutting		2	2		
Scraping	1	5	6		
Scraping/cutting		1	1		
Scraping/graver		1	1		
Undetermined use		1	1		
Modified chunks (n = 6)					
Cutting					
Scraping	2	1	3		
Spokeshave		1	1		
Undetermined use	1	1	2		
Debitage (n = 150)					
Flakes	5	56	61		
Chips	4	59	63		
Chunks	3	23	25		1
Totals	42	180	220	1	1

026 and 2-054 exhibit use wear, extensive wear is evident along the right edge of the latter artifact.

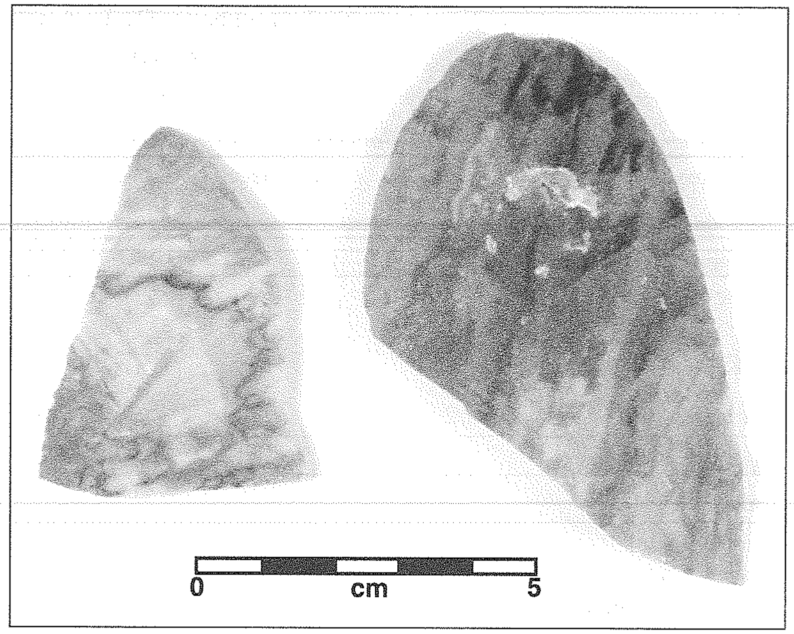


Figure 5. Modified flake (Specimen 1-010) and bifacial knife fragment (Specimen 1-09), left to right.

Modified blades, flakes, chips and chunks (n = 61)

This category of cache materials includes both expediency tools and tool fragments. Thirty-seven of these modified pieces were fashioned and used for scraping purposes. Five artifacts are scraping/cutting tools (Specimens 1-020, 1-023, 2-035, 2-089, and 2-130). A modified chip (Specimen 2-023) is a scraper/graver and a modified chunk (Specimen 2-082) represents the only spokeshave recovered from this feature, albeit from a displaced context. The blades and flakes of this category have single facet, multiple facet, or crushed platforms. Modifications vary from light to extensive retouch, on single or multiple edges. Use wear, from light to extensive, is evident on many of the modified pieces. While not common, polish is evident on six of the displaced modified pieces (Specimens 2-017, 2-023, 2-024, 2-035, 2-056, and 2-089). A modified flake—Specimen 2-081—has calcium carbonate residue. Four modified items, including one blade, one flake, one chip, and one chunk are too fragmentary to ascertain type of use.

Debitage (n = 150)

The majority of the Hackberry Cache feature specimens consist of unmodified flakes, chips, and chunks. Only 12 debitage items were found *in situ*, while 138 were recovered from displaced contexts. Flakes (n = 61) and chips (n = 63) are nearly equal in number, with a lesser amount of chunks (n = 25). As noted earlier, it is anticipated that refits may well be found among these and other cache specimens.

Table 2 summarizes dimension and weight data for the unmodified flakes recovered from the cache. Examination of these data reveals that the flakes range from 12.6 to 67.5 mm in length, with the largest number of specimens (n = 42; 69 percent) measuring between 15.1 to 32.5 mm. While width measurements range from 10.1 to 67.5 mm, 49 flakes (80 percent) measure between 15.1 to 35.0 mm in width. Thickness dimensions are more tightly clustered, between 0.1 to 15.0 mm, with 31 flakes (51 percent) measuring 2.6 to 5.0 mm. Individual flake weights vary from 0.1 to 32.5 grams, with 51 percent weighing between 0.1 to 2.5 grams.

Unmodified chip data are presented in Table 3. Overall, these specimens are generally smaller than the unmodified flakes just described, ranging in length from 0.1 to 57.5 mm. The vast majority of chips (n = 50; 79 percent) measure between 10.1 and 30.0 mm in length. Width dimensions vary

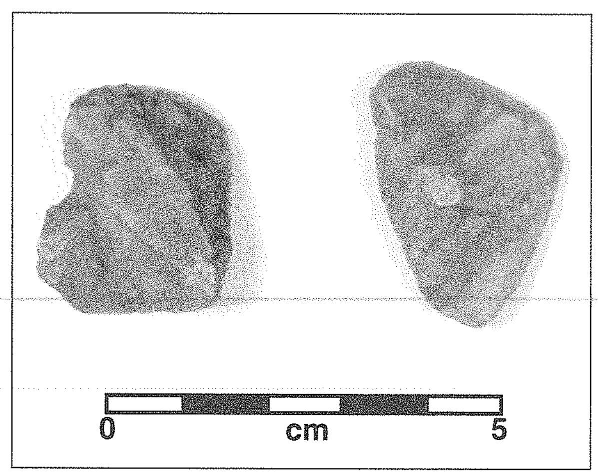


Figure 6. Scrapers (Specimens 1-015 and 1-26, left to right).

Table 2. Hackberry Cache Unmodified Flake Measurements (n = 61)

Measurement Range	Length (mm)	Width (mm)	Thickness (mm)	Weight (grams)
0.1-2.5			8	31
2.6-5.0			31	19
5.1-7.5			13	3
7.6-10.0			6	3
10.1-12.5		2	1	1
12.6-15.0	1	3	2	
15.1-17.5	6	8		
17.6-20.0	6	4		1
20.1-22.5	8	9		
22.6-25.0	4	5		1
25.1-27.5	4	8		
27.6-30.0	5	3		
30.1-32.5	9	8		2
32.6-35.0	2	4		
35.1-37.5	1	2		
37.6-40.0		1		
40.1-42.5	3			
42.6-45.0	2			
45.1-47.5		1		
47.6-50.0	1			
50.1-52.5	3	1		
52.6-55.0	1			
55.1-57.5				
57.6-60.0	2			
60.1-62.5	2			
62.6-65.0	1	1		
65.1-67.5		1		

from 0.1 to 40.0 mm, with the largest number (n = 52; 83 percent) measuring between 7.6 to 25.0 mm. Thickness dimensions range from 0.1 to 7.5 mm, although only three specimens (5 percent) measure over 5.1 mm. Most chips (n = 53; 84 percent) weigh between 0.1 and 2.5 grams. Only two specimens exceed 2.5 grams in weight.

Table 4 summarizes data for the unmodified chunks. Chunk length is fairly evenly distributed between 12.6 and 55.0 mm. Width and thickness dimensions range from 7.6 to 45.0 mm and 2.6 to 12.5 mm, respectively. Nineteen (73 percent) of these specimens measure between 2.6 and 7.5 mm in thickness. Chunk weights range from 0.1 to 17.5 grams, with most (n = 21; 81 percent) clustering between 0.1 and 7.5 grams.

DISCUSSION AND CONCLUSIONS

Alibates caches from the Southern High Plains are a varied lot. Some, such as the Helton-Harrell Cache (Mallouf and Wulfkuhle 1991), Lane County Cache (Thies n.d.a.), Black Dog Village site/ Features 7 and 8 (Keller 1975:15) and the Nara Vista Cache (Green 1955), are composed primarily of bifaces and/or performs and cores. The Alibates (Flaigg 2002), Sailor-Helton Cache

(Mallouf n.d.), Dawn (Green 1955) and Potter County (Witte 1942) caches, as well as Feature 19/Structure 1 and Feature 11 at Black Dog Village (Keller 1975:15; 18) consist mainly of blades and/or flakes that were likely intended for future tool manufacture. The recovery of pieces of an antler billet tool with the Alibates Cache (Flaigg 2002) strongly suggests that the feature represents a toolkit assemblage.

Heterogeneous caches include artifacts that represent various stages of lithic tool manufacture, from cores and unmodified debitage to retouched and/or utilized flakes, and formal tools. Where noted, use wear is frequently in evidence on the tools found in such caches. Features recorded in south-central Kansas (Theis n.d.b.; Reynolds 1990) and at the Cold Springs Crossing, Johnson-Cline, Two Sisters-1 and Heerwald sites in western Oklahoma (Lintz 1981) all contain varied lithic assemblages. The A1107 Cache (Slesick 1978) bears a strong resemblance to the Hackberry Cache as it contains bifaces, scrapers and a beveled knife, retouched and unmodified flakes.

Temporal placement of Alibates caches is heavily reliant upon relative dating when diagnostic artifacts are in evidence, such as the presence of such Late Prehistoric artifacts as arrowpoints (Flaigg 2002; Lintz 1981) and beveled knives (Lintz 1981; Slesick 1978; Keller 1975). The Hackberry Cache assemblage includes three beveled knife fragments, indicative of the Late Prehistoric period.

The Hackberry Cache represents a purposeful accumulation of 220 Alibates agate and two nonlocal lithic artifacts. The contents were apparently stored in a small, basin-shaped pit dug into an alluvial terrace overlooking Point Creek in Roberts County.

Table 3. Hackberry Cache Chip Measurements (n = 63)

Measurement Range	Length (mm)	Width (mm)	Thickness (mm)	Weight (grams)
0.1-2.5	1	1	28	53
2.6-5.0			31	8
5.1-7.5		3	3	1
7.6-10.0	1	7		
10.1-12.5	5	7		
12.6-15.0	3	11		
15.1-17.5	5	13		1
17.6-20.0	6	5		
20.1-22.5	8	3		
22.6-25.0	10	6		
25.1-27.5	8	1		
27.6-30.0	5	1		
30.1-32.5	1	2		
32.6-35.0		2		
35.1-37.5	1			
37.6-40.0	2		1	
40.1-42.5	3			
42.6-45.0	1			
45.1-47.5	1	1		
47.6-50.0				
50.1-52.5				
52.6-55.0				
55.1-57.5	1			

Table 4. Hackberry Cache Chunk Measurements
(n = 26)

Measurement Range	Length (mm)	Width (mm)	Thickness (mm)	Weight (grams)
0.1-2.5				11
2.6-5.0			7	6
5.1-7.5			12	4
7.6-10.0		1	5	2
10.1-12.5		1	2	2
12.6-15.0	2	6		
15.1-17.5	1			1
17.6-20.0		3		
20.1-22.5	2	6		
22.6-25.0	2	3		
25.1-27.5	1	1		
27.6-30.0	1			
30.1-32.5	3	2		
32.6-35.0	1			
35.1-37.5	2			
37.6-40.0	2	1		
40.1-42.5	1	1		
42.6-45.0	1	1		
45.1-47.5	1			
47.6-50.0	1			
50.1-52.5	4			
52.6-55.0	1			

Forty-two of the 222 cache specimens were found to be *in situ* while slopewash had displaced the other materials downslope, toward the creek channel.

The feature's contents are best characterized as heterogeneous, consisting of bifaces (n = 8), scrapers (n = 3), modified blades/flakes/chips (n = 55), and debitage (n = 150). Use wear, retouch and even rounding and polish is evident on several of the bifaces, scrapers and modified pieces.

The presence of three beveled knives indicates a Late Prehistoric period age for the feature. No other diagnostic artifacts were found in direct association with the cache and the feature did not reveal any datable materials.

The question of whether the Alibates agate used by the creator(s) of the Hackberry Cache originated at a primary or secondary (gravel) source remains largely unanswered. A few of the debitage pieces retain minor areas of cortex but the majority of cache specimens do not retain any evidence of cortical surfaces. The lack of cores in this cache assemblage further prevents a clear assessment of the context of origin. However, the heterogeneous nature of the feature contents indicates that nearly every useable piece of Alibates was retained presumably for future usage. Additional study of this cache feature is planned in order to garner additional information about the sequence of lithic reduction techniques and in the hopes of shedding important light whether the Alibates agate was derived from primary or secondary sources.

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A Profile in East Texas Archeology

Mark Walters

Numerous individuals have made large contributions to the archeology of East Texas who are now largely unknown to the current archeological profession and the public. One such individual was Sam Whiteside from Smith County, Texas (Figure 1). Sam Whiteside was born and raised in eastern Smith County. He married Carrie Thompson and raised, and is survived by, two children: Ann Daniels of Tyler, and Dr, James B. Whiteside of Long Island, New York. Sam Whiteside was a successful rose grower and one of the founders of the Texas Rose Research Foundation, which promoted active research in commercial rose production. Mr. Whiteside was a faithful church member and respected community leader.

During the mid-1950s Mr. Whiteside developed a keen interest in archeology. Being a studious person, he familiarized himself with current archeological techniques, gleaned from his membership in the Texas Archeological Society (TAS), and associations developed with leading Texas archeologists of that day. He formed a close relationship with E. Mott Davis of the University of Texas, who was often a guest in his home, and corresponded regularly with Dr. Davis as well as Edward B. Jelks and other leaders in Texas archeology.

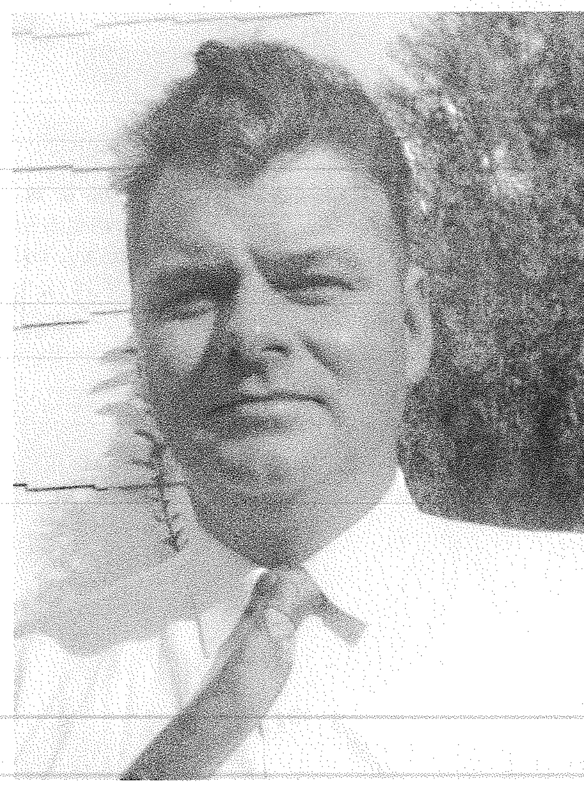

Figure 1. Sam Whiteside (photo by author).

Sam was one of the founding members of the East Texas Archeological Society (ETAS) that met in Tyler, Texas. Tyler was also the location of the 1958 TAS Annual meeting, which Sam helped organize and host.

In his early work, Sam Whiteside investigated a slate of mostly local prehistoric Caddo sites on Prairie Creek in Smith County. His surviving notes, maps, and artifacts indicate that he followed correct archeological procedures in these investigations. As his interest and experience grew Mr. Whiteside expanded his scope of work to include all of East Texas. This effort led to the discovery and consequent recording of some important Caddo sites in East Texas such as: Bryan Hardy (41SM55) (Walters et al. 2000); Boxed Springs (41UR30) (Perttula et al. 2000), a large Early Caddo mound center on the Sabine River; Jamestown (41SM54), an eight mound Caddo site in northern Smith County that was recently purchased by The Archaeological Conservancy (TAC); Redwine (41SM193), a Caddo site that was acquired by the TAC a few years ago (Walters et al. 1998), and the Dalton Mound (41UR11), located on Lake O' the Pines (Davis and Gipson 1960).

As a member of the ETAS in Tyler, Sam Whiteside also helped with the survey of numerous lake projects, including Lake O' the Pines, Lake Palestine, and Lake Athens. Unfortunately, Mr. Whiteside suffered a devastating illness at mid-life that ended his archeological career. Fortunately his family preserved his notes and collections, many which were donated to the Texas Archeological Research Laboratory at the University of Texas at Austin. As his nephew and the Region 4 Director of TAS, it has been my concern and intent to see that studies of these notes and collections are published. Texas archeology owes a great debt to such past individuals that can be partially repaid today by recognition of their efforts.

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The Field of Rocks Site

S. Alan Skinner

ABSTRACT

A total of forty-four piles of largely unshaped limestone rocks were found in two areas on the slope below a limestone bench during the course of an archeological survey of a proposed landfill site in southeastern Jack County. Despite the absence of datable artifacts, some of the rocks had a bulb of force left by a large sledge hammer and must have been broken historically. Rather than being burned rock mounds or cairn burials, the rocks were apparently gathered together in piles that were to have been taken to a lime kiln. Based on the history of Jack County, it has been concluded that the piles were gathered in the late 1800s but were never utilized due to the 1898 arrival in Jacksboro of commercially-packaged lime on the Chicago and Rock Island Railroad.

INTRODUCTION

Two "fields" containing rock piles were noted during the course of an archeological pedestrian survey of a proposed landfill site in southeastern Jack County, Texas (Figure 1). The survey (Skinner and Todd 2004) had been done to satisfy federal and state environmental requirements with regard to the development of a new Type I MSW landfill site. The "rock pile fields" were noted as anomalies since they were on the slopes below a limestone bench and were not farmable locations. The two fields contained nineteen and twenty-five rock piles in the north (Field 1) and south (Field 2) fields respectively. The rocks were good-sized and showed no evidence of having been burned. Smaller fist-sized rocks were on the disturbed surface of the adjacent slope. No prehistoric or historic artifacts were found on the exposed ground surface in the areas surrounding the rock piles and no historic structures were present. The fields were investigated more thoroughly at the request of the Texas Historical Commission reviewer who wanted a better description of the features.

As the study began, the first concern was whether the rock piles were natural or man-made features. It was concluded almost immediately that they were not natural but that left the question of their function. The absence of surface artifacts did not aid in answering this question. Central Texas is blanketed with thousands of burned rock mounds but the rock in the Jack County piles did not appear burned and the individual rocks were certainly larger in size than most burned rock. It was considered that the piles might be cairn burials such as described in west central Texas (Lintz and O'Neill 1993) or insinuated in nearby Palo Pinto County (Skinner et al. 2001), but no one has reported cairn burial fields, particularly located on steep slopes below limestone benches. It was also considered that the piles might be the result of field clearing where the rocks were piled up and then not removed, except that the slope could certainly not be farmed or even planted in grass. Besides, why would the smaller rocks in the field have been ignored? Consequently, an investigation of this apparently unique site was carried out by AR Consultants, Inc. as part of the landfill study.

Jack County is located in North Central Texas and is part of the North Central Plains region. The land consists of undulating to hilly terrain and has light-colored, loamy soils that overlie very deep reddish clayey subsoils, sandstone, and limestone. An estimated half of Jack County is included within the "Fringe" division of the Western Cross Timbers as described by Dyksterhuis (1948:Figure 1), but the landfill site is included in the sandy main belt of the area. The vegetation of the main belt of the Western Cross Timbers, is characterized by a sparse overstory of post oak (*Quercus stellatta*) and

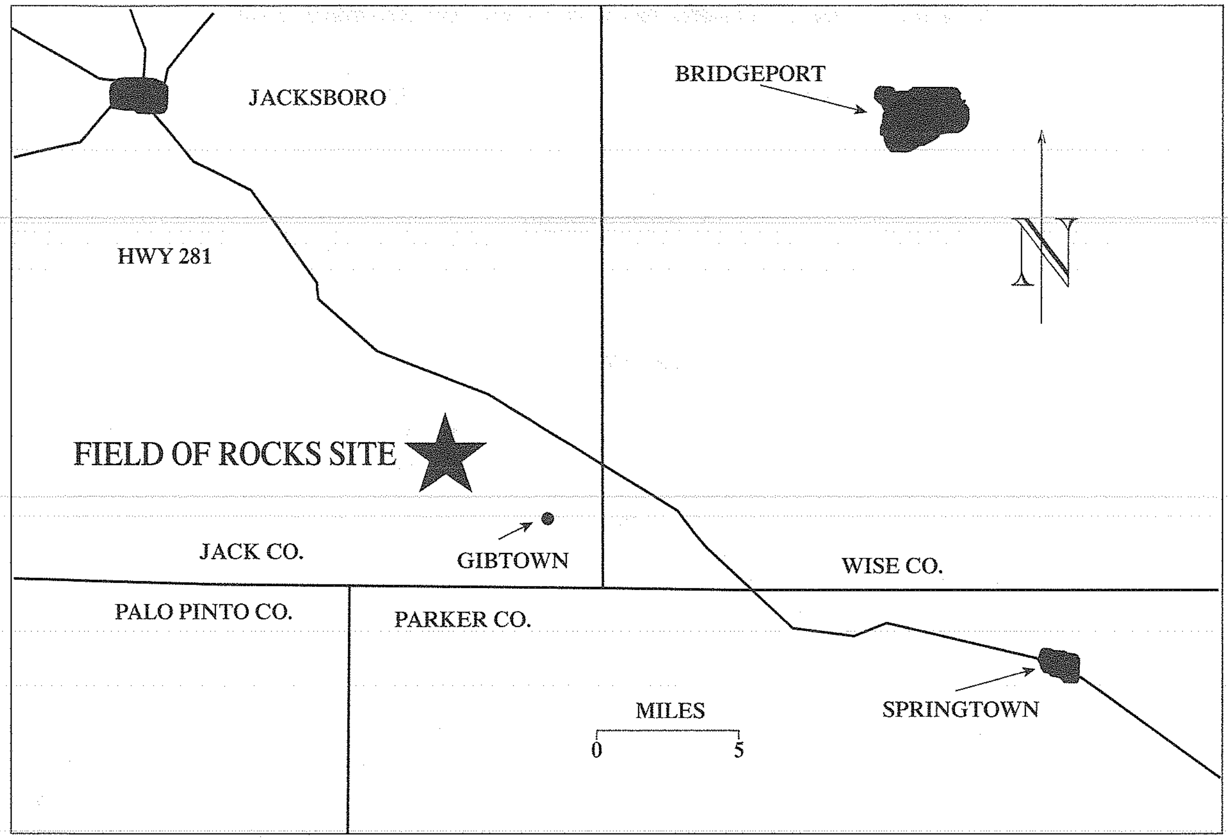

Figure 1. The location of the Field of Rocks site shown on a map of the surrounding counties in North Central Texas.

blackjack oak (*Quercus marilandica*). The remainder of this region, as mapped by Dyksterhuis, is open grassland prairie that has since been invaded by other trees, primarily mesquite and juniper (Diamond et al. 1987; Francaviglia 2000). The geology of the county is primarily Lower Cretaceous in age (Bureau of Economic Geology 1991), and it is upon these limestone formations and overlying soils that the main belt of the Western Cross Timbers is found. There are no permanent water sources in or immediately adjacent to the landfill site.

The prehistory of the general region was thoroughly reviewed by Joe Saunders in the survey report on the South Bend Reservoir (Saunders et al. 1992) and is not repeated here. Suffice it to say that the North-Central Texas region, and more specifically the upper West Fork of the Trinity River Watershed, has been continuously inhabited by Native Americans since as early as 7,000 B.C. and probably even earlier based on the finding of older dart points. Prehistoric sites have been described at numerous locations within the river and creek valleys as well as on the bluffs that overlook these valleys. Sites include deeply buried and vertically stratified deposits such as the Harrell site in Young County, as well as mounds of burned rock, midden deposits that contain an abundance of freshwater mussels, lithic workshops, and rock overhangs that were inhabited. There appears to have been a heavy occupation during the Late Archaic period, but occupation was continuous by the prehistoric residents who apparently practiced a seasonal round supported by a hunting and gathering economy. It appears likely that about eight hundred years ago the local economy shifted to a more "Plains"-oriented subsistence pattern that is reflected by an increase in Plains-adapted animals, particularly the buffalo, and in a tool kit that included specialized scrapers, arrow points, and the manufacture of pottery.

Evidence of historic Native American occupation at the South Bend Reservoir is absent even though 541 prehistoric sites and 168 historic archaeological sites were recorded during the survey of more than 37,000 acres. This pattern has been reported through much of North-Central Texas (Skinner 1988), even though historic documents refer to the presence of historic Native American groups in the region during the 1700s and 1800s.

Historical archaeology in the region has focused on residential sites and on Fort Richardson. Jack County was first settled in 1856 when the first settlement, Keechi, was established. The county was established on August 27, 1856 and was named for William H. and Patrick C. Jack who participated in the Texas Revolution, a name that has not been used for any other county. The Butterfield Overland Mail crossed Jack County. Construction began on Fort Richardson by the US Army in 1867 near present day Jacksboro and was finished by 1869.

Most of the archeological investigations in Jack County have been in Fort Richardson State Historic Park (41JA2) and include research done by Black and Kegley (1998), Dickson and Westbury (1976), Ippolito (1977), Lorrain (1972, 1973), Robertson and Ing (1974) and Westbury (1976). However, a synthesis of the National Grasslands prepared by the Archaeology Research Program at Southern Methodist University (Jurney et al. 1989) for Wise County has provided insight to where potential sites might be expected in Jack County.

Only one site and one survey were found listed on the Texas Archeological Sites Atlas (2004) for the Gibtown, Texas 7.5' USGS map. The site, 41JA17, consists of a nineteenth century dog run cabin with a well, cistern, a collapsed cellar and possibly a privy. The site is located near Boonesville which is east of the landfill tract area and almost at the edge of that map. The site was discovered during an archaeological survey for the proposed Jack County Power Plant. SWCA Environmental Consultants (Barile 2000) conducted an archaeological survey of the Wise County Power Project that covered approximately 270 acres east of the study area and north of SH 199 where Wise, Jack and Parker Counties join but like many other projects in this area, no archeological sites were discovered.

SITE DESCRIPTION

Two areas, termed "fields" below, are the loci of piles of unshaped limestone rock that were found on cleared slopes (Figure 2) in the southeastern part of the landfill tract. The two fields have been designated as archeological site 41JA18 at the Texas Archeological Research Laboratory. As shown on the site map, the rock piles occur in two separate areas that are situated on the slope below and adjacent to a level limestone bench. The piles are oval to circular in shape and range from about one meter to almost five meters in long axis and up to a meter in height. The limestone stratum that makes the bench is generally less than a meter thick and is underlain by various colored clays to a depth of at least six meters. No other limestone layers are exposed on the clay slope that averages an approximately 45° incline. Scattered on the slope are large limestone slabs and boulders along with the limestone piles. The surface of each field has the appearance of having been disturbed and small pieces of limestone remain scattered on the surface. In addition, larger slabs and boulders are somewhat embedded into the surface. It is apparent that the limestone stratum once extended over the slope area. When the less resistant underlying clay was eroded from underneath the limestone, it broke and fell onto the eroding surface. It is reasonable to expect that the limestone broke along natural fracture lines into large and small pieces that over time were scattered on the slope.

Field 1 consists of nineteen rock piles that occur over an area that is roughly 160 meters long and extends from almost the edge of the bench to the foot of the slope, a horizontal distance of 15-20 meters. In fact, one pile is located away from the toe of the slope as shown on Figure 2. An itemization of the piles is presented in Table 1 below. The entire slope adjacent to the piles (Figure 3) has the disturbed appearance mentioned above, and in fact this same disturbed appearance extends a distance of 25 meters to the north of the northern-most pile on the slope. Based on this condition, it was concluded that rock piles were once in this area and were removed. The entire surface of Field 1 was carefully inspected in order to locate datable artifacts but nothing was found.

The northern half of Pile 1 in Field 1 was taken apart for the purpose of determining its construction and to explore for datable artifacts or subsurface features (Figures 4 and 5). A total of 164 rocks were removed from the pile and many of these showed that they had been struck with a heavy hammer and the rock been split, leaving a bulb of force on the ventral surface. The rocks ranged in size from 35x30x18 to 18x23x11 cm and their weight was from 14-40 pounds [6,350-17,236 gm]. None of the rocks were too large for one person to move. None of the rocks appeared to have been broken with a hammer after being placed in the pile and there was no matrix other than rodent nests among the rocks. Charcoal, ash, soil, and bone were absent inside the pile. The rocks forming the pile

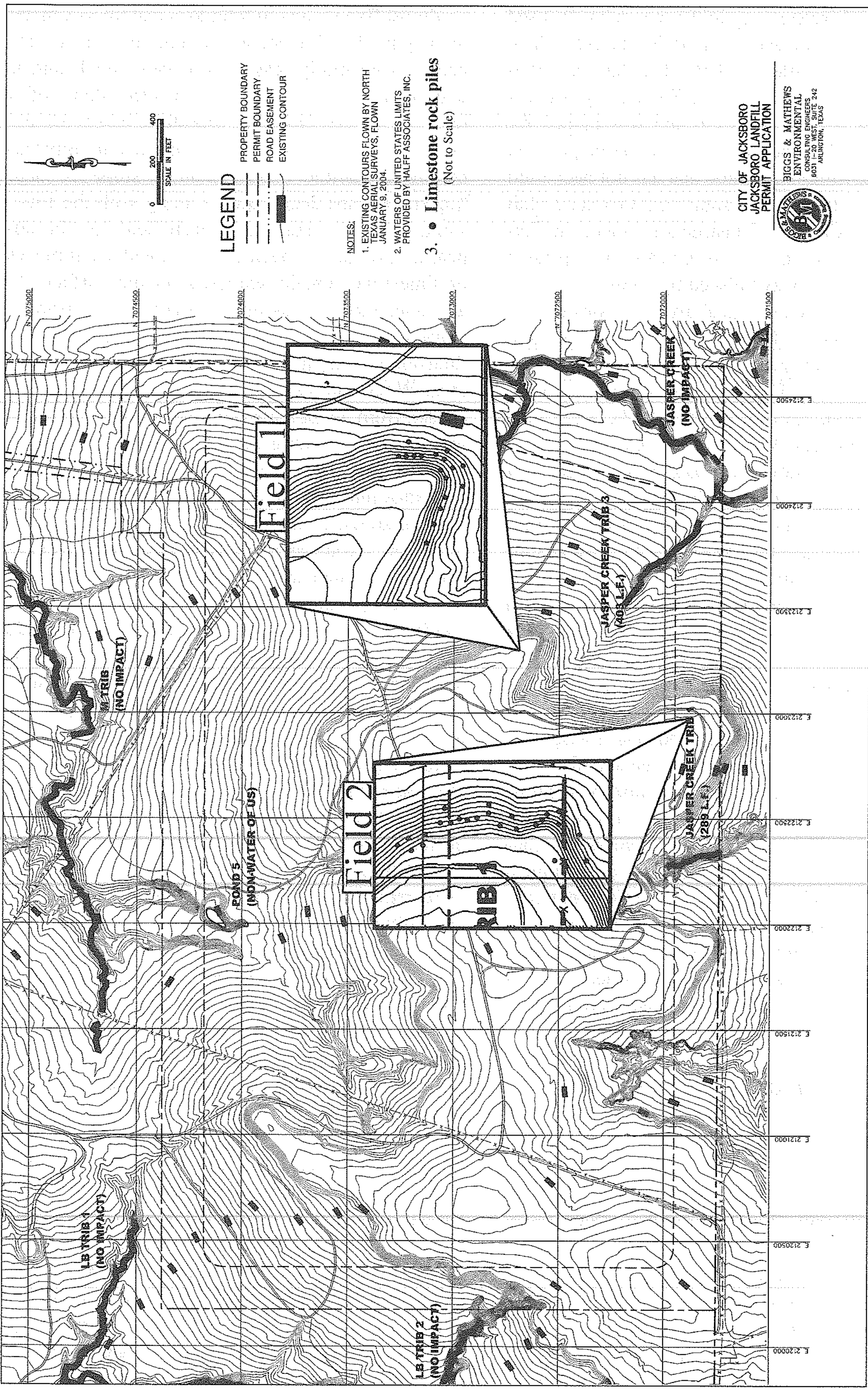

Figure 2. Stone piles in Fields 1 and 2 at the Field of Rocks site.

Figure 3. Piles 2-4 shown on the slope near the north end of Field 1. View is to the east.

had been placed on the ground surface but excavation of a test pit below the ground surface failed to find any evidence of burning or fire-cracked rock or any historic or prehistoric artifacts. A nine cm thick layer of very dark grayish brown (10YR3/2) rocky clay rested on light brownish gray (10YR6/3) mottled clay which is in place and is part of the Glen Rose Formation.

Field 2 consists of twenty-five rock piles that occur over an area that is roughly 160 meters long and extends from almost the edge of the bench to the foot of the slope. One pile is located on the surface of the limestone bench near the southern end of the field and two are at the bench edge near the northern limit of the field. An itemization of the piles is presented in Table 2 below. The entire slope surrounding the piles has been disturbed but no evidence was found that limestone had been harvested and piled on adjacent parts of the slope as noted in Field 1 so apparently none of the rock piles had been removed. The entire surface of Field 2 was carefully inspected but no datable artifacts were found. The slope between Fields 1 and 2 was inspected and although some large embedded slabs are present, the surface is undisturbed and there are no isolated rock piles.

Pile 1 in Field 2 was totally dismantled. A total of 44 rocks were removed from the pile and some of them had been struck with a heavy hammer before being placed in the pile. The hammering left a bulb of force but no two pieces were obviously refittable. The rocks ranged in size from 30-50 pounds. None of the rocks were too large for one person to have moved. None of the rocks appeared to have been broken in place with a hammer and there was no matrix other than rodent nests between the rocks. Charcoal, ash, or bone were not found in the soil. The rocks in the pile had been placed on the ground surface and excavation of a test pit failed to find any evidence of burning or to recover any artifacts. The upper 21 cm of the fill in the test pit below the ground surface was a very dark grayish brown mottled clay that graded into 6 cm of grayish brown (10YR5/2) clay mixed with limestone.

The rock piles present intra-site features that were no doubt created during the historic past based on the presence of the bulbs of force which must have been administered by a sledge hammer. We

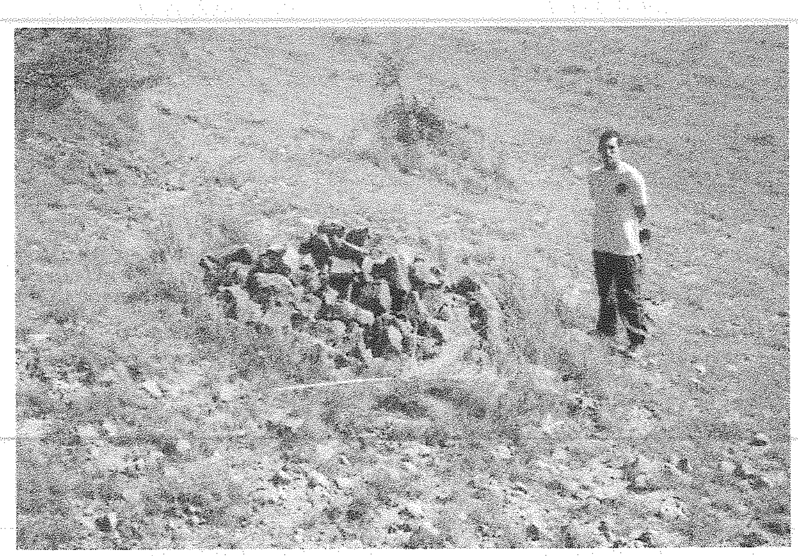

Figure 4. Pile 1 in Field 1 with Tom Jennings serving as a scale for the size of the pile and the angle of the slope. Note the small rocks in the disturbed foreground.

conducted an experiment using an eight-pound long handled sledge and were able to create a smaller but similarly struck stone. However, most of the stones in the piles do not have force bulbs and must have been grubbed from the slope and piled in convenient locations. The grubbing, or harvesting, was probably done with a pick or the disturbed appearance would have not been created in each of the fields. Likewise, it must not have been considered efficient to have collected the smaller fist-sized rocks that remain on the disturbed surface. Furthermore, it was apparently not efficient to break pieces off of the larger slabs and boulders that remain imbedded in or on the slope.

Figure 5. View of Pile 1 in Field 1 showing the north half removed and arranged in piles to ten to the north. View is to the west.

DISCUSSION

The purpose of the rock piles is not obviously clear. The rocks are of sufficient mass to have been used in the construction of a rock wall but the individual rocks do not present a tabular appearance that could have been effectively dry laid or mortared. In the course of this investigation, the field team inspected late 1800s farm rock walls at Fort Richardson and building walls in downtown Jacksboro. The rocks in the piles at site 41JA18 are

Table 1. Field 1 limestone pile metric dimensions presented N/SxE/Wxheight.

1. 3.1x3.0x1.0	8. 2.0x1.5x0.5	14. 1.5x2.0x0.5
2. 2.4x1.4x0.5	9. 2.6x2.2x1.0	15. 1.0x1.0x0.5
3. 2.9x4.8x1.0	10. 2.4x2.3x1.0	16. 2.3x1.4x0.5
4. 2.5x3.1x0.75	11. 1.0x1.0x0.25	17. 3.1x1.5x0.5
5. 1.2x3.1x0.5	12. 1.8x2.6x0.5	18. 4.5x2.6x1.0
6. 1.4x1.6x0.5	13. 2.0x2.6x0.5	19. 1.2x1.5x0.5
7. 1.5x1.2x0.25		

Table 2. Field 2 limestone pile metric dimensions presented N/SxE/Wxheight.

1. 1.6x1.4x0.3	10. 4.1x2.3x1.0	18. 2.7x3.0x0.75
2. 2.8x2.9x1.0	11. 3.1x3.9x0.75	19. 1.5x2.0x0.5
3. 1.6x1.0x0.25	12. 2.5x2.8x0.75	20. 2.2x2.2x0.75
4. 2.0x2.2x0.5	13. 1.4x3.0x0.5	21. 1.3x1.4x0.5
5. 1.7x1.7x0.5	14. 1.9x4.3x0.5	22. 2.4x1.2x1.0
6. 2.3x2.3x0.75	15. 2.2x1.0x0.5	23. 1.6x2.2x0.5
7. 1.7x2.6x0.75	16. 3.0x2.8x0.75	24. 1.6x1.3x0.5
8. 1.7x2.6x0.75	17. 3.1x3.5x0.5	25. 1.5x1.6x0.5
9. 1.5x2.0x0.5		

decidedly more rounded, more irregularly shaped, and generally larger than those at the fort or in town.

The rocks were relatively easy to harvest and were of a good quality limestone that had been exposed on the surface for some time. These characteristics match those described as being an ideal lime mortar source by Ralph Smith (1976). A search of information about the lime kiln process found little information about harvesting limestone before burning it in a kiln. Most authors, including Smith (1976), Jones (2004), Pike (1980), and others indicate that three resources were necessary in the lime production process. First was a good quality limestone, then plenty of firewood, and finally water to slake the lime and ash residue after burning. Smith indicates that the oldest and hardest limestone was preferred, particularly weather-exposed pieces obtained from hilltops. While limestone and firewood are readily available at the Field of Rocks site, water is rarely available.

No evidence of a lime kiln was found on the surrounding surface or in the banks of the nearby dry tributaries of Beans Creek or in the creek bank. In fact, no kilns have been recorded in Jack County, although it is likely that one or more was used at Fort Richardson (personal communication with Shirley Sewell at Fort Richardson, July 2004). In this rural setting, it was expected that a creek bank lime kiln such the clay-lined kiln (Fox 1983:297) at site 41SV53 at Glen Rose (Skinner and Humphreys 1973:15, Figure 11b) or an above ground lime kiln such as reported at O.H. Ivie Reservoir (O'Neill et al. 1993:411-414) and reconstructed in Shackelford County (Skinner 2003:13) might be found. Certainly, no evidence of a commercial lime kiln such as the Denton Kilns in Bexar County (Fox n.d.) was found.

We did, however, find that an old road extends to the southeast in the direction of Gibtown. Therefore, it was concluded that the limestone piles in Fields 1 and 2 represent a commercial effort to collect good quality limestone for conversion into lime mortar. In fact, it would appear based on the disturbed but pile-less part of Field 1 which is close to the Gibtown road, that some of the rock was hauled off to a lime kiln closer to Gibtown where both water and firewood were available. Based on the use of a sledge hammer and the history of Gibtown (Minor 2004), it is postulated that the piles were created some time in the 1890s. This decade has been selected because in the late 1800s, Gibtown was the second largest town in Jack County. At that time, three churches, several stores, a school, hotel, cotton gin, and steam grist mill were present. While it is possible that the nearby community of Haley Springs would have needed lime or cement to build parts of the cotton gin, saw mill, and corn mill (Brune 1981:251), their earlier creation in the 1870s and absence of a large community probably did not necessitate a major commercial lime manufacturing operation. Likewise, lime mortar was commonly used to mortar hewn stone chimneys (Jordan 1978:99). The number of rock piles is evidence of major harvesting which would not have been needed for the scattered residences in the area, particularly when metal stoves were replacing massive open faced fireplaces. This all changed after the Chicago and Rock Island Railroad arrived in Jacksboro in 1898. Subsequently, Gibtown was largely abandoned by businesses and residents. It is likely that the need for mortar in Gibtown would have diminished. Furthermore, the railroad and early twentieth century industrial improvements resulted in the mass production of lime, cement and the ultimate disappearance of lime production as a cottage industry (Jones 2004:1).

While it is concluded that this was a major limestone gathering operation in Jack County, the find raises one question that has several minor implications. First and foremost, why have similar sites not been recorded elsewhere in the Texas hill country if making lime was both a cottage industry and a larger commercial industry in the second half of the nineteenth century? Is it because the cottage industry was done one firing at a time without long-range plans for the next firing? Certainly commercial lime kilns had to stockpile rock and if so, is the Field of Rocks site the only instance where rock was harvested and never used? Archeologists working in the region need to consider these issues.

ACKNOWLEDGEMENTS

Many people responded to calls and e-mails about the rock piles at the Field of Rocks site. In Jacksboro, the NRCS District Conservationist Tony Dean and at Fort Richardson, Marjorie Sewell, both willingly shared with us their familiarity with Jack County history but were unaware of any lime kilns or rock fields in the county. Anne Fox in San Antonio and Elton Prewitt in Austin shared their experiences with lime kiln sites. Information about the landfill site was provided by Russell Marusak of Halff Associates, Inc. in Dallas. Jeffrey Jones in

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Highlighting the Society

The Society offers its members and the public many avenues for participating in the archeology of Texas. This *Bulletin*, the quarterly Newsletter, public lectures at the annual meeting, the annual meeting, field schools and more. *Highlighting* is devoted to showcasing one of those exciting avenues to ensure that all members know of, and can take advantage of, other aspects of the Society about which they may have had limited knowledge. The Society also welcomes non-members to learn about these important ways in which the Society contributes to our understanding of the archeology of Texas. Readers who are non-members and wish to learn more about the Society or to become members can go to the back page of this *Bulletin* or go to the Society's website at *www.txarch.org*.

Enhancing Our Skills

The TAS Archeology Academy

Pam Wheat, Harry Shafer, Sandy Rogers, and Karen Fustes

The Texas Archeological Society (TAS) sponsors a series of sessions called the *Texas Archeology Academy* each spring to enhance the archeological skills of its members and to introduce archeological techniques to newcomers. The *Academy* is new to TAS, but response to the 2003-2004 sessions was overwhelming in the numbers who attended and in their reaction to the presentations. The sessions are workshops held on weekends at institutions across the state. Each session covers in depth just one topic, and every year several topics are offered at different locations.

The *Academy* was developed in response to members' requests for more training. Members' requests went to the Strategic Planning committee that met in 2002. At that time TAS sponsored only two major events each year: the annual meeting and the field school. While these are well-attended and successful, if the time or place for these was not convenient, a member might not be actively engaged with TAS during the year. Therefore, the Strategic Planning Committee suggested regional workshops that would offer introductory and advanced topics on Texas archeology. An advisory committee met in August 2002, to plan the workshops with Dr. Harry Shafer who took the lead to develop the curriculum. Members of the committee were Margaret Howard, Jim Blanton, Nick Morgan, Clarke Wernecke, Clell Bond, Jimmy Smith, Jonelle Miller, Skip Kennedy, Karen Fustes, Mike

Figure 1. Shafer teaching Academy class in Houston (Photo courtesy of Phil Stranahan).

Durack, Phil Stranahan, Harry Shafer and Pam Wheat. To underscore the enthusiasm that surrounded the workshops from inception, these volunteers together contributed 117 hours and drove 1,990 miles to attend the meeting and develop the program initiative.

As an outcome of the meeting, the committee set the goal for the *Texas Archeology Academy*: walk participants through the logistics and rationale of an archeological investigation—what archeologists do, how it is done, and why it is done. We wanted to provide an opportunity for hands-on training in the class and field and to establish a network of people with strong archeological know-how. Apparently, we succeeded. One participant summed up the course: "We are learning the whole before the hole." Texas Archeology 101, the basic course, provides the starting point for this understanding (Figure 1).

Since the basic source of information for archeology is the material remains of past cultures, we selected two material classes—Ceramics and Lithics—for the second and third topics. The idea is to take the subject matter beyond artifact types and names. Each class shows how the study of material remains is accomplished and how those remains can reveal much about a culture and its people.

Since 2003, approximately 525 people have attended TAS's *Academy*. Because of their success, the TAS will continue this enlightening and informative program in 2005. For facts and figures, 85 people joined the Society in 2003 in order to attend the *Academy*. In 2004, TAS gained 63 new members at *Academy* sessions. Everything began in 2003 with Archeology 101 sessions held in Fort Worth, Houston, and San Antonio. In 2004, the program was expanded to include the Ceramics session. Six sessions were held in 2004 with Archeology 101 in San Angelo, El Paso, and Corpus Christi, and the Ceramics sessions were held at Huntsville, San Antonio, and Dallas. In 2005, two Lithics sessions will be added with Archeology 101 and Ceramics to continue in various locations.

The information for each *Academy* is provided through PowerPoint presentations (Figure 2) and each participant is given a manual contained on a CD. But, the sessions are more than just lectures. They are hands-on sessions with artifacts. Participants listen and discuss issues with professional as well as seasoned and knowledgeable avocational archeologists. In some cases, field studies are included in the curriculum. Below, we summarize each of the various topics.

Figure 2. PowerPoint presentations with reenactors at Archeology 101 session (Photo courtesy of Phil Stranahan).

ARCHEOLOGY 101: Recognizing and Documenting Archeological Sites

In Archeology 101, the full scope of an archeological investigation is presented over a three-day period. Presentations are broad rather than insular. Participants are provided with the tools necessary to identify, properly record, and assess an archeological site through five presentations (Figure 3). Hands-on exercises and demonstrations accompany the visual presentations. Course instruction includes basic knowledge needed to identify archeological sites in various regions across the state, how to properly survey a site and record the information needed to complete a standard TexSite survey form, how to perform a test excavation, if necessary, including establishing methods of control (horizontal and vertical), sampling,

Figure 3. Shafer teaches Academy in Houston (Photo courtesy of Phil Stranahan).

preserving provenience of artifacts recovered, collecting samples, laboratory processing and cataloguing specimens, analysis, interpretation, and reporting.

Archeology 101 also includes a day in the field with an archeologist. The steps in recording and testing a site that are discussed in class presentations are demonstrated then executed by participants on an archeological site. The archeologist takes the data collected that day and prepares a report that is given to each participant. In other words, we practice what we preach: it is important to not just identify the site, but to also systematically record it. Moreover, if it is important enough to dig, then we must analyze and report what was recovered.

Figure 4. Byers instructing on site recording methods during field day for Archeology 101 session (Photo courtesy of Bryan Jameson).

The goals of Archeology 101, then, are to illustrate the methods for recording sites and to impress upon participants the need to record sites (Figure 4). A better understanding of the past and better management of our archeological resources comes from knowing the locations of sites across the landscape and through time. The first step in managing archeological resources on private land is to know that the site is there, then to learn more about that site. But, one site never tells the whole story. It is the cumulative knowledge of the location of archeological sites in time and space that allow archeologists and planners to piece together the larger puzzle. Therefore, the site data must be reported to the data repository for the state—the Texas Archeological Research Laboratory (TARL) at the University of Texas at Austin. The manual for this session was written by Shafer and includes: Introduction to Archeological Reconnaissance; Site Survey; Testing; Laboratory Analysis; and, Writing the Report.

CERAMICS: The Stories Found in Pottery

The purpose of the *Ceramics* session is to provide a comprehensive background and understanding of prehistoric and historic ceramics from archeological sites (Figure 5). Ceramics constitute one of the largest and most informative material classes of artifacts recovered archeologically. In this session, two

Figure 5. Ceramics class in Dallas (Photo courtesy of Pam Wheat).

days are devoted to exploring the kinds of information that ceramics reveal. The CDs for the session, produced by Phil Stranahan, will enable participants to print out the presentation material with color images.

A comprehensive study of ceramics incorporates many approaches, as indicated by the topics addressed in this workshop. Topics include the properties of clay, definition and origins of pottery, how pottery was made (pinch pots, coil and scrape, paddle and anvil, wheel, and molds), how and why pottery was embellished, how pottery can be sorted, classified, and analyzed. We also discuss what we can learn from pottery in terms of chronology, dating, technology, trade and exchange, subsistence, and social and political identities.

Much of a culture is reflected and mapped in its ceramics. The roles ceramics play are many and often complex, and are quite different when used among hunters and gatherers (coastal and central Texas groups), formative cultures (Caddo and Pueblo groups), and more complex cultures (Maya and historic settlers). Ceramics occur in all areas of the state and their origins are many. A side bar to the study of ceramics includes an overview of the origins of prehistoric Texas pottery. Hands-on exercises and pottery making demonstrations are incorporated into the Ceramics session agenda.

LITHICS: Reading Stone Artifacts

The Lithics session provides each participant with the background and hands-on experience to recognize stone artifacts and to interpret basic information. The course includes a brief overview of stone tools, why stone artifacts are important, how they are produced and used, and how stone tools contribute to the archeological record.

This session begins with a review of rocks and how they were used. Stone tools were fashioned by two basic processes: chipping and grinding. Chipped stone tools are made of siliceous rocks (flint, chert, and obsidian). Flintknapping techniques leave diagnostic attributes on the stones struck and resulting flakes (Figure 6). The process of how siliceous stones behave under loaded stress (when hit with a hammer), kinds of stresses applied (hammers, punches, or pressure) and how fractures are initiated are all explained in the Lithics session. Hands-on examples show how to recognize these processes. Different approaches can yield a functional chipped stone tool. How the force is applied depends on how one was taught. Ground stone artifacts are formed either by being shaped through use, or by shaping a desired form. These processes also are described and presented.

Attendees participate in exercises designed to record information about stone artifacts. These exercises include sorting, classifying, measuring, and recording as part of basic stone tool analysis. Advanced analysis includes understanding the process of making a stone tool from the cobble to finished product (called linear reduction models), functional uses of stone tools (such as cutting, scraping, pounding, and piercing), formation of use-wear, recognizing breakage patterns, and tracing use-life of stone tools (i.e., how form and size change).

Figure 6. Binetti demonstrates flintknapping (Photo courtesy of Pam Wheat).

The final segment of the Lithics session focuses on interpreting stone artifacts and patterns in the archeological record. At this point, stone artifacts are put into the hands of participants—with attention-getting examples! Discussion includes technological style and identifying different flintknapping traditions, recognizing trade and exchange, caches and what they may mean, the difference between expedient, formal, and prestige artifacts. Since stone tool use often differed among hunters and gatherers, formative, and complex societies due to resource availability and mobility, examples show some of these differences and how they may be understood. This workshop also includes flintknapping demonstrations with an emphasis not so much on how *points* are made, but rather on understanding how *the archeological record is formed.*

NOW THE EXPERIENCE

The first session of the Texas Archeology Academy—spring training in archeological reconnaissance—began with an overflow crowd: 51 paying participants and 21 volunteers! We were thrilled! An analysis of the participants list showed 26 members and 25 new members. This session was held in Houston at the University of St. Thomas in February 2003. Shafer was the lead instructor using the archeology of the Gulf Coast to illustrate method and theory. Frank Binetti demonstrated flint knapping during the lunch hour on the first day of class (see Figure 6). As a side benefit to participants, the Brazoria Militia related their living history program during the field day at San Felipe de Austin!

Figure 7. Historic centennial marker and log cabin at San Felipe State Park (Photo courtesy of Pam Wheat).

Marianne Marek, principal investigator, and Bob Shelby, TAS director for Region 5 led the field day. Archeological investigations included test units on private land of the township of San Felipe (Figure 7). The objective was to determine the extent of habitation. Each crew tested a city block then took

Figure 8. Shafer identifies pottery for student (Photo courtesy of Connie Moberly).

their materials into a lab where they processed their artifacts and completed a field sort. A report of fieldwork by Marianne is published on the internet at *www.txarch.org*.

In January 2004, 49 people attended the first Ceramics session at the Dallas Museum of Natural History. Co-sponsors were the Tarrant County Archeological Society, the Dallas Archeological Society, and the Dallas Museum of Natural History. Over a two-day period, Shafer introduced participants to all aspects of ceramics including the definition and origins of pottery, the technology of making pottery, the decoration and analysis of pottery and the interpretation of pottery. As he explained, there is much that can be learned from ceramics in terms of chronology, dating, technology, subsistence, social identity and patterns. But, most popular with participants were the hands-on segments after the presentations. These allowed participants to examine and classify pottery fragments. Each person was given a loupe for close-up study of the sherds—a plus for the participants. Dr. Randy Moir, professor of anthropology at Southern Methodist University, presented the segment on historic ceramics. After the sessions, participants enjoyed viewing the exhibits at the Dallas Museum of Natural History.

Just as each sherd or ceramic vessel is unique to its creator, the Ceramics session also exhibit uniqueness. In Huntsville in February 2004, the second Ceramics session welcomed forty-six people. Co-hosted by the Sam Houston Memorial Museum (SHSU), Houston Archeological Society, Brazosport Archeological Society, Fort Bend Archeological Society and the Deep East Texas Archeological Society, the session was held in the Walker Education Building on the grounds of the SHSU (Figure 8). Dr. Shafer's presentation was filled with detailed information, eliciting many questions from the audience. Information presented was similar to that presented in Dallas, but it was tailored to talk about ceramic information for this region of the state.

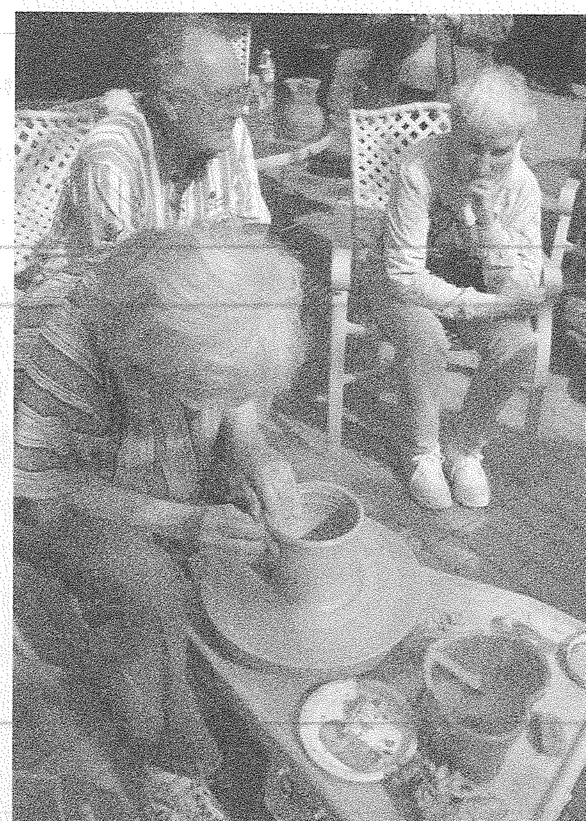

Figure 9. Norma Elvin demonstrating use of kick wheel pottery manufacture in San Antonio (Photo courtesy of Phil Stranahan).

In Huntsville, two local potters shared their expertise—another plus for the participants. Norma Elvin demonstrated the use of a kick wheel and fashioned several ceramic pieces while answering questions from the audience (Figure 9). Grady Mangum guided the novices in fashioning pinch pots. He provided samples of the local clay and the various tempers used to create vessels. In addition, he mixed several types of slips that were used by the student potters to paint their creations on Sunday. On Saturday, Mike Sproat, TAS volunteer and historical interpreter at the Sam Houston Museum, provided a guided tour of the museum grounds. Another TAS volunteer, Connie Moberley, treated visitors with a digital photo display in the exhibit hall entitled "Glimpses of Russia."

On the final day of the academy, the historic ceramic segment was presented by Sandra Pollan of the Brazosport Archeological Society. Sandra introduced a wide range of historical period ceramics that archeologists might recover in Texas. Information regarding earthenware, stoneware and porcelain was presented along with a reference list to be used for further research. She also provided a hands-on activity after her presentation using the many historic sherds that have been excavated from a Brazoria County site. As the grouped participants sorted sherds, Sandra Pollan, Johnney Pollan and Harry Shafer assisted the groups (Figure 10). Based on these instructions, participants found themselves able to sort, classify and sometimes identify the sherds by means of makers' marks.

Figure 10. Sorting sherds at Huntsville Academy (Photo courtesy of Connie Moberly).

In Huntsville, there were over 15 exhibits for attendees to view and discuss, many germane to the overall course. The museum has an exhibit of Mexican ceramics from the Temple Houston Collection and from the Kirbee Kiln, a pre-civil war pottery kiln in Montgomery County (Malone et al. 1979). One popular exhibit was the pottery jig saw puzzles that challenged everyone to assemble 12" square pots from photo "sherds" with magnetic backing. TAS members Betty Elvin, Sandy Rogers, Frank Binetti, Kay Poling, Beth Aucoin, Shanna Guillote, Don Keyes and the local archeological societies also provided displays. A special activity on Sunday was the tour of the George Russell Collection located in Huntsville. Mr. Russell, a collector of early Texas furniture as well as ceramics, has been collecting for many years. He owns part of Georgeanna Greer's collection as well as examples of Leopard's, Wilson's and Edgefield, all South Carolina pieces.

SAMPLE THE FUN AND THE LEARNING:
Research Reports Generated by Texas Archeology 101—Field Days

Each Archeology 101 session included a field day for hands-on training in techniques learned in the classroom. The following is a synopsis of field days conducted in 2003. Reports for 2004 field days will be posted on the TAS web site as available. Complete narrative reports for all Archeology 101 field days are posted on the TAS web site at *www.txarch.org*.

2003 San Felipe de Austin—Marianne Marek, Principal Investigator

The San Felipe de Austin (41AU2) State Archeological Landmark (SAL) is the 148-acre town site that served as the capital and headquarters for the first Anglo colony in Texas. Empresario Stephen F. Austin established San Felipe in 1824 and the town site flourished until 1836 when the Texans burned it to the ground to prevent its capture by Mexican forces. After the war, many of the town's residents never returned and San Felipe declined, never regaining the prosperity and influence that it held before the war. Because many residents never returned, and the area has subsequently mainly been used for pasture, a large portion of 41AU2 remains intact.

TAS's Academy session conducted investigations at site 41AU2 on March 1, 2003, after classes in Houston. A large amount of historical research had been previously conducted to identify the colonial landowners, and possible locations of homes and business within the town site. That historical research was utilized to guide and help interpret the field investigations. The Academy session conducted shovel test investigations on sixteen lots within the town site. These investigations identified six areas of colonial occupation, where according to the historic records, specific colonial homes and businesses once stood.

San Felipe de Austin has been determined eligible for listing on the National Register of Historic Places. The National Register nomination is just one step towards the larger goal of preserving this important historic site and promoting heritage tourism for the economic development of San Felipe and Austin County as a whole. Public lectures and tours of the excavations are given to educate and interest the current citizens of San Felipe and others on the important history of the 41AU2 town site.

2003 Hutcheson Ranch—Johnny A. Byers, Principal Investigator

Archeological investigations were conducted at the Hutcheson Ranch in northeastern Parker County, Texas, by Texas Archeology 101 after class sessions in Fort Worth. Fieldwork was performed on May 10, 2003, with 50 members of the Academy workshop assisted by_members of Tarrant County Archeology Society. Methods and forms from the session's handbook were utilized. Eight Crew Chiefs instructed the enthusiastic participants in the discovery, mapping, and recording of three archeological sites. These crews were supported by the additional members who staffed the lab, photographed the work, instructed in soils, and generally kept the fieldwork running smoothly.

This effort resulted in the recording of one historic turn-of-the-century homestead (41PR101), a Late Archaic lithic scatter in floodplain deposits (41PR103), and a possible Late Archaic upland site associated with a large fire-cracked-rock scatter (41PR102). The full report defines the study area, examines the homestead site in terms of regional history, and reviews the prehistoric sites in the context of Upper Trinity River regional archeology. Again, participants did real work, recording sites with appropriate forms and learning how archeology is done, step by step.

2003 Seco Creek—Jason Weston, Principal Investigator

The one-day field session associated with the Texas Archeology 101 course for San Antonio was held at Seco Creek at the invitation of Tom and Lynda Hester. The sites used for the March 22, 2003, field day are clustered within approximately five acres of land on the east bank of the Seco Creek in Medina County, Texas. The Seco Creek Area contains a number of historic and prehistoric sites. Work during the field day focused on four of these sites: 41ME88, 41ME89, 41ME91 and 41ME92 (Figure 11). This area of Seco Creek is surrounded by high hills but the sites are on a flat, open area of land, a terrace just high enough to have avoided inundation by the floods of 2002. Passing between Seco Creek and the sites is a small, narrow gravel road providing the access for local residents to the main highways. The current owners make use of an extensively updated house that dates from the 1800's and a post-Civil War ranch house now used as a guest cabin (41ME91).

The Seco Creek area was chosen as the best location to expose participants to site mapping, note taking, surface collecting, shovel testing, artifact cataloging and washing at a variety of site types. The density of artifacts provided clear, in-the-field examples of a wide range of cultural materials and how they are recovered, recorded and cataloged. The field day essentially moved participants though the entire field process from site locating and mapping, to noting surface materials, shovel testing and filling out the proper paperwork to cleaning and cataloging in the lab.

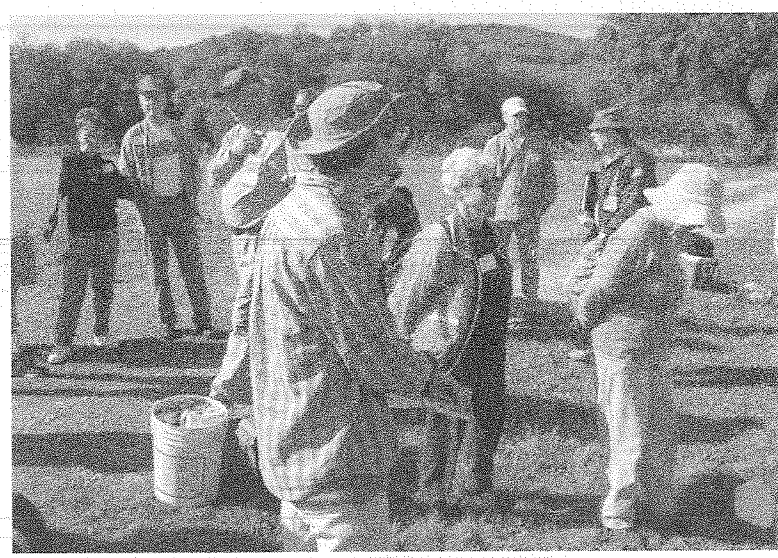

Figure 11. Survey procedures at Seco Creek field day (Photo courtesy of participant).

Other Reports

In 2004, equally exciting fieldwork was conducted in other portions of the state: at Fort Chadbourne (Doug Boyd, PI), Firecracker Pueblo (David Kirkpatrick, PI), and the Nueces River (Robert Drolet, PI). Reports on those sites were sent to Academy participants, filed at the Texas Archeological Research Laboratory, and posted on the TAS web site at *www.txarch.org*.

SO, DID WE SUCCEED?

At the conclusion of each *Academy* session, participants completed a questionnaire that included twenty questions, ranging from logistics to content. These responses were used to adjust arrangements and presentations at the sessions that followed. A summary of the results follows, and the results show that both the Society and the participants benefited.

Texas Archeology 101 Results

Table 1 provides statistics on the age and gender of participants. In general, participants ranged in age from 20-60, and gender was evenly distributed between men and women, suggesting that archeology

Table 1. Age Ranges and Gender of Participants in *Texas Archeology 101 Academies* (by percent).

Location	Percent 20-40 Years old	Percent 41-60 Years old	Percent 61-70 Years old	Percent + 70 Years old	Percent Male
San Angelo	23	44	31	2	50
El Paso	6	41	41	12	53
Corpus Christi	42	29	29	–	42

appeals to both genders equally. But, other information is equally informative. In San Angelo, 97 percent considered the content "very interesting," while three percent said it was "not enough." We interpret "not enough" as evidence that while the workshop was good, participants wanted even more. These sentiments were echoed by the participants in El Paso where *all* participants rated the content "very interesting," and in Corpus where 81 percent said the content was "very interesting," 15 percent said it was "adequate," and 3 percent said it was "not enough."

Table 2 illustrates the ratings of the presentations in the three venues. These ratings show that most participants found the presentations to be well above average, with 70 percent or more of the participants in each locale stating that the presentations were excellent.

Table 2. Participants' Ratings of the Presentations (by percent).

Location	Excellent	Good	Fair
San Angelo	71	29	–
El Paso	77	23	–
Corpus Christi	70	30	–

The manual was rated "great" by 70 percent of the San Angelo participants and "useful" by 30 percent. Although this question was asked at the other workshops, we switched to manuals on CDs after the San Angelo session. Therefore, the answers varied, and, in some cases, folks had not viewed the CD when they answered survey.

To us, one of the more interesting questions focused on whether participants might actually use their new information and skills. Participants were first asked if they would record sites in the future and then asked if they would record sites on their own land. Table 3 indicates how the participants anticipate using the new skills. While a large proportion indicated that they would record sites in the future, slightly less than half indicated that they would record sites on land they own.

Table 3. Ways Participants Anticipate Using Techniques Learned (by percent).

Location	Will assist recording sites in the future	May record sites in the future	Will record sites on their land	May record sites on their land
San Angelo	76	24	48	44
El Paso	44	39	40	30
Corpus Christi	83	17	55	11

Open-ended questions elicited many comments. To the question "*what was most memorable?*" San Angelo participants said:

- information about SAL's (State Archeological Landmarks)
- how to identify sites and artifacts
- sketch map and pace size
- all, especially hands-on
- getting to hear Dr. Shafer, Dan Potter, & Doug Boyd
- the process of dating
- types of specimen
- flint-knapping demo

El Paso participants listed the following for "*most memorable*":

- definition of culture
- what archeology is all about
- viewing the whole before the hole
- meeting and talking to Harry Shafer
- good information and procedures

Comments from Corpus participants on "*most memorable*" were:

- meeting other interested people
- importance of site maps
- scope of archeology
- writing reports
- flint knapping
- all the work required to record a site
- everything was very interesting

Ideas for additional programs were many. Participants from San Angelo included rock art, ceramics, any preservation information, and dating. Additional programs El Paso participants would like to see included more on local sites, ceramics, rock art, basket weaving, and arrowhead descriptions. In response to the question "*what did you like?*" we believe the responses indicate that we did a lot right with this academy. The responses ranged from 'everything' to very informative, the camaraderie, learning about other groups, well organized, presented in laymen's terms, the CD, the overall subject matter, lectures, knowledgeable people running the workshop, to it was basic nuts and bolts. These types of responses were so pervasive that we conclude that the sessions were well received.

Results from Ceramic Sessions

In general, the sessions on Ceramics drew more experienced TAS members. Many had joined TAS the previous year in order to attend the first *Academy* session. They readily welcomed the format and instructors for *Ceramics: The Stories Found in Pottery*.

Table 4 illustrates the age and gender breakdown of the participants in the Ceramics sessions at Dallas, Huntsville and San Antonio. In contrast to the general Archeology 101 sessions, the participants are slightly older with fewer in the 20-40 year age group and more in the 70+ age group. Moreover, more females participated than males.

Course content again appealed to the participants. In Dallas (Figure 5), 95 percent ranked the content "very interesting," and 5 percent said it was "adequate." In Huntsville, content was ranked even higher with 97 percent saying it was "very interesting" and only three percent saying it was

Table 4. Age Ranges and Gender Percentage of Participants in *Ceramics: The Stories Found in Pottery* (by percent).

Location	20-40 Years old	41-60 Years old	61-70 Years old	+ 70 Years old	Male
Dallas	12	44	46	2	39
Huntsville	11	43	35	11	44
San Antonio	6	38	41	15	44

merely "adequate." The San Antonio rating of content was the lowest of the three, although there too it was still relatively high with 71 percent saying content was "very interesting" and 29 percent ranking it as "adequate."

Rankings of the presentations were again high, as shown in Table 5. Excellent rankings ranged from a low of 71 percent in Dallas (Figure 13) to a high of 92 percent in San Antonio. This is a higher than expected ranking and we give great kudos to our presentors for this result.

Figure 12. Students viewing pottery types in San Antonio ceramics session (Photo courtesy of Pam Wheat).

Figure 13. Students learning about pottery types in San Antonio ceramics session (Photo courtesy of Pam Wheat).

The manual received generally favorable ratings, but with some mixing. Again, we had a hard copy manual in Dallas; then in Huntsville and San Antonio, the manual was on CD. Frankly, participants weren't too sure what to think of a CD. In Dallas, 82 percent scored it "great," while in Huntsville only 50 percent gave it that rating. Then, in San Antonio, 91 percent ranked it 'good."

The query listed as *most memorable information* again elicited many thoughts. In Dallas, participants responded:

- exchange of information and ideas with other class members
- sherd analysis
- pottery demonstration (Figure 14)
- ceramic correlation to subsistence patterns
- trade and migration implications of pottery
- flow charts
- interaction with knowledgeable people
- seeing various examples of pottery
- how information is obtained by reading ceramic sherds.

In Huntsville, this query solicited the following responses:

- how one extrapolates the information about ceramics and relates that to behavior
- actual analysis of sherd types
- everything
- sorting sherds
- hands-on pottery
- the definition of pottery.

Table 5. Participants' Ratings of the Presentations (by percent).

Location	Excellent	Good	Fair
Dallas	71	29	–
Huntsville	78	22	–
San Antonio	92	8	–

In San Antonio, the question was altered slightly to *what was the best item you learned*. To this query, participants said:

- classification and types of pottery
- identifying temper
- sorting and charting sherds
- change through time
- origins if Texas ceramics
- it was a great review for me
- use of pottery to date sites.

What I liked was answered in a variety ways. In Dallas (Figure 15), participants said: very well organized, good hands-on after instruction, all was very interesting, geared to the layman, I'm new and felt it was a great beginning, learned a lot, the opportunity to meet others interested in same areas. Similar responses were provided in Huntsville where the statements were: everything was enjoyable, Dr. Shafer's presentation and slides, instruction filled with good illustrations, well-planned,

Figure 14. Demonstration of wheel thrown pottery techniques in Dallas (Photo courtesy of Pam Wheat).

Figure 15. Vessels made by students at the Dallas ceramics session (Photo courtesy of Phil Stranahan).

clearly presented, met other folks, all of it. Finally, in San Antonio we heard: lots of hands-on, pottery technology, everything, informal learning atmosphere, subject matter easy to understand, very informative session, it was fun and I learned a lot, gathering of interested persons from all over.

An Invitation to Participate

All *Academy* sessions are open to anyone interested in archeology and the sessions do not require prior experience in ceramics, lithics or archeology. Each session is intended for inexperienced and experienced avocational archeologists, professional archeologists, undergraduate and graduate students, and educators. In 2005, four *Academy* sessions will be held across the state: Archeology 101 in Tyler (February 12,13,19); Ceramics in Austin (January 22-23); Lithics in San Angelo (February 26-27) and in Victoria (April 23-24).

Credit Available

A certificate of participation is awarded to all attendees. Continuing Professional Education (CPE) credit will be available for teachers as approved by the State Board of Education Certification (SBEC). Credit is defined as contact hours and range from 12 to 18.

SUMMARY

We think the TAS *Academy* has been a very successful program and has added significant training opportunities for members and others. As such, the *Academy* sessions provide hands-on experiences to new and current members, and provide an important compliment to the Field School. Members who attended Archeology 101 had basic training in surveying, site recording, site mapping, laying out a grid and a meter unit, and field recording techniques. Those attending Ceramics and Lithics sessions will have first-hand experience in manufacturing techniques, identifying, recording, and interpreting artifacts of these material classes, whether encountered at Field School excavations or elsewhere. The *Academy* adds a new level of sophistication and understanding of archeology to the TAS membership.

ACKNOWLEDGEMENTS

The Archeology Academy Committee would like to thank the many unnamed volunteers who contributed time and effort to make the arrangements for the Academy sessions at each location. In Houston, Bob Shelby served as regional director and Father Ed Bader secured location at the University of St. Thomas. In San Antonio, Mike Durack was regional director and arranged for space at the Southwest Center for Art and Craft and Elisa Phelps and Marne Chandler facilitated our use of the Witte Museum. In Fort Worth, Jim Blanton was local chair as regional director and Paula Vastine-Norman made arrangements at Tarrant

County College. In Dallas, Jennifer Kirker was local arrangements chair and space was provided by the Dallas Museum of Natural History. In Huntsville, Beth Aucoin (regional director) and Sandy Rogers hosted at the Sam Houston Memorial Museum. In San Angelo, Claude Hudspeth (regional director) and Marilyn Eisenwine made arrangements at Angelo State University. In Corpus Christi, Trudy Williams (regional director) and Bob Drolet and Rick Stryker facilitated use for the Corpus Christi Museum of Science and History. In El Paso, Diane Crabtree was local arrangements chair and Marc Thompson hosted at the El Paso Museum of Archaeology.

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Native North American Armor, Shields, and Fortifications, by David E. Jones. University of Texas Press, Austin, 2004. 184 pp.

Reviewed by Robert H. Norment

In this slim volume, David E. Jones presents a new perspective on the natives of North America and their armament and fortifications. In roughly 164 pages, Jones has examined a great deal of primary documentation and assembled a diverse compendium of information on these overlooked and obscure topics related to native North American cultures. From the southeastern fortified cities of the Chickasaw to the armor clad warriors of the Puget Sound, Jones presents a well researched treatise on a portion of Native American culture long overdue its place in the sun. He systematically presents each regional cultural affiliation, dissects and disseminates the evidence, and presents the reader with his bright perspective on this largely untapped database.

As an 18th century living history interpreter, I can attest that primary documentation of historical observations, events, and material culture, is one of the key facets of our research. These data assist us in presenting an accurate portrayal of the particular historical period we wish to emulate. Professor Jones not only presents important new information that we should incorporate into our interpretations, he is quite passionate in the presentation of his documentation. He does not discriminate between the well known areas of plains war shields and southwestern pueblos, with that of the obscure tactics of the southern Californian tribes or the intricate rod armor of the Tlingits. Each is given equal treatment. Additionally, he presents very viable suppositions based on oral traditions in those areas where primary documentation is, to say the least, sketchy.

The diversity of the historical documentation in the book is quite rewarding. For example, he describes two totally unrelated instances of attacking French troops in the southeast donning "wooden" armor. This was a real coup that can be used in future re-enactments and in archeological research. Because of Jones' passionate writing style, I could envision leather clad steeds and heavy war-shirted warriors of the plains attacking an Arikara or Mandan village. I was with Bienville's Marines as he stormed the Chickasaw fortress at Ackia. And, what I would have given to have been there standing next to Hernando De Soto as the Creek warrior demonstrated his ability to shoot arrow after arrow completely through a Spanish curraiss!

I was also intrigued by the complexity of the armor that he was able to identify, as well as the fortifications built by the natives of the northwest coast, Alaska, and Siberia. Concerning fortifications, we have the best examples of physical evidence (as well as primary accounts) of all three subjects in this book. He provides ample evidence of all and documents them thoroughly.

If I had to pick a "favorite" chapter (or cultural affiliation), it was the one on the southeastern tribes' armament and weaponry. I apologize for my bias, but, in native matters, I've always felt the southeast is an often over-looked region. Again, I was not disappointed with the professor and his chapter labeled "The Strong Bows" that gives a great deal of information on weaponry of the southeast. This chapter was second only to those stories from the northwest, with the plethora of first hand accounts and surviving examples from that area. Through his data, Jones illustrates what craftsmanship and ingenuity these peoples displayed!

I always find the bibliography of any book a gold mine for additional research. Again, I was not disappointed with this one. Indeed, Jones has done well gathering this research for such a vast land with diverse cultures and arranges it in a comprehensible way for student or historian. In my opinion, this is the kind of publication that nurtures thought. Hopefully, Jones had reopened a long hidden porthole in time: a Spanish moss-covered trail through the swap, a lichen-encrusted crag in the rocks, on the side of a rain soaked fern covered mountain, or a footpath dimly lit by a ray of sunlight peeking through the firs. These subjects are a ripe vineyard for the graduate student. They deserve additional research.

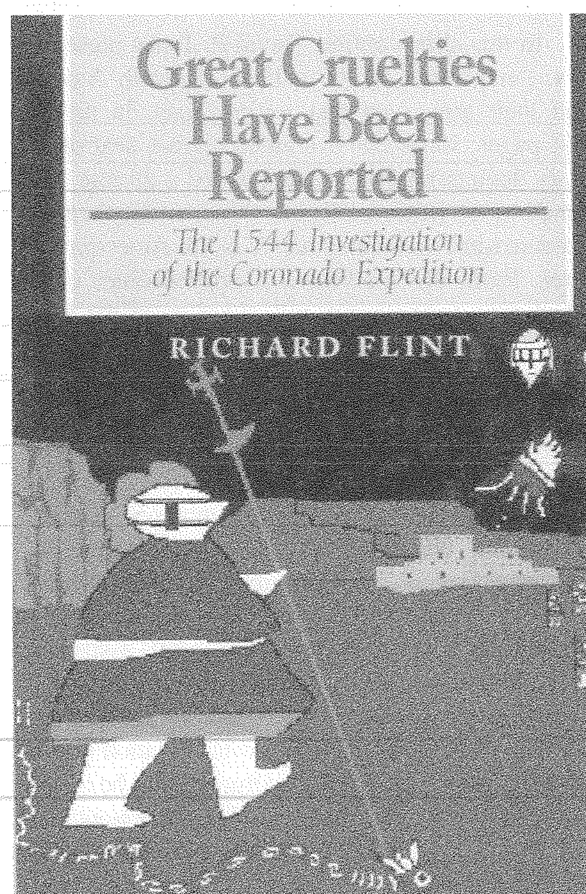
Great Cruelties Have Been Reported—The 1544 Investigation of the Coronado Expedition, by Richard Flint, Southern Methodist University Press, Dallas, 2002, xix + pp. 647.

Reviewed by Nancy A. Kenmotsu

The Coronado expedition in 1544 had significant consequences for Native Americans in New Mexico, Texas, and Oklahoma. It radically affected the lives of all the people encountered in northern Nueva Espana, including those on the Southern Plains of Texas and Oklahoma. As expeditionary forces burned pueblos forcing residents to flee to other pueblos and swept east to Pecos Pueblo, then on to Quivera, they also caused ripples among the groups who were economically or socially affiliated with the peoples the forces treated so harshly. This new publication by SMU Press presents new information about that expedition. As such, it is an important work for anyone researching the historic contact period.

Flint is an historian who has been interested in the Coronado expedition since 1980, most recently doing extensive research on the subject in Sevilla in 1997-1998 under a Fulbright dissertation grant. Serious researchers of early contact studies will appreciate the work for several reasons. First, Flint puts the entire expedition into its historic context (Chapter 1, The Historical Background). That is, he describes the King's orders to expeditionary forces to cease the murder, plundering and other improper acts that had been committed during previous Spanish expeditions. Despite such admonitions, Flint's study of the expedition reveals that great cruelties occurred yet again in this expedition. Flint acknowledges that his portrait of the expedition is at odds with the picture painted by Herbert E. Bolton's characterization of the expedition in *Coronado, Knight of Pueblos and Plains* (University of New Mexico Press, Albuquerque, 1949) as a benevolent tour of this northern land. In Flint's words (p. xvi), "Nothing could be further from the truth."

A number of texts of the Coronado expedition survive, including letters and a rough journal kept by Coronado himself. Many of them ignore or whitewash the cruel incidents with the native groups. Flint, however, utilized the texts from an



investigation of the expedition. That investigation, launched a year after the expedition returned to Mexico City, was conducted between 1543 and 1545, and the findings were issued in early 1546. Some of these texts have been employed by other researchers; only a very few have been previously published. The texts themselves are the second reason why researchers will appreciate Flint's tome. All of testimonies and documents related to the investigation are reproduced in the book, both in Spanish transcription and in translation. Moreover, Flint took great pains to identify as many versions of the original texts as possible and used the version that he believed most accurate; his liberal footnotes provide the reader with significant differences from other versions.

Chapter 3 (Lorenzo de Tejada and the Beginning of the Investigation) through Chapter 24 (A Final and Definitive Decision) contain brief overviews of the contents of the texts used followed by the actual texts themselves. Chapters 4 through 22 each contain the testimony of a single individual, each asked the same questions in the same order. Flint's introduction to each chapter provides background on the individual witness and his relationship to both Coronado and to the viceroy, Antonio de Mendoza, a close personal friend of Coronado. These introductions are brief, but in them Flint underscores inconsistencies between testimonies and also points out efforts of individual witnesses to evade or side-step difficult issues. For example, in Chapter 14, Juan de Zaldivar, one of Coronado's ten captains, "gave very brief answers, all to the effect that the Spaniards were completely justified in doing what they did in Tierra Nueva" (p. 251). In Chapter 13, Pedro de Ledesma, says Flint (p.232), "expressed surprise and outrage that the native peoples did not immediately capitulate and eagerly become royal subjects. And he explained the warfare between Pueblos and the expedition. . . as occasioned by the anger of the Pueblos over being asked for clothing to keep many members of the expedition from freezing, an anger Ledesma implied was illegitimate."

The testimony of Francisco Vazquez de Coronado himself is in Chapter 15, and represents one of the most evasive testimonies of all the witnesses. Previous and subsequent witnesses clearly acknowledge that pueblos were burned, many Indians killed or maimed by having their hands cut off or attacked by dogs, and women raped, among other cruelties. Yet, Coronado testified that he either had no knowledge of the incidents or that the incidents were incorrectly portrayed by other witnesses. Thus, when questioned about the burning of Tiguex pueblos, he replied (p. 289):

> That he himself did not order those pueblos burned and torn down nor does he know which particular captain may have burned and destroyed them. But he believes that because of the great cold that there was and because the camp was in the open country far from the mountains, the soldiers would have burned them and the wood to save themselves.

Researchers will appreciate that Flint provides the full texts that he uses for his conclusions in Chapter 25 (Partisan Testimony as Source Material for History). Typically, books on Spanish expeditions summarize the journey and present the author's interpretation of it, much like Bolton. In this case, Flint provides the texts themselves. Readers do not get small quotes taken from the testimony; rather, they get the full testimony. As a result, the texts underscore Flint's conclusions.

Why then, was only one individual punished, and that individual was not Coronado? Flint's summary shows that the investigation was *pro forma* "orchestrated to clear the capitan general [Coronado] and, more importantly, his sponsor and superior, the viceroy. . . The charges raised against the leaders of the expedition. . . would have fallen to Mendoza's responsibility, a dangerous possibility in light of the many other charges raised [against the viceroy]" (p. 502). Perhaps it is always about politics?

The book, despite its size, is quite well done. It presents previously unpublished material related to some of the first Europeans to encounter the native peoples of New Mexico, Texas, and Oklahoma. The testimony reveals the prevailing, and not surprising, attitude that the expeditioners believed their actions had been for the good of Spain and that the natives should simply have been more accommodating. The book sets out to show how the investigation white-washed the cruelties of the expedition; in the end, it succeeds. It also includes appendices that are of value, including one on the birth place, age, and arrival of 115 members of the expedition, another on biographical data on the individuals testifying or mentioned in the text, and yet another on the geographical location of places names as Flint understands them. Historians and archeologists interested in and investigating the contact period in Texas will find the book to be an excellent resource.

The Artifacts of Pecos, by Alfred V. Kidder. Percheron Press, 2003, Republication of Yale University Press, 1932, original. Original pagination retained (xvi + 314 pages) with new preface material and a foreward by Fred Wendorf (8 pages).

Reviewed by Douglas K. Boyd

It might seem odd at first to find a review of a 1932 publication on New Mexico archeology in a twenty-first century issue of a journal that concentrates primarily on Texas archeology. Something done that long ago in New Mexico can't be relevant to Texas archeology today, right? Wrong!

It is fitting that the Percheron Press chose to republish Alfred Kidder's classic, *The Artifacts of Pecos*, in their "Foundations of Archaeology" series. They republished the 1932 volume intact, in its original form and pagination, and only added a few preface pages and a short forward by Fred Wendorf. This is a tremendous value because the book is truly one of the great classics in American archeology. When it was originally published in 1932, it was one of a series of eight volumes resulting primarily from Kidder's excavations at Pecos Pueblo from 1915 to 1929:

Introduction to Southwestern Archaeology, with a Preliminary Account of the Excavations at Pecos
by Alfred V. Kidder, 1924

Pueblo Pottery Making
by Carl E. Guthe, 1925

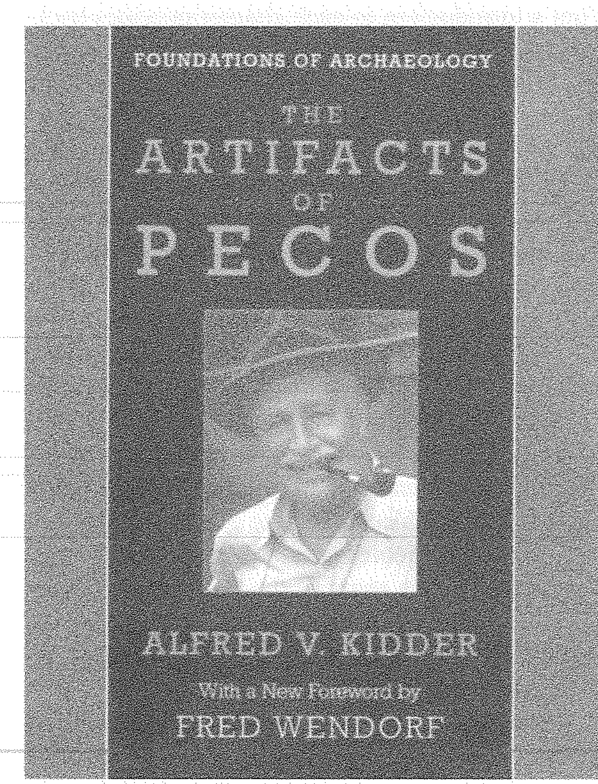
The Pueblo of Jemez
by Elsie C. Parson, 1925

The Indians of Pecos
by Earnest A. Hooton, 1930

The Pottery of Pecos, Volume I:
The Dull-Paint Wares
by Alfred V. Kidder with C. A. Amsden, 1931

The Artifacts of Pecos
by Alfred V. Kidder, 1932

The Pottery of Pecos, Volume II:
The Glaze-Paint, Culinary, and Other Wares
by Alfred V. Kidder with Anna O. Shepard, 1936



Pecos, New Mexico: Archaeological Notes
by Alfred V. Kidder, 1958

These eight volumes are remarkable in their scope. They cover a range of important topics, including analyses of material culture, human skeletal remains and burial practices, architecture, and ethnohistory. The significance of Kidder's work at Pecos Pueblo is widely recognized, and his contributions to American archeology are unquestionable. His pioneering use of stratigraphic excavation techniques and the development of the Pecos Classification to define Southwestern culture history are well known. The eight volumes in this series—originally called the "Papers of the Southwestern Expedition"—are all classics in American archeology, but it was in the sixth volume, *The Artifacts of Pecos*, that Kidder pushed the concept of systematic typological classification of material culture. While less well known than his contributions to stratigraphic archeology and Southwestern culture history, *The Artifacts* set the standard for archeological reporting for the remainder of the century. It was one of the first archeological reports to describe all of the material culture from a site excavation rather than focusing only on the flashy museum-quality specimens. The following quote (p. 6-7) explains why Kidder was so frustrated with the state of archeological reporting in 1932 and why he felt compelled to write *The Artifacts* in the manner he did:

> The museum attitude, in other words the valuation of an object for what it looks like instead of for what it tells, has been a most serious brake upon the wheels of archaeological progress, for archaeology is a historical discipline, it seeks to reconstruct the past of peoples who have left no written records, and its documents are the material remains left by vanished populations. The selection from such remains of a few pieces of outstanding appearance, to the neglect of everything which is not handsome or unusual is therefore a perfectly fatal perversion of emphasis.

The Artifacts of Pecos is basically a descriptive catalog of the artifacts, excluding the culinary ceramics, recovered from many seasons of excavations at Pecos Pueblo. This book, along with its two companion volumes on the pottery, are a comprehensive and detailed account of the material culture from one of the most significant Pueblo villages—both prehistorically and historically—in the American Southwest. While these volumes have long been essential reading for Southwestern archeologists interested in Puebloan material culture and chronology, they also are indispensable tools for researchers interested in Southern Plains-Pueblo interactions from Late Prehistoric to historic times. Judging from the large volume of recently published literature, the Southern Plains-Pueblo phenomenon is a popular research topic for Southwestern and Texas archeologists alike.

The Artifacts of Pecos is well illustrated with 251 figures, including excellent black & white photographs and exquisite line drawings. Kidder's attention to detail is evident in the typological classifications he establishes for many types of artifacts and the copious images that illustrate the range of variability in each group. The following list of primary artifact classes, along with the number of artifact groups within each class, may give an idea of the comprehensive nature of Kidder's classification scheme in *The Artifacts*:

chipped stone (40 groups, including 11 categories of drills)

ground or pecked stone (38 groups)

unworked stone (8 groups, including concretions and fossils)

clay (65 groups, including effigies, miniature vessels, and smoking pipes)

shells (13 groups)

bone (50 groups)

antler (16 groups)

wood (9 groups)

basketry and textiles (7 groups)

foodstuffs (3 groups)

miscellaneous perishable objects (4 groups)

objects of European manufacture (6 groups)

Kidder states (p.12) that the records and collections from Pecos were sent to the Phillips Academy at Andover, Massachusetts.[1] To give an idea of the size of the Pecos collections, over 2,000 chipped stone tools are described in *The Artifacts*, and 175 axes are found among the thousands of ground and pecked stone tools. In most cases, the numbers of artifacts are large and they are described as artifact classes rather than individual specimens, but Kidder does pay attention to the unusual specimens and describes and illustrates many of them separately. The lack of tabulated data is noticeable, and it is simply impossible to know exactly how many artifacts of a particular class were recovered in many cases. This is especially true for some artifact classes such as metates and manos. Kidder stated (p. 71), "In the field I paid, unfortunately, much less attention to the manos than I should; and, because of their weight, I shipped relative few of them to Andover." Other occasional statements offer rare insights into of the state of archeological collection practices in the early twentieth century. Refering to the small river pebbles that were faceted and worn from use such as pot polishers, Kidder notes (p. 64) that "several hundred were collected and many more were discarded in the field." Pot polishing stones were apparently so abundant that they simply didn't feel the need to collect them all.

Where appropriate, Kidder describes the age, context, or stratigraphic position of selected specimens or groups of specimens. This is particularly useful because it helps to sort out materials that were simply discarded into the trash middens from the many artifacts found in cache pits or associated with human burials within the middens. The Olivella shell beads, of which more than 2,000 specimens were recovered from Pecos Pueblo, are a good example. Kidder notes (p. 186) that all of them appeared to be *Olivella dama* from the Pacific coast. He also lists seven instances where Olivella beads were found in burials and notes the age and sex of each individual along with the associated pottery types and inferred chronology. He also notes that almost 1,000 Olivella beads were found in a single strand, measuring 38 feet in length, that was apparently wrapped around a large rock. The beads were found in a subfloor cache pit inside a kiva, and they dated to post-Columbian times. These beads are of particular interest to Texas archeologists because they are commonly found in the northern part of Texas and are particularly abundant in the Plains Village sites (such as those of the Antelope Creek phase and Buried City) along the Canadian River. It seems fairly certain that large numbers of Olivella beads came into the Southern Plains via the Pueblo trade, and Pecos Pueblo was a major distribution center.

Kidder's comments also are helpful because he notes the probable or possible sources for many of the items that are definitely of nonlocal origin. From a decidedly Texas-centric point of view, Kidder's notes on materials of Plains origins are particularly informative to those of us interested in Southern Plains-Pueblo interactions. Large numbers of chipped stone artifacts were made out of alibates agate, and Kidder considered them to have been imported by Plains tribes. Tool types made of alibates include drills and the classic Plains-style end scrapers and beveled knives used by bison hunting groups. Kidder describes the "two-edged" (n=50) and "four-edged" (n=8) knives, and notes that almost all of them are made "a purplish-gray stone streaked with darker reddish-purple in much the same way that bacon is streaked with lean. . . the same stone is found abundantly along the Canadian River in Texas, near Amarillo" (p. 31). He called this stone "silicified alibates dolomite" and recognized its importance in the Plains-Pueblo trade. Two exceptionally large beveled knives (one 7 inches long, the other 8 inches long) were found associated with burials that also contained Glaze I pottery. This is interesting because in a general note on the stone tools from Pecos (p. 42-44), Kidder observes that alibates agate is rare in the early deposits, but that alibates flint, snub-nosed end scrapers, and two-edged knives become common in late Glaze IV and Glaze V deposits. This clearly signals the intensification of Plains-Pueblo trading activities in the late 1500s and 1600s. This intensification also is signaled by a proliferation of late style Glaze pottery appearing at many prominent sites in the Southern Plains.

One unusual artifact Kidder describes (p. 58) is a "notched hoe" of quartzite that he suggests is of Caddoan origin and resembles the stone hoes from Oklahoma and Arkansas. Like the occasional Southwestern artifacts that somehow ended up in the eastern woodlands, this artifact hints at the broad scope and complexity of prehistoric and protohistoric exchange systems in North America.

In concluding, *The Artifacts of Pecos* is valuable not only for its importance to the history of Southwestern and American archeology, but also as a pure jewel of a reference book. I have found *The Artifacts of Pecos*, and its companion volumes on *The Pottery of Pecos*, to be essential tools for studying Plains-Pueblo interactions as manifest on sites in Texas. These three volumes contain substantial information about Plains artifacts that ended up in the Pecos Pueblo trash middens and burials. They are equally useful for identifying and understanding Puebloan artifacts that are found scattered across the Southern Plains. Over a decade ago when I was faced with interpreting thousands of specimens from a protohistoric tipi encampment at Lake Alan Henry (formerly Justiceburg Reservoir), it was Kidder's books on ceramics and artifacts from Pecos Pueblo that came to my rescue. While pondering two unusual ceramic artifacts found at the Longhorn site, it was particularly gratifying to find nearly identical specimens illustrated in *The Artifacts* and find Kidder's eloquent description of them as Class II, Type B, Subtype 3 Pecos-style pipes!

END NOTE

1. The artifacts and records generated by Kidder's Pecos excavations were housed at Robert S. Peabody Museum of Archaeology at Phillips Academy in Andover, Massachusetts, for many years, but the Kidder Collection was moved to the Pecos National Historical Park, where it is located today. After the passage of the Native American Graves Protection and Repatriation Act in 1990, the museum began discussions with the Pueblo of Jemez, which is where the last surviving Pecos Indians went when they abandoned Pecos in 1838. In May of 1999, the remains of 2,067 Pecos Indians were repatriated to the Jemez group.

Digging Up Texas, a Guide to the Archaeology of the State, by Robert Marcom. Published by Republic Of Texas Press, Plano, Texas (2003)., x + 251 pages.

Reviewed by Wayne Clampitt

In *Digging up Texas, A Guide To The Archaeology Of Texas*, author Robert Marcom has written an informative beginner's book on archeology. For those who have developed an interest in archeology through television or movies but have no one to ask questions of, this is the book for you. The book is presented in fourteen chapters among which the reader discovers chronological overviews of cultures, language groups and excavations. Interviews with professionals in archeology, fictional stories for the young reader, and a listing of regional museums and resources are also included.

As readers move through the chapters, they will learn valuable information about the various fields of study under the banner of Archeology, some of the principles and laws governing how the process of archeological excavation is done and a clear summary of how scientific principles are applied from thesis statement to excavation. Marcom mixes terms and information in his narratives nicely, providing much more discussion of archeological terminology than the average beginners' book. First-hand accounts of excavations that he has participated in provide an introduction to the workings of field schools and how excavations are conducted.

Beginning in the introductory chapter, and frequently reinforced, Marcom dispels any idealism concerning archeological excavations. He writes, "Archaeology – the work is hard, the mosquitoes voracious, and the hours long. Only the excitement of discovery and a reverence for those human beings and their ways of life would suffice to enable us to bear the discomforts." At just under 250 pages and 14 bibliographical references, *Digging Up Texas,* is "not intended as a scholarly essay," yet the subjects are covered in enough depth that the reader can understand the importance of the archeological sites without becoming entangled in the details of the site excavation.

In covering the prehistory of Texas, the first five chapters are short on discussions of archeological sites and instead contain one or two page summaries on prehistoric Texas cultures and historical episodes. Several "The Way It Might Have Been" stories in each chapter further illustrate the lifeways being discussed. Marcom balances these stories (intended for a juvenile audience) with interviews of professionals working in different areas of archeology and presents their perspectives on related topics or interpretations. Among those interviewed are Jeff Indeck, curator of the Panhandle Plains Museum, Dr. Dirk Van Tuerenhout, Texas State Archeologist, Patricia Mercado-Allinger and Margaret Howard, past-president of the Texas Archeological Society (TAS).

Beginning in Chapter Five, *Woodlands Material Culture*, the author provides a more in-depth look at the archeology of his site selections. In Chapter Six readers learn about the dramatic Gulf Coast excavation of the La Belle shipwreck; in Chapter Seven, the pre-Civil War days of the U.S. frontier forts and Texas Rangers. Brett Cruse's Red River War project is described in Chapter Eight, where Marcom shares the histories of five battle sites along with the revealing archeological information gained by examining the patterns of the recovered shell casings.

Then, in Chapter Nine, the reader gets a surprise, an introduction to historic excavation methods using feet and inches instead of the meter and centimeter for recording measurements. This was because the English measure of feet and inches used for the original survey and construction of the structures at the plantation were carried over for recording the excavation. At the Levi Jordan Plantation Site, the future archeologist gains insight into the important role that local residents play through oral interviews. This chapter also makes the reader aware of the sensitivity necessary in all of archeology when dealing with the public on emotional issues such as slavery, graves, or the reputation of family members.

Chapter Ten, *The American Indians in Texas,* contains summaries of the various "Texas" Tribes grouped broadly into Southwestern, Plains and Southeastern culture groups and then by their linguistic affiliations. However, Marcom's tribal "summaries" usually give only one or two facts per tribe and generally contain too little information to even be called summaries. The description of the Cherokee, for example, is limited to the political events surrounding their removal to Texas. The lack of any chronology in this chapter along with his use of linguistic affiliation runs the risk of leading to false conclusions. The Wichita, for example, are Caddo speakers, but culturally distinct from the Caddo.

Chapter Eleven is a colorful description of the author's experiences at the 2002 TAS Field School, though curiously he never mentions the Bowmer site. None the less, throughout the book the reader is introduced to excavation as if he/she were a new volunteer showing up the first day. Instructions and information come quickly and succinctly as Marcom walks you to a unit and sets down to work or tours the excavation with the reader in tow. Indeed, a discussion of the excavations and field schools is the author's forté, and he covers those subjects very well.

The important role the Texas Historical Commission plays in Texas, a review of regional museums and visits to several historic sites are covered in Chapter Thirteen. The Texas Historical Commission's Archeology Division is the subject of a wide ranging conversation taken from a 2002 interview with Patricia Mercado-Allinger, Texas State Archeologist. Concluding in Chapter Fourteen, "Resources for Avocational Archaeology," Marcom sums things up with directories of web sites and TAS affiliated Regional Associations, an important resource for new comers. It is important to note that he asks the reader not to dig or collect, stresses the importance of directed excavation and gives great advice on getting help.

Although *Digging Up Texas* is a very informative book, it has several problems that this reviewer found distracting; in part these are the result of the complexity of the subject matters. For instance, Marcom's choice of title is troubling because rather than writing a guide "to" the archeology of the State, it is rather, a guide "for" the archeology of the State. Those expecting a guide book "to" archeological sites in Texas in the fashion of past books such as *Traces Of Texas History* (Fox, 1983) or *The Art Of Fieldwork* (Wolcutt, 1995) will be disappointed whereas a guide "for" the archeology of the State and how to get involved in it, the book is well crafted.

It is also a book "for" learning of the different cultures and periods of Texas, that archeology has revealed to us. An example of the difficulty in dealing with the complexity of topics occurs in Chapter One, "*Past Lifeways, Texas Style*." Here the author uses only six paragraphs to cram together 14,000 years of history and then decides to devote the remaining twelve pages of the chapter to the previously mentioned laws and principles used in archeology. As a reader, I felt a discussion of the many regional tribes in pre-contact times should have been included here, especially since later chapters focus largely on the non-native tribes of the historic period.

The use of previous but dated publications such as the respected, *The Indians of Texas* (Newcomb, 1961) does little to inform the reader of how views about those tribes have changed in the last forty years. A discussion of how cultures interacted over time and even one map of the state would have been nice additions. Marcoms presentation of topics is also sometimes unbalanced, as for example, his emphasis on historical events versus the significant issues of prehistoric archeology found in Texas. As well, his Bering Strait story could have been better balanced and perhaps broader in scope had he mentioned the possibility of an earlier prehistoric migration route (Owen, 1988) as suggested by Texas' own Dr. Michael Collins in, *Clovis Technology* (Collins, 1999). Here Marcom would also have found a summary of the Gault Site findings, which he labeled "unpublished" and failed to cite any references for.

Despite my reservations, *Digging Up Texas* is an informative beginners' book for those wishing an introduction to Texas archeology. Marcom states in the beginning of this book that he is writing it for the general public and accomplishes that at several reading levels. As *A Guide To The Archaeology Of The State,* however, the book suffers from the brevity of its' treatment of complex topics and the author's use of generalizations. Still, Marcom has undertaken a challenging task and produced a book that will tell you a little about a lot. In summary, the broad, descriptive perspective of his writing helps to balance some of the shortcomings that by necessity must be found in a book of this scope. Marcom's work is a nice springboard of information that steers the reader toward further readings and repeatedly encourages their participation in Texas archeology. This book mirrors the goals of the whole archeological community in promoting awareness, education and participation to the public and deserves recognition for its contributions to these endeavors.

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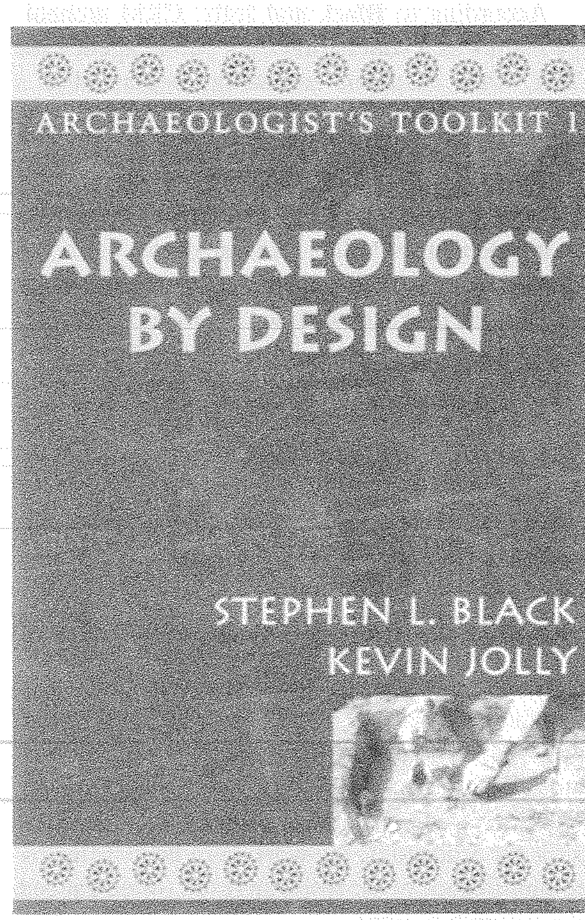
Archaeologist's Toolkit 1: Archaeology by Design. Stephen L. Black and Kevin Jolly, i-ix, 157 p., Altamira Press, NY, 2003.

Reviewed by Owen Lindauer and James T. Abbott

Altamira's Press's *Archaeologist's Toolkit* series is "designed to teach novice archaeologists and students the basics of doing archaeological fieldwork, analysis, and presentation." This first of seven volumes is intended to supply the basics of archeological research design to this diverse audience. It also tries to be an essential resource for those working in the field or training university archeology students. This attempt to reach the novice student as well as provide an authoritative and essential resource for professionals is an ambitious goal that the volume achieves only to varying degrees.

While clever, the title of the volume is somewhat misleading. A more appropriate title would be "Archeology by Process," since the authors go beyond an explicit discussion of research designs to describe their implementation as research, including ancillary topics such as field logistics and analysis. Strategies to accommodate the "real world" are addressed in discussions relating to the management of a project's schedule, personnel, and resources. Background is presented on cultural resource management law and regulations, as well as the personnel at various state and federal agencies who work with the law, and how these people impact archeological research.

The principal message of *Archaeology by Design* is a welcome one. Black and Jolly argue that advancement of the discipline—that is, the state of our collective knowledge of prehistory and history—requires considerable forethought and planning before, during, and after the period that the trowel touches the ground. They present an engaging and hopefully convincing argument that archeologists should strive to extend the archeological record by answering relevant and non-trivial questions about people, and that unless a practitioner has these questions in mind as they approach a site, and keep them in mind as they excavate and analyze, they are unlikely to gather the data necessary to effectively address them. To this sermon against the "dig and figure" mode of archeological research we shout hallelujah; it is



our experience that reliance on serendipity inevitably leads to mediocrity or failure, and does a disservice to the archeological record.

Another theme that the authors highlight is a difference in approaches to archeology. Black and Jolly focus much of their attention in the first half of the book describing two distinct worlds of archeology: an academic world, where all archeologists are trained, and a "real world" of cultural resources management (CRM), where most archeologists put their training to use. Their rationale for this focus is that "to design effective research in either world, you must understand the research world in which you operate and work within its particular constraints."(p. 5). While the main point is relevant, the illustrations provided by the authors are often simplistic, and all but ignore the collaborations and overlapping aspects of these two archeological "worlds" in their attempt to highlight contrasts. Oversimplified differences between academic and CRM archeology identified by the authors include the genesis of research, the level of available funding, and the factors motivating project completion.

According to Black and Jolly, CRM archeology begins as a solicitation by a public agency for CRM, while academic archeology begins when a researcher is motivated to solve a problem. The false implication is that archeologists who work in CRM lack research interests of their own and are slaves to the desires of agencies, while academics are independent scholars motivated only by a desire for knowledge. The truth is considerably more complex. Both academics and CRM archeologists are motivated by a variety of altruistic, intellectual, and pragmatic factors. In particular, the suggestion that academic archeologists would ignore opportunities to work in particular locales or on certain site types because such work would not conform to a previously existing desire or problem, while CRM archeologists work anywhere on anything, strikes us as a false and elitist generality.

A second difference identified by Black and Jolly is that CRM has built-in funding, while in academic research funding is almost always a limiting factor. This is a distinction without a difference. While there is generally more funding available CRM projects, funding is always a limiting factor in exactly the same ways it is a limiting factor for academics: the work must be justified by the significance of the research result (often gauged by a research design).

Third, Black and Jolly maintain that CRM involves legally binding contractual obligations, while academic archeology involves ethically binding academic promises. The authors say that for CRM there is a factor of "control" by agencies who issue contracts where the sponsoring agency insists that work is completed and is appropriately reported. Academic researchers decide how and when their research results will be disseminated and are not bound by anything more than his or her own ethics regarding accountability. This distinction has a technical difference, in that academic commitments often lack the formality or legal force of a contract. But both aspects amount to the issue of accountability and professional responsibility.

After describing the two archeological worlds, Black and Jolly go on to argue that a significant gap exists between what is taught in academia and the skill set needed to work in CRM. We agree that many archeology students do not get all the academic coursework that they could use in the CRM profession. However, this gap has been closing in recent years (gradually, as the reality of what their students actually end up doing slowly sinks in to the halls of academia), and the focus on this duality serves to perpetuate an issue that was much more significant twenty years ago than it is today. In particular, the authors' argument that CRM archeology can often be better than its questionable reputation should be balanced by an observation that academic archeology can also be wanting. We submit that there is only one standard for good professional research, and that a worthy research design can be developed or ignored in either world. Moreover, there is a great deal of cross-over in activities between academic archeologists and CRM archeologists, and broad cooperation and reliance on each other to achieve the goals of research is common.

Some aspects of the discussion of CRM archeology involve generalizations that present an incomplete picture of the process, or as parables based on particular experiences of the authors. For example, the reader is told that a CRM research design begins with the area of potential effects (APE) which is drawn by an engineer or architect. In reality, the responsibility for the definition of a construction project's APE lies with the federal agency who is either sponsoring, permitting, or allowing the project to occur on land it manages. While this APE may be drawn by a variety of people, including engineers or architects, usually it is defined by a professional archeologist who either is employed by or acting on behalf of the federal agency. Where project APE is defined by someone other than an archeologist, it usually reflects the application of guidelines developed by an archeologist, and it is always concurred upon (either formally or tacitly) by the State Historic Preservation Officer during the consultation process.

According to the authors, the next step in CRM research is the request for proposals (RFP). The RFP process is the usual mechanism by which archeology sponsored or mandated by the government is contracted with the private sector. The RFP is a technical specification for what work needs to be done, and it establishes a competition among archeological entities (private firms as well as academic archeologists). The authors reduce CRM research to the formula: CRM= APE + RFP. Several opportunities to highlight the complexities of CRM are missed in this discussion. First, they ignore the many instances where established relationships between non-governmental sponsors and CRM firms negate the entire process. Not all CRM archeology begins with the issuance of an RFP; often, it begins with a phone call. Second, the opportunity to discuss the relationship that exists between CRM as a business and archeological research is given short shrift. Instead, there is a repetitive theme throughout this entire discussion that contrasts scientific archeology with archeology as business, as if doing good archeology and operating an efficient and profitable business are antithetical. This aspect of the discussion seems both unfair and inaccurate to us—while "lowball" CRM contractors are a fact of life, there are also many CRM firms that have thrived precisely because they do excellent research in an efficient manner. Third, Black and Jolly focus their discussion almost entirely on data-recovery level investigations at the expense of survey and testing investigations, which form the lion's share of CRM projects. Here, they miss an opportunity to note that all archeologists (yes, those academic archeologists too) too often conduct the initial stages of their fieldwork without a research design. While the form of the research design that these types of investigations require is quite different than required for data recovery, they are just as vital. Unless survey and testing is conducted with clear goals regarding the questions appropriate to ask, the outcome will be wanting.

The remainder of the book is dedicated to describing the process of conducting research—developing a research strategy, formalizing it as a research design, and implementing the investigation. This is an extremely ambitious scope, and its treatment is encompassing but hardly exhaustive. The book closes with a series of Appendices—"Groups You Should Join," "Journals You Should Read," an acronym glossary, and a field checklist—that are particularly appropriate for the student reader.

Interspersed throughout the book are special topical discussions presented as sidebars and appendices to provide more detail outside the main narrative. While informative, too often these are 'bite-sized' discussions that oversimplify terms or issues and commonly miss opportunities to discuss relevant issues. The sidebar "What the Heck is a Cultural Resource?" (pg. 9) is one case in point. In this important discussion, the authors miss the opportunity to probe the concepts of archeological (regulatory) significance and preservation in the context of preservation laws. The significance of an archeological resource, as spelled out in Section 106, is typically a function of the information that could be learned from a site (this is termed criterion (d) in Section 106 parlance). Therefore, establishing whether a site is eligible requires a research design to provide the context of the eligibility determination. It is not enough to know that a site is well preserved or contains numerous "neat" artifacts—under criterion (d), a site is only significant if it can yield important information about the past, and, the criteria that establish what is important follow from a research design. Regarding preservation of archeological sites, excavation is not the only or even the preferred way to "preserve" sites in CRM. Avoidance of construction impacts is the preferred approach in CRM. The CRM world is filled with instances where archeological sites were conserved, protected, and preserved for the future without conducting excavations.

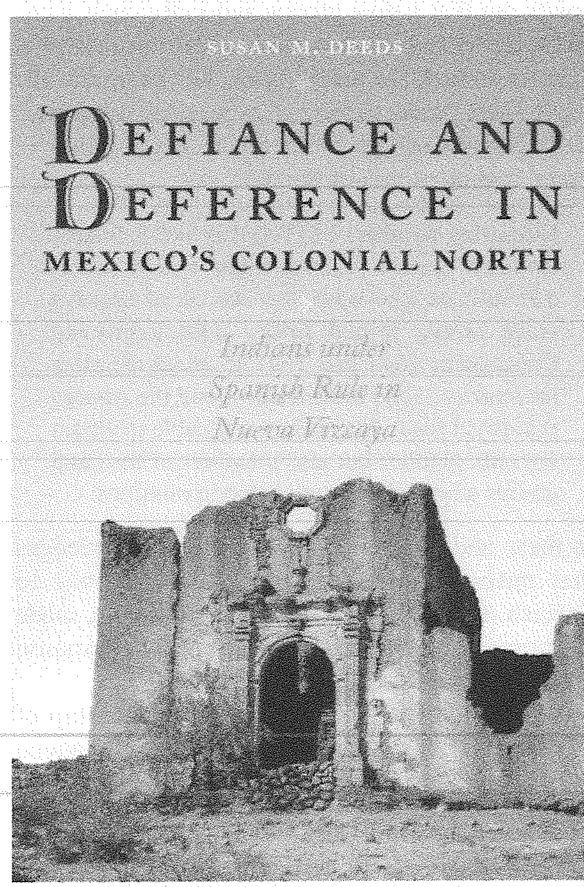
Another topical sidebar that misses the mark is the one about NAGPRA, the Native American Graves Protection and Repatriation Act of 1990 (pg. 110-111) and the relationship it establishes between Native Americans, archeologists and graves. The missed opportunity is a discussion of how the concept of research design is tied to the issues of affiliation and decision making in NAGPRA. This law only applies to Native American human remains, associated funerary goods, and items of patrimony collected from federal lands or in museums that accept federal funds where a reasonable connection can be made to a living federally recognized Tribe who also has made a claim to these items. Establishing the connection between archeological items and descendant groups is rich in potential for research designs. Further, once a decision is made that a descendant group has a claim on NAGPRA items, proposed analyses or research on those items must be presented in a research design that is reviewed and approved by the descendant group. This occurs in the context of consultation, compromise, and a willingness to work, as the authors point out.

Despite the preceding criticisms, *Archaeology by Design* is a unique and valuable resource for professionals and students alike. It is extremely readable and presents a cogent framework for conducting archeological research. Amateurs with an interest in the profession as well as the subject matter of archeology will also find the book of value, although portions are clearly of voyeuristic interest only for non-professionals. The book should be of particular interest to BTAS readers because it reflects Texas experiences, as both Black and Jolly are professional native sons. Readers will find the prose to be conversational in style, attribution of other scholar's ideas relaxed, and citations minimal. Throughout the book, the authors strive to distill involved and complex ideas to essential concepts. This is a very difficult task which the volume, on balance, is successful in accomplishing.

Defiance and Deference in Mexico's Colonial North, Indians Under Spanish Rule in Nueva Vizcaya, by Susan M. Deeds. University of Texas Press, Austin, 2003, 300 pp. + xiii.

Reviewed by Nancy A. Kenmotsu

In the past decade, there has been a resurgence of archeological interest in the period of contact between Europeans and Native Americans. This interest extends to the Society and its recent field schools at Mission Espiritu Santo de Zuniga near Victoria and the past two years at Presidio San Luis de las Amarillas near Menard. Deeds, who teaches Latin American and U.S.-Mexico border history at Northern Arizona University, has long shared that interest. Like this book, her writings largely focus on how selected Native American groups and Spaniards in northern Mexico dealt with one another during the Colonial period. In this book, she focuses on the Xiximes, Acaxees, Tepehuanes, Tarahumaras, and Conchos. The first three of these groups largely resided well south of Texas, in southern Nueva Vizcaya (which today is largely the Mexican state of Chihuahua). The Tarahumaras, however, resided then and today southwest of Texas in the eastern slopes of the Sierra Madre Occidental. The Conchos resided along the Conchos River of Mexico, up to its confluence with the Rio Grande near Presidio, Texas, and interacted with the people of La Junta de los Rios (Presidio area). Unlike the Tarahumaras they were unable to sustain their cultural identity through the 300 years of Spanish colonization; today their descendants are among the mestizo communities found between Parras and Presidio.



Deeds' study is about why and how these groups struggled between resistance and adaptation in this northern frontier area, and why the Tarahumaras and Tepehuanes were able to sustain their ethnicity, while others, including the Conchos, could not. She notes (p. 190):

> The frontier, a recurrent theme in world history, has frequently been featured as the crucible in which the so-called civilized and savage have come into contact, collided, and transformed one another. What is often silenced or simply unchronicled is the mutations they have undergone.

To gain insight into these themes of collision and transformation, she extensively researched Spanish archives in Arizona, Saint Louis, Mexico, and Spain. The result is a well-researched and thoughtful presentation of the Spanish and native experiences in these northern lands beginning in 1560 and continuing until just before the nineteenth century. The book is laid out chronologically with each chapter establishing the historical context of the time period it covers, including events and decisions made in Mexico and Spain, and then presenting how those events and decisions affected the relations between the various groups on the northern frontier.

Deeds meticulously lays out how those experiences evolved over the centuries. And, importantly, the native groups are given credit for their own actions and reactions to Spanish missions, presidios, and enforced labor. Too often, historians and archeologists have viewed the changes occurring during the colonial period as changes that were simply imposed on the indigenous peoples and, however reluctantly, accepted by them. Deeds consistently points out that native groups and individuals acted on their own behalf, sometimes effecting change in Spanish tactics and institutions. For example, she (pp. 63-64) points to the native reaction to Spanish slave hunts north and east of the silver mines of Parral and just south of Presidio:

> Increasing numbers of [Tobosos and Salineros from the eastern deserts], along with Cabezas and Julimes who were also objects of massive slave hunts, joined forces with aggrieved Conchos in 1644 and 1645 to attack Spanish haciendas. . . and mule trains along the *camino real*/royal road. The leaders were able to attract not only gentiles but also members of the band groups who had been relocated in missions.

In these and other passages, Deeds acknowledges that native groups did not simply submit to Spanish demands but rather, when possible, made their own decisions about the appropriate response to those demands.

She (p. 75) points out that the relationship of missions and Indians was complex and changed over time. At first, Indians entered missions for various reasons, including simple curiosity. The complexity grew over time:

> Two of the most attractive inducements were the missions' capacity to provide protection from enemy Indians and to furnish foodstuffs and other commodities (clothing, tools, etc.). . . . Another key was the degree to which missions could serve as a kind of temporary base which allowed indigenous peoples access to their rancherias and wilderness areas for gathering, hunting, and even raising a few of the newly introduced sheep or cattle.

I think these types of relationships were likely repeated in Texas missions, and Deeds' study merits serious consideration when we research the action and reaction of Texas Indians to the missions founded here.

Another aspect of Deeds' study merits consideration for individuals interested in understanding how the colonial period affected native groups: the conflating of ethnic groups. When the Europeans arrived in northern Mexico, Texas, and New Mexico, they encountered literally hundreds of named groups. Yet, we know that only a few remained in 1800. Deeds carefully documents that some groups were reduced by epidemics, others were reduced from cultural processes. For example, the sedentary Acaxees and Xiximes were first affected by devastating epidemics. At the same time, however, the two were traditional enemies. The Spanish used that enmity, recruiting one or the other to fight each other and to also work in mines, ranches, and missions. By the 18th century, they "had been swamped by outsiders and interracial mixing was well underway. . . . These selective adjustments. . . facilitated the transformation of these Indians into mestizos whose daily lives were not much different from those of their poor Spanish neighbors" (p. 192). In contrast, the Conchos were largely hunters and gatherers. She concludes that they did not survive as an ethnic group because they were much less cohesive as a social unit. Individual Concho bands had paramount chiefs who, over time, served as labor brokers, literally selling their band members into service for the mines or missions. "The Spanish tactic of divide and rule effectively mediated against their [continuity]" (p. 193).

While I found the book to be well-researched and stimulating, I do take exception to one of Deeds' assumptions. She believes that there was very limited inter-mixing of groups prior to Spanish colonization. I disagree. I believe that the archeological record, as well as the archival record from the first entradas in northern Mexico, Texas, and New Mexico both illustrate that there was considerable contact between groups. This exception aside, the book is an important one for any student of Spanish colonial history. Archeologists doing research on this period in west Texas should certainly become familiar with it. Other archeologists doing research on the colonial experience elsewhere in Texas should also explore the discussions she provides about the interplay of defiance and accommodation of both Spaniards and Indians. These cultural processes likely had similar action and reaction among the Indians and Spaniards in Texas.

The Texas Indians, by David La Vere. Texas A&M University Press, College Station, 2004. xiv + 293 pp.

Reviewed by Timothy K. Perttula

David La Vere's latest book is a history of the Indians that have lived in Texas from at least 12,000 years ago to today, one that purports to provide a "complete chronological and cultural history of Texas Indians" (from the book's dust jacket). It also lays claim to being "the first full examination of the history of Texas Indians in more than forty years;" that is, since William W. Newcomb, Jr.'s classic 1961 book *The Indians of Texas: From Prehistoric to Modern Times* (University of Texas Press).

La Vere relies on archeological, anthropological, and historical evidence to write a very accessible book on Texas Indians, one that aims "to keep the Indians at center stage" (p. x). I think, for the most part, he has been successful in that, casting his story to look beyond the dry narratives of the explorer, archivist, or missionary for insight, but also drawing upon his relationships with present-day Indian communities to bring an even-handed treatment to the book of the meaning and significance of recorded events and actions by real peoples, Indians, Europeans, and Texans alike. Where he succeeds most forcefully are in "The Blossoming of Texas Cultures" (Chapter 2) and "From One Millennium to the Next" (Chapter 10, and the concluding chapter in the book). But let us begin at the beginning, namely the history of Texas Indians before about A.D. 1500.

Chapter 1 ("Texas' Earliest People") is the story of Texas Indian peoples before European contact. In it, La Vere seeks to use archeological evidence, melded with his understanding of the social and cultural make-up of hunter-gatherers and agricultural peoples in North America, to trace cultural and social changes among Texas Indians. He is fairly current in his archeological readings about Texas prehistory, probably more so than the average anthropologist, relying to some considerable extent on the recently published *The Prehistory of Texas*, Texas A&M University Press (2004), although he never gets the title of the book right in footnotes or in the bibliography. Furthermore, he actually cites one contribution by Michael B. Collins ("Implications of Monte Verde, Chile, for the Earliest Prehistory of Texas") that is not even published in the 2004 book.

The story he tells, though, is probably familiar to most of the readers of this journal. He begins with the Paleoindians living in Texas at least 12,000 years ago, moves on to the Archaic Indians (ca. 8000 B.P. to A. D. 800) that lived by hunting-gathering and foraging, Woodland Indians in the eastern part of the state that began to settle down and made pottery, and ends with the Caddo agricultural groups living in eastern Texas and the Puebloan groups in far west Texas. But his story has some quirks and foibles in it. He insists on repeating the notion that Paleoindians relied on mammoths for food, when archeological evidence from sites such as the Gault site in Central Texas have effectively demolished that argument. He goes on to state that Folsom people in Texas, like the Clovis folks before them, lived in rock shelters and caves, erroneously mentioning the Lubbock Lake site as an example (p. 7) where there is no rock shelter! While there certainly are several important Paleoindian sites in Texas found in rock shelters and caves—including Horn Shelter No. 2, Bonfire Shelter, Devil's Mouth, and Baker Cave—most are assuredly not found in those contexts. Later in the chapter he tells us that Archaic Indians "still made their homes in caves and rock shelters" (p. 11). La Vere suggests that it was only around 6000 years ago that the megafaunal species (such as the mammoth, horses, camels, and giant armadillos) became extinct, when it has been fairly well established that the extinction of such animal species occurred several thousand years before that, and not during the lengthy Texas Archaic period.

His description of the Archaic Indians takes much, rightfully so, from what archeologists have learned from studies of the archeological record in the lower Pecos region because the preservation of perishable artifacts and rock art on sites there provides an unequalled opportunity to paint a broader picture of how the Indians were living then. But the general view from there may not have much to do with the diverse and increasingly localized Archaic traditions studied all across the state. For example, La Vere suggests there was a "population explosion" in Archaic times throughout Texas, but in the region I am most familiar with—eastern Texas—I certainly wonder if that is the case.

When La Vere turns to a discussion of the Woodland period Indians, those Indians living in Northeast Texas between ca. 500 B.C. and A.D. 800 (he wrongly starts the period 400 years later, at 100 B.C.), my spirits about his grasp on the subject began to wane a bit. First, the Woodland period according to La Vere is supposedly marked by the domestication of plants and animals, of which there is no evidence of either in the archeological record of the region, and he posits that these Indians participated in long-distance trade networks. The latter may be true of Hopewell groups living in the Midcontinent and other Woodland groups scattered across eastern North America, but an examination of the regional archeological record of Northeast Texas shows very little in the way of long-distance trade, much less evidence of participation of Texas Woodland groups in networks of trade. He is consistently off on his dates for periods or events of cultural significance, telling us East Texas Indians began to make their pottery about A.D. 500, when recent archeological work there has shown that pottery began to be made about 1000 years earlier, ca. 500 B.C. He also mistakenly views the Woodland peoples of East Texas as being influenced by "Hopewell Complex" groups living in the Ohio River valley area, while overlooking the stronger relationships that existed between the East Texas Indians then and other Indians living in the lower Mississippi valley that archeologists call the Marksville culture.

For some reason, he also posits that warfare in Woodland period times led to "the rise of a powerful chiefdom system" (p. 16), but he seems to be basing this on archeological evidence from other parts of eastern North America, rather than any evidence from Woodland period sites in East Texas. And finally, La Vere came up with the mistaken notion that a "thick, cord-marked style [of pottery]" spread "west out of East Texas" (p. 17) during Woodland period times. As far as I know, cord-marked pottery in East Texas is as rare as hen's teeth, if not rarer, and one would have to travel a long way west and northwest from East Texas to stumble on a cord-marked pot (e.g., to Amarillo).

La Vere does rightly point out how the adoption by certain Texas Indians of cultivated plants such as corn and beans constituted an agricultural revolution and helped lead to a very different way of life for these people (including the Caddo in East Texas) compared to hunting-gathering groups in Texas. But it must be said that corn was adopted and used in far West Texas and the Jornada Mogollon area (as early as 1200 B.C.) long before it was in East Texas, and La Vere's contention that a new variety of corn arrived in Texas around A.D. 700 that had a significant impact on aboriginal lifeways is simply speculation, at best. I do basically agree that by around A.D. 1200 (or perhaps a century or so later) that corn was "the lifeblood of the peoples of Northeast Texas" (p. 18), although I doubt that Caddo villages in the region in the mid-1500s were "surrounded by thousands of acres of corn" (p. 18).

I do not know why La Vere asserts (p. 21) that the Caddo cultural tradition began around A.D. 700 (see also La Vere 1998). The earliest and best-dated Caddo site in East Texas, the George C. Davis mound center on the Neches River in Cherokee County, was established in the "very late 800s A.D." (Story 2000:14). Additionally, he tells the reader (and repeats it several times in Chapter 5, "Resurgence in East Texas") that the Caddo at that time lived in cities, even going so far as to call them "huge cities" {p. 104), as well as towns and villages, but there were never any cities 'holding thousands of people" (p. 20) in the region, although there were many dispersed villages, hamlets, and farmsteads. I also do not know where the "medium-sized towns" were that La Vere states were present on the Angelina, Neches, Trinity, and Red rivers.

La Vere's discussion of the Pueblo cultural tradition in Texas is equally flawed. He mistakenly speculates that the Mogollon were "absorbed by the expanding Anasazi" around A.D. 1200 (p. 23). The Anasazi were located in the northwestern region of the Southwestern United States. The Puebloan cultural tradition in Texas was a period of cultural florescence in the Hueco Bolson area of West Texas when Jornada Mogollon groups lived in the area between A.D. 200 and about A.D. 1450. Similarly, he suggests that the sedentary farming communities along the Rio Grande from the El Paso area downstream to La Junta de los Rios were formed by Puebloan peoples "that migrated down the Rio Grande" (p. 24). That may be the case for the La Junta de los Rios pithouse and surface pueblo communities, at least in the sense that it is believed these communities can trace their origins to Jornada Mogollon peoples in the Hueco Bolson/El Paso area, but certainly is not an accurate characterization of the long developmental history of Formative period (ca. A.D. 200-1450) groups in the western Trans-Pecos.

When the book turns away from painting a picture of the Texas Indians living before contact with Europeans, I think it admirably fulfills its promise as a book about the history of these peoples. His Chapter 2 is an admirable synthesis of Indian lifeways in Texas in 1500 prior to the coming of Europeans, although I question his assertions that the Jumanos were "originally a Pueblo people who had migrated southward" (p. 29) or that the Yscani, one of the Wichita tribes, lived on the Texas Panhandle in 1500 and were "known as the Teyas" (p. 30). In the chapter, he effectively compares and contrasts different Indian societies and their descent systems, subsistence strategies, the world of women, the world of men, kinship, reciprocity, political authority, religion, exchange and trade, and the scale and place of warfare.

In continuing the narrative, La Vere uses key events in Chapters 3-9, such as the arrival of Europeans like Cabeza de Vaca (Chapter 3) and Luis de Moscoso (Chapter 5) in the first half of the 16th century; the establishment of missions (Chapter 4) and the impact of the introduction of European goods (such as horses) and diseases; the movement of Plains Indian tribes like the Apache and Comanche into Texas (Chapters 5 and 6); the disruptions of Indian lifeways by participation in the English and French deer hide trade and slave raiding (Chapter 7); and the coming of Anglo-Americans to Texas early in the 19th century (Chapter 8), as an effective way to introduce and discuss the effects of pivotal events on various Texas Indian tribes. This includes a discussion of the ethnogenesis of formerly disparate groups in Central Texas, some of them coming together to form the Tonkawa in the latter part of the 18th century, and the ways and means these Indians devised to stay alive and keep their newly formed social and cultural identity intact amidst an increasingly hostile world. One important way they apparently did this was by incorporating new ideas, new goods (i.e., horses, guns, glass beads), and new cultures "into their own worldview and social structure" (p. 58).

Most histories of the Indians of Texas end with the removal of tribes to reservations in Oklahoma, or after the last battle between a tribe and U.S. Army forces in Texas. In Chapters 9 and 10 of the book, however, La Vere continues the story of Texas Indian peoples to modern times, reminding us that "many people still consider themselves Texas Indians, and Indian people still live within the boundaries of Texas. And their disappearance is certainly not assured. What will happen in future centuries is not known, but history is not over" (p. 238). He tells us about the travails of Indians living on reservations in Oklahoma and Texas (the Alabama-Coushatta and Tigua), as the U.S. government actively worked to eradicate traditional Indian culture, and then broke up the reservations in a series of 1890s and early 1900s land allotments, believing this to be the key to insuring that Indians walked "the white man's road." From there, the U. S. Government instituted relocation programs and tribal termination policies in the mid-20th century, while also foisting reorganization policies (through the Indian Reorganization Act of 1934) on most of the tribes living in Oklahoma. Through it all, however, beginning in the 1950s and 1960s, "Indians began to experience a cultural, political, and economic resurgence" (p. 237) that continues today.

The Alabama-Coushatta and the Tigua had a different relationship with the U.S. government because their small reservations were, through a variety of historical circumstances, under the control of the State of Texas. That relationship with the state has in recent years been contentious because of land claims and casino gambling, and the Alabama-Coushatta eventually obtained trust protection from the federal government in 1985 because they were not happy with the administrative oversight of the Texas Commission for Indian Affairs.

The Texas Indians is a book well worth having for all those interested in the Native history of the Indians that have lived in the state of Texas. It tells a compelling story of the many different Indian tribes and groups that have lived (and continue to live) in Texas, especially for the period of time after A.D. 1520, with detailed presentations on the culture, religion, socio-political organization, kinship and descent systems, subsistence pursuits, and exchange and trade relationships of the Alabama-Coushatta, the Apache (including the Lipan Apache and Plains Apache), the Atakapas, the Caddo (including the Kadohadacho and Hasinai tribes), Coahuiltecan groups, the Comanche groups, Jumanos, Karankawan groups, the Kickapoo, the Kiowa and the Kiowa-Apache, the Tigua, the Tonkawa, and Wichita tribes. Although there are some bits and pieces of the story that La Vere tells that other anthropologists and ethnohistorians will dispute, it is nice to have one book to turn to that provides a solid and coherent introduction to the history and lives of Texas Indians. On the other hand, if the reader is looking for an introduction to the archeology and prehistory of Texas Indians, this is not that book.

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The Indian Texans, by James M. Smallwood. University of Texas Institute of Texan Cultures at San Antonio and Texas A & M University Press, College Station (2004). 150 pages.

Reviewed by Thomas H. Guderjan[1]

This volume is part of a series, *Texans All*, published by the Institute of Texan Cultures in San Antonio, as an upgrade to its previous pamphlet and book series dealing with ethnic groups in Texas. As I understand the intent for the *Texans All* series, the books are not necessarily meant to contribute new research or even be comprehensive treatments of their subject. Instead, the books are designed to provide broad based, accurate introductions to their subjects that are accessible to the general public. The collaboration with Texas A&M Press is a welcome movement towards broadening this accessibility. *The Indian Texans* is divided into only four chapters, which respectively deal with the archeology of Texas, the historic Indian experience and contemporary situation of Native Americans. This balanced treatment of the topic is written by a scholar who is also a Native American.

The first chapter, From Prehistory to Foreign Invasions, would be of most interest to Texas archeologists. Unfortunately, it is so poorly executed as to keep the book off most archeologists' shelves. The chapter opens by telling us that Texas Indians have been here "at least 37,000 years ago, perhaps even earlier," a clear reference to the long discredited dates of hearths where coal was burnt in North Texas that were excavated in the early days of radiocarbon dating. In the same paragraph, we learn that the Caddos were "great farmers" and the Karankawas and Coahuiltecans were both "coastal tribal groups." I am not sure what a "great farmer" is, but I am sure that the Coahuiltecans were not a coastal group. Further, despite the statement in the forward that one of the justifications for the new series was the new information about cultural groups in Texas, there is only a passing reference to Bob Ricklis's volume on the Karankawas. In the next pages, we see discussions of Midland Minnie, the "8,000," or "18,000" or "37,000 or more" year old "first mother of Texas." Yes, the forward to the book is accurate and archeologists do know more that they did in the 1950s and 1960s. Unfortunately, the author has not read much of it.

For example, there is a discussion of the first excavations at Bonfire Shelter from the 1960's, but no mention of the more recent and highly important excavations at the site, despite the fact that artifacts from the excavation are even in the Institute's permanent exhibit. The laundry list of what the author does not discuss about Texas archeology could go on, but it is enough to say that this entire discussion has not been the state of the art since 1968, when the Institute of Texan Cultures first opened its doors. Also, in a volume meant to reflect new information, I was surprised to see a citation of Worthington's 1959 volume on the *Indians of the Southwest.* I was even more surprised that H. Marie Wormington apparently changed her name to "Donald Worthington." This is one of several technical problems with the editing of the citations.

Quite happily, the rest of the volume is a substantial improvement over the first section as the author's knowledge is on better footing. Even so, the discussions of the cultural groups at contact are over simplified. For example, the Jumanos are depicted as being a single group contacted repeatedly from 1535 to 1684. The very real debate that these were actually more than one group and the relevant archeological data, however, are not discussed or mentioned. The Tiguas are portrayed as having fled the Pueblo Revolt of 1680 to El Paso. However, the population numbers are muddled and confusing and no mention is made of the debate as to whether they fled the north or were Spanish captives. On the positive side, the Tonkawas are accurately depicted as being recent immigrants from the north rather than long-term Texas residents. However, the source material for this information is DeVere's *Life Among Texas Indians* and a web site rather than T.C. Campbell's original ethnohistoric work. The reliance on such secondary sources is another consistent fault with the book. It both exposes limited scholarship and perpetuates old myths. Another example is the discussion of Comanche horse-herding which is cited as deriving from an older version of the Institute of Texan Cultures pamphlet series co-authored by Carol Canty and myself, when it appropriately should be credited to Canty's innovative master's thesis at the University of Texas at San Antonio. Despite such issues, the second chapter of the book, Invasions of Europeans and Americans, is generally an accurate and useful treatment.

The final chapter, From Survival to Revival, presents the contemporary situation of Native Americans in Texas and is the strength of the volume. The author, a participant in contemporary affairs, offers new information and insight, particularly in regards to the Indians living today in urban settings. There are failings here, too, however. The first several pages uncritically use interview material from the Institute's very powerful film on urban Indians in Texas. One woman discusses difficulties with moving from rural Oklahoma to Dallas in cultural terms. Critics of the film see her as a dysfunctional individual whose problems have little to do with her ethnicity. Another individual, Greg Gomez, is cited as remaining culturally Indian in a modern urban environment. It is unfortunate that Gomez's later activities in the controversial world of Napoleon Chagnon's research with the Yanamamo people of South America were not mentioned. Particularly useful, though, are discussions about urban life in Dallas and the updated information about the status of Kickapoo and Tigua life and current political issues.

In the end, *The Indian Texans* shortcomings far outweigh its contributions. I suspect this was contracted to Smallwood with a size limitation. While that makes for a short book, it also makes for a not terribly useful book. As a discussion of the prehistoric archeology of Texas, it will be far eclipsed by Pertulla's new *Prehistory of Texas* (2004, Texas A&M Press) edited volume. Moreover, because the discussion of the historic period is not as strong as Newcomb's original *Indians of Texas*—much less DeVere's new *The Texas Indians*—it perpetuates much inaccurate and incomplete information. This is a function of both limited scholarship and the length of the text. However, the last chapter is its saving grace. No one else has published an accessible discussion that deals with contemporary Indians in Texas. This is an area in which the Institute of Texan Cultures is uniquely positioned to make great contributions and I hope they continue to do so.

Does it belong on your bookshelf? Yes, probably. But don't loan it out to anyone looking for anything but the quickest over view of the subject and also hand them copies of Newcomb, DeVere, and Pertulla's books.

NOTE

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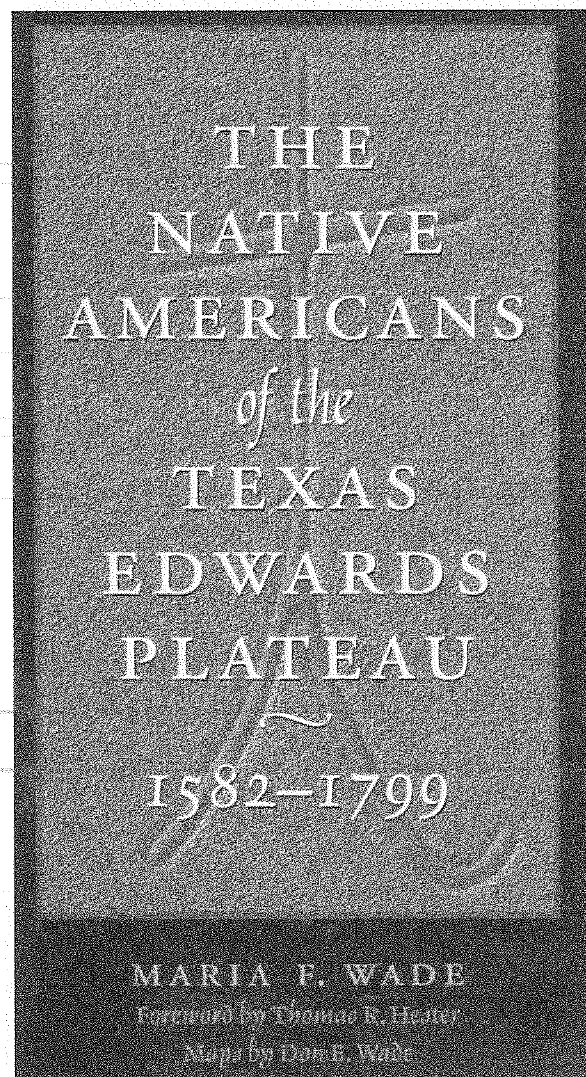
The Native Americans of the Texas Edwards Plateau, 1582-1799. Maria F. Wade, University of Texas Press, xxvi-293 pages, 2003

Reviewed by Nancy A. Kenmotsu

Maria Wade's book should be required reading for any archeologist, historian, or lay reader who is researching or simply interested in the Native Americans encountered in Coahuila or the western regions of the Edwards Plateau during the early historic era. The book is based on her dissertation, and "represents a commitment to unravel Native American history" in and around west central Texas (p. xv). Whether or not she achieves that goal, she clearly does illustrate, in many ways, that the Native Americans encountered by the Spanish were acutely aware of the changes taking place in their world as a result of European settlement and actively sought to adjust to the changes. She notes (page xx) that "archival information about these groups is fragmentary, disjointed, and reflective of the lack of value attributed by Europeans to the social and cultural practices of these groups." I think that she succeeds in showing that Iberian disdain as she demonstrates the Spaniards' folly in establishing the Mission of Santa Cruz de San Saba and the Presidio San Luis de las Amarillas.



> At issue is the assumption of the Spaniards that they could be friends with everyone regardless of Native internal enmities, as well as the political arrogance of making new alliances without informing former allies, especially when the new alliances were made with their bitter enemies. Such behavior would not be tolerated in any political or military setting; why would it be countenanced by Native Americans? (p. 187).

As she points out, the Apaches for whom the mission and presidio were established, had many enemies and those enemies were not pleased that the Spanish had established a place for their protection and instruction. A few pages later, she slams home this point, saying "There was no perfidy in the attack [on San Saba]. The intentions of the Native Americans were clearly displayed: they were attacking the allies of their enemy, the Apache" (p. 190). This discussion alone makes the book an important addition to one's library.

But, the book is also important for its translations of selected documents. In her *Introduction*, she lays out her methods in seeking specific documents and copies of them made by various scribes (pp. xx-xxii). The use of multiple copies of the same document is rare, but as she shows, it is absolutely critical to avoid the pitfalls when one relies on a single version or translation. Again, this aspect of her book makes it a serious, important book that should be used by archeologists and historians dealing with the 16th through the 18th centuries.

In Chapter One *(A Move to Settle)*, Wade provides the historic context for why certain groups—particularly the Babane and Jumano—wanted the Spanish to establish a pueblo for their people. This is a desire that is echoed throughout much of the book. These and other Native groups were brought south to Saltillo and elsewhere to serve as inexpensive labor on haciendas and silver mines under the *encomienda* system. Many of those brought to the south did not survive the experience. Aware of the pueblo that the Spanish established for the Tlaxcaltecan families, other groups sought the same privilege. Wade succeeds admirably in presenting the native agenda in this chapter. She talks about how "faced with the decimation of the kinfolk, the remaining Babane and Jumano and their allies attempted to reach an agreement with the Spanish authorities" (p. 21). In these and other passages, she hammers the point that natives were not simply members of a group, but rather individuals with ideas and points of view, and they tried desperately and repeatedly to effect changes during the colonization process.

Chapter Two (*The Bosque-Larios Expedition*) presents her translation of the diary of the 1675 expedition into the general region of the Lower Pecos. Where the text of the diary she used was incomplete, she employed Eugene Bolton's translation. One of the excellent points of the book is that she describes differences between versions of the same document and then tells the reader which version she believes is more accurate and why. Hopefully, future translations will follow her lead, as it has long been a problem in the literature; poor translations or mistakes made 200 years ago by scribes have resulted in misinterpretations. She also interprets the actual route. Thus, the text is accompanied by maps illustrating the route take during this expedition and the route of the1683-1684 expedition of Mendoza to the Edward's Plateau (Chapter 4). The maps highlight where she believes specific camps and water crossings of two major expeditions are located. But, these maps are problematic. On the one hand, it is nice to see route interpretation. All too often it is not included. On the other hand, unlike her comparison of different versions of the same document, she offers no explanation for how she determined the loci of camps or water crossings, just a footnote to inform the reader the name of the map that she used to select the location. Since the maps she employed have a scale of one inch equals 250,000 feet, they are insufficiently detailed for the reader to understand her selection of locations. Moreover, she offers no clues about why she chose a particular location. Are there landmarks that point to her selection of this place? Does archeological data that might support her choice? In a scholarly work, this is a significant flaw. And, frankly, I would argue, in some cases, that her choices are simply wrong.

Maps aside, her introduction to the 1675 expedition and her translation are very well done. She spends time in the introduction on the issue of multilingualism, something that archeologists have a tendency to overlook. There is ample evidence that native groups at contact could speak several languages and, as she notes, recognition of this fact is "crucial to the understanding of the. . . relationships among the Native groups" (p. 25).

Chapter Three (*A Move to Revolt*) discusses the broad events that led to a series of major Native revolts caused by settlement, mining operations, and missionary activities. She also provides an overview of the individual missions in Coahuila, when they were established and where, and where they were moved.

Chapter Four (*The Mendoza-Lopez Expedition, 1683-1684*) is the centerpiece of the book. This trip was a major expedition into the heart of Texas, and resulted in a great deal of information about the Edwards Plateau as well as Native groups between El Paso and west central Texas. The diaries also illustrate relationships among those Native groups. Here, she carefully lays out the multiple versions of the diaries she is using and who has used them in the past. As she presents her new translations, she notes other translators who have interpreted words, phrases, or other items differently than she, and thoroughly explains her interpretation. I applaud her. She also provides a nice introduction to the purpose behind the expedition and to the men in the force that traveled the route. Given the renewed interest in the early historic era and the Late Prehistoric among Texas archeologists, especially with recent Texas Archeological Society field schools at Spanish contact sites, this chapter provides a wealth of data about Native Americans at contact. The

Caddo (or Tejas) are mentioned in the chapter, as are many other groups. Wade ably illustrates alliances and enmities with her translations, information that should be employed by archeologists but is often ignored. For example, she notes that one version of the diaries state that the "Huicaciques, Ayelis, Aguidas, Amichienes, Tujojos, Amomas, Manaques, Durjaquitas, Chuncotes, Anchimos, Colabortes, Unotjitas, Chinsas, Quaysabas, Payubunas, Pahuachianes and others...all belonged to the Tejas" (p. 116). As archeologists, we need to pay attention these data. Can we identify any of these groups from other early documents? Are the Ayelis the Ais of San Augustine area? If so, how were they aligned and with whom? These types of early documents may allow us to better understand how Caddoan and other alliances functioned.

As noted, she includes route maps, and, like the map for the Bosque-Larios expedition, offers no justification for its conclusions. Other than El Paso and La Junta, I suggest the maps be ignored. Another problem that pervades this chapter as well as Chapter eight (*Ethnohistory and Archaeology*) is the lack of acknowledgement of researchers who have investigated selected groups that were among the those presented in this book. For example, Kelley (1952, 1986), Sholes and Mera (1940), Hickerson (1994), Kenmotsu (1994, 2001), and others have published their research on the Jumano, but none of these is noted or even mentioned even though the chapter is largely focused on the Jumano. On page 74, she speaks of the Cuitoa, Excanxaque and Ayjado, but fails to mention that Newcomb and Campbell (1982), Vehick (2002), and others have also studied these groups, their home territories, and their alliances with other groups. I have no problem if Wade disagrees with other researchers, including me, about our conclusions, but simply ignoring those conclusions as if they never existed is a significant drawback to her achievements in this book. It makes one question her conclusions about the groups.

Chapters Five (*A New Frontier: Tierra Adentro, Tierra Afuera*) and Six (*Hard Choices: The Apache, The Spaniard, and the Local Native Groups, 1700-1755*) present timelines of "events that occurred in various areas of northern New Spain in chronological order. . . and allow connections between event to be perceived" (p. 137). It is an interesting approach and the timelines achieve their goal in that they make the reader take the broader perspective. Rather than focus on a single expedition or event, her timelines focus the reader on the relationship between events at La Salle's ill-fated colony and events south of modern Presidio, Texas. I was bothered, however, by her asides that identify specific locations (a rancheria located near Langtry, Texas [p. 143]) without any supporting proof, and by some of her conclusions that are problematic (e.g., that the French traded "red dirt [hematite]" when hematite is naturally abundant in East Texas [p. 142]). Nonetheless, if the reader simply pauses to consider how these events may have played native groups and Spaniards against one another, the timelines succeed fairly well.

Chapter Seven (*The Price of Peace: Friends, Foes, and Frontiers*) deals with the Apache bands and their relationships with the Spanish and other Native groups, noting:

> None of the Apache missions was successful, because for the Apache, missions were temporary and expedient solutions to a problem. The Apache were not fickle; they were politicians. They played the game that was proposed to them to their best advantage (p. 183).

Again, she forces the reader to consider a native point of view.

Her concluding two chapters (*Ethnohistory and Archaeology* and *Weaving the Threads*) are relatively short, and each reader will have to determine if she adequately presents evidence to support her conclusions. I certainly disagree with some of her conclusions. For example, she states that sites 41CX3 and 41CX4 were the camps of the Gediondo in 1683 and were also the natives camps seen by Castano de Sosa in 1594. The only evidence she offers that this are the sites is that they cover a large area. I find that argument highly questionable. Neither site has been subjected to subsurface excavation. The only Late Prehistoric material from the sites are Bonham and Perdiz arrow points. Given that Pandale, Langtry, Marcos, Shumla, Frio, and Marcos dart points were also found on the surface, it is equally likely that the sites are essentially Archaic period campsites. Moreover, the diary of Castano de Sosa (1871) is vague about the exact location where the natives were encountered and the name used for the natives was "Despeguan" which has no recognizable linguistic correlation with Gediondo. While I found these types of errors as unsettling as her identifications of expeditionary camps and lack of references for previous research, overall the book has many things to commend it. Wade admirably presents, to the extent possible, the native point of view, illustrating how individual native leaders sought to exact a better future by negotiating and/or warring with the Spanish. She also shows how those efforts waxed and waned over time, and how native alliances fluctuated based on events near and far. The book is particularly recommended because of her translations of two key expeditions into the western Edwards Plateau, an area of great interest to Texas archeologists.

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