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TEXAS ARCHEOLOGICAL SOCIETY

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BULLETIN

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Editorial

A new editor may or may not introduce a policy of change. This one likes the Bulletin or he would not have accepted the position of editor. Some of the most admirable qualities of the Bulletin are its broad coverage of topics and geographic areas, the enthusiastic participation of the amateurs, and the standards of quality in printing of text and illustrations.

There are, however, a few areas in which improvements could be made. These are mentioned, not so much in criticism as in hope that we might be able to do something about them. One area in which changes are needed is in terminology. Knife, blade, and focus are terms which are frequently misused. Knives, in current usage, may be anything which appear to be suitable for cutting regardless of shape or process of manufacture. Blades in 90 percent of the world are elongated, parallel-sided pieces detached from a core. In the Southwest, however, they may be this, or they may be the front half of an arrowhead or they may be a biface too large to haft as a projectile point. A focus is a concept that should be refined so as to be in some way compatible with the reality of social organization.

In regard to written reports there are several problems. Perhaps the most trying of these is the lack of understanding by the excavator-author of his responsibilities. Here the professional is as guilty as the amateur. I have a couple of comments. First, it does not further communications for each author to devise a brand new system of classifying scrapers and "knives." And second, a conclusion to a report must be more than a summary.

One further thought at this time concerns the aims or objectives of an archaeological excavation. It is not enough to classify a site as belonging to a particular focus. Classification is not a goal but a step toward something more important. This is particularly true when most of our foci are defined almost entirely in terms of projectile points. We must try to recover more material on behavior.

JOEL L. SHINER

Southern Methodist University
Dallas, Texas

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Cad Mound: A Stone Bead Locus in East Central Louisiana

JON L. GIBSON

ABSTRACT

Products of the various stages of stone bead manufacture and associated tools have been recognized from the Cad Mound site in southern LaSalle Parish, Louisiana. These have made possible the reconstruction of industry techniques and processes. Archeological context of the site, stratigraphic position of the beads, and relative dating of the industry by river channel correlation *ca.* 1300 B.C. indicates the antiquity of the process. It is suggested that Cad and other similar sites in the Catahoula Lake Basin participated in the Eastern Archaic horizon.

INTRODUCTION

During the course of an archeological survey of Indian sites in LaSalle Parish, Louisiana in 1963-1964, an interesting stone-working technique was discovered. Surface collecting of the Cad Mound site, revealed numerous pieces of stone showing evidence of pecking, grinding, sawing, drilling, and polishing. These were recognized as products of the various stages or steps in the manufacturing process of stone beads. The completeness of the bead series, and consequently its value in illustrating the procedure and techniques of manufacture, was deemed noteworthy. Rather than await detailed analysis of the survey work, which has subsequently indicated a need for intensive excavation at several sites, this short treatise has been prepared.[1]

Helpful correspondence was had with James Ford, Florida State Museum, Clarence Webb, Shreveport, Louisiana, and R. King Harris, Southern Methodist University. John Rovik, Louisiana State University School of Geology, kindly identified stone materials. Thanks are also due to Mrs. J. E. Allbritton, LaGrange High School, for her critical reading of this manuscript. Several initial drafts of this paper were typed by Claudia Gibson, and the final copy was prepared by Mary Beth Gibson.

LOCATION AND PHYSIOGRAPHY

Cad Mound and associated village midden are located in southern LaSalle Parish, about six miles southwest of the small settlement of Walters, Louisiana. The site is situated about two hundred yards south of Indian Bayou in the large, poorly drained, periodically flooded sump area known as the Catahoula Lake Basin.

[1] A preliminary report of the LaSalle Parish survey has been published by the author (Gibson 1966: 193-237).

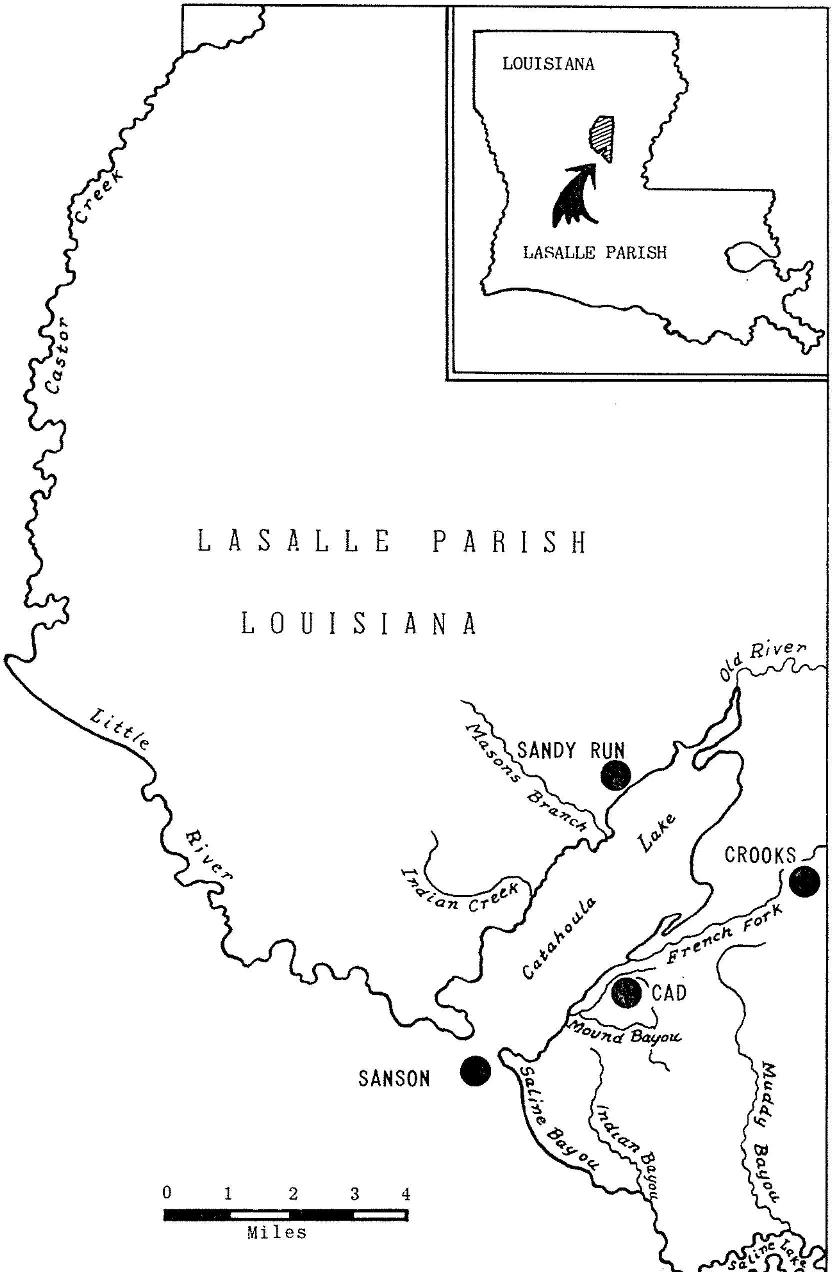


FIGURE 1. Archaic sites in the Catahoula Lake Basin of LaSalle Parish, Louisiana. Inset shows location of LaSalle Parish.

Physiographically, the site area is very complex; a reflection of the dynamics of structural faulting and of stream development.[2] Cad itself is located on the first of an old series of crescentic ridges representing the bank-line levees of an ancient meander. Size of the scar, approximately three-quarters of a mile across, indicates that it was probably formed by a stream the size of the Ouachita River or the Arkansas River. Implications of this observation will be discussed in more detail later.

Directly adjacent and partially overlapping the backslope of the old levee system is a strand line beach composed of coarse white sand. This beach, one of a discontinuous series of such phenomena surrounding the bed of Catahoula Lake, has been formed by sediment deposition during pauses in the lowering of the lake level.

A small conical mound, formerly sixty feet in diameter and six feet high, is present at the site. It has undergone considerable alteration since 1961, due primarily to land clearing operations. The mound was not excavated, but a three inch auger hole was put down in the west slope of the mound. Rather homogeneous reddish-brown sandy silt was encountered throughout with no evidence of superimposed mantles or other features. Coarse sands of the beach ridge containing both Marksville and Coles Creek components were found underlying the mound base. This indicates that the mound was constructed after deposition of the beach and puts a post-Marksville date on the mound erection.

STRATIGRAPHY

Limited testing of the Cad site in the fall of 1963 revealed a rather deep midden. About twenty-four inches of black organic sand filled with refuse of the Coles Creek period overlay a lower stratum of yellowish brown silty clay containing Marksville pottery in the upper six inches and flint debitage in the lower twelve to twenty-four inches. A six inch zone of yellow sand mixed with black soil and fresh-water mussel shells separated the strata. Although no beads were found in the lower stratum, this is presumably the layer in which they occur stratigraphically. Horizontal distribution of the products of bead manufacture support this assumption. Beads have been found only where the post-Marksville period sands of the beach ridge finger out and the silts of the old levee system reach the surface. Lending additional weight is the fact that some beads have ironstone accretions adhering

[2] For a history of the development of the Catahoula Lake Basin, the reader is referred to H. N. Fisk's monograph, Geological Investigations of the Alluvial Valley of the Lower Mississippi River.

to the walls of the perforations. Ironstone nodules and lenses are known only from the lower midden stratum.

SUMMARY OF SITE COMPONENTS AND ARTIFACTS

Cultural material characteristic of Archaic, Marksville, Coles Creek and Plaquemine periods was found intermingled on the surface and vertically distributed in the midden cuts. Potsherds were predominately *Coles Creek* types; *Coles Creek Incised, Greenhouse Incised, French Fork Incised, Mazique Incised, Chevalier Stamped, and Rhinehart Punctated.* Occasional sherds of *Plaquemine Brushed, Manchac Incised,* and *Catahoula Incised* were present, indicating a light Plaquemine occupation. *Marksville Plain, Marksville Stamped, Marksville Incised,* and *Marksville Zoned Punctated* types attested to the presence of a minor Marksville component. This summary of types agrees well with that listed by Fisk (1938: 7) of ninety-eight percent *Coles Creek* types and two percent *Marksville* types from Cad Mound.[3]

The Archaic component here was represented by several artifacts characteristic of the Eastern Archaic period (Griffin 1952: 355-356) plus some evidentally local traits. The polished stone inventory included, in addition to stone beads: a bar gorget, a quartzite "tablet," a geniculate or "figure-7," a notched "net sinker," a small granite maul, a claw pendant of jasper, celt fragments, teardrop shaped plummets, and bar weights. Other lithics were large choppers, several varieties of scrapers, gouges of the *Clear Fork* type, and dart points of the *Gary, Kent, Epps, Delhi, Macon, Marcos,* and *San Patrice* types. A microlithic industry of polyhedral cores, retouched and use-retouched flakes, double-backed flakes commonly known as "Jaketown perforators," edge-abraded flake saws, and peculiar notched flakes rounded out the artifact inventory of this component.

Although most of the preceding items are known for the Poverty Point period (Ford and Webb 1956), I prefer to refer to this assemblage as Archaic because of the conspicuous absence of baked clay objects, steatite vessel fragments, and *Motley* points. It goes without saying that the full artifact inventory present at the Poverty Point site may not be expected to occur *in toto* at many other sites, provided of course that Poverty Point does represent the aggregation of products of many widespread subsidary or satellite villages. Enough sites are now known from the area to postulate a localized Catahoula Lake Archaic development which perhaps slightly preceded the classic

[3] This breakdown was of a collection of sherds secured from Cad by J. A. Ford in 1933 in preparation for his analytical report of Indian sites in Louisiana and Mississippi (Ford 1936).

Poverty Point manifestation and which may have added certain increments to the Poverty Point trait list. Alternative explanations of the Catahoula Lake development are that it participated in the diffusion of Poverty Point traits from the type site, and/or it was simply a marginal manifestation tucked away in the Catahoula Lake Basin. Only more investigation will elucidate this problem.

STONE BEAD MANUFACTURING

All the steps of the stone bead manufacturing process were found at Cad. The process involved an intimate knowledge of pecking, grinding, sawing, drilling, and polishing techniques. Materials utilized were vari-colored quartzites, predominately shades of red and purple, red jasper sometimes banded with black, and brown chert. Tan and green siltstones occasionally provided raw materials. Over sixty percent of the worked stone was quartzite. Another twenty percent was jasper, with chert, siltstone, and limestone furnishing about equal remaining percentages. All of this material was available locally in the hills north and west of Cad, from graveliferous terrace outcrops. A very small amount, probably less than two percent, of non-local stone was present.

The initial step in processing the stone involved rough pecking and grinding of the edges of the selected pebble in order to achieve a rectanguloid shape. Often pebbles occurring naturally in this general shape were used, thereby omitting this shaping step. Quite frequently even smaller pebbles were selected which not only enabled the maker to by-pass initial shaping but also sawing. For convenience the products of this initial shaping step will be termed "blocks."

The roughly shaped "block" was then cut by flake saws. Depending on the size of the block, one or two lines were cut into one face and one end of the material usually no deeper than 2 mm (Fig. 2). A blow from a hammerstone, perhaps concentrated along the plane of a punch or similar instrument, was then directed about the midpoint of one of these grooves which served to diffuse the energy of the blow along it and through the block, breaking off smaller rectanguloid "blanks" (Fig. 3). Accidents, probably results of misdirected percussion strokes or faulty material, occasionally did occur as evidenced by block fragments (Fig. 2, f, g). Virtually the same technique is used today to trim glass.

Blanks were subjected to further grinding until tubular or barrel shapes were obtained (Fig. 4, a-d). One small partially finished bead was prism-shaped (Fig. 4, e). Two other blanks were rather rectangu-

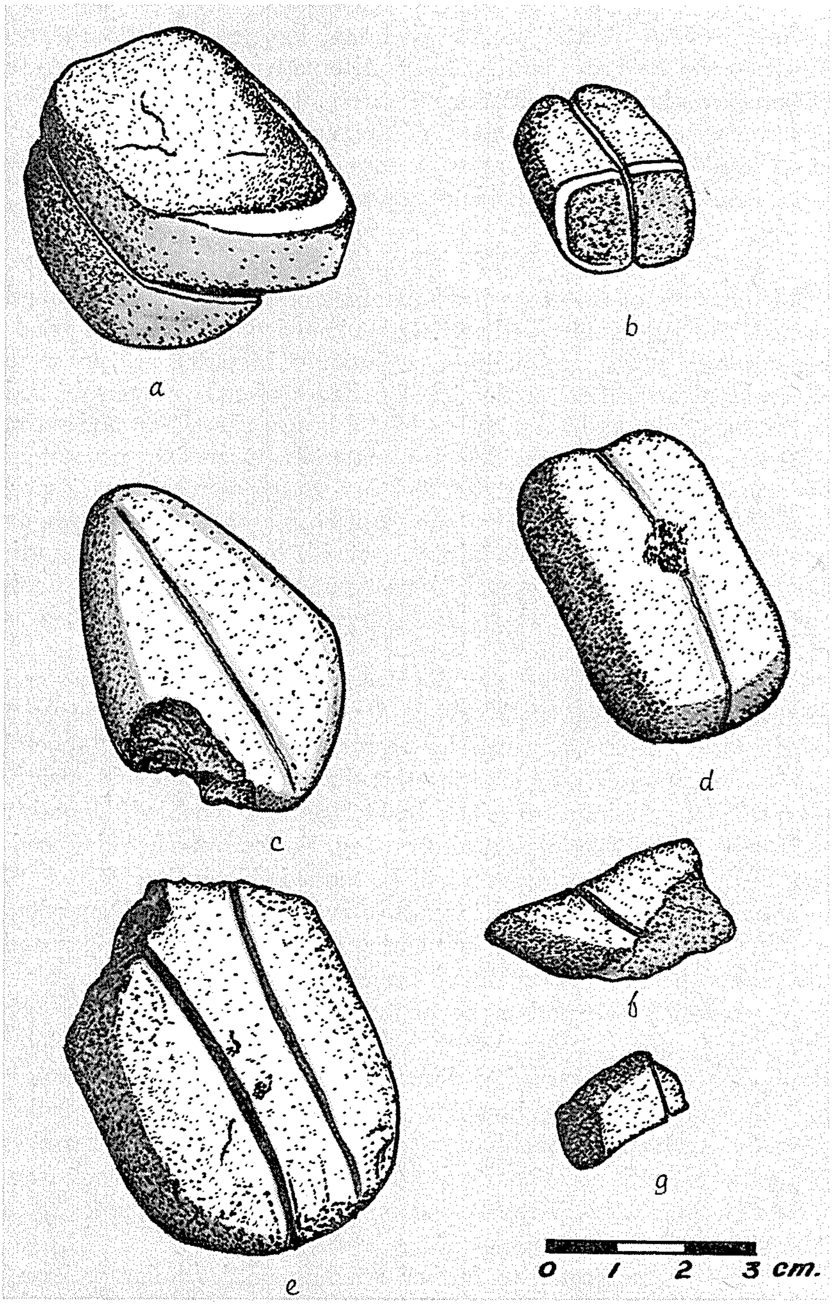


FIGURE 2. Bead Blocks. a-b from Sanson Place, Rapides Parish, Louisiana. c-g from Cad Mound.

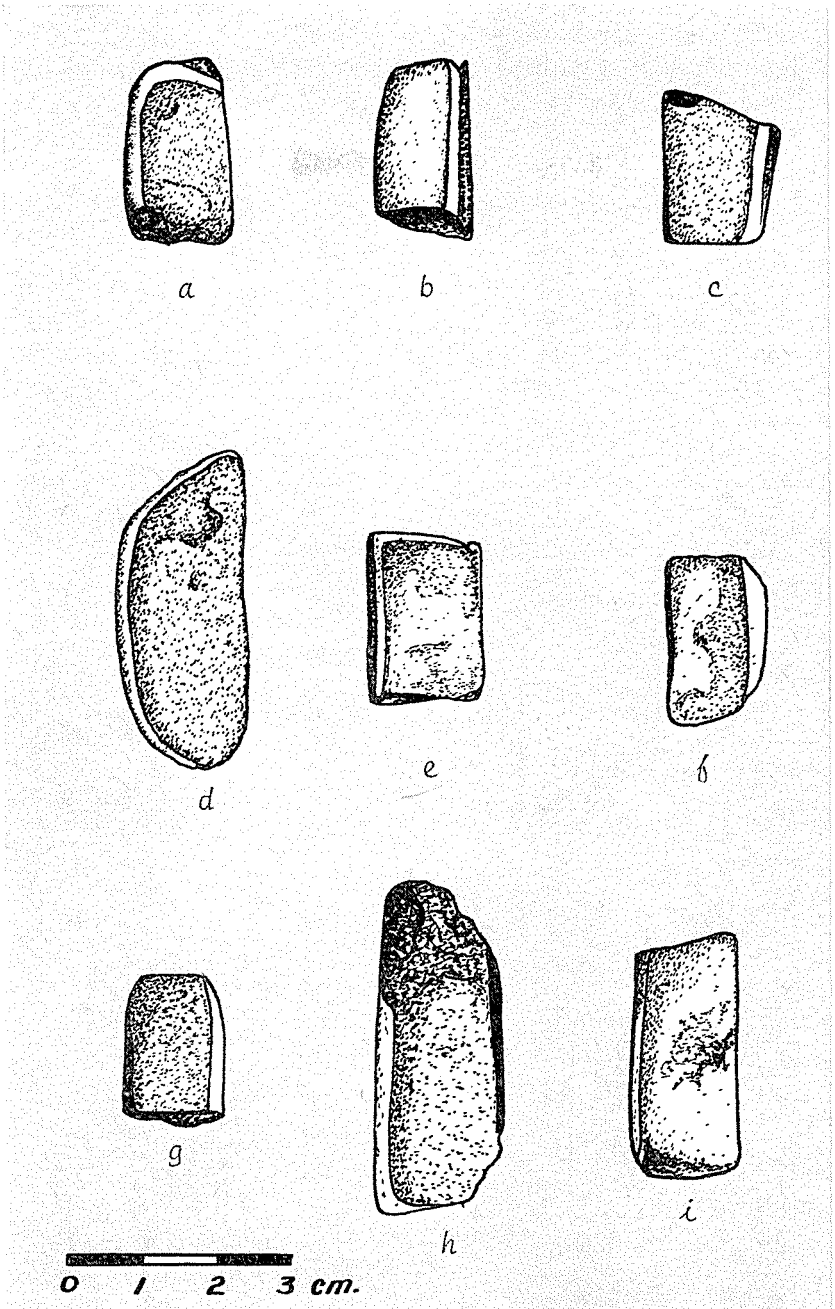
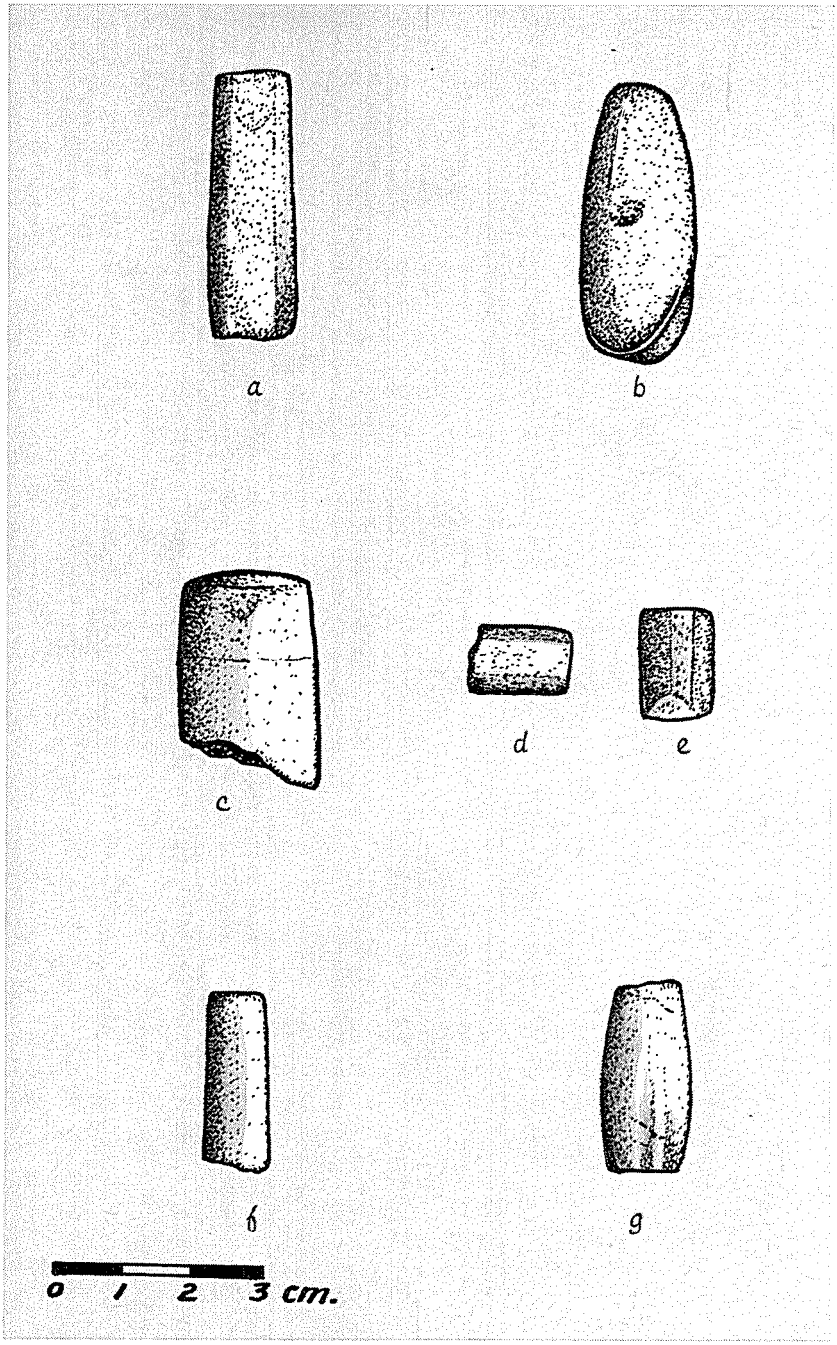


FIGURE 3. Bead Blanks. a-i from Cad Mound.


a
b
c
d
e
f
g
0 1 2 3 cm.

lar in cross-section, but they may have been discarded before further shaping was completed.

Holes drilled in the tubular blanks were cylindrical. Conical countersunk perforations were apparent in one finished bead (Fig. 4, f), but they had been almost completely masked by later cylindrical reaming. Small depressions, apparently drill seatings, pecked into both ends of several blanks prior to drilling suggested that conical counter drilling was concomitant with cylindrical drilling. James A. Ford (personal communication 1966) related that these drilling methods posed a temporal difference, with counter-drilling earlier, and cylindrical drilling later. However, evidence from Cad and from Indian Knoll did not substantiate this assumption. Holes were drilled with a rotary motion of the drill for encircling striations etched into the bore wall of the bead were often visible.

Subsequent grinding and polishing completed the beads and often gave a low lustrous finish (Fig. 4, f, g). Finished beads ranged from 30 mm. to 14 mm. in length, and 13 mm. to 7 mm. in maximum diameter. Perforation diameter ranged from 6 mm. to 2.5 mm. and was usually slightly tapering. Tubular and barrel shapes were the only forms found, but unfinished blanks suggested a prism form and possibly a long rectangular form. Beads observed in private collections from Cad were flattened cylinders, oval in cross-section, but the seemingly desired shape was some variety of the cylinder.

The cutting process was duplicated in laboratory experiments. Several pebbles of limestone and quartzite were sawed with flakes. The flake saw after use had polished and abraded edges similar to aboriginal saws recovered from Cad. The blanks produced by striking the sawed groove by sharp percussion blows were also similar. The process was very time-consuming, and saw edges became dull and useless very quickly.

TOOLS

The saws were "lamellar" flakes or blades of hard cryptocrystalline chert detached from prepared cores. However, considerable use was also made of cortex flakes and other relatively large pieces of debris (Fig. 5). Sizes varied from 38 mm. to 16 mm. in length and width from 22 mm. to 14 mm. One side, two sides, or even all the sides were abraded, polished and nicked with fine use scars. On all the observed

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FIGURE 4. Tubular Blanks and Finished Beads. a-b, d-g from Cad Mound. c from Sanson Place. d-e partially finished beads with incomplete perforations. f-g finished beads.

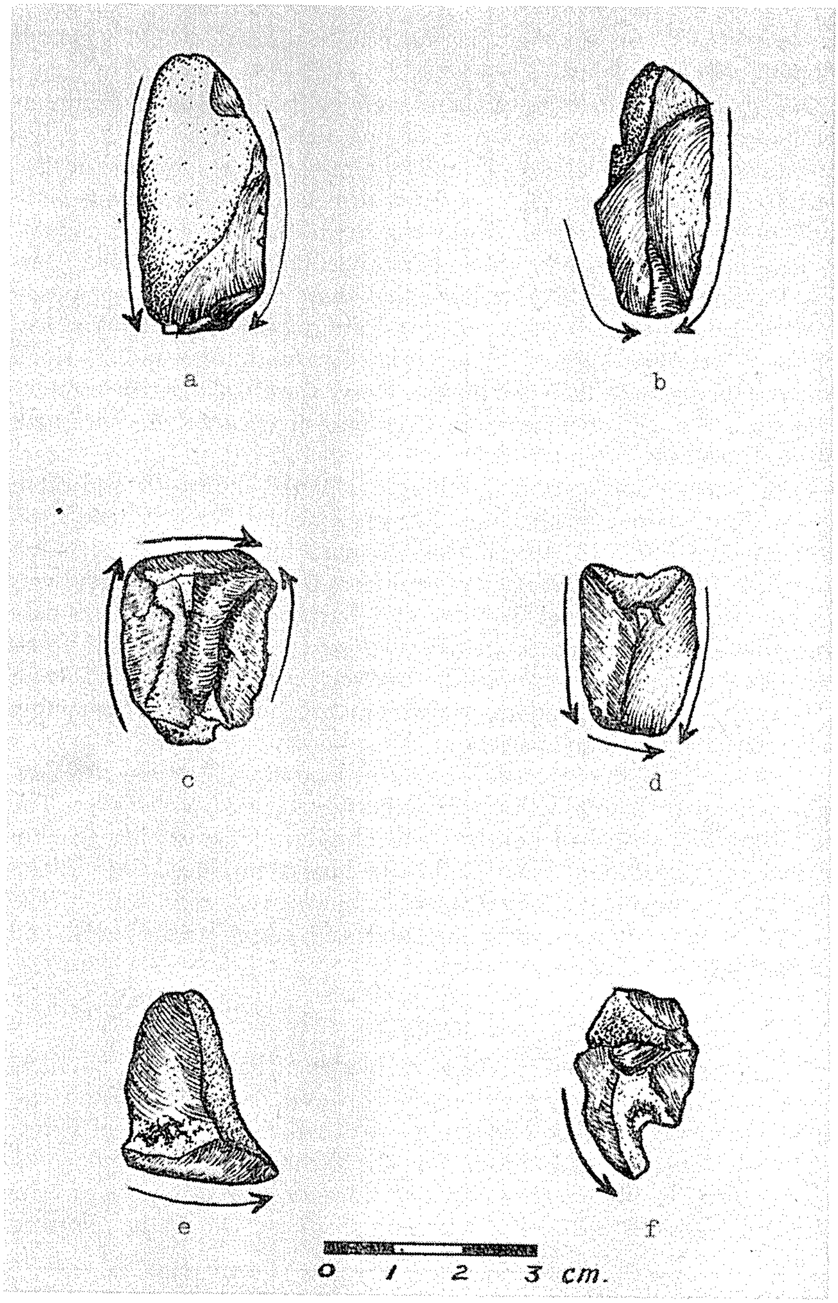

FIGURE 5. Flake saws. a-d symmetrical flakes. e-f irregular flakes. Length of arrows shows extent of utilized edge.

specimens, the utilized edge was V-shaped or slightly rounded in cross section. No attempt was made to break down these "saws" into styles, as has been done by Wheeler (1965: 19-20) in his description of similar tools from Wetherill Mesa. It is sufficient to say that the flakes were "saws" used for cutting bead blanks from prepared blocks.

Both conical and cylindrical drills were employed. These tools were not represented in collections from the site, which may suggest that they were made of a perishable material, utilizing sand as an abrasive. Webb (1946: 269) described the drilling process in atlatl weights from Indian Knoll which was identical with the one used at Cad and probably involved similar tools (cane or reed). However, flint drills which Webb associated with conical perforations were not recognized at Cad. Annular grooves in bore walls of some beads from Cad may be indicative of repeated introduction of sharp, fresh, cutting sand into perforations. However, it may be that sand grains trapped between the bore wall and the soft drill scratched these lines and is not indicative of the "cutting-cleaning-cutting" process.

The other tools necessary for bead manufacturing, hammerstones, were found at Cad. These undoubtedly served a dual purpose as striking instruments and as anvils. They are typically chert or quartzite pebbles with battered edges and pitted faces. Several Catahoula sandstone hones found at Cad were probably the abrading and polishing mediums.

STONE BEAD DISTRIBUTION IN LOUISIANA

Spatial distribution of stone beads in Louisiana gives full credence to the fact that most alluvial surfaces in the Lower Mississippi Valley were too geologically recent to have supported Archaic occupancy (Haag 1961: 317-323). William G. McIntire (personal communication 1966) found no beads in his extensive survey of Coastal Louisiana, although he theorized that Archaic components did exist (1958: 53). Likewise, Sherwood M. Gagliano (1963: 105-132) in his extension of the coastal survey to preceramic sites of the Pontchartrain Basin and the terrace lands of the Florida Parishes found no evidence for such a lapidary industry. Recently reported Poverty Point sites in this area (Gagliano and Saucier 1963: 326), yielded no beads; indeed, their conspicuous absence was noted by the authors.

Nevertheless, stone beads are known from a few sites in geologically old areas in South Louisiana, but they are certainly rare. One fragmentary barrel-shaped bead was recovered from the *Tchefuncte* component at the Lafayette Mounds (Ford and Quimby 1945: 23). Moore (1912: 507; 1913: 72) reported jasper beads from a site in St. Landry

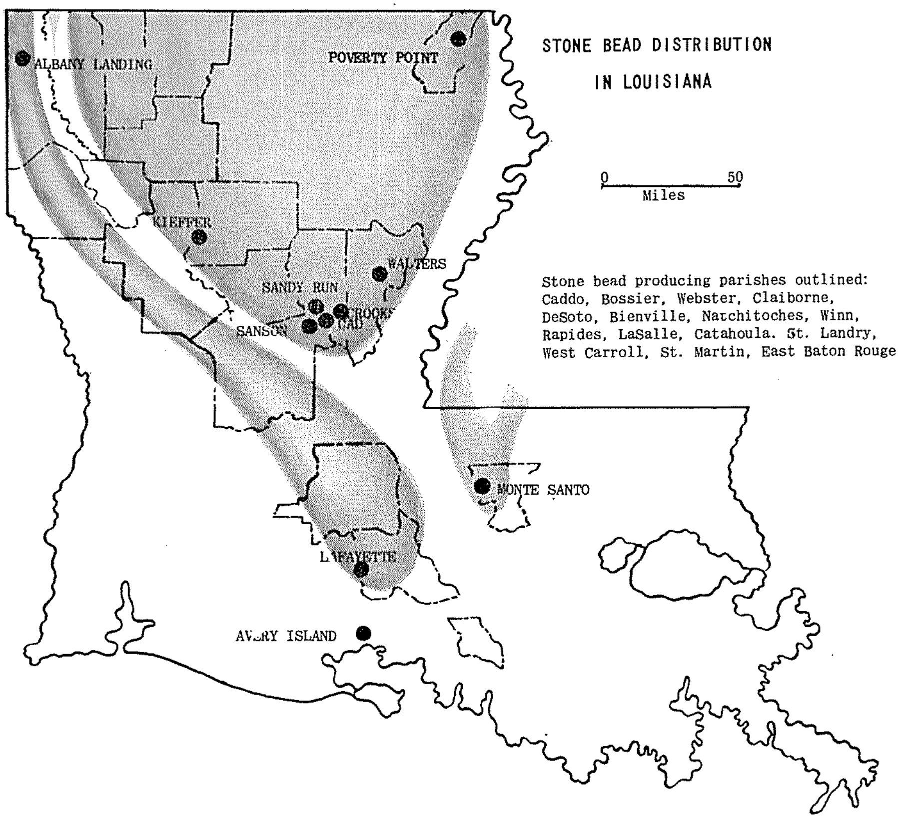

FIGURE 6. Stone Bead Distribution in Louisiana.

Parish and one in Rapides Parish, but archeological contexts are not fully understood. The recently excavated Monte Sano Mound in East Baton Rouge Parish yielded a red jasper owl effigy bead or pendant duplicating a similar specimen (called the Bertha Hale) from Poverty Point. Lack of suitable stone, subsidence of old surfaces and therefore potential bead-producing sites, or possible cultural rejection may be some of the factors influencing the distributional picture of stone beads.

The majority of stone beads are from sites on the Quaternary terraces and on the Arkansas River Cone (Macon Ridge) in North and Central Louisiana. In the alluvial Mississippi Valley of Eastern Louisiana, beads occur in sites located on the older alluvial areas primarily on surfaces of the C_1 and C_2 stages (Fisk 1944: Pl. 15, sheet 3) of the Arkansas or the combined Arkansas/Ouachita rivers. The few sites known further south are all located on Prairie Terrace or perhaps Bayou Teche deltaic surfaces.

Distributional information is only a reflection of current knowledge and consequently is subject to revision as new data become available. However, it certainly is a function of land surfaces existent in the Archaic and confirms the suspected antiquity of stone bead manufacturing in the area. Presently, bead producing sites occur in a broad area of North Louisiana: eastward from a narrow band flanking the west side of the Red River Valley to the recent alluvial Mississippi River floodplain, and southward in quantity to Rapides Parish in the center of the state.

CORRELATIONS, AFFILIATIONS, AND CONCLUSIONS

Unfortunately, no radiocarbon dates are yet available from Cad. However, the old channel scar on which Cad is located was apparently a portion of the C_2 course of the Arkansas River, which Fisk (1944) estimates to have been active *circa* 1300 B.C. Very limited evidence primarily from Poverty Point, which was apparently associated with a precedent C_1 Arkansas channel but which yielded radiocarbon dates averaging 800 B.C. (Ford and Webb 1956: Tab. 9), hints that this date may be of too great a magnitude. Irrespectively, I am inclined at the present time to favor a slightly earlier temporal position of the Catahoula Lake Archaic, primarily on the basis of the artifact assemblage and the lack of certain traits known to have persisted into more recent cultural periods.

Both Cad and Poverty Point had bead-making industries. Ford and Webb (1956: 101-103) describe the beads at Poverty Point, but present no data on manufacture. Most of the beads from Poverty Point are finished forms, and it is my impression from a cursory examination of several private collections that unfinished beads, blanks, and rejects are far too few to complement the enormous number of completed specimens. Nevertheless, manufacturing data are available. A remarkable cache discovered at Poverty Point by R. King Harris of Southern Methodist University apparently represents the entire contents of a lapidary's tool kit. Of the eighty-three pieces of red and green talc, over half have been worked in a fashion similar but not identical to the Cad method. Probably due to the soft and laminar nature of the raw material, initial preparatory grinding was not called for, and the blanks were completely (or nearly so) sawed from the block. Also differing from the Cad material is the fact that the saw was a large novaculite biface (a *Pogo* spear point in classificatory terminology).

Other differences in the total bead series from Poverty Point and

Cad include lack of cylindrical reamed perforations and edge-abraded saws at Poverty Point and absence of the wide variety of Poverty Point bead forms at Cad. Whether these differences are sufficient to outweigh the similiarities in the finished products can not presently be ascertained.

Other comparative data are available from Archaic components in the Pickwick Basin of Northern Alabama (Webb and DeJarnette 1942) and in the Green River area of Kentucky (Webb 1946; Webb and Haag 1939, 1947). Tubular and barrel-shaped beads of jasper and channel coal are persistent occurrences in these sites. Unfortunately for our purposes here, processing techniques were not found or were not recognized. Nonetheless, Webb (1946: 267-269) does go into considerable detail in describing atlatl weight manufacturing at Indian Knoll, Oh2. This process provides a corollary with the Cad process, and undoubtedly with very few alterations could be expanded to include stone bead making in the area. It appears that drilling of the atlatl prism was the crucial step in manufacture and was usually done before a great deal of effort was expended on grinding and polishing. Conversely at Cad, drilling of the bead blank was one of the last steps followed only by finish smoothing and polishing. Webb makes no mention of stone sawing in this connection.

In the northwestern portion of Louisiana and perhaps spilling into eastern Texas and southern Arkansas are several sites yielding stone beads. These sites are collectively grouped into the Bossier (Webb 1948) or the Bellvue (Fulton and Webb 1953) foci. Although too little is known of these foci to compare them with phases in the Red River Mouth sequence, they do appear to fall temporally later than the Archaic or Poverty Point periods. Even so, they have retained some of the major traits of the Archaic, including stone beads. Nearly all of the beads are finished products, and processual data are not available.

Archaic period precursors of these foci are perhaps known, but limited information prevents a definitive statement at this time. One of these supposed Archaic sites, Albany Landing in Caddo Parish, may have had a bead-making industry. Two unfinished beads—one, a red jasper disc with incomplete countersunk perforations, and the other, a barrel-shaped, undrilled blank—are known from the site (C. H. Webb, personal communication 1966). The Kieffer Place in western Winn Parish, another apparent Archaic site, is unusual because it is a mound site. Partial leveling of one of the three mounds in 1964 uncovered several oval pits which contained the calcined remains of several individuals. Apparently pits had been dug from the mound surface and the burials had been burned *in situ*. Burial furniture consisted entirely of barrel-shaped and tubular stone beads of silicified wood, brown chert, and jasper. Surrounding the mounds in isolated spots were found a few dart points of types Elam, Evans, and Delhi, but pottery was conspicuously absent. These few data from Kieffer lend additional support to mounting evidence of mound construction in the Archaic period.[4]

Passing mention has been made previously to an, as yet undefined, archeological manifestation in Central Louisiana, the Catahoula Lake Archaic phase. Further elaboration of Central Louisiana cultural sequences is reserved for a paper planned in the near future.

Presently, bead making data are available from four sites in the Catahoula Lake Basin and one from the eastern peripheral margin of the basin. These sites are Cad, Sandy Run, and Crooks Site in LaSalle Parish; Sanson, or more properly Joseph Island, in Rapides Parish; and Walters Place in Catahoula Parish. For all practical purposes, bead production at these sites are identical; description of the Cad industry in this paper suffices for all. None, however, appear as extensive as Cad.

Cad is certainly a bead "factory" in the strict sense of the word. Beads were manufactured on the spot and were not brought in by trade. Judging from the large number of unfinished and rejected pieces representing various stages of manufacture, the number of finished beads is surprisingly few. The studied collections give a ratio of approximately fifty unfinished forms for every finished bead. This tantalizingly hints that Cad may have also functioned as a distributional center for objects of the lapidary art.

Evidently, Cad had some familiarity with the trade network so well established by Poverty Point times. Galena, crystal quartz, slate, greenstone, granitic rocks, and possibly other exotic materials are present in small but persistent amounts. If these exotic materials are trade items and not the results of home-based forays, then the idea must be entertained that Cad must have had something to trade in return. Stone beads would fulfill this criterion admirably.

In conclusion, Cad bead factory is recognized as a local manifestation of the Eastern Archaic period. This tentative affinity is further supported by the broadening of the bead distribution pattern to the north and east, toward the major Archaic centers in the east. Confinement to land surfaces, geologically no younger than around 1300 B.C.,

[4] Radiocarbon 14 determinations accumulated by Ford and Webb (1956) and by Gagliano (1964: 13) suggest that mound-building was established in the Lower Mississippi Valley perhaps as early as 2500 B.C. and almost certainly by 1000 B.C.

suggests the antiquity of this industry, which falls well within the temporal bounds of the Eastern Archaic period. Presently, it is felt that Cad and consequently, the Catahoula Lake Archaic phase, are antecedent to Poverty Point, but only more excavation and radiocarbon determinations will help elucidate this problem.

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The Distribution and Character of Sites, Arroyo Los Olmos, Starr County, Texas

MILTON B. NEWTON, JR.

ABSTRACT

The characteristic morphology of Southwest Texas prehistoric sites is examined in the area of Starr County revealing a typical banded, or gallery, arrangement. No particular point may be called a site, but strips of occupancy follow the banks of streams—a band of campsite debris lies near the stream and a zone of foraging lies some distance out from the stream bank.

Surface collections and initial excavations suggest a slowly evolving projectile point inventory. These points, along with associated choppers, gouges, knives, and so forth, chronicle a history of at least 9,000 years from Lerma times through the Falcon Focus (5000 B.C. to 500 A.D.) to the Mier Focus (500 A.D. to 1750 A.D.). This entire period seems to be marked by slow evolution of one form of Desert, or Archaic, Culture.

The prehistory of Southwest Texas is so rich in problems and interesting material that it is strange that it has attracted the attention of so few archeologists. As a logical beginning some indication of the distribution and character of the sites, or in short, the settlement geography of the area will be described. In reporting these observations, An Introductory Handbook of Texas Archeology (Suhm, Krieger, & Jelks 1954: 134-43) will be used as a basis for descriptions.

The area discussed in this report is limited to the middle drainage of the Arroyo Los Olmos, the name of which refers to the hackberry (*Celtis laevigata L., Ulmus* family) which is characteristic of the lower course. This stream joins the Rio Grande after following a south-to-southeasterly route from Jim Hogg County across the middle of Starr County. It is near the village of El Sauz that the Coahuiltecan campsites described here are located. They occur along both sides of the Arroyo Los Olmos about ten to fifteen miles north of Rio Grande City, the county seat of Starr County (Fig. 1).

The landscape is dominated by mesquite and cactus which go under the collective term "monte," "chaparral," or brush, but many other plants fill in the cover. These include members of the *Leguminosae* such as mesquite (*Prosopis juliflora*) and Texas ebony (*Pithecolobium fleicaule*); members of the acacias such as retama (*Parkinsonia aculeata*) and huisache (*Acacia farnesiana*); many *Compositae;* and numerous *Cacti.*

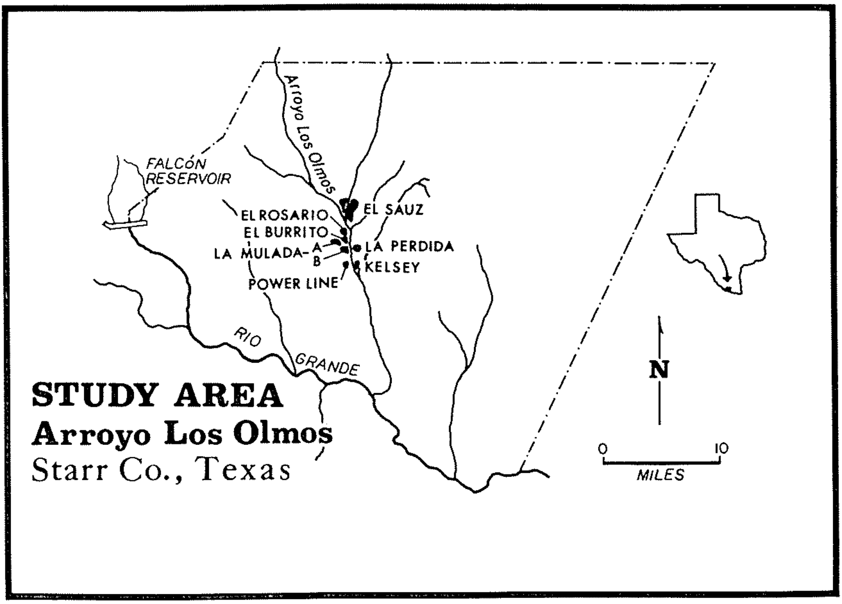

FIGURE 1. The locations of sites involved in this study.

Although the Arroyo Los Olmos is intermittent, most of the time water can be found either in pools or by digging into the sands of the bed. The climate has been classified as one marked by dryness with steppe vegetation—called "mesquite savannah" (Suhm *et al.* 1954: 134)—with mild, dry winters, and hot summers. Under these conditions life in prehistoric and early historic times was confined to narrow bands along the stream. Several early Spanish ranches were located along the Los Olmos in the same areas where most abundant prehistoric remains are found. In addition, main lines of communication in both prehistoric and historic times followed the Los Olmos.

Additional physical features to be borne in mind when examining prehistoric occupation along the Los Olmos are the characteristics of the soils and the erosion working over these soils. There are, in general, two main layers of earth in most of these occupation areas. The lower member is a stratum of at least several feet consisting of a dense pink clay that is studded throughout by snail shells and nodules of caliche.

Cason (1952) remarked on the cultural sterility of a similar clay and on the difficulty of excavating it at Falcon Reservoir some 25 miles west of the Arroyo Los Olmos. It must be noted in passing, however, that excavation connected with the present investigations

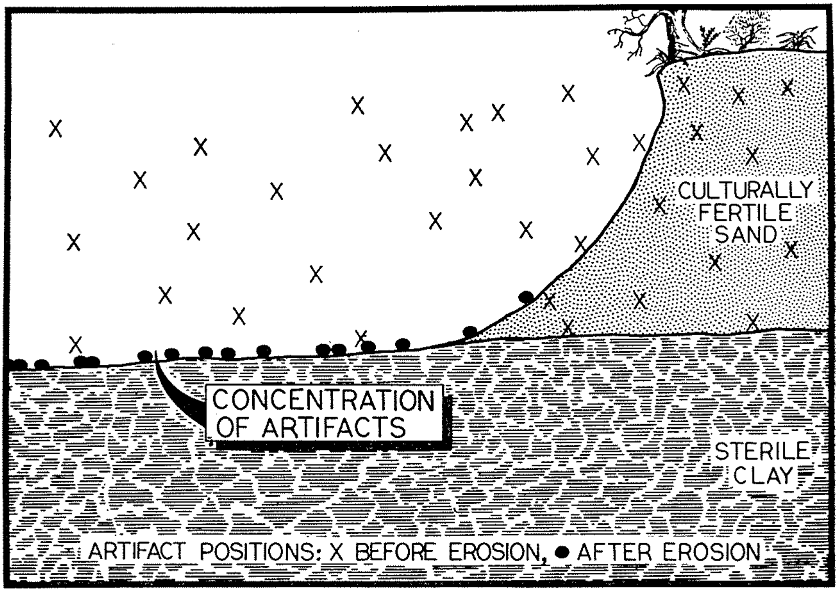

FIGURE 2. The lowering of artifacts to a common surface.

revealed cultural material lying upon the clay and slightly intruded into it. These materials consisted of two Lerma points (one unfinished), choppers, gravers, knives, utilized flakes, and what probably should be called a hoe or grubber (chopper). Nevertheless, the pink clay mentioned here and by Cason is, in general, culturally sterile.

Immediately above the pink clay is a bed of gray-tan, clayey sand of very fine texture which becomes comparatively hard and brittle when undisturbed and exposed to the sun. When disturbed, however, it is easily eroded. This fine sand is the culturally fertile zone. Significant here, it also is the stratum most subject to both sheet and headward erosion. In areas of active erosion the sand is quickly removed exposing wide expanses of clay littered with artifacts. These areas may be mistaken for sites, but are in reality the debris of sites deriving from the removal of the sand and the lowering of the artifacts to a common surface (Fig. 2). The casual observer is likely to think that he has come upon the site of an intensive or prolonged habitation.

The concentration upon a common surface of the artifacts from what appears to be 9,000 years of human occupation has led to very large local collections which often run into the tens of thousands of artifacts. The only value of such surface collections—aside from the

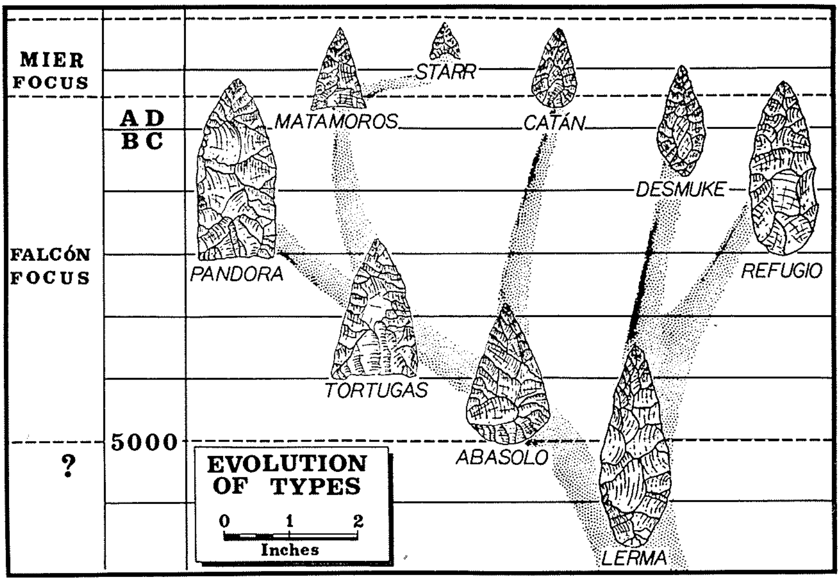

FIGURE 3. The evolution of local types, Starr County, Texas.

establishing the ranges of variation in the artifact types—lies in their helping to determine the former location and orientation of a site.

The first human occupation of the "monte"—if indeed it was a "monte" at that time—consisted of frequently shifting, generalized food gatherers who manufactured the ubiquitous *Lerma* point along with a variety of similar generalized tools. (Aveleyra Arroyo de Anda 1964: 390, suggests with others that the *Lerma* phase is primarily a hunting culture). These people were followed by, or developed into, the group defined as the Falcon Focus which was followed in turn by the Mier Focus (Suhm *et al.* 1954: 136-138). However, the Falcon and Mier foci may be the same culture at different stages.

It is here suggested that there was indeed an unbroken continuity from *Lerma* to *Starr* points (Fig. 3). This assumption is based on the absence of any clear-cut break in tool types other than the few non-local types (Table 1) and on overall morphological similarity among the characteristic points. This homogeneity was noted both in surface collections and in limited excavations carried out at La Perdida Site (Fig. 1) where two trenches showed overlapping sequences of Lerma-Falcon and Falcon-Mier foci. It is here suggested that since about 7000 B.C. (Lerma C14 date of 7312±500 B.C.; MacNeish 1958: 194-99) until historic occupation by Spanish culture in 1749, there was one basic lifeway developing in Southwest Texas. This con-

TABLE 1

Percentages of Selected Point Types

	Falcon & Earlier	*Mier & Later*	*All Types Together*
LERMA	10.92		9.05
ABASOLO	14.88		12.32
TORTUGAS	38.61		31.98
PANDORA	6.40		5.30
REFUGIO	6.40		5.30
DESMUKE	2.64		2.18
MATAMOROS		70.00	12.01
CATAN		18.18	3.12
STARR		5.45	.94
TOTAL LOCAL TYPES	79.85	93.63	81.90
NON-LOCAL TYPES	20.15	6.36	17.78
	100.00%	99.99%	99.68%
TOTAL SPECIMENS COUNTED		641	
TOTAL MIER FOCUS & LATER		110	
TOTAL FALCON FOCUS & EARLIER		531	

tinuity is evidenced by the gradual shift in form through the following types of projectile points: *Lerma, Abasolo, Tortugas, Pandora, Refugio, Desmuke, Catan, Matamoros*, and *Starr*. These nine local types make up the overwhelming bulk (81.9%) of collections in the area and each single local type is represented by a strikingly larger portion of the total than any non-local types (Table 1).

Because of the shifting of prehistoric inhabitants through their range as the resources they desired varied, their cultural remains are to be found at almost any site where erosion has not stripped such artifacts away, but rather has exposed them to view. Apparently the considerations pertaining to camp location included:

1. proximity to water—generally the Arroyo Los Olmos
2. access to new crops of wild foods such as mesquite beans, cactus pears and pads, yucca blooms and roots ("camotes"), and various berries. (It must be borne in mind that it is more economical to move the camp to the food than to carry food any great distance to the camp.)
3. likelihood of taking at least some game
4. availability of fish, crayfish, and mussel
5. the presence of suitable topographic situation (relief, cover, exposure, drainage, etc.)

The flexibility of these considerations, the demands of primitive conservation, and the scattering of bands in the area all operated to dis-

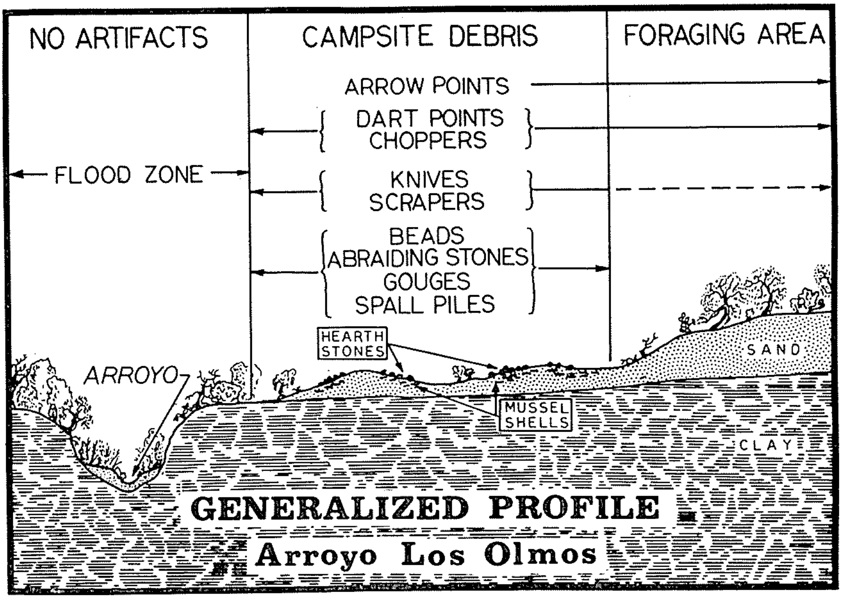

FIGURE 4. A generalized profile intersecting the Arroyo Los Olmos, Starr County, Texas.

tribute sites more or less evenly over flats and small rises along both banks of the Los Olmos.

At almost any point along the arroyo, either bank would exhibit a profile much like that illustrated in Figure 4. First, in the immediate vicinity of the stream, sharp erosion has cut below the culturally fertile sand, through the sterile clay, and in some places down to a sandstone bedrock. No artifacts are found in this thickly wooded flood zone of the arroyo. This strip of "chaparral," frequently disturbed by floods, varies in width from 10 to 100 yards.

Immediately back of the "chaparral"-covered bottom, evidence of prehistoric occupation usually begins to appear in the "monte." This second zone along the arroyo is usually a slightly eroded, plain-like surface marked at intervals by low, indistinct hills. In the lightly-eroded areas and on the flanks of the hills appears the bulk of the undisturbed deposits which are being gradually exposed. At some places such as the La Mulada and El Burrito Sites, wide clay flats intervene between the wooded bottoms and the relatively undisturbed areas. These relatively undisturbed areas of lightly eroded flats and hill flanks are culturally fertile as are, of course, the areas of the fine gray-tan sand described above.

Artifacts are concentrated in a band following the arroyo, and in this area of sandy soil are to be found a group of artifacts which are uncommon or nonexistent at greater distances from the stream. These include stone and shell beads, abrading stones, gouges, and spall piles, along with general camp refuse such as hearth stones, mussel shells, and—rarely—bits of bone. Found primarily in this same band, but diminishing sharply with distance from the stream, are knives, scrapers, and projectile points. Arrow points, dart points, and especially choppers are widespread and may be found a great distance from any hearth stones or other signs of camp life. Thus, we have two cultural zones paralleling each bank of the Arroyo Los Olmos: nearer the stream, an area of concentrated camping, gathering, and hunting refuse, and farther back from the stream, an area of scattered hunting and digging tools. There is no absolute difference in kind between the materials of the two cultural zones, and the proportions blend into a continuum.

In summary then, it must be kept in mind while considering the culture of Southwest Texas that this area was inhabited for a very long period by a group or groups resembling the historic Coahuiltecans and whose material culture evolved slowly as may be inferred from a gradual proliferation of artifact forms based on a few generalized models. Further, the shifting exploitation of a broad spectrum of resources as dictated by this culture failed to establish campsites in exactly the same geographic location upon every visit to an area. Instead, artifacts—the only evidence of former occupation with the possible exception of certain alterations of the "natural" vegetation—are widely scattered along the Arroyo Los Olmos in topographic situations as generalized as the culture which was seeking these temporary homes.

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The Use of Statistics In Archaeology--A Bibliography

compiled by

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INTRODUCTION

Statistics as used in the following bibliography refers mainly to inductive, as opposed to descriptive, statistics. By descriptive statistics is meant the use of certain summarizing measures to reduce an unwieldy mass of data in order that it can be more easily understood. These measures may be percentages, means, standard deviations, histograms, or other devices; all share the common characteristic of functioning to condense a collection of facts. Examples can be found in almost any archaeological monograph. Inductive statistics differs in that the properties of a population (or "universe") are inferred by examining a sample drawn from that population. Involved is probability theory and sampling techniques, and for this reason articles dealing with statistical sampling of archaeological deposits are included in the bibliography.

In compiling references the use of a statistical test of significance usually determined the inclusion of any particular essay. Inductive statistics makes use of an ever-increasing number of such tests, but the one most widely favored by archaeologists is the *chi*-square test of independence. The Brainerd-Robinson technique and related tests such as that of Meighan (1959) and M. Ascher (1959) are measures of association between two variables. These can be understood as inductive in that the non-randomness of the distribution of the two variables (the correlation)—as demonstrated by the sample—points to a similar non-random distribution in the universe.

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Notes on Excavated Ring Midden Sites, 1963-1968

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ABSTRACT

Recent excavations and radiocarbon dates of ring middens in Texas, New Mexico, and Colorado indicate that this type of site is relatively late, dating generally after A.D. 800.

A survey of ring midden sites has been carried out during the past few years, primarily in western Texas and southern New Mexico (Greer 1965). Since the survey began in 1963, a number of sites have been tested, and radiocarbon dates are now available for many of them.

Ring middens are circular, doughnut-shaped middens of fire-cracked limestone rocks and gray ash. These may be classified as either midden circles or mescal pits. Following are descriptions of the ring midden types in this report.

Midden circles are the remains of the surface hearths from which the broken stones have been thrown back in a circle producing a mound of rocks and ash with a central depressed area of ash. Form I midden circles are symmetrically circular middens with a widely depressed center. Variety A is 40 to 55 feet in diameter and 4.0 to 5.5 feet high. The sides of the pit are usually quite steep and the rim is composed of medium-sized pieces of burned rock with little or no ash. Variety B is about 30 to 35 feet in diameter and 0.5 to 2.5 feet high. The central depression is shallower—saucer-shaped—and the rim contains a mixture of ash and small, heat-fractured rocks.

Mescal pits are the remains of earth ovens, the mound of burned rocks and ash being the result of raking back the coals and broken slabs after plant baking. Although surface features may be similar to midden circles, the mescal pits contain a slab-lined cooking pit in the center of the midden dug down below the natural ground level, the original surface. Form I has the same surface characteristics as Form I midden circles, even to the variety distinctions. Form II is a semicircular midden accumulation.

Excavated ring midden sites include eight in Texas—three middens in Val Verde County, two in Sutton County, two in Crockett County, one in El Paso County—as well as five in Eddy County, New Mexico, and one in Las Animas County, Colorado. The sites in Val Verde, Crockett, and Sutton counties are mainly in regions of low hills and fairly wide, shallow canyons and no doubt represent, at least in part, sotol-gathering activities. The El Paso County site, which is on a flat, sandy desert section of the mountain-basin region east of El Paso, may also be the result of plant baking. The southern New Mexico sites are in the Guadalupe Mountains of Carlsbad Caverns National Park just north of Culberson County, Texas (Greer 1966a). One site (with three tested middens) is at the base of the mountains, and two others are on top of the 600 to 1300 foot escarpment overlooking the desert flats to the east and south. These middens also were probably used to roast sotol (*Dasylirion*) and mescal (large *Agaves*, including *A. perryi*) which are still present in the area. The site in southeastern Colorado, just east of Trinidad, is on the open plains and is next to a large canyon. The purpose of this midden is unkonwn—no *Dasylirion* or *Agave* or edible species of *Yucca* are present in the area.

Eighteen dates were obtained from the samples dated by the Radiocarbon Laboratory of The University of Texas at Austin (Table 1; Pearson *et al.* 1966; Valastro *et al.* 1967; Valastro *et al.* in press). The earliest date of 610 B.C. does not fit in well with the other dates and may be questionable as a date of midden circles. It is from Felton Cave (site TX-20, Sutton County) and if correct should date the beginning of the side-notching tradition in the eastern part of west Texas. The two excavated ring middens appear to be Form IB midden circles lying directly on bedrock. *Perdiz* points were scattered about the general surface of the site and both middens. It has been suggested—though impossible to discern at the time of excavation—that the middens accumulated during times of late corner-notching and early side-notching traditions, and the centers were later dug out to be used as earth ovens by people who used stemmed arrow points. The date of 610 B.C. then may be attributable to the Archaic occupation rather than to a Neo-Indian group which made use of the midden circles.

A later date of A.D. 1240 for the early part of the *Ensor-Frio* tradition at the large Form IB mescal pit at the Hodge Site (site TX-21, Val Verde County) suggests a definite overlap with the Neo-Indian occupation in this part of Texas and the ceramic periods in areas only slightly to the west. The occurrence at this late date of small side-notched dart points, primarily the *Ensor* type, in nearly all Neo-Indian sites in the general area of Val Verde-Terrell counties might suggest that dart points and arrow points were in use contemporaneously. It is possible they were both used on arrows by the same groups of people. Similar suggestions have been made by Johnson (1964:37) and Dibble (1967:34) for Val Verde County.

The Cammack Sotol Pit, site TX-14 in Val Verde County, is a Neo-Indian Form II mescal pit yielding a large number of arrow points and a few side-notched dart points, but no pottery. The site, representative of the Livermore Focus or possibly the middle part of the Bravo Valley Aspect, has a date of *circa* A.D. 1335 on two samples.

The dates of the Form IB midden circle at the Dunlap Site, TX-63, Crockett County (Calhoun 1966), seem to fall within those attributed to the Livermore Focus or the middle part of the Bravo Valley Aspect (Kelley *et al.* 1940). They range primarily from A.D. 1280 to 1410—the earlier date of A.D. 1010 is inconsistent with the others. The site is characterized by stemmed arrow points, *El Paso Brown* pottery, and a continuation of small, side-notched dart points.

Mr. Arnold Sommer of Midland, Texas, has recently excavated a ring midden, site TX-75, on top of a high mesa at an elevation of about 3000 feet. It is on the western edge of the Edwards Plateau overlooking the Pecos River valley in western Crockett County. Although an earth oven technique is suggested by the small subsurface slab-lined pit, there is some question as to what was cooked. The midden may represent a late Form IB mescal pit. Sotol is present in small amounts on the middle slopes of the mesa sides, but it is entirely absent on the high flats where ring middens are most common. A single side-notched *Ensor* point from the excavated area suggests a fairly late date, but radiocarbon measurements are not yet available.

The Jornada Branch of the Mogollon in western Texas and southern New Mexico is divided here arbitrarily into early, middle, and late parts since phase distinctions cannot be recognized for the excavated middens. The early part is represented by Form IB midden circles at the Pow Wow Site, TX-2, El Paso County, and Middens No. 3 at site NM-82, Eddy County, and by a Form II mescal pit at Midden No. 2, site NM-1, Eddy County. These sites yielded dates of A.D. 900, 1130, and 1170 respectively. Pottery is primarily *El Paso Brown* and *Alma Plain.* The middle Jornada Branch at Midden No. 2, site NM-2, Eddy County, dates A.D. 1330. *El Paso Brown, Chupadero Black-on-White,* and *Lincoln Polychrome*(?) are present. The late Jornada Branch at Midden No. 5 at site NM-82, a Form IB midden circle, was dated at A.D. 1465 and contained *El Paso Brown* and *El Paso Polychrome.*

Arrow points from most Neo-Indian sites are stemmed and tend toward laterally protruding barbs and often irregularly serrated blade edges, the *Perdiz-Livermore* type. A few sites such as the Form IA midden circle at Midden No. 1, site NM-82, have contained plain and notched triangular arrow points.

The Louden Site (CO-1), a Form IB mescal pit in southern Colorado, was dated at A.D. 1435, but it is uncertain what cultural affilia-

TABLE 1. Radiocarbon dates from ring midden sites.

Sample No.	*Site & Midden No.*	*County & State*	*Date*	*Cultural Affiliation*	*Reference*
Tx-291	Felton Cave No. 1	Sutton Texas	610±100 B.C.	Archaic (early side-notching tradition)	Valastro *et al.* 1967
	Felton Cave No. 2	"	no date		
	TX-25	Val Verde Texas	no date	Archaic (middle side-notching tradition)	
Tx-362	Hodge Site	"	A.D. 1240±80	Archaic (late side-notching tradition)	Valastro *et al.* in press
Tx-310	Dunlap Site No. 1	Crockett Texas	A.D. 1010±120	Archaic (late side-notching tradition) or Livermore Focus	"
Tx-351	"	"	A.D. 1280±80	"	"
Tx-357	"	"	A.D. 1320±90	"	"
Tx-359	"	"	A.D. 1380±100	"	"
Tx-358	"	"	A.D. 1410±100	"	"
Tx-227	Cammack Sotol Pit	Val Verde Texas	A.D. 1325±185	Livermore Focus	Pearson *et al.* 1966
Tx-361	"	"	A.D. 1340±80	"	Valastro *et al.* in press
Tx-363	Pow Wow Site	El Paso Texas	A.D. 990±80	early-middle Jornada Branch	"
Tx-364	"	"	A.D. 840±60	"	"
Tx-367	NM-82 No. 3	Eddy New Mexico	A.D. 1160±80	"	"
Tx-368	NM-82 No. 3	"	A.D. 1100±100	"	"
Tx-365	NM-1 No. 2	"	A.D. 1170±90	"	"
Tx-366	NM-2 No. 2	"	A.D. 1330±80	middle Jornada Branch	"
Tx-369	NM-82 No. 5	"	A.D. 1440±80	late Jornada Branch	"
Tx-370	" "	"	A.D. 1490±90	"	"
	NM-82 No. 1	"	no date	"	
Tx-290	Louden Site	Las Animas Colorado	A.D. 1435±65	Plains Apache (?)	Valastro *et al.* 1967

tion is represented. Previously I suggested that the site might be attributable to an early Plains Apache occupation (Greer 1966b).

The dates show all these sites to be relatively late, with the exception of the questionable date of the Sutton County midden which is at least 1450 years earlier than the other excavated sites. Surface collections at numerous middens indicate that side-notched dart points, occasionally with a few very fine and thin arrow points, are most common. The earliest sites—those containing only dart points—tend to be in the eastern parts of west Texas, e.g. the Val Verde County region. As one goes west across the state and north into southern New Mexico, ring midden sites are more commonly Neo-Indian and often contain ceramics. As shown by the date of A.D. 1240 from Val Verde County, the late "preceramic" sites may actually be quite late.

Field work continues to suggest that the Form IB middens with their small rocks, considerable ash, and gently rolling surfaces generally predate the more angular Form IA middens. Form IA middens are characterized by steep, ash-free rims of larger rocks, often a lighter, orange color. The best example of this sequence is site NM-82 where the single Form IA midden overlies earlier type IB middens and contains later arrow point styles. *Ramos Polychrome* and obsidian, materials found in the latest sites, consistently have been found in Form IA middens in the Guadalupe Mountains.

Many of the middens currently being investigated in western Crockett County by Arnold Sommer and Aaron Riggs of Midland are classifiable as Form IA. They often contain more ash and small rocks and have shallower central depressions with less steep rims than many of the Form IA middens in the Guadalupe region, the "type area." It might be that the Crockett County middens represent a transitional form with a very limited temporal position. Additional work of the present excellent quality by Sommer and Riggs will probably clarify the situation considerably. It is my impression that mescal pit middens with stone-lined pits are generally later than midden circles, but there is presently insufficient data to support a formal hypothesis.

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The Paleo Type Flake Knife

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ABSTRACT

The absence of biface knives at early kill sites might be explained in terms of practical economy of stone working. Bifaces, especially fluted points, have extremely short useful lives as butchering tools because of the tendency to become dull in a short time. Logically, then, the Paleo knife was the flake knife.

One problem that has bothered many of us is the apparent absence of a type knife at Paleo elephant and bison kills. This has led some to assume that fluted points were used for butchering tools. Others fail to identify knives, but assume that they should have been present.

Aside from perishable artifacts about which we know next to nothing, two tools must have been indispensable to the Paleo Indian hunter. One of these is apparatus with which the animal was killed and the other is the device with which the carcass was butchered. Hide scraping tools, however important, are not as essential as the weapon and the knife.

Since only stone and bone artifacts survive at butchering/kill sites, there is no positive proof as to identification of knives. A certain amount of experience and experiment, however, permits the application of some logic to the problem.

First, it is absolutely impractical to make fluted points, Folsom or Clovis, for use as knives. Anyone who has done extensive research in flint working must admit that the difficulties in producing a Folsom point are substantial (Crabtree 1966). A large amount of time and labor is involved. Numerous experiments in grinding or smoothing basal and lateral edges have shown me that sharp edges can be completely dulled in less than 60 seconds. Thirty or 40 strokes, rubbing the edge through sandy clay, will produce a "typical" ground edge. It is my belief that thick-skinned, hairy animals that wallow would have large amounts of abrasive dirt on their hides. The biface fluted point would be quickly dulled and could be sharpened only by considerable effort. A few resharpenings and the tool would be used up. Certainly, the labor required in producing a fluted point would not be wasted on usage that would consume the tool in a few minutes. Fluting appears to be solely designed to reduce the bulk for hafting. Channel flakes are obviously too small and fragile to be used as knives.

If, then, the fluted biface is impractical, what was the knife type? It has been common practice to classify flakes with beveled edges or ends as scrapers. A fresh flake with a thin edge is sharp, but dulls quickly. However, it can be produced easily. A thin edge can be straightened and strengthened by beveling (shearing or raking). When it becomes dull, it is easily resharpened. When it wears out, there is no loss of an investment of time and labor. When the edge becomes too thick for cutting, the tool can be retained as a ready-made scraper, if needed.

To classify all beveled edged flakes as scrapers is unwarranted and suggests that man killed bison and mammoth, scraped the hides, but did not butcher. On the contrary, I suggest that the thin edged flakes with beveling are the real Paleo knives. They can be produced easily and economically and they can be resharpened. Fluted bifaces require a large expenditure of effort to produce and would dull quickly.

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Dallas, Texas

A Preliminary Report on Excavations at Hitzfelder Cave

R. DALE GIVENS

In the spring of 1962, Mr. Norman Hitzfelder discovered a cave shaft or sink hole on his ranch thirty miles north of San Antonio. For a number of years thereafter Mr. Hitzfelder periodically worked at the site removing rock and rubble that filled the shaft down to about 30 feet, at which point the opening was blocked by a soapstone boulder. (It is worth noting that soapstone is not known to be native to the immediate locale of the sink hole.) Mr. Hitzfelder used dynamite to break the boulder and found human bones immediately below. Shortly thereafter, the site was visited by Robert Benfer who surveyed the site and assigned it a number: 41-BX-26. In addition to several week ends of work by Benfer, Mardith K. Schuetz of the Witte Museum and a party of spelunkers spent varying periods investigating the site.

In February, 1967, an unusual skull fragment (calotte) was recovered. At this time the cave shaft was at 35 feet at the deepest point. Mr. Hitzfelder called this to the author's attention and arrangements were made for a group from Trinity University to excavate the remainder of the cave. Work in the spring of 1967 was carried out entirely by a group of student volunteers. During the summer and the 1967-1968 academic year a class was organized to excavate with the help of more volunteers.

To date, the excavation has revealed the skeletal remains of between 30 and 40 individuals, including portions of at least 30 skulls. A large proportion of the bones are fragmentary and in poor condition. The human skeletal remains are mostly represented by badly scattered bones although three semi-articulated burials have also been found. A multitude of animal bones, mostly from small species, were found. Remains of domesticated dog and most of five deer have also been recovered.

Only a sprinkling of artifacts have been found. These include three bone awls, one of which has been notched along one side; some 30 bone beads; a few pieces of worked shell; a spherical stone that may or may not have been shaped; a stone pendant; three points of *Frio* type; and a "stemmed knife." Two points were found by Mrs. Schuetz with the first discovery of human bones—one is a *Pedernales* type and the other is somewhat intermediate between the *Marshall* and *Lange* point.

At present, excavation is at the 45 foot level. Bedrock has been reached around the periphery of the main cavern, which is 35 feet by 15 feet, but the center is still dirt—or, in actual fact, mud. A shaft running downward at close to a 45° angle extending some 20 feet was recently discovered, but the opening is too narrow to enter at present. A side cavern, some 18 feet deep and only a few feet wide on the east side of the main cavern is currently being cleared. Each Saturday to date, at least 50 bone fragments have been recovered, and there seems to be no end in sight.

The excavation has been extremely difficult to carry out with anything like proper technique owing to continuous dripping from the cave roof and water that runs in with every rain. Work proceeds in a combination of mud and slush.

For much the same reasons it has been very difficult to date the site. Benfer collected a carbon sample at about 32 feet which gave a date of 1000 A.D. ±190. However, there is good reason to believe that this sample consisted largely of washed in surface carbon and gave a date unrelated to the skeletons. Professor Ernest Lundelius of The University of Texas Geology Department has provided a report on the animal species represented, but this has not helped the dating problem. Currently, he is working with a new and larger sample that may add more information. The artifacts, few as they are, indicate an Archaic assemblage. Although dating on the basis of these artifacts is much too broad and inaccurate, they would seem to indicate an age of about 3000 to 4000 B.C. as maximum.

The site is of significance for at least three reasons. First, Benfer and Ruben Frank have pointed out the presence of several "burial caves" in central Texas (personal communication), but the Hitzfelder Cave is the first of these to be scientifically excavated. Second, in other central Texas sites, skeletal remains and an Archaic artifact assemblage have seldom been associated together, and little is known of the skeletal morphology of Archaic people. Third, the morphology of some of the skulls is significantly different from the type generally representative of the American Indian (Fig. 1).

Little more need be said concerning the first two points at this time, but the third needs additional explanation. While the analysis of the skeletal material is still in its early stages, enough of the skulls have been reconstructed to make some generalizations possible. Approximately half of the 30 skulls either belong to infants or very young individuals, or else are too incomplete to study. Of the remainder, five do not appear to be distinguishable in any way from modern and recent American Indians. The other ten, however, are remarkable in showing a combination of morphologically "archaic" traits. In varying

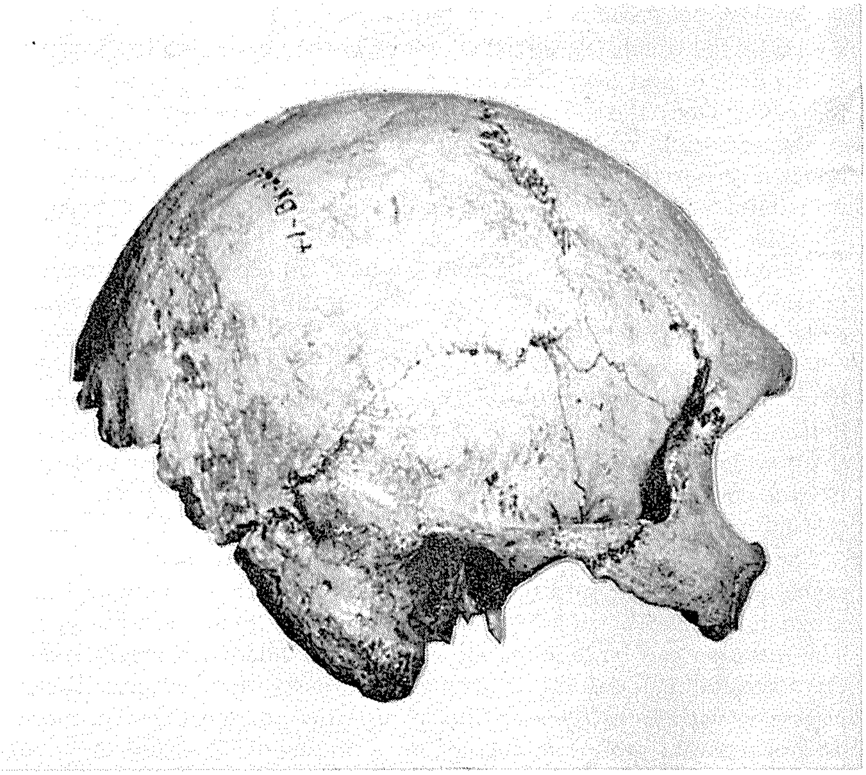

FIGURE 1. One of the skulls from Hitzfelder Cave.

degrees, these have a pronounced supra-orbital torus, marked post-orbital constriction, a sloping forehead, and are dolichocranic (long-headed). Recently, Dr. T. D. Stewart, the Smithsonian Institution's Senior Physical Anthropologist, examined the material. He felt that the skulls, including the more extreme ones, are within the range of modern man (*Homo sapiens sapiens*), especially in regard to the size of the mastoid process and in the presence of a well developed chin.

Other generalizations can be made at this time which raise additional questions. The teeth are markedly free of caries or other disease, but show an extreme amount of wear even in young individuals. The latter phenomenum is undoubtedly related to diet. The limb bones are equally free of disease, although there are a few cases of lesions. Life expectancy must have been very low for the oldest individual recovered shows suture closure indicative of an age between thirty-five and forty. The average age would have been much lower, probably around twenty.

The last point raises another problem. The remains are certainly a sample, but of what kind? How large was the population from which it was drawn, and over how long a time span were the bones left in the cave? Does the accumulation represent one year or many?

Archaeologists are often prone to refer to any discovery of human bones as a burial. In many cases this may not be the situation at all. At Hitzfelder Cave, there are several alternative possibilities to consider. Do the bones represent bodies lowered to that level and buried, or were they simply tossed in from the top? Do the bones represent a primary burial or a secondary one? Was death due to natural causes or to sacrifice or warfare?

One of the skulls shows clear evidence of having received a severe blow which knocked a chunk out of the right parietal. The frontal bone and facial region are split at approximately the same level, something which would occur with green bone but is not likely to occur from a post-mortem blow on the parietal. It seems rather clear that this individual, at least, met with foul play.

The range of variability in the skeleton of modern man is considerable. This, in fact, seems to be the case with most Primates, and the range may have been greater for ancient man than modern types. The question can be legitimately raised as to whether the Hitzfelder Cave skeletal material represents a single group of people (population or deme) with an extreme amount of variation, or whether two more or less separate groups might not be represented. It is too early to make a final judgment, but from observation alone (without the help of anthropometric measurements), there appear to be the "unusual" skulls with some variation among them and the "normal" skulls with no intermediate forms between. Further analysis may show that the less extreme of the "unusual" skulls fills this gap, but at present this does not seem to be the case.

No final interpretation is possible until a complete analysis of the material can be made. When this is possible, our knowledge of the early people of Texas should be greatly extended. It is already evident that the range of variability is considerable if all the skulls are placed in a single population, as perhaps they should be. If no intermediates are found, it might be more appropriate to consider the remains as representing two different populations with one of them possessing a number of morphologically archaic traits. This should have a multitude of additional implications which need not be considered in this paper.

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The Nature of Non-Buried Archeological Data: Problems in Northeastern Mexico

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ABSTRACT

Open area sites in northeastern Mexico were surveyed and artifacts near selected individual hearths were collected in an attempt to discover significant hearth/artifact assemblages representing valid technological and cultural associations. It is suggested that future, similar field work concentrating on isolated hearths might reveal artifact distributions which would permit a sorting out of the various activities and participating socio-cultural groups once occupying this and other regions.

SURFACE SITES

Few attempts have been made to recover in a systematic manner archeological data from surface sites. Non-buried cultural debris is generally considered to have its greatest value in indicating the presence of a site whose contents are mostly buried and subject to excavation. Surface artifacts are presumed to be no longer *in situ* and of little value for a spatial, contextual analysis. While disturbance at open area sites is often extensive, significant distributional evidence may still be present, and artifacts recovered from their relatively undisturbed contexts can indicate the patterned human behavior responsible for their existence.

Non-buried archeological data falls into two categories: (1) that which has never been buried but lies approximately where discarded, misplaced, or stored by its original owner, and (2) that which has been buried and since uncovered by natural agents such as wind and water.

Wind alone often produces blowouts in regions of sand or fine-grained soil and little cover vegetation. Sites subjected to extensive deflation, not uncommon in west Texas, contain a jumble of re-exposed artifacts which may have suffered from several burials, uncoverings, and re-burials by the shifting sands. In consequence, vertical and even horizontal provenience of artifacts has been altered considerably since original deposition, permitting little more than relic-collecting by archeologists.

In contrast, sites apparently never buried have produced information regarding the spatial distribution of activities. For example, a preceramic site in east-central Arizona with Folsom and Concho

Complex components revealed areally separated classes of debris representing activity loci (Longacre 1962). Another site, Lone Hill, in southeastern Arizona, also contained artifact forms spatially clustered in a manner representing probable sexual division of labor (Agenbroad 1966). Both of these sites were divided into grids (over a thousand four-meter squares in the former, 135 ten-foot squares in the latter) from which a statistically random sample of at least 10% was drawn. The selected sections were carefully searched for all cultural lithic debris. Analysis revealed functionally specific areas of the sites.

At the Carmen site in south-central Arizona (Brown 1967), a grid system of ten-foot squares was imposed, but no independent clusterings of surface artifacts occurred. It was concluded that it was not a domestic camp site but a locale from which material for chipped stone was procured over a 4000 year span. Activities were thus spatially patterned in relation to available natural resources rather than to socially defined task areas.

Sites which have been buried and subsequently uncovered by gentle water action present additional problems when the archeologist is trying to recover artifacts from their original depositional context. This has been attempted in northeastern Mexico (Varner 1967), where the techniques of data recovery differed considerably from those used in Arizona. Due to the kinds of artifacts, the disturbed condition of many of the sites, and perhaps to the techniques employed, spatial patterning, while present, was not spectacular. A refinement of approach, however, may provide future, conclusive analyses of the nonrandom distribution of surface artifacts in this and other regions.

HEARTH INVESTIGATIONS IN NORTHEASTERN MEXICO

In the summer of 1960 during an archeological survey of northern Neuvo Leon and eastern Coahuila, Epstein (1961) discovered 70 sites, many of which are in large open areas. One site of particular importance, San Isidro (NL 37) in the state of Nuevo Leon, contained evidence of early human occupation in the now semi-arid region between Monterrey and Reynosa. Lithic artifacts, including tools and waste flakes, were found scattered among fragments of sandstone and limestone. Much of this fragmentary burned rock was concentrated in numerous roughly circular forms, three to five feet in diameter. These were presumed to be the remains of campfires, although none contained organic materials such as burned bone or charcoal. Both the hearth and artifacts were still in the process of being exposed by slow, relatively gentle sheet erosion that had left them just below or on the present ground surface.

The artifacts recovered during this initial reconnaissance at San Isidro included many large bifacially and unifacially flaked pebbles ("choppers") made from a hard gray limestone, now covered by a thick tan patination. Other smaller types of artifacts, including two Paleo-American *Plainview* projectile points, were usually of the same material. Among the few flint objects recovered were two additional *Plainview* points and five other points resembling Archaic and Neo-American types of Texas.

During the summer of 1962 students of The University of Texas Department of Anthropology Field Session excavated the San Isidro site as part of The Northeastern Mexico Archeological Project directed by Epstein. Unfortunately, no cultural stratigraphy could be determined from the few artifacts recovered in the course of the excavations (including 12 *Plainview*, two *Lerma*, and four *Tortugas* projectile points). It had been decided, however, to make an extensive collection of surface materials. Part of the site area was divided into hundred-foot squares and these into quadrants which served as arbitrary zones for mapping the location of all artifacts and hearths.

In addition to the excavations and collections at San Isidro, the general survey begun in 1960 was continued. Six other areas produced similar assemblages of large artifacts and, in one instance, a *Plainview* point. It became increasingly obvious that a significant amount of cultural data could be obtained by the systematic mapping and collecting of artifacts from these numerous formerly-buried surface sites. In an important way, natural erosion was accomplishing what could not be done by archeological excavation—the removal of tremendous amounts of covering material so that an extensive sample could be taken from underlying cultural deposits.

In his original survey of 1960, Epstein began development of a new procedure for obtaining archeological data from such surface sites. This procedure consisted essentially of careful collecting of all archeological material scattered around individual hearths. It was assumed that these hearths represented an occupation of a single group for a relatively short period of time in contrast to deposits found in caves, middens, etc., which may contain the cultural remains of several traditions deposited over an extensive span of time. Archeological effort at the latter sites has been expended to identify significant differences in artifact or other material content which may reveal important cultural changes through time (cf. Johnson 1967).

Epstein believes that individual hearths might come close to representing elusive "instants in time" which could be reconstructed through archeological techniques. An intensive study of hearth/artifact assemblages might provide the opportunity to more easily sort out the activities of various separate cultures that had occupied a single area over a period of time. The problems of determining valid "cultural associations", i.e. relating artifacts to single cultures, might be reduced if not resolved. This in turn could bring us closer to a general understanding of the processes involved in prehistoric cultural changes. The small discrete archeological units in northeastern Mexico appeared to provide an excellent area in which to attempt such research.

QUESTIONS AND PROBLEMS

During the field session of 1962, an attempt was made to derive some method of determining valid artifact assemblages from hearth areas (Epstein 1962). However, from a systematic collection of all cultural materials around individual hearths in a selected portion of the San Isidro site, few conclusions could be reached. The attempt to distinguish categories of hearths, *per se*, from possible differences in material and/or structure were even less conclusive. This difficulty in determining culturally significant hearth/artifact assemblages was considered to be due to the small and restricted sample of hearths—only fourteen were analyzed, and all of these came from the one site (Whallon 1962).

With this background in mind, the writer and Epstein began discussing the possibility of applying similar procedures to hearth concentrations from widely dispersed locations throughout northeastern Mexico. Perhaps a more extensive sample would reveal subtle and still undiscerned cultural or ecological distinctions.

We found several important questions could be asked about hearths, their associated artifacts, and most importantly, about the people who made and used them. For example, when and how long were these hearths used? Could a temporal sequence of hearth or site occupancy be determined by seriation or any other archeological techniques applied to the rather meager two-dimensional distribution of evidence? Does each hearth represent a single occupation by one group of people for a continuous but limited period of time? This last question might be difficult to test. The several projectile point types known to occur at single sites did suggest the presence of more than one cultural group. On the other hand, this study might be an opportunity to discover with relative certainty the use of several projectile point types by a single prehistoric cultural group.

The sheer abundance of separate hearths in relatively small areas seemed to indicate construction of a new hearth each time one was needed. Since re-use of hearths by diverse groups would confuse the evidence, it might be difficult to determine valid intrasite assemblages or complexes on the basis of internal evidence only. But intersite comparisons should provide sufficient data to make such distinctions.

Were these hearths used in the manner of hearths known elsewhere from ethnographical and archeological evidence? Campfires are generally constructed for a limited range of purposes such as cooking, warmth, ceremony, etc. But what was going on around these particular hearths? How many of the potential activities around a campfire could we deduce or infer as actually having occurred? Not all possible activities would have likely taken place around the same campfire or necessarily even in the same camp, and cultural remains such as lithic artifacts should reflect some of these differences.

Minimally, we could determine some of the kinds of technological activities that had occurred around individual hearths. The total archeological evidence seemed rather meager—primarily lithic artifacts which could be analyzed and separated on one hand into functional tool types, and, on the other, into mere waste debris. At least it could be discovered which artifacts appear most frequently and which appear least frequently around hearths. Thus the evidence would indicate which kinds of artifacts were made near or around hearths versus those made elsewhere and brought into the hearth area. Such a distribution of artifacts would contribute to identifying loci of task performance.

ASSUMPTIONS AND PROCEDURES

The main objective of the field work was to sample as much of the region of northeastern Mexico as possible in the time available, beginning with areas closest to Monterrey. The first area chosen was near the village of Garcia, about thirty miles west of Monterrey. After inspection of this site (NL 19), it was decided that the only really adequate system for collecting artifacts would be to record their exact distance from the hearth center and the approximate direction in which they lay, i.e. N.E., S.E., S.S.W., etc. Although it would have been much faster merely to collect the artifacts dispersed about a hearth *in toto* and treat them as a gross unit, this would not explore the possibility that differences in the assemblages might be interpretable functionally as resulting from different activities taking place near or farther away from a campfire or in a direction determined by factors such as wind, sun, or topography.

One basic assumption under which we had to work was that most of the hearths had undergone relatively little disturbance since their original use. Hopefully, there had been no important cultural disturbances such as re-use of hearths by different groups of people. We assumed that re-use was not the rule for several reasons. There were no apparent secondary additions of stone to the reasonably compact hearths nor any scattering of old hearth stones around a hearth proper. In fact, many small concentrated hearths of a single layer of stone were observed within such proximity that they were not likely used at the same time. The over-all appearance of the hearths indicated a rather limited use of each and little, if any, disturbance of a hearth by later occupants of the vicinity. If this lack of cultural disturbance could be verified, it would raise the question: why the apparent waste of effort involved in constructing an entirely new hearth so near another?

Of more immediate concern in our attempt to obtain culturally meaningful artifact groupings was the geological activity that had taken place. An important question to consider was whether the hearths and surrounding artifacts still retained approximately their original position or if they had been significantly disturbed by erosion. That the land surface had remained exposed for a considerable length of time following use of the hearths was suggested by the absence of organic materials such as shell, bone, and especially charcoal within the hearths excavated at San Isidro. The major problem could perhaps be reduced to one of a mixture of cultural debris on the original surface rather than to that plus erosional mixing.

Several facts suggested that geological disturbances in the areas had not been severe. The concentrated clustering of burned rock seemed to show that disturbance was not extensive. Rocks which had been split, presumably by fire, were lying with the several separate pieces *in situ*, i.e. in their position at breakage. They had not been disturbed after complete detachment. The reason for this gentle exposure appeared to be the gradual sheet erosion of the fine-grained soil particles from around the hearth stones. The piles of rock had apparently been covered in a gentle fashion by deposition over them of sediments carried by wind and/or water. Their subsequent and probably recent uncovering has been due to gentle diffuse runoff over large areas, i.e. sheet erosion by water action not confined to channels. Over-grazing by goats and cattle in northeastern Mexico since the Conquest has promoted such unintegrated fluvial activity tending to produce general denudation rather than arroyo dissection (Fig. 1). In some locales, however, slope washing has led to extensive arroyo cutting which resulted in the destruction of many hearths (Fig. 2).

It is likely that every single hearth has not been covered over at

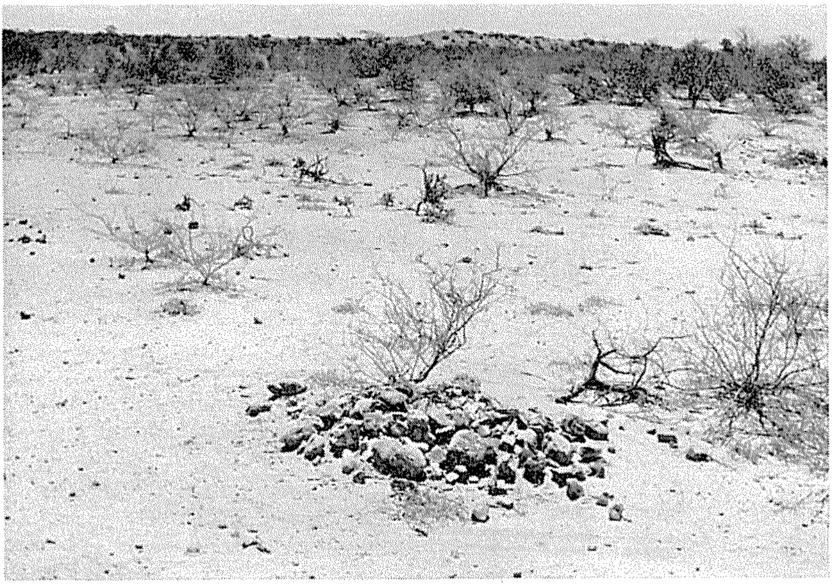

FIGURE 1. Hearth NL 156.5, in an area typically denuded of ground-level vegetation.

some time during its existence, but there is no easy way to determine this from field observation. Since there was evidence indicating that most of the hearths had been buried, this was regarded as the rule. The exceptions hopefully would not significantly affect our methods of investigation or our conclusions.

After an initial walk through and around a site, an admittedly subjective attempt was made to select a more or less "random" sample of hearths. The hearths selected included a great variety—from very small and concentrated to large and more scattered. At some sites we selected several adjacent hearths in order to plot them and their associated artifacts on a single map using plane table and alidade. In other instances we attempted to find hearths so remote and isolated that no other hearth was even in sight.

The locations of artifacts gathered from around any individual hearth were plotted on graph paper or simply noted in the daily log as to distance and direction from the hearth center. On completion of artifact collecting at each hearth, the stones were moved aside and a shovel and small screen were used to search for artifacts or organic remains not on the ground surface. Very few artifacts were buried, however, and the only area in which we found organic material was near Torreon, Coahuila, where there was charcoal mixed in with

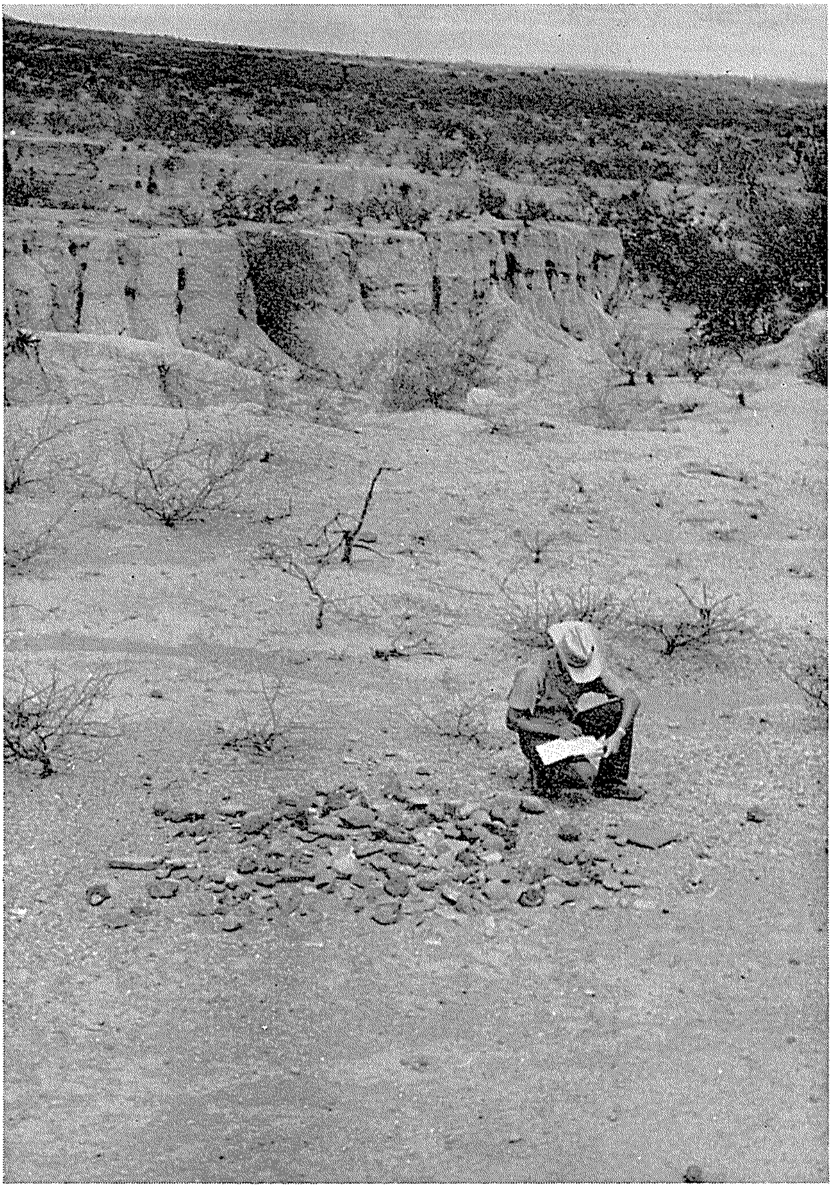

FIGURE 2. Hearth NL 158C.1 with extensive arroyo dissection behind.

hearth stones. The four radiocarbon dates obtained from this charcoal are not considered reliable because of probable contamination from being virtually on the ground surface.

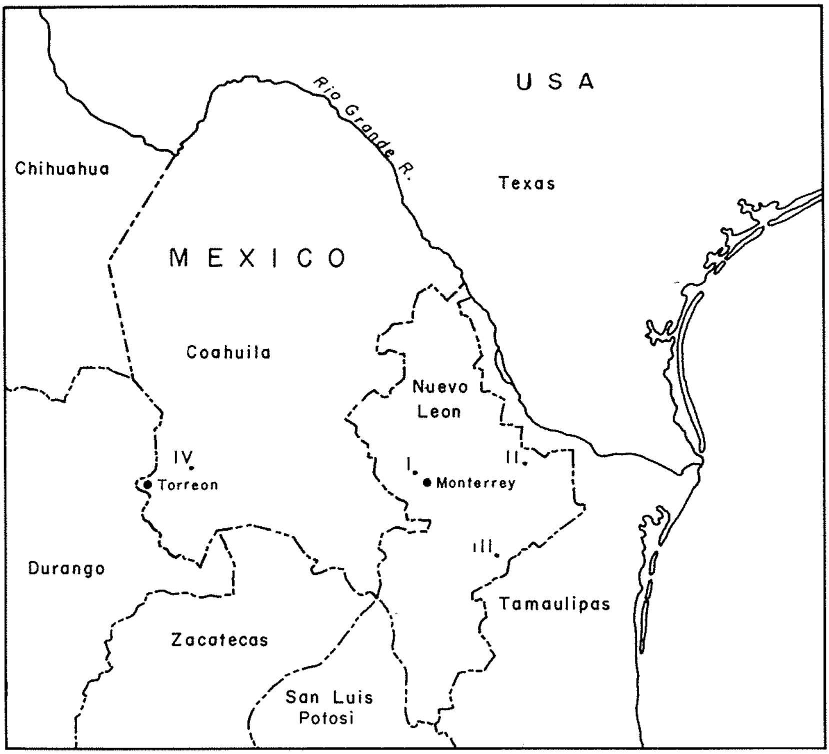

FIGURE 3. Map of northeastern Mexico. Roman numerals indicate areas investigated.

DATA

The specific sites investigated were in regions east, south, and west of Monterrey (Fig. 3); time did not permit a survey to the north. Some of the sites are on the banks of arroyos which may have once contained water more often than they do today. Others occur in dessicated regions with no evidence of present or past major water sources. The reasons for hearth concentrations, i.e. preferred camp sites in particular areas, are not obvious.

From the 20 open sites assigned numbers, a selection was made of 204 hearths. Artifacts were found nearby on the ground surface at 104 hearths whereas the remaining 100 hearths had no artifacts.

The 567 artifacts recovered during this investigation were all of lithic material with an obvious predominance of heavily patinated limestone pebble-cores and flakes. Because there were relatively few flint artifacts, they were analayzed separately from those made of limestone, sandstone, or basaltic rock. Strict attention was given to establishing morphological categories of artifacts through analysis of technological procedures. The analysis was based on observable artifact form and excluded any presumed function. A similar analysis of artifacts from Texas resulted in what has been called "lithomorphic classes" (Johnson 1967). These are categories of lithic objects showing morphological alteration by man, but not all are tools or artifacts necessarily used by man. The resulting six major groups and the number of artifacts recovered in the survey are:

I.	Pebbles	114 specimens
II.	Unworked flakes	344 specimens
III.	Worked flakes	23 specimens
IV.	Miscellaneous bifaces	20 specimens
V.	Thinned, pointed bifaces	63 specimens
VI.	*Clear Fork* gouges	3 specimens

There was no apparent alteration of any artifacts at a date later than their original manufacture. Because of the heavy patination on most artifacts, such reworking or resharpening would be obvious. It should also be noted that no artifacts recovered showed deliberate shaping by means of abrasion or grinding—there were no manos, metates, mortars, or pestles.

ANALYSIS AND CONCLUSIONS

Observations made in the field and analysis of the collected artifacts have unfortunately cast shadows on the validity of many of our hearth/artifact assemblages. This does not necessarily depreciate our general approach or specific techniques. At some sites there was undoubtedly more washing about of artifacts than originally anticipated, as attested by the presence of modern pottery, bottle caps, etc., in and among hearth stones. At other sites there may not have been enough erosion to expose buried hearths adjacent to those visible, thus disguising the mixture of occupational debris from different hearths. This was especially possible where an exposed hearth lay near a bank or on a steep slope.

A problem that is becoming increasingly important is the difficulty of finding open sites over which goat herders have not tramped while searching for projectile points and other thinned bifaces as a relief from boredom and as a means of slight financial gain. Also, Texas relic hunters have for years been scouring much of northeastern Mexico, including our specific Coahuila sites, in search of all kinds of flint artifacts. Unfortunately, such looters are prone to pick up projectile points and a miscellany of what is to them spectacular. Consequently, the professional or serious amateur archeologist is left with depleted and unbalanced patterns with which to struggle.

The projectile point types which were found have such extended temporal ranges as far as related archeological data reveal that they are of little analytical value in establishing dates for specific associated artifacts or hearths. For example, MacNeish (1958) found *Abasolo*, *Tortugas*, and *Nogales* type points in all of his excavated cultural phases dated from 7000 years ago to early historic times. These are common types in the northeastern Mexico-southwestern Texas region and were found at coastal plains sites during this survey. The same open sites possessed *Catan* and *Matamoros* points, which are generally assigned a temporal range of about A.D. 500 to 1700 (Suhm *et al.*
assigned a temporal range of about A.D. 500 to 1700 (Suhm *et al.* 1954).

About half of the hearths recorded had no visible, associated artifacts and others had so few artifacts that occupation of hearth areas was probably brief, perhaps only for one night. MacNeish (1958:138) suggested brief occupancy for similar "temporary open camps" in Tamaulipas.

From this equivocal evidence the question of a single occupation for every individual recorded hearth is not definitely answered. But in general, the small compact construction of most hearths suggests their use by a micro-band of related persons who built a communal fire adequate for their size group. This is consistent with our knowledge of the early historical inhabitants of the area whose socio-political organization was a simple one of exogamous, patrilocal micro-bands (Ruecking 1955).

The presence of numerous, adjacent hearths is probably due to each having been buried soon after use. Later hearths would be built on a slightly higher level of the sediments. Eventually, with the change to erosional activity, deflation of all hearths resulted in their common placement on the present ground surface, much in the manner of desert pavement.

The total specific activities around any individual hearth remain a matter of speculation but now within a decreased range of probability. The paucity of artifacts and their uncomplicated forms suggest rather simple, limited activities—certainly none that would not be expected. No doubt brush was broken off, pulled up, or chopped and placed on the hearth stones to provide kindling for cooking and warmth. Mussel shells found among the hearth stones at one site show that at least part of the time these were "mussel-roasting hearths." At other times they were probably used to roast or singe vegetation such as cactus pears.

Unfortunately, no directional distribution of activities can be determined from the locations of artifacts around individual hearths. Many artifacts and/or tools were no doubt manufactured near hearths and carried away, or away from hearths and brought in, or near one hearth and subsequently removed to a location near another hearth. The data available from this brief survey are insufficient for an extensive analysis of the complicated patterns of artifact distribution which may be present; however, the gathering of additional data and their statistical manipulation should reveal these patterns. The potential value of careful, systematic recovery of surface artifacts from many open area sites may ultimately be realized through the ongoing refinement of statistical analyses and through the computers which handle huge amounts of data.

Some simple correlations of tools with debitage were discovered. There were 22 hearths with thinned, pointed bifaces (projectile points, knives, etc.), 33 hearths with thinning flakes, and 11 hearths with both. With the exception of an unusual red projectile point found at one hearth and a black one found at another, wherever thinned, pointed bifaces and thinning flakes occurred together, there were flakes of the same color as the bifaces. The reverse is not true, however—there are flakes at several hearths which lack the corresponding color projectile points. This can be interpreted to mean that some step in the manufacturing or retouching of projectile points took place around the hearths. Since there appears to have been a "cache" of non-thinned projectile point blanks discovered at one site, it seems likely that flint was procured and roughed out into point blanks at its source in the mountains to be transported until needed.

The emphasis on choppers, or at least large, heavy pebble implements at many hearth sites is consistent with the technological habits of other desert cultures such as in the adjacent southwestern United States. But the latter usually had a wider variety of artifacts in their assemblages, including especially the grinding implements characteristic of or essential to an efficient desert economy. The complete absence of manos, metates, etc., around the Mexican hearths suggests that there was no extensive pre-cooking preparation of edible vegetation in the vicinity of the hearths. The presence of pounding implements made of wood instead of stone in early historic times may mean that prehistoric peoples made equally extensive use of wooden mortars. However, wooden pounding tools have not been found in excavated rock shelters and other sites in nearby mountains where stone manos and metates were uncovered.

On the basis of the probable absence of wooden pounding implements around hearths and the near absence of likely flesh-cutting or hide-working implements or animal bones, one may suspect that most hearth sites had a special use to people who lived elsewhere. In many instances this would account for what appears to be an incomplete assemblage of artifacts. One could tentatively conclude, as has Taylor (1966:64), that these nomadic foragers frequently searched what must have been generally waterless areas for vegetal food while staying within traveling distance of watered mountains, rockshelters, etc. Thus hearth sites may represent temporary, perhaps seasonal camps of bands which lived more often or more permanently elsewhere. Such seasonal transhumance was a practice of desert cultures of the western Great Basin (Davis 1963). We may suspect that prehistoric foragers of northeastern Mexico were systematically exploiting adjacent microenvironments in a more or less regular manner. Reoccupation of sites by the same group probably occurred, perhaps annually, but with no material framework to return to such as in Arizona where the metates were left inverted when not in use (Agenbroad 1966).

At isolated hearths there is little doubt that we recovered truly valid, discrete hearth/artifact assemblages. There are sometimes few artifacts at such isolated hearths, and these do not tell us much. For example, one site consisted of 5 hearths, of which 3 had one bifacial pebble implement each, one or two percussion flakes, and several black flint thinning flakes.

One basic problem at these and other surface sites may be that of low "archeological visibility" which has been observed among contemporary nomadic cultures such as the African Bushmen. The Bushmen leave surprisingly little occupational residue behind at their campsites (Deetz 1965). Similarly, the probable short-time use of each hearth area in Mexico may have resulted in cultural debris consisting of only a small fraction of the potentially structured material elements which might be correlated with the behavioral attributes of the cultural system. Therefore, few single, discrete hearth assemblages might contain sufficient artifacts to permit discovery of the quantitative co-variation in the distribution of cultural items. While some patterning of artifacts can probably be found around hearths in any site that is adequately preserved, the non-random distribution of debris may sometimes only allow interpretations that approach triviality or pontification of the obvious.

In conclusion, because so few investigations have attempted to discover such basic aspects as configurations of artifact categories, the true nature of surface archeological data remains poorly explored. However, the recent work in Arizona and northeastern Mexico are suggestive of the potential value of systematic surface collection and that, at the very least, mere relic-collecting from surface sites must not be tolerated. Archeologists—professional and amateur—cannot continue to neglect the significant paleo-anthropological information to be found in non-buried archeological data.

ACKNOWLEDGMENTS

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Analysis of Human Skeletal Remains From Coontail Spin

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ABSTRACT

Six adult skeletons and the remains of one fetus were excavated from the Coontail Spin Rockshelter during salvage archeological excavations at Amistad Reservoir in the fall of 1962. Five of the adult skeletons and the fetus skeleton came from relatively late Archaic stratigraphic contexts (Nunley, et al. 1965: 8-12). Individual No. 2139 was unearthed at some distance from the other four adult skeletons, but at approximately the same depth. Individual No. 2137, found on the surface, cannot be assigned to a particular stage on archeological evidence. With the above reservations, the skeletons of the six adult individuals are considered as a sample of one population in the following description.

MATERIALS AND METHODS

In general, the preservation of skeletal material was quite good. The individual found on the surface, No. 2137,[1] is represented by both femora, tibiae, and innominates; the sacrum; right clavicle; and a few vertebrae and ribs. This male was in his early twenties at time of death. The fetus, No. 2142, lacks one fibula and radius. Individual No. 2139 (Burial No. 1) is a very complete skeleton of an approximately 23 year old female with practically all the bones present, most in excellent condition.

A male over 50 years of age, No. 2138 (Burial No. 2) is represented by a skull, mandible, left humerus, right scapula fragments, a right tibia, all five lumbar vertebrae, and both calcanea and astragali, fragments of the right humerus, right and left ulnae, right and left fibulae, ribs and vertebrae. Another male over 50 years of age, No. 2140 (Burial No. 3), is represented by a complete skull and mandible, and fragments of a right and left femur and tibia. Right and left humeri fragments, a left clavicle, four lumbar vertebrae, a complete right astragalus, and fragments of the right calcaneum, scapula, rib, vertebrae, and hand and foot bones were excavated with the previously mentioned skull and thought to belong to that individual. In the lab, however, it became obvious that the postcranial material represented another individual, an adult female.

Skull fragments, a mandible, fragments of a right humerus, a manubrium, a right clavicle, and a few vertebrae and rib fragments represent individual No. 2141, a female(?) past 50 years of age. Because

[1] Skeletal catalog numbers refer to data sheets on file at the Physical Anthropology Laboratory, Department of Anthropology, The University of Texas.

of the paucity of material, this individual is not definitely identifiable as to sex, but the material is more suggestive of female than of male. The last individual, No. 2143, which is represented by a mandible and a few skull fragments appears to be a male over 50 years old. In addition to the seven individuals, a few foot bones, a sternum, and a right patella fragment—all apparently adult—were not assignable to any individual and are excluded from the analysis.

Age was estimated by using criteria suggested by McKern and Stewart (1957), while the sex identifications are based on criteria from Montagu (1960). All measurements and observations correspond to those defined by Montagu (1960) and Hrdlicka (1952). Post-cranial indices were computed only when bones were present from the same side of the skeleton.

ANTHROPOMETRIC DATA AND OBSERVATIONS

Measurements for the skeletal remains from the Coontail Spin Site are presented in Table 1. The two individuals with measurable skulls, No. 2140 and No. 2139, are both extremely long-headed with cranial indices that fall in the hyperdolichocranic range. No. 2140, a male, has cranial index of 66.8 and No. 2139, a female, has cranial index of 62.4. Individual No. 2138, a male, while not measurable, had a skull complete enough also to suggest hyperdolichocrany.

Individual No. 2140 has a skull higher than it is wide. It has a complete Inca bone, and small wormian bones occur in the lambdoid suture. Most of the maxillary and mandibular dentition were lost during life. Only the maxillary first left molar and both canines were present, and absorption of the alveoli was generally complete. Bony response to musculature was noted as medium on the skull.

Individual No. 2139 is similar in most respects to the preceding male. This 23 year old female also has a long, narrow, rather high skull. Wormian bones were present in the lambdoid suture, but there was no Inca bone. The metopic suture is visible only in the nasal-glabella area. All the mandibular teeth had been lost during life, and the alveoli were completely absorbed. The same condition was found in the maxilla where the only remaining tooth was a first right molar which was eroded down to the root. The musculature of this individual was also noted as medium.

Individual No. 2138 is represented by a nonrestorable skull. This male of 50 years or more had lost all of his mandibular and most of his maxillary teeth during life. A left canine, premolar, and first molar were present in the incomplete maxilla. Of pathological interest is a small indentation in the frontal bone, above the lateral edge of the left supraorbital ridge. The depressed area is about 15 mm. in diameter and protrudes about 5 mm. into the interior of the skull. There is no evidence of necrotic intrusion into the surrounding bone. This male also had a very pronounced inion.

A complete mandible is all that represents individual No. 2143, a male over 50 years of age. The teeth present show excessive wear and all the crowns are completely worn down to the alveolar borders. A left incisor and first and second molars were lost during life. An interesting feature of the mandible are the extremely large mental foramina.

Individual No. 2141, a female(?) over 50 years old, is represented by only a few skull fragments. Portions of the maxilla and mandible are present. From the nature of the alveoli, it appears that the incisors and canines were lost shortly before death. The remaining alveoli were completely absorbed.

The postcranial material tends to represent individuals of gracile proportions with rather heavily muscled males and medium to heavily muscled females. Individual No. 2138 demonstrated a healed fracture of two carpal phalanges. The anterior borders of the lumbar vertebrae all tended to be moderately lipped, both superiorly and inferiorly, but this is hardly unusual considering the mature age of the individuals. The only other abnormality noted was a bony growth, possibly an exostosis, on the inferior side of the right sternum of Individual No. 2141; the manubrium was also involved.

Stature, as calculated by the Mongoloid formula of Trotter and Gleser (1958: 111), is presented in Table 4. The two males, No. 2137 and No. 2138, are 5'5" and 5'4" respectively, while the female, No. 2139, is 5'6". They have been compared with males from the Langtry Creek Burial Cave (Greer and Benfer 1963: 247, Table 4) whose statures were 5'9" and 5'7" (measurements taken only from the tibia). As is generally known, stature tends to decrease with age, and the disparity in height is probably explained by the age difference of the two samples. The two Langtry Creek males were 33 and 30 years old at time of death.

Comparative data from the Guadalupe Mountains of southeastern New Mexico (Mera 1938: 61-63) and Langtry Creek Burial Cave in Val Verde County are presented in Tables 2 and 3. The general impression is that the three samples, within the bounds of normal variability, represent one population. However, more specific relationships can be pointed out. Female No. 2140 from Coontail Spin compares quite closely to the Guadalupe Mountain material. The skull is much shorter and narrower than either the Langtry Creek individual or the two females from the Guadalupe mountains. It is interesting to note the rather large disparity in size between the smaller Coontail Spin postcranial measurements and the larger Langtry Creek individual.

Cultural evidence also points to more similarities than differences among the three groups. The artifact assemblages of the two Val Verde County sites and the sites from the Guadalupe Mountains vary only in minor details. The only significant cultural differences would appear to be the occurrence of pottery in the New Mexico sites and some differences in dart point morphology. Significant similarities are: side-notched projectile points (dart points), similar cordage, similar sandals, rabbit sticks (or fending sticks), and similar burial practices (Mera 1938; Greer and Benfer 1963; Nunley *et al.* 1965). Therefore, on the basis of cultural similarities, the sample from the Guadalupe Mountains, though coming from a variety of sites—*i.e.*, mortuary caves, occupational shelters, middens, and midden circles ("sotol pits")—would seem to date at approximately the same time (Late Archaic) as the samples from Coontail Spin Rockshelter and Langtry Creek Burial Cave. The Langtry Creek Burial Cave is dated as Late Archaic by Greer and Benfer (1963: 248). This evidence confirms the impression of similarity derived from the Late Archaic skeletal evidence from West Texas and southeastern New Mexico.

CONCLUDING STATEMENT

Six adults and one fetus from Coontail Spin Site have been described. The sample was found to compare quite closely with other skeletal material from the Late Archaic Stage in Val Verde County and southeastern New Mexico. Because of the small number of published reports describing skeletal material, these conclusions must remain tentative. Further excavation and analysis of skeletal material are highly desirable, if not absolutely necessary, before our knowledge of the biological nature of prehistoric human populations from Texas and surrounding areas can be expanded.

TABLE 1

Coontail Spin Skeletal Material: Measurements and Indices[1]

Individuals Sex Age	2137 Male 20	2138 Male 50 plus	2140 Male 50 plus	2143 Male(?) 50 plus	2139 Female 23	2141 Female(?) 50 plus
CRANIAL						
Cranial Capacity	----	----	1270	----	----	----
Maximum length	----	----	187	----	186	----
Maximum breadth	----	----	125	----	116	----
Basion-bregma	----	----	133	----	----	----
Auricular height	----	----	115	----	----	----
Left parietal	----	----	5	----	5	----
Minimum frontal	----	93	89	----	82	----
Bizygomatic diameter	----	----	119*	----	----	----
Nasal height	----	----	49	----	46	----
Nasal breadth	----	----	27	----	22	----
Interorbital breadth	----	----	23	----	23	----
Basion-nasion	----	----	95	----	----	----
Orbital height, left	----	----	34	----	34	33(rt.)
Orbital, breadth, left	----	----	37	----	35	----
Gonion-menton, combined	----	81	----	92	77	----
Bigonal diameter	----	100	----	----	93	----
Height ascending ramus, left	----	61(rt.)	----	34(rt.)	54	----
Minimum ramus width, left	----	28	31	34(rt.)	25	----
Mandible thick. between M 1-2	----	----	16	14	----	14
Angle of lower jaw (0° =rt. angle)	----	24°	----	31°	29°	----
Indices						
Cranial	----	----	66.8	----	62.4	----
Length-height	----	----	71.1	----	----	----
Breadth-height	----	----	106.4	----	----	----
Cranial module	----	----	148.3	----	----	----
Nasal	----	----	55.1	----	47.8	----
Orbital	----	----	91.9	----	97.1	----

[1] All measurements in mm. except cranial capacity which is in cc.

* Approximate

Table 1 (continued)

Individuals Sex Age	2137 Male 20	2138 Male 50 plus	2140 Male 50 plus	2143 Male(?) 50 plus	2139 Female 23	2141 Female(?) 50 plus
POSTCRANIAL						
Humerus, left						
Maximum length	----	301	----	----	283	----
Maximum middle diameter	----	18	----	----	18	----
Minimum middle diameter	----	13	----	----	12	----
Maximum diameter head	----	41	39	----	38	----
Minimum Circum.	----	51	----	----	49	----
Middle Index	----	72.2	----	----	66.7	----
Humeral-femoral index	----	----	----	----	67.1	----
Robusticity index	----	16.9	----	----	17.3	----
Humerus, right						
Maximum diameter head	----	----	39	----	----	38
Radius, left						
Maximum length	----	----	----	----	232	----
Humero-radius index	----	----	----	----	81.9	----
Ulna, right						
Maximum length	----	----	----	----	246	----
Clavicle, left						
Maximum length	----	----	132	----	128	----
Middle Circumference	----	----	31	----	25	----
Clavicle, right						
Maximum length	137	----	----	----	----	127
Middle Circumference	35	----	----	----	----	----
Femur, left						
Bicondylar length	405	----	----	----	424	----
Maximum length	409	----	----	----	435	----
Maximum diameter head	41	42	----	----	41	----
Subtrochanteric diameter, anterior-posterior	22	----	----	----	25	----

Table 1 (continued)

Individuals Sex Age	2137 Male 20	2138 Male 50 plus	2140 Male 50 plus	2143 Male(?) 50 plus	2139 Female 23	2141 Female(?) 50 plus
Subtrochanteric diameter, lateral	24	----	----	----	27	----
Middle diameter, anterior-posterior	24	----	----	----	27	----
Middle diameter, lateral	22	----	----	----	23	----
Minimum Circum.	71	----	----	----	76	----
Platymeric index	91.7	----	----	----	92.6	----
Middle index	91.7	----	----	----	85.2	----
Robusticity index	11.4	----	----	----	11.8	----
Femur, right						
Bicondylar length	401	----	----	----	424	----
Maximum length	409	----	----	----	431	----
Maximum diameter head	41	----	----	----	41	----
Subtrochanteric diameter, anterior-posterior	21	----	----	----	24	----
Subtrochanteric diameter, lateral	24	----	----	----	27	----
Middle diameter, anterior-posterior	26	----	----	----	27	----
Middle diameter, lateral	21	----	----	----	23	----
Minimum Circum.	71	----	----	----	77	----
Platymeric index	87.5	----	----	----	88.9	----
Middle index	80.9	----	----	----	85.2	----
Robusticity index	11.7	----	----	----	11.8	----
Tibia, left						
Maximum length	358	----	----	----	354	----
Middle diameter, anterior-posterior	27	----	----	----	26	----
Middle diameter, lateral	16	----	----	----	16	----
Nutrient foramen diameter, anterior-posterior	30	----	----	----	31	----
Nutrient foramen diameter, lateral	19	----	----	----	19	----
Minimum Circum.	63	----	----	----	64	----
Middle index	59.3	----	----	----	61.5	----
Platycnemic index	63.3	----	----	----	61.3	----

Table 1 (continued)

Individuals Sex Age	2137 Male 20	2138 Male 50 plus	2140 Male 50 plus	2143 Male(?) 50 plus	2139 Female 23	2141 Female(?) 50 plus
Length-thickness index	17.6	----	----	----	18.1	----
Tibio-femoral index	88.4	----	----	----	83.9	----
Tibia, right						
Maximum length	----	370	----	----	----	----
Middle diameter, anterior-posterior	----	28	----	----	----	----
Middle diameter, lateral	----	20	----	----	----	----
Nutrient foramen diameter, anterior-posterior	----	32	----	----	----	----
Nutrient foramen diameter, lateral	----	24	----	----	----	----
Minimum Circum.	----	70	----	----	----	----
Middle Index	----	71.4	----	----	----	----
Platycnemic index	----	75.0	----	----	----	----
Length-thickness index	----	18.9	----	----	----	----
Tibio-femoral index	----	----	----	----	----	----
Fibula, left						
Maximum length	----	----	----	----	345	----
Innominate, left						
Height	192	----	----	----	198	----
Breadth	132	----	----	----	149	----
Index	68.8	----	----	----	75.3	----
Sacrum						
Height	104	----	----	----	79	----
Breadth	115	----	----	----	114	----
Index	110.6	----	----	----	144.3	----

TABLE 2

Comparison of Cranial Measurements between Coontail Spin, Langtry Creek Burial Cave, and Material from Southeastern New Mexico (Guadalupe Mountains)

	Coontail Spin No.	Coontail Spin Mean	Langtry Creek No.	Langtry Creek Mean	Guadalupe Mtns. No.	Guadalupe Mtns. Mean
Male						
Maximum length	1	187.0	1	190.0	7	180.0
Maximum breadth	1	125.0	1	140.0*	7	136.0
Basion-bregma	1	133.0			7	132.0
Auricular height	1	115.0			6	114.8
Bizygomatic diameter	1	119.0*			6	131.4
Female						
Maximum length	1	186.0	1	183.0	2	183.0
Maximum breadth	1	116.0	1	134.0	2	134.5

* Approximate

TABLE 3

Comparison of Long Bone Measurements between Coontail Spin and Langtry Creek Burial Cave

	Coontail Spin No.	Coontail Spin Mean	Langtry Creek No.	Langtry Creek Mean
Male				
Humerus, left				
Maximum length	1	301.0		
Femur, right				
Bicondylar length	1	401.0	1	499.0
Maximum length	1	409.0	1	451.0
Tibia, left				
Maximum length	1	358.0	1	380.0
Female				
Humerus, left				
Maximum length	1	283.0	1	288.0
Femur, left				
Bicondylar length	1	424.0	1	427.0
Maximum length	1	434.0	1	430.0

TABLE 4

STATURE

Individual No. 2137, male	
Tibia, left	5' 5"
Individual No. 2138, male	
Tibia, left	5' 4"
Individual No. 2139, female	
Tibia, right	5' 6"

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Excavation of a Buried Midden, Site 41CX11 in Crockett County, Texas

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ABSTRACT

A site in northwestern Crockett County was discovered exposed in the banks of an intermittent stream. Burned rocks, ash, and other occupational debris were underneath ten feet of sterile overburden. Limited excavations made in 1967 recovered *Langtry* projectile points and other artifacts which suggest that the site may be assigned to the Period 2 Pecos River Focus.

INTRODUCTION

Site 41CX11 is visible in the east bank of an intermittent stream for a distance of 94 feet in a north-south direction. In the bank opposite it is only 54 feet in length. The creek bed is approximately 12 feet wide. This suggests a circular or oval outline for the midden dissected to the west of center by the stream. The occupation layer varies from 9 to 30 inches in thickness on the east bank and is thicker—3 feet—in the west bank. Overburden made up of sands and gravels covers the occupation level to a maximum of 10 feet.

On the present surface there are two nearby burned rock middens. The first is some 40 feet in diameter and lies nearly 400 feet to the north-northeast. The second, only 10 feet in diameter, is about 300 feet to the south. These middens and adjacent surfaces have been arrowhead hunted for years, but only an occasional find can be made today.

The small stream that cuts through the site derives from the Edwards Plateau and empties into the Pecos River a short distance below the site. The creek bed contains water only following the infrequent rainfalls.

Most of the vegetation in the area is in the form of cacti or brush and includes barrel cactus, hedgehog, prickly pear, yucca, mescal, lechugilla, sotol, allthorn, catclaw, and creosote. Deer, rabbit, coyote, and javelina are abundant in the area today. Smaller animals include pocket gopher, raccoon, skunk, snake, lizard, frog, turtle, and bird.

The author is indebted to J. M. Barkes of Midland for his hours of work on the contour map and to Colten S. Parker of Lubbock and Arnold E. Sommer of Midland for their companionship and assistance during the excavation.

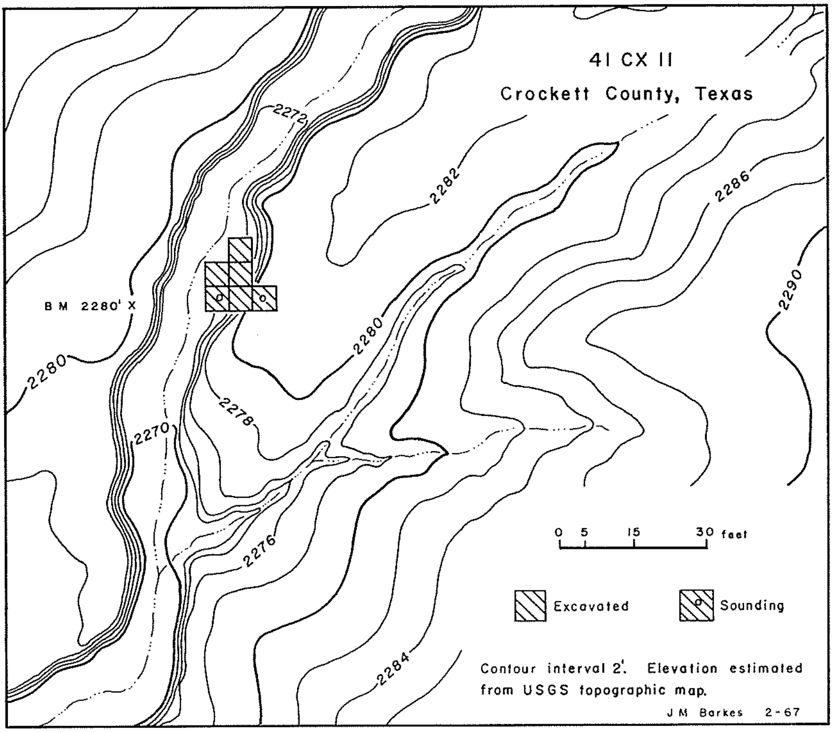

FIGURE 1. Topographic map of Site 41CX11.

EXCAVATION

A datum was established for vertical control, and the site was mapped with plane table and alidade (Fig. 1). Horizontal control was maintained by referring to a base point 25 feet west of the top edge of the east bank. This point was selected because it offered the opportunity to reach the largest area of the burned-rock stratum by the removal of a minimum of sterile overburden. A grid system of five foot squares was superimposed, one of which would permit a strata-test through overburden, midden, and all other layers (Fig. 2). Within each stratum records were kept by 6 inch levels.

Six of these squares were excavated through the burned-rock layer. Rocks were removed by hand, but all other excavated material was passed over a ¼-inch hardware cloth.

Although bedrock was exposed on the west wall of the creek some 20 feet upstream, it was not reached in the area of excavation. Several soundings to 3 feet below the midden found only pea gravel. A narrow

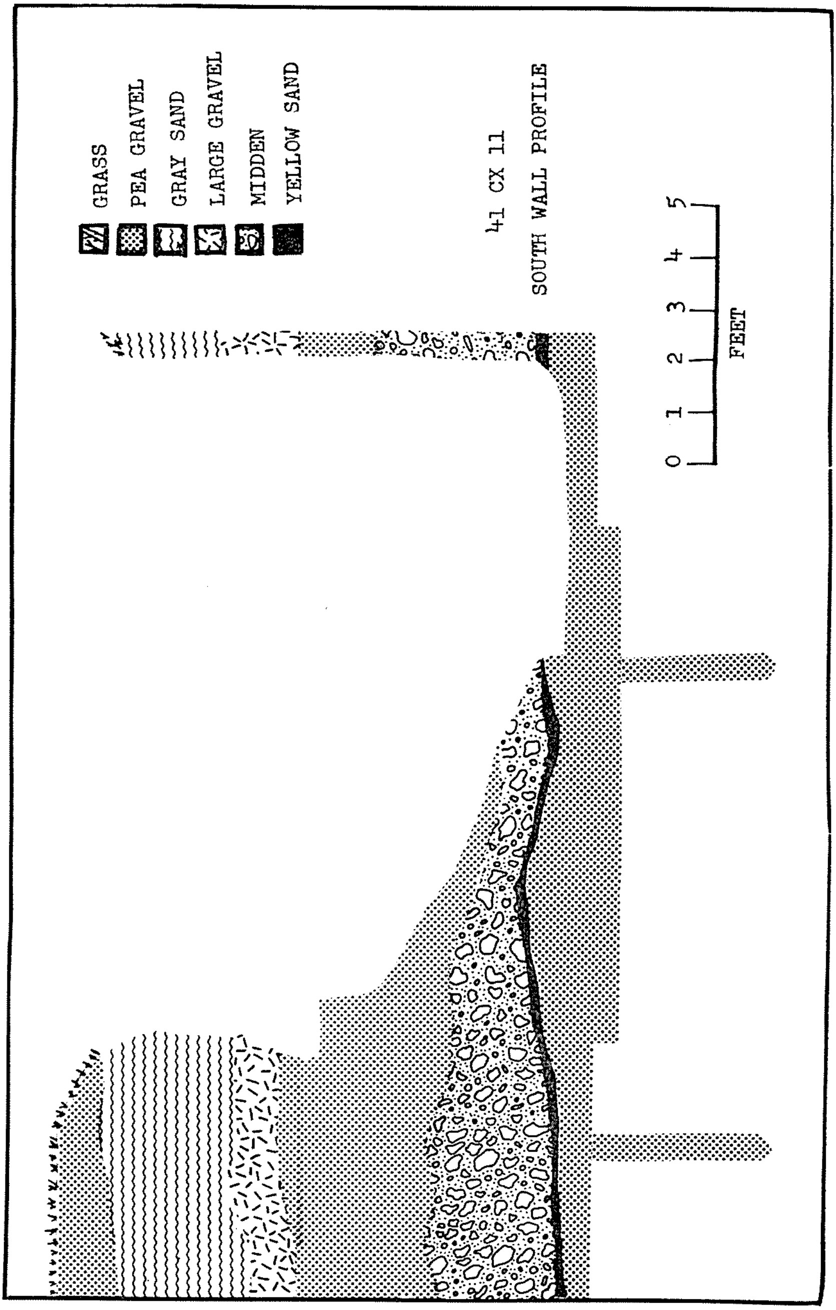

FIGURE 2. Profile of the south wall.

cut, 6 inches in width, was made in the opposite (west) bank, and it conformed to the sequence of strata disclosed in the east bank.

The thickness of the midden deposit varied from 9 to 36 inches. The mass of the midden was made up of thousands of densely-packed angular fragments of limestone which averaged from 2 to 5 inches in diameter. The limestone is derived from outcrops of the Cretaceous formation found extensively over the Edwards Plateau. On contact with fire limestone fractures in angular fragments and becomes a dark gray color.

The space between the stones was filled with greasy ash. Bits of fresh-water mussel shells, dirt, and various artifacts occurred throughout the unstratified mass of rocks.

Study of the area of burned rock exposed in the banks and the excavated area revealed no recognizable pattern of deposit. The midden does not appear to be doughnut-shaped as there were no peaks on either end in the bank profile. No cooking basin or pit outline was recognized within the burned-rock deposit.

TOOLS

Twenty tools of chipped stone were recovered from the six excavated squares, nearly half of these coming from one square on the south-central part of the excavated area. Some of the squares had been truncated by erosion down into the artifact-bearing zone, therefore, measurements were also taken upward from the bottom of this zone. Most of the tools were in the lowest levels of the midden zone: half of the tools were in the lower 6 inches and three-quarters were in the lower 12 inches. The same frequencies applied to the projectile points. The latter are identified according to the Handbook of Texas Archeology (Suhm and Jelks 1962).

One broken, stemmed dart point, apparently of the type *Marshall*, was recovered from within the overburden, 5 feet above the base of the burned-rock layer (Fig. 3 A). The broken blade is broad and asymmetrical. Shoulders are barbed. The stem is parallel-sided and the base is slightly convex. Maximum width across the barbs is 3.9 cm. and stem width is 1.4 cm.

A crudely flaked projectile point with a contracting stem was classified as an *Almagre* (Fig. 3 B). The tip is missing, so the blade shape is unknown, but one edge appears to be straighter than the other. Shoulders are weak and the thick base is almost pointed. It also resembles a variety of *Langtry* with crude workmanship.

Six projectile points from among the five squares that yielded artifacts are classified as *Langtry* (Fig. 3 C-H). More than one sub-type

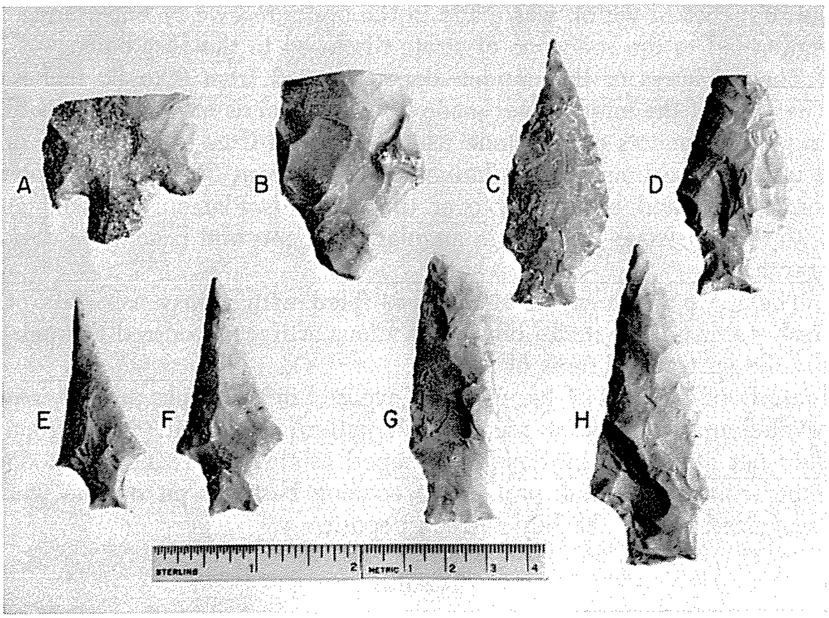

FIGURE 3. Projectile points. A, *Marshall* point. B, *Almagre* point. C-H, *Langtry* points.

may be represented, but features intergrade and separation is difficult. These have triangular blades with edges that are straight (D, G, H), or concave (E, F), or recurved (C). All are finely chipped and have prominent shoulders. Stems vary from contracting (E, F) to parallel-edges (D, H) to slightly expanding (C, G). Bases are concave on four specimens (C, D, E, F) and straight on two (G, H). Two specimens have a noticeable bevel on the base (D, E). Lengths vary from a minimum of 5.4 cm. to a maximum of 8 cm. Shoulder width of the *Langtry* type varies from 2.2 cm. (E) to 2.9 cm. (D).

Nine knives, the most numerous artifact class, are made of the local gray and tan flint (Fig. 4). They may be divided into five groups based on the shape of the base, the thickness, or the manufacture:

(1) Two bifaces, one a basal fragment, have thin well-worked blades with straight bases (Fig. 4 A, B). The complete specimen has one convex edge and one recurved edge.

(2) One specimen with a convex base is very thick (Fig. 4 C). Workmanship is not as good on this knife as on other specimens, however, it is of a more coarse grade of chert. It is 9.0 cm. long, 5.1 cm. wide, and 2.5 cm. thick.

(3) Two specimens are triangular to leaf-shaped blades with con-

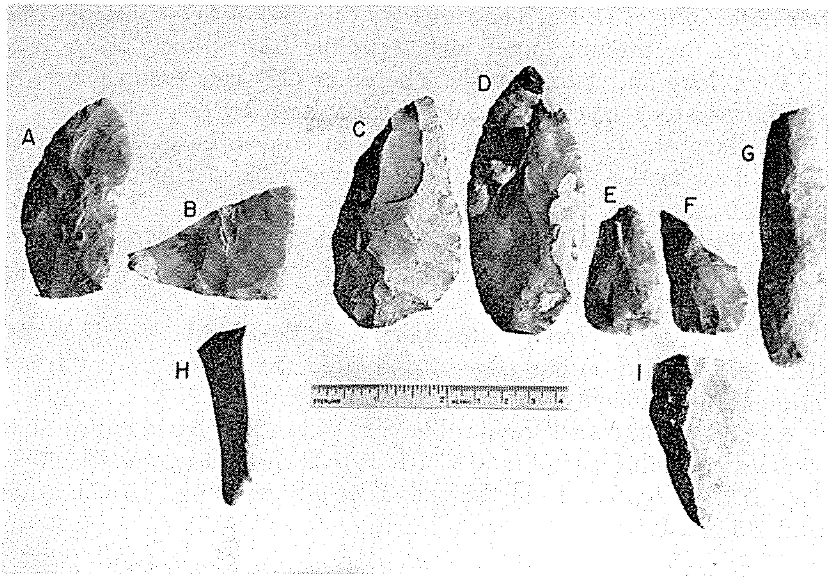

FIGURE 4. Knives.

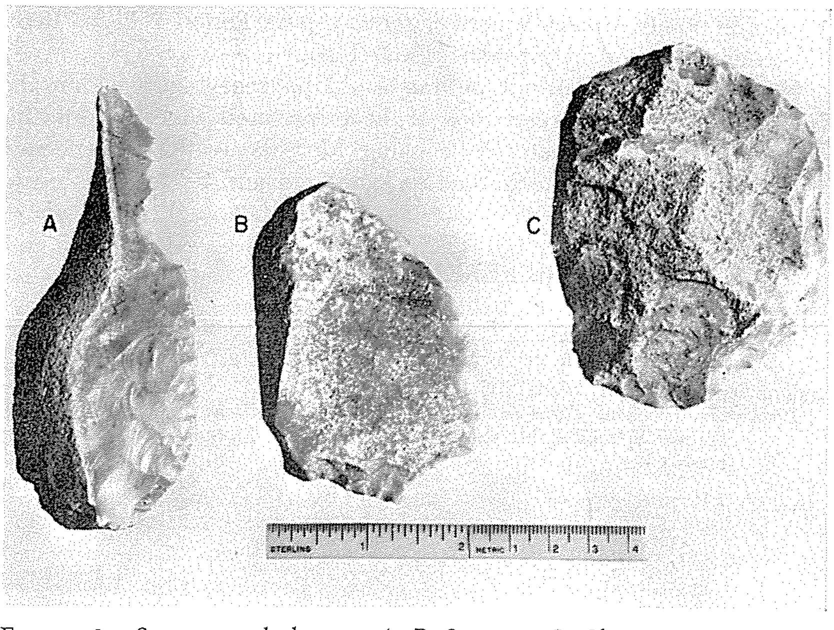

FIGURE 5. Scrapers and chopper. A, B, Scrapers. C, Chopper.

vex bases (Fig. 4 D, E). They are very thin and of fine chipping. One (D) was the artifact found highest in the burned-rock layer. It is 10.4 cm. long and 4.4 cm. wide. The other (E) was found lowest in the burned-rock layer. It is 5.0 cm. long and 2.8 cm. wide.

(4) Two parallel-sided specimens with convex bases are triangular in cross-section (Fig. 4 F, G). The complete specimen is 9.9 cm. long, 2.6 cm. wide, and 0.7 cm. thick.

(5) Two unifacial specimens are actually triangular flakes retouched on a small area of one edge to provide a cutting or scraping edge (Fig. 4 H, I).

Two scrapers, one on a cortex flake, were recovered. (Fig. 5, A, B). They are worked on one edge of one face. The underface is the flat, original, unmodified cleavage of the flake.

A chopper produced from a thin core of tan flint has a cortex layer present on both faces (Fig. 5 C). It is oval in outline. All except 3.1 cm. of the edge has been thinned. It is 9.1 cm. long, 7.3 cm. wide, and 2.5 cm. thick.

CONCLUSIONS

A limited excavation serves as a means of testing a site to learn the nature of the deposit and to determine the need for a larger excavation. This goal was reached. The consistent distribution of *Langtry* projectile points in each square suggests a pure Period 2 Pecos River Focus as described by Epstein (1962: 116).

No cooking basin or pit outline could be recognized within the burned-rock layer. Burned rock or heat fractured limestone of this quantity surely was created by cooking. More excavations are needed to better understand the burned-rock midden and its relationship to cooking methods.

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Midland, Texas

Some Puebloan Trade Pottery From Panhandle Aspect Sites

MARTHA LEWIS CRABB

ABSTRACT

Twelve types of Puebloan trade pottery were found in 5 Panhandle Aspect village sites and two camp sites in the western half of the Texas Panhandle. Nine of these have not previously been reported for the Panhandle Aspect. All of these pottery types apparently date between A.D. 1200 and A.D. 1450. These dates correspond to the general dates suggested for the Panhandle Aspect.

INTRODUCTION

From 1964 through 1967 amateur archeologists from Dumas, Texas, collected a large number of New Mexico trade pottery sherds. The sherds were found at 7 sites along the Canadian River and its tributaries in the western half of the Texas Panhandle.

Except for two isolated finds, the 73 sherds were found in test excavations or on the surface of 5 village sites. Four sherds from a collection of the National Park Service are included. The village sites, CR1a, Big Blue 1, Floyd Ranch Ruin, Ozier Ranch Ruin and Saddleback Ruin, are each located on a bank of the Canadian River or a tributary creek where live water exists today. Each is adjacent to a cultivable flood plain and some timber.

Four reported Panhandle Aspect sites, one in the Oklahoma Panhandle and three in the Texas Panhandle, have produced Puebloan trade sherds while 8 reported sites have yielded none. The Saddleback Ruin near Tascosa in Oldham County (Holden 1933) produced about two dozen Puebloan trade sherds and 4910 cordmarked sherds. The trade pottery was identified as *Glaze I* and *Biscuit A* which Baerreis and Bryson (1966) equate with *Agua Fria Glaze-on-red* and *Abiquiu Black-on-gray* respectively. Several Puebloan sherds were picked up from the surface at Saddleback by Floyd Hudspeth of Amarillo, Texas, including 3 *Kuaua Glaze-polychrome* dated *circa* A.D. 1450 and one *Cieneguilla Glaze-on-yellow* dated A.D. 1375-1450.

The Antelope Creek Ruin in Hutchinson County and the Alibates Creek Ruin in Potter County (Krieger 1946) produced the following four types: *Lincoln Black-on-red, circa* A.D. 1300-1400; *Cieneguilla Glaze-on-yellow, circa* 1375-1450; *St. Johns Polychrome, circa* 1200-1275; and *Agua Fria Glaze A. Agua Fria Glaze A* is equated with *Agua Fria Glaze-on-red, circa* 1325-1425, by Baerreis and Bryson (1966).

Four sherds of Puebloan trade ware in a sample of 1831 sherds were recovered at the Stamper Site, Oklahoma, type site of the Optima Focus (Watson 1950). They were identified as *Rowe Black-on-white* dating from the late 13th century and found only in a few of the upper Pecos Valley ruins.

My sincere appreciation goes to each of the following people: Dr. Alfred E. Dittert, Jr., former curator, Museum of New Mexico, made this paper possible by identifying and dating the sherds. Jack T. Hughes, Panhandle-Plains Historical Museum, gave helpful advice. Michael Becker, Superintendent of Sanford Reservoir, kindly gave permission to use the identifications contained in his letter from Albert H. Schroeder, National Park Service archeologist.

The sherds were found by Mr. and Mrs. Floyd Blackburn, Mr. and Mrs. Jimmy Crabb, Mr. and Mrs. Collier Phillips, Mr. and Mrs. Fred Squyres, Mr. and Mrs. Archie Caven, Mr. and Mrs. Bill Smith, Charlie Knight, and Floyd Hudspeth.

VILLAGE SITES

CR1a Site

CR1a is a large, rich site directly across Running Water Creek south of CR1 in Moore County, Texas (Glasscock 1955). It has produced typical Panhandle Aspect materials except that stone houses and polished stone tools are absent. Several artifacts not reported for other Panhandle Aspect sites found here are: eagle or hawk talons; carefully made discoidal stones with red ocher on the flat sides; a cache of 24 end scrapers, 9 side scrapers, 6 knives, and 24 large unworked flakes; a small animal figure, a bead, and a small flower each of fired clay. Over half of the cordmarked rim sherds are collared. Small triangular, bifacially-worked flakes, one to two inches long, are abundant.

The midden which lies under 12 to 24 inches of compact overburden is from 8 to 36 inches thick, averaging about 18 inches. Local collectors have recovered hundreds of artifacts from the midden area. Although no positive evidence of houses has been found, the site must have been occupied permanently or intermittently by a large group for many years. House floors, but no stone structures or foundations, have been found in CR1 just across the creek.

Four types of Puebloan trade pottery were found at this site:

Santa Fe Black-on-white, A.D. 1225-1350
(9 sherds, 1 vessel)

Wiyo Black-on-white, A.D. 1300-1400
(8 sherds, 2 vessels)

Galisteo Black-on-white, A.D. 1300-1325
(13 sherds, 2 vessels)
Rowe Black-on-white, A.D. 1350
(19 sherds, 2 vessels)

These types are from the Rio Grande-Pecos River area of northeastern New Mexico. The temporal range is from A.D. 1225 to 1400 with a median date of about A.D. 1300.

Big Blue 1 Ruin

This village site is located in Moore County on a high promontory overlooking the winding channel of Blue Creek and a wide floodplain. Slabs of dolomite mark the foundations and fallen walls of two groups of separate structures at the Big Blue 1 Ruin. A midden area 6 feet deep which is located on a shelf immediately below one group of houses was excavated. None of the houses were excavated.

Three sherds of a *Cieneguilla Glaze-on-yellow* vessel dated A.D. 1375-1450 and one possible jar base sherd of *Agua Fria Glaze-on-red,* A.D. 1325-1425, were found in the midden. Dates of the pottery cover a period from A.D. 1325-1450 with a median date of around A.D. 1400.

Ozier Ranch Ruin

This ruin is on the north side of the Canadian River between Evans Canyon and Martins Canyon in Moore County. It is on a bench about 20 feet above the bed of the river. Formerly the river bed was one mile across but is now covered by the waters of Lake Meredith. North of the site a steep bluff rises nearly 200 feet to the level of the Llano Estacado.

This site has been almost completely wrecked by vandals. Evidence of stone walls at least 3 feet high were observed in some of the pot holes. The rooms were evidently in a cellular arrangement.

A large amount of *Borger Cordmarked* pottery and the usual stone and bone artifacts were found. A sherd of Puebloan trade pottery was described by Dittert as an anomalous specimen close to *Galisteo Black-on-white* (personal communication). Other Puebloan sherds collected by National Park Service personnel and Jack T. Hughes were identified by Dittert as Apache A.D. 1600-1700(?); *Largo Glaze-on-yellow, circa* A.D. 1425; *Largo Glaze-polychrome, circa* A.D. 1425 (letter from Albert H. Schroeder to Michael Becker 1966). The late Apache sherd is doubtless intrusive.

Evidently this site was occupied after the Panhandle Aspect ruins were completely covered with sand and soil as the surface of the site was covered with flint chips before it was disturbed by collectors.

Disregarding the Apache sherd, the dates of the Puebloan sherds span the years A.D. 1300 to 1425. Since the identification of the *Galisteo Black-on-white* is questionable, A.D. 1425 is the best date for the trade ware at the Ozier Ranch Ruin.

Floyd Ranch Ruin

Full-height stone-walled rooms in cellular arrangement and polished stone axes set the Floyd Ranch Ruin apart from the other 3 Panhandle Aspect sites investigated. Situated northwest of Amarillo on a high bank of the Canadian River, the site offers a panoramic view of the river and surrounding plains. Typical Panhandle Aspect materials have been found as well as a polished stone ax of fibrolite, turquoise ornaments, stone artifacts of obsidian and Dakota sandstone, and corrugated cookware sherds.

The Puebloan trade sherds show a wide range of dates and sources. Types from the Rio Grande-Pecos River area of northeastern New Mexico are 1 sherd of *Cieneguilla Glaze-on-yellow,* A.D. 1375-1450; 1 sherd of *Wiyo Black-on-white,* A.D. 1225-1350; and 1 sherd of *Santa Fe Black-on-white,* A.D. 1225-1350. One sherd of *Chupadero Black-on-white,* A.D. 1200-1600, usually found in eastern New Mexico and 7 sherds of 1 vessel of *Heshotauthla Polychrome,* A.D. 1275-1375 from western New Mexico were recovered.

Disregarding *Chupadero Black-on-white,* the temporal range of the sherds is from A.D. 1225 to 1450, median date of about 1350.

Isolated Finds

One sherd of Puebloan pottery identified as *Kowina Black-on-white,* A.D. 1200-1400, was found on top of a sand dune a quarter of a mile downstream from CR1 and CR1a. This type is probably from western New Mexico. Another sherd identified as *Largo Glaze-on-yellow, circa* A.D. 1425, was found in a cut bank of Blue Creek near several Panhandle Aspect sites.

The Texas sites from which trade pottery has not been reported are the Handley Ranch or Wolf Creek Ruin, Cottonwood Creek Ruin (Moorehead 1931), Tarbox Creek Ruin (Holden 1930), CR1 (Glasscock 1955), the Medford Ranch, Spring Creek, and Conners sites (Duffield 1964).

TABLE 1
Puebloan Trade Ware From Panhandle Aspect Sites

Types	*No. of sherds*	*No. of vessels*	*Date* A.D.	*Source area*	*Present sites*	*Previously reported sites & pottery*
Agua Fria Glaze-on-red	1	1	1325-1425	Rio Grande Pecos area	Big Blue 1	Saddleback Antelope & Alibates
Chupadero Black-on-white	1	1	1200-1600	Eastern New Mexico	Floyd Ranch	
Cieneguilla Glaze-on-yellow	5	3	1375-1450	Rio Grande Pecos area	Big Blue 1 Floyd Ranch Saddleback	Antelope & Alibates
Galisteo Black-on-white	14	3	1300-1325	Rio Grande Pecos area	CR1a Ozier Ranch	
Heshotauthla Polychrome	7	1	1275-1375	Western New Mexico	Floyd Ranch	
Kuaua Glaze-polychrome	3	1	*circa* 1450		Saddleback	
Kowina Black-on-white	1	1	1200-1400	Western New Mexico	Isolated find	
Largo Glaze-on-yellow	2	2	*circa* 1425	Rio Grande Pecos area	Ozier Ranch Isolated find	
Largo Glaze-polychrome	1	1	*circa* 1425	Rio Grande Pecos area	Ozier Ranch	
Rowe Black-on-white	19	2	*circa* 1350	Rio Grande Pecos area	CR1a	Stamper
Santa Fe Black-on-white	10	2	1225-1350	Rio Grande Pecos area	CR1a Floyd Ranch	
Wiyo Black-on-white	9	3	1300-1400	Rio Grande Pecos area	CR1a Floyd Ranch	
Totals	73	21				

SUMMARY AND CONCLUSIONS

Typical Panhandle Aspect materials found in association with the sherds were *Borger Cordmarked* pottery; *Harrel, Fresno*, and *Washita* projectile points; ovate and diamond-shaped beveled knives; snub-nosed, side and flake scrapers; flint drills, hammerstones, choppers; ornaments of mussel shell, olivella shell, and of stone, bone, and turquoise; bone hoes, rasps, awls, flaking tools, and digging stick tips; charred maize kernels and cobs; and a great abundance of Alibates flint chips.

Nine types of Puebloan pottery found at Panhandle Aspect sites are added to the six types already reported. The fifteen types of trade pottery include: *Agua Fria Glaze-on-red, Cieneguilla Glaze-on-yellow, Abiquiu Black-on-gray, Lincoln Black-on-red, St. Johns Polychrome, Rowe Black-on-white, Chupadero Black-on-white, Galisteo Black-on-white, Heshotauthla Polychrome, Kowina Black-on-white, Kuaua Glaze-polychrome, Largo Glaze-polychrome, Largo Glaze-on-yellow, Santa Fe Black-on-white, Wiyo Black-on-white.*

While the majority of the types are from the Rio Grande-Pecos River area of northeastern New Mexico, it is interesting to note that *Kowina Black-on-white* and *Heshotauthla Polychrome* are from western New Mexico. These two western New Mexico types have a temporal span of 200 years from A.D. 1200 to 1400. While the 12 types (shown in Table 1) span 400 years from A.D. 1200 to 1600, all were being produced within the period from A.D. 1250 to 1450.

CR1a with a median date of about A.D. 1300 seems to be the oldest of the village sites here reported. It has yielded no evidence of rock structures or foundations. Big Blue 1 with a median date of around A.D. 1400 is a village of separate house ruins. Ozier Ranch with a median date of A.D. 1425 is, beyond reasonable doubt, a village of contiguous stone-walled rooms. It would appear, from the pottery dates, that Ozier is the latest of the sites.

Although CR1a, Big Blue 1, and Ozier Ranch fall into a neat chronological pattern of early dates with no rock structures, middle dates with individual houses, and late dates with contiguous rock-walled rooms, the Floyd Ranch site does not fit the pattern so nicely. The dates of the Puebloan pottery found at Floyd Ranch range from A.D. 1225 to 1450 with a median date of between A.D. 1350 and 1375. The rooms at this site are definitely of cellular arrangement with stone walls to the full height of the rooms. The site is considerably closer to the New Mexico Pueblo region than the others, and the corrugated cookware, polished stone axes and hoes, turquoise ornaments, and use of obsidian and Dakota sandstone indicate more Puebloan influence.

It is suggested that the people at the Floyd Ranch site were being subjected to earlier or greater influences from the western Pueblos, which would account for the appearance of contiguous roomed houses at the slightly earlier date.

The dates of the Puebloan pottery here reported correspond with the carbon 14 date determinations of A.D. 1200 to A.D. 1500 reported by Baerries and Bryson (1966). The dates also correspond with the dating of the Panhandle Aspect as discussed by Krieger (1946).

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Dumas, Texas

An Unusual Hollow Reed

HARVEY P. SMITH, JR.

An interesting and unusual hollow reed was found in a small cave during a recent survey of cave shelters in Brewster County, Texas (Fig. 1). Use of this type of native, jointed reed by the ancient cave dwellers of this region has been reported by many previous explorers. However, this particular artifact is rather unique.

It was found in a comparatively small cave which is approximately 3 feet wide and 3½ feet high at the entrance, diminishing through a depth of about 30 feet. An occupational deposit occurred 15 feet back from the entrance in an irregular depression in the rock floor. A ¾ inch hard surface crust had to be broken and removed to expose the occupation stratum. A triangular flint knife, a polished bone awl, an unidentified bone tool, a short piece of twisted cordage, and a quantity of bone fragments as well as the hollow reed shaft were recovered.

The reed shaft, which is 22 cm. long and 1.1 cm. in diameter, consists of one section of hollow reed tube with closed joint sections at both ends. It was unusual in the fact that it was fitted at one end with a long, slender, hardwood, needle-like point. This hardwood point was placed into the hollow reed in a perforation in the solid joint section. The point extended into the reed approximately 4/5 inch and was carefully fitted with the distal end to the interior. The projection of

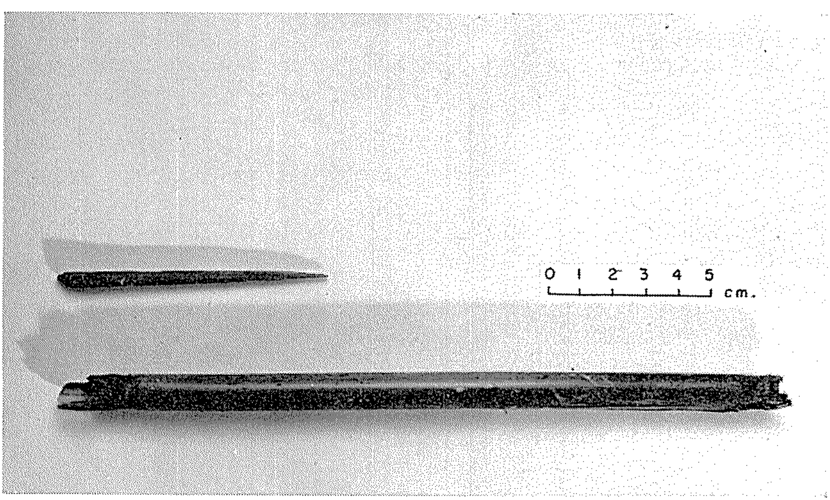

FIGURE 1. The hollow reed and needle-like point.

the proximal end of the point was partially concealed by an irregular extension of the side walls of the reed beyond the joint. The opposite end of the reed shaft also has an irregular projection of the side walls of the tube beyond the joint section. These jagged projections may imply that the hollow reed is a fragment of a longer original shaft. The opposite end has a similar perforation of the same size through the solid portion. The wood point appears to fit into this second perforation equally well. Nothing was found in the hollow portion of the reed.

The hardwood point is 8.4 cm. in length with a maximum diameter of 0.5 cm. Sharp cuts are apparent at the proximal end where the piece was finished off to a blunt end. The distal end tapers to a very sharp point.

When removed from the reed shaft, the hardwood point could be reversed and refitted into the perforated joint, but it is slightly too large at its proximal end for a proper fit.

Whether the hollow reed served only as a container for the wood point or was part of a longer shaft is not known. However, the perforations of similar size in both joint ends seem to rule out the possibility of the reed having an original length much beyond the two joints. The two joints have been smoothed by abrasion. Similar reeds with smoothed joints have been reported in the Trans-Pecos by Martin (1933).

It would have been possible for a wood point to have been placed in each end of the reed judging by the similarity of the two joint section perforations. This would imply the possible use of the reed as a carrying device or container for two such needle-like points. If it were true that the reed shaft was used for carrying one or more wood points, then the use of poison on the wood points would be plausible. Otherwise, protection of the point prior to use would not have been so necessary or important. Wood points which show evidence of dark staining have been reported in the Trans-Pecos area (Martin 1933) which may indicate possible use of poison by the early cave dwelling people. These latter points were not found in relation to a reed or other container. Other wood points, "fore shafts", and blunt wood points previously referred to from this area appear to be considerably larger and are designed for attachment to a reed shaft by inserting into the hollow section (Gardner and Martin 1931).

The relatively small size of the wood point, fitted to an apparent carrying device of hollow reed suggests the use of a poison dart technique by Trans-Pecos cave-dwellers.

ACKNOWLEDGEMENTS

Members of the survey party were Jimmy Zintgraff, Clarence Zintgraff, Don White, Ed. Smyth, Jimmey Smith, and the author.

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San Antonio, Texas

The High Bluff Site on the Clear Fork of the Brazos River

RICHARD AND JUDY FLINN

ABSTRACT

The High Bluff Site near the Young and Stephens County line in north-central Texas was excavated on week ends and holidays from 1961 to 1964. The occupation zone extended from the surface to an average depth of 12 inches. The projectile points recovered indicate a transitional occupation of the late Edwards Plateau Aspect followed by a briefer occupation of the Austin Focus of the Central Texas Aspect.

INTRODUCTION

As early as 1958, the writers noticed flint and broken projectile points each time a sandy road near High Bluff was graded. Upon closer investigation, a flat midden area of concentrated material near the edge of the bluff was found. In 1961 a three-by-five foot test pit was excavated in the midden which revealed ample cultural material to warrant further work. A small grid consisting of five-foot squares was laid out and dug as week-end time and holidays permitted.

Special thanks and appreciation are due Harry J. Shafer of the University of Texas for his "lessons in archeology" and for encouragement and answers to endless questions. Our thanks are also extended to the land owner for allowing us to work on his property.

THE SITE

The High Bluff Site is located on the Clear Fork of the Brazos River in the extreme northern part of Stephens County near the small town of Eliasville. Seven miles north-east of Eliasville, the Clear Fork flows into the Brazos River. Historically, the Brazos River Indian Reservation was located in this vicinity in the 1850's.

The natural foods available in the area today were probably available during earlier times as well. Prickly pear cactus, with its fruit ripening in summer, is very abundant. Post oaks and live oaks, which predominated in the days when the first settlers arrived, provided a good source of acorns. Today, large numbers of mesquite trees and underbrush cover the once open areas. Cottonwood, elm, hackberry, pecan, and grapes all occur along the streams.

The wild game present in the area today are deer, opossums, rac-

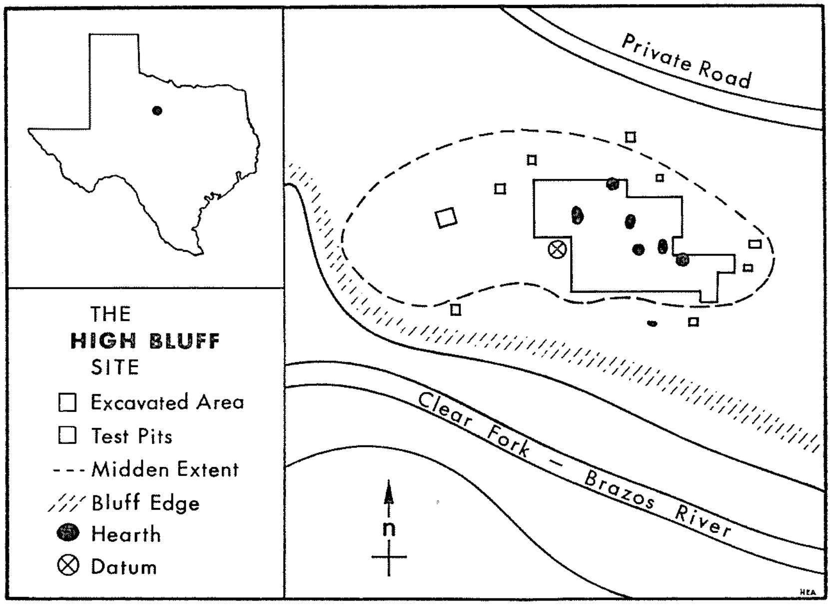

FIGURE 1. Sketch map of the site. Not to scale.

coons, ringtails, foxes, wolves, bobcats, squirrels, and occasional mountain lions. Wild turkeys, doves, and quail are also abundant.

The site extends about 150 feet along the bluff edge and back from the edge to a maximum distance of about 50 feet. A grove of live oaks covers a considerable portion of the site.

The grass-covered midden area is almost completely level except for a slight slope near the bluff edge. The site showed no recent disturbance other than one charcoal-filled surface depression which had been a recent campfire.

The site was apparently ideally suited for occupation. A large area of shoals in the river directly below provided an abundant supply of fresh water mussels. From the bluff edge, there is a commanding view of the surrounding countryside across the river, and it is possible to see for miles from this point. Access to the river can be gained by winding one's way down between large rocks and boulders to the bottom of the bluff. An eroded gully runs from the top of the bluff, where the site is located, down to the river bottom. This could possibly be the remainder of a well-worn trail of earlier times.

The plateau area behind the site is covered with heavy grass and must have been an ideal hunting area. The heavily wooded area along the river below would also have been excellent for hunting.

The soil is hard, black and ashy, and contains burned fragments of limestone and mussel shells in varying amounts. All the burned rock was in small to medium fragments—no slabs or large pieces were found.

Only two soil zones were evident—a black midden soil and a yellowish-orange clay and gravel below. The clay and gravel zone rested directly on bed rock.

The depth of the midden deposit varied from as little as 8 to as much as 15 inches; over most of the site it varied between 10 and 12 inches. Almost all the cultural material came from the black soil although an occasional flint chip or mussel shell fragment was found in the very upper part of the clay and gravel. Most of the projectile points and many of the tools came from the uppermost 6 to 8 inches of midden soil. Tremendous quantities of mussel shells occurred throughout the black, ashy soil, and at some points solid masses of shells extended from the surface level down to depths of 12 to 15 inches.

EXCAVATION

Using a large mesquite tree as a datum point, a small grid of five-foot squares was laid out. All the lines were oriented in directions of north-south and east-west. The east-west rows were lettered and the north-south rows were numbered. Each square was identified by the coordinate of its south-east corner, as A-1, B-2, C-3, etc.

Sifting the soil soon proved to be impossible. The soil was either a black gumbo or rock-hard depending upon rains or the lack of them. During rare, damp periods between rains, the soil was very crumbly and easy to work.

A shovel was used for loosening the soil, and a knife was used for closer work. The firmness of the soil made it possible for one to go almost to the bottom of the deposit for a large shovelful. The entire load of dirt could be carefully loosened and removed intact to a large piece of plywood. This over-sized clod of dirt was then placed grass side down on the board, and the dirt was removed working from the bottom of the deposit towards the grass or soil surface. As each tool was discovered, its measurement from the grass surface could quickly be determined.

The location of each specimen within the square was also noted on a sketched square which was included with the field notes for each respective square.

OCCUPATIONAL FEATURES

Several fireplaces or hearths were encountered. All were shallow, saucer-like depressions containing burned rock, ash, and charcoal. Some consisted of concentrated heaps of ash. None were lined.

Hearth No. 1 was a circular concentration of burned rock about 30 inches in diameter. It began at a depth of four inches and extended down to about 8 to 9 inches. The soil in the immediate area of the rock was extremely ashy, and bits of charcoal occurred throughout. Many split bones, some of deer, and mussel shells were present southeast of the hearth stones for a distance of 5 feet. Heat scarred flint predominated in this area. Some of the bones and mussel shells were burned.

Hearth No. 2 was roughly triangular shaped and consisted of a concentration of very ashy soil and charcoal fragments. It began at a depth of two inches and extended down to about 6 inches. It was about two feet long and 10 inches wide.

Hearth No. 3 was another concentrated group of burned rocks in an elongated oval pattern which was about 24 inches in length and 15 inches in width. There was a large quantity of split bone on the western side of it extending several feet.

Hearth No. 4 was a small circular area of burned rock and ash, 10 inches in diameter, which was roughly dish shaped. It ranged from a depth of about 3 inches to 8 inches. Within a foot and a half to the northeast of the hearth, there was a concentration of core tools, hammerstones and scrapers.

Hearth No. 5 was a large egg-shaped concentration of charcoal and ashy soil ranging from a depth of 4 to 8 inches. It was 36 inches long and about 29 inches wide. The charcoal was extremely concentrated in the center area of this one. There was no burned rock. About 2½ feet to the west of the lower end of this hearth there was another concentration of charcoal about 6 inches in diameter. There were occasional burned rock fragments in no particular pattern or concentration in this area.

Hearth No. 6 was a roughly circular group of burned rock and charcoal about 16 inches in diameter. It ranged in depth from two inches below the surface to about 6 inches. There was a very heavy concentration of mussel shells and flint in this area. At certain points, the mussel shells were present in such great numbers that there was little soil visible among them. About 3 feet to the southeast of the hearth at a depth of 5 inches, there was a cache of about a quart and a half of unworked flint flakes. All were of a rather uniform size and thickness.

DESCRIPTION OF THE ARTIFACTS

The 1101 tools from High Bluff included tools of chipped stone, chipped and polished stone, ground stone, miscellaneous stone, worked shell, and worked bone.

Projectile Points

Dart Points

Ninety dart points were recovered from the High Bluff Site. Of this group, 27 fragments were unidentifiable as types. Many of these were stems that resembled those of the *Darl* type. The remaining 62 specimens were divided into several recognized types and some miscellaneous groups. The flint used for manufacturing these specimens was, for the most part, local.

Points have been classified into types as defined in the Handbook of Texas Archeology unless otherwise noted (Suhm and Jelks 1962).

DARL TYPE (33 specimens, Fig. 2, a-o, Fig. 3, a-j)

This group of medium to long, slender points vary somewhat; however, as a group, they all have the same general characteristics and fit into *Darl* type.

Twenty-four specimens are beveled on the right on both faces, one specimen is beveled on the right on one face only, and another (Fig. 2, a) is slightly beveled on the left side of one face. Four remaining specimens are not beveled on either face.

The stem edges are parallel to slightly expanding. On most specimens the stem edges have been ground slightly; others show heavy grinding. Stems are beveled on the left on one face on 5 specimens and on both faces on 5 others.

The bases are concave to straight on the majority of the group; they are convex on 4 examples (Fig. 2, d). Seven have been ground.

One specimen with a short stubby body that is beveled on the right edge of each face appears to be a reworked *Darl* point (Fig. 2, m).

Range of dimensions: length 3.7 cm. to 7.5 cm., width 1.6 cm. to 2.1 cm., thickness 0.6 cm.

EDGEWOOD TYPE (2 specimens, Fig. 3, k-l)

Two specimens with expanding stems, concave bases, triangular bodies, and prominent shoulders are classified as *Edgewood* points. Both distal tips are missing. The largest specimen is lightly beveled on the right lateral edge of each face (Fig. 3, k).

Dimensions of larger specimen: length 3.8 m., width 2.2 cm., thickness 0.5 cm. Smaller specimen: length 3.5 cm., width 2.3 cm., thickness 0.5 cm.

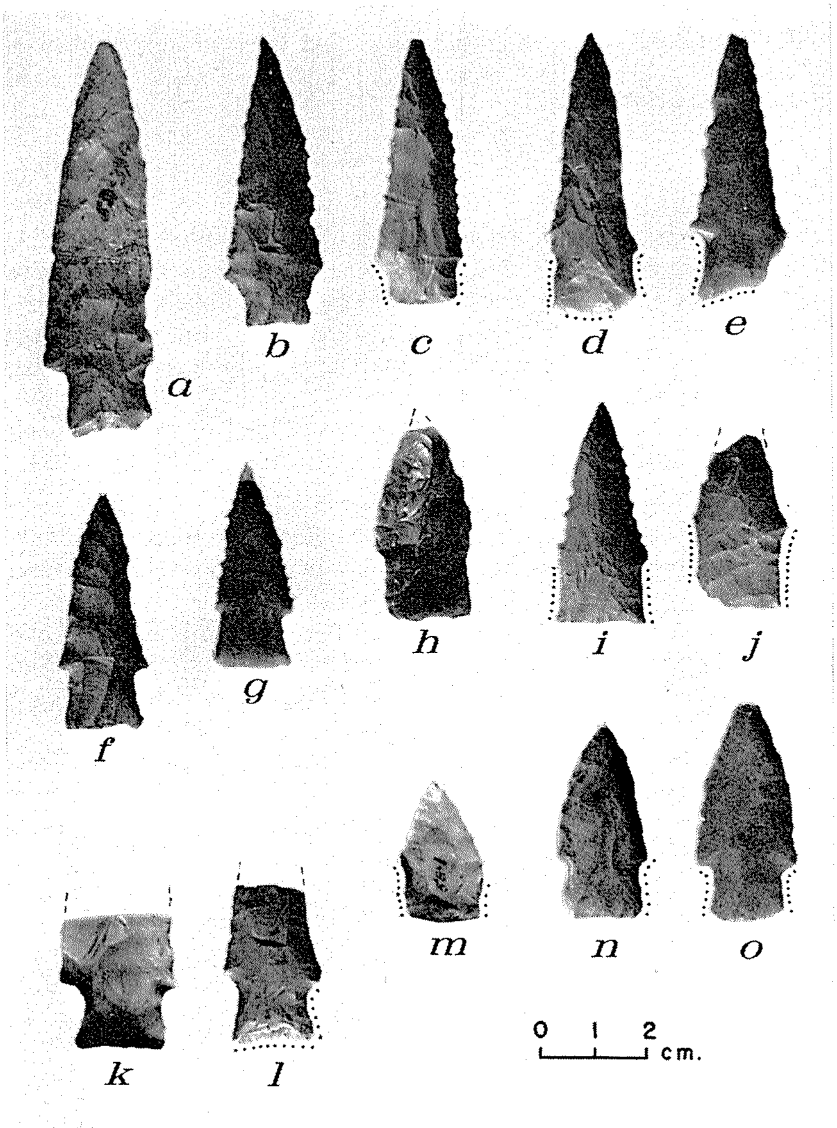

FIGURE 2. Projectile points. *Darl* points. Dots denote stem and/or basal grinding.

ELIASVILLE PROVISIONAL TYPE (10 speciments, Fig. 3, m-o, Fig. 4, a-f)

A group of 10 points from the High Bluff Site are classified tentatively as *Eliasville* points. In addition one fragment and two stems

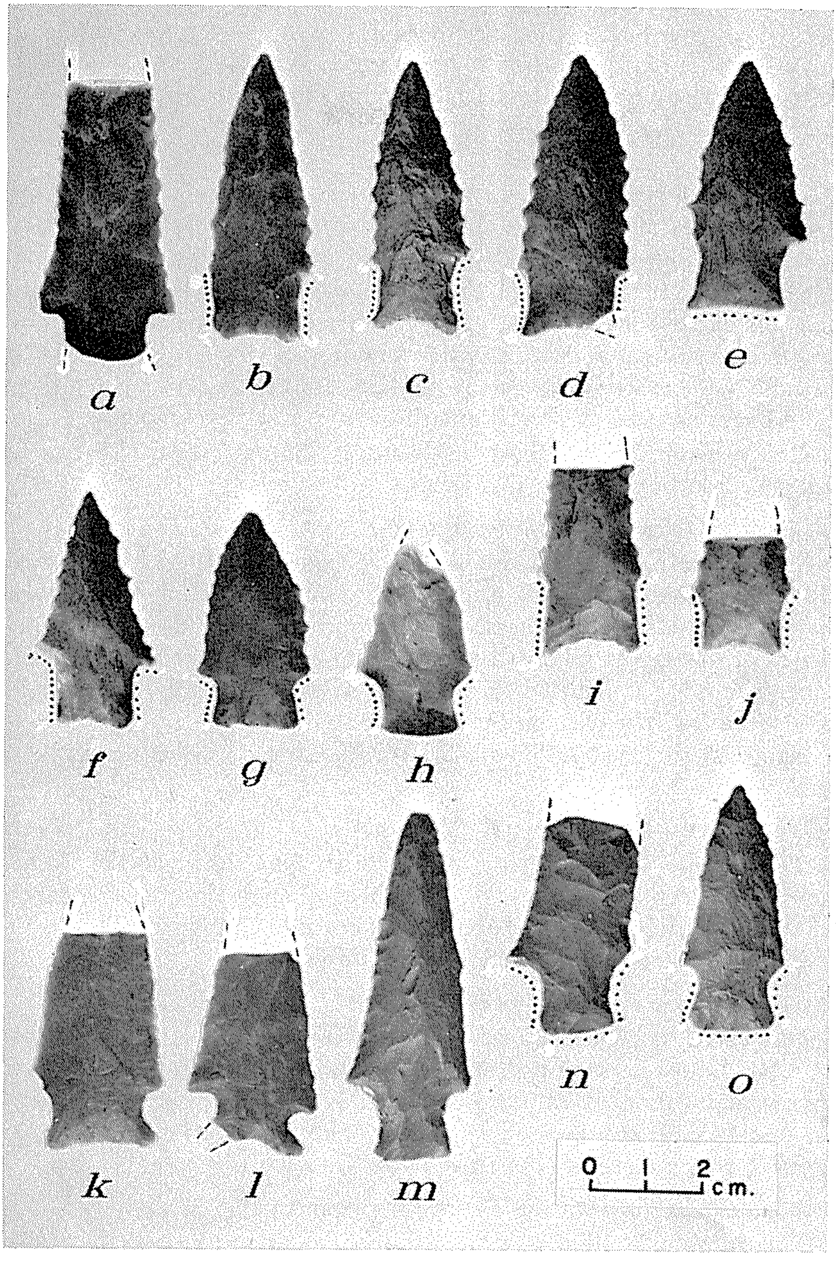

FIGURE 3. Projectile points. a-j, *Darl* points. k, l, *Edgewood* points. m-o, *Eliasville* provisional points. Dots indicate area of griding.

belong in this group. The points are characterized by medium to long triangular, serrated bodies and weakly expanding stems with concave edges and convex bases. Bevelling occurs on three specimens. The shoulders flare slightly, terminating in short angular projections in many cases. The stem edges and bases are ground as indicated in the illustrations.

Although certain specimens from the *Eliasville* group resemble the *Darl* type and also resemble the *Godley* Type in general outline, considerable differences are evident from either type (Jelks 1962: 40, Fig. 16; Forrester 1964: 9, 41-42, Pl. 5-6, Fig. 20). These specimens with the convex base may represent a local variation of *Darl* since they do occur in combination with classic examples of the *Darl* type. When members of the *Eliasville* group are compared with *Darl* points, their differences as well as their similarities are rather pronounced.

Range of dimensions: length 3.0 cm. to 6.2 cm., width 1.6 cm. to 2.2 cm., thickness 0.4 cm. to 1.2 cm.

ENSOR TYPE (4 specimens, Fig. 4, g-j)

These four points, characterized by triangular shaped bodies with lightly serrated edges (3 examples), stems demarked by shallow notches, and straight to concave bases, correspond to the *Ensor* type. Three of these points have beveled lateral edges on the right of each face. The other is beveled on the right on one face only and steeply chipped across the base on the same face (Fig. 4, j).

Range of dimensions: length 3.0 cm. to 4.0 cm., width across base 1.9 cm. to 2.2 cm.

MARCOS TYPE (4 specimens, Fig. 4, k-n)

These points are smaller than the *Marcos* type shown in the Handbook and except for their small barbs bear a much closer resemblance to the ones from the Ham Creek Site (Forrester, 1964: 10, Pl. 4).

Dimensions: length 4.7 cm., width 2.2 cm.

MESERVE(?) TYPE (1 specimen, Fig. 4, o)

One small specimen appears to be a *Meserve* point. It has a slightly expanding stem with a deep concave base which has been thinned by the removal of several flakes, giving the appearance of a short flute on one face. Both stem edges are ground and the base is heavily ground. It is beveled to the right on both faces.

MISCELLANEOUS TRIANGULAR POINT (1 specimen, Fig. 5, a)

This triangular point has one straight lateral edge and the other retouched to a thick convex edge.

Dimensions: length 3.6, width 2.1 cm.

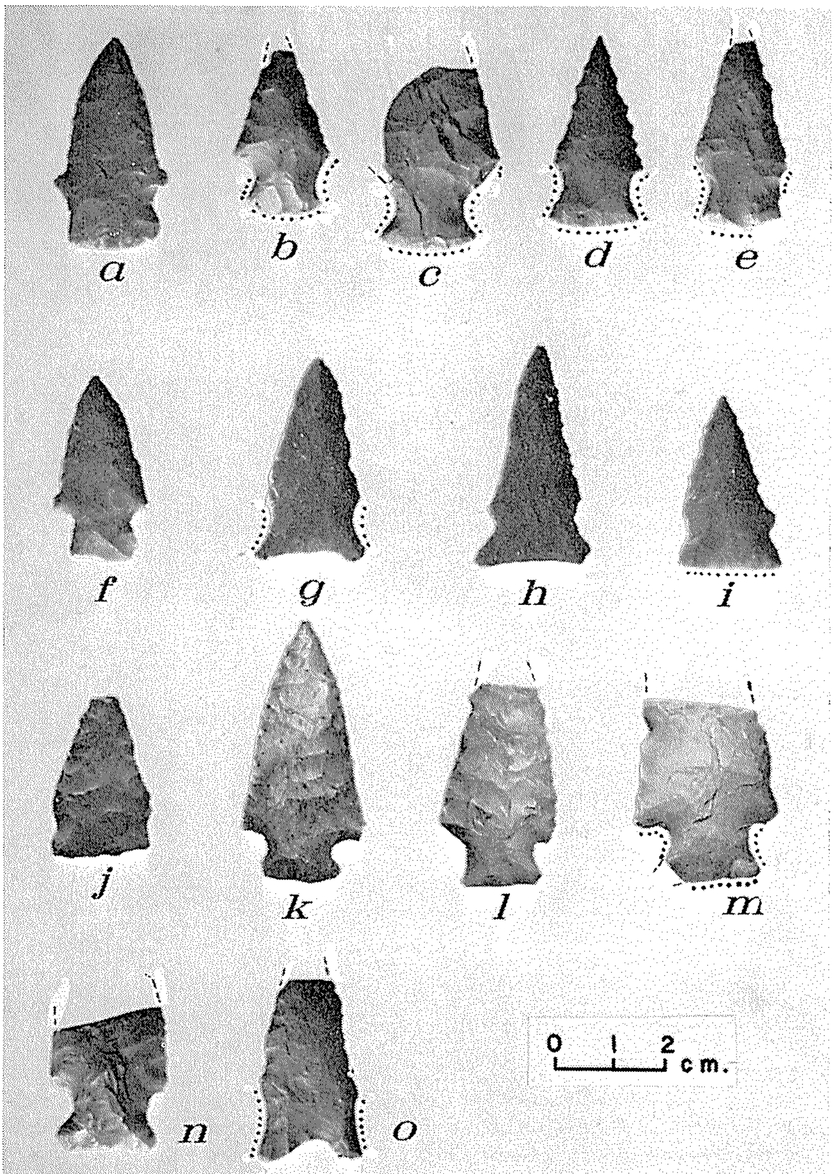

FIGURE 4. Projectile points. a-f, *Eliasville* provisional points. g-j, *Ensor* points. k-n, *Marcos* points. o, *Meserve*(?) point. Dots denote area of grinding.

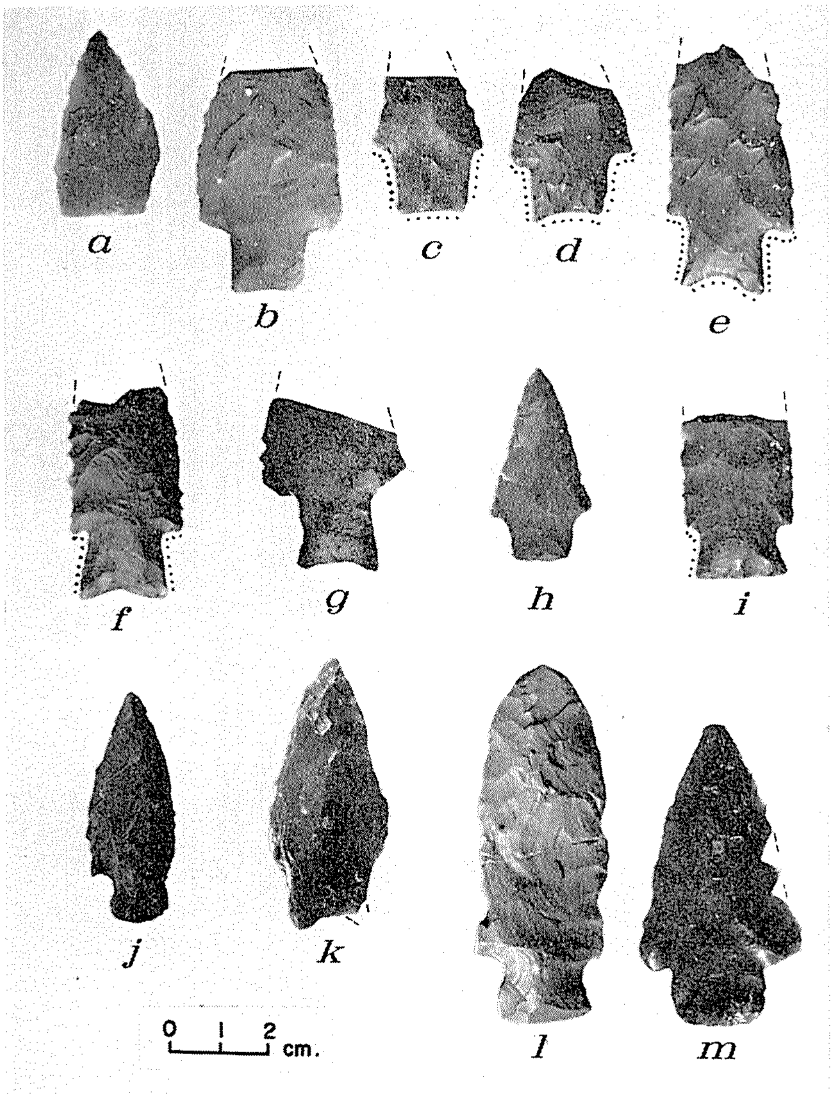

FIGURE 5. Projectile points. a, Miscellaneous triangular point. b-d, Miscellaneous group I points. e-g, Miscellaneous group II points. h, i, Miscellaneous stemmed points. j, *Palmillas* point. k, *Pedernales* point. l, m, *Williams* points. Dots indicate area of grinding.

MISCELLANEOUS GROUP I (3 specimens, Fig. 5, b-d)

Three points are characterized by their approximately straight stems and mildly concave bases. The bodies on two examples are of medium length, but that on the third is large with convex edges. The shoulders are prominent but not barbed. The stem edges and the bases are ground on the two smaller specimens.

MISCELLANEOUS GROUP II (3 specimens, Fig. 5, e-g)

Members of this group are characterized by slightly expanding stems, concave to pronounced concave bases, moderate shoulders, and bodies with serrated edges. The stem edges are beveled to the left on both faces, the beveling more pronounced on one face than on the other.

MISCELLANEOUS STEMMED POINTS (2 specimens, Fig. 5, h, i)

Two points do not fit into a recognizable type. One, similar to *Darl* and *Eliasville*, has triangular body with bevel to the right, straight lateral edges, straight stem and base (Fig. 5, h). The other point, though broken, appears long with retouched lateral edges, expanding stem and straight base (Fig. 5, i). The stem is ground on one lateral edge.

PALMILLAS TYPE (1 specimen, Fig. 5, j)

A slender point with a bulb-shaped stem is made from a very lightweight tan flint which contains small fossils. The body has a shallow sloping bevel on the right lateral edge of each face which is more pronounced on one face than the other.

Dimensions: length 4.5 cm., width 1.7 cm.

PEDERNALES TYPE (1 specimen, Fig. 5, k)

The thickest projectile point has a leaf-shaped body, weak shoulders, and an indented base.

Dimensions: length 5.3 cm., width 2.5 cm., thickness 1.2 cm.

WILLIAMS TYPE (2 specimens, Fig. 5, l, m)

One large point has a long heavy body with a broad, blunt, oval point (Fig. 5, l). The stem is convex on one lateral edge and concave on the other. The base is slightly convex. In size and general appearance it resembles the *Williams* type even though the shoulders are not as pronounced as on many examples. The second specimen has a slightly convex base (Fig. 5, m).

Dimensions: Specimen 1: length 7 cm., width 2.3 cm. Specimen 2: length 6 cm., width 3.2 cm.

Arrow Points

A total of 34 specimens—23 identifiable arrow points and 11 fragments—were recovered. Thirteen are subtriangular and 10 are stemmed.

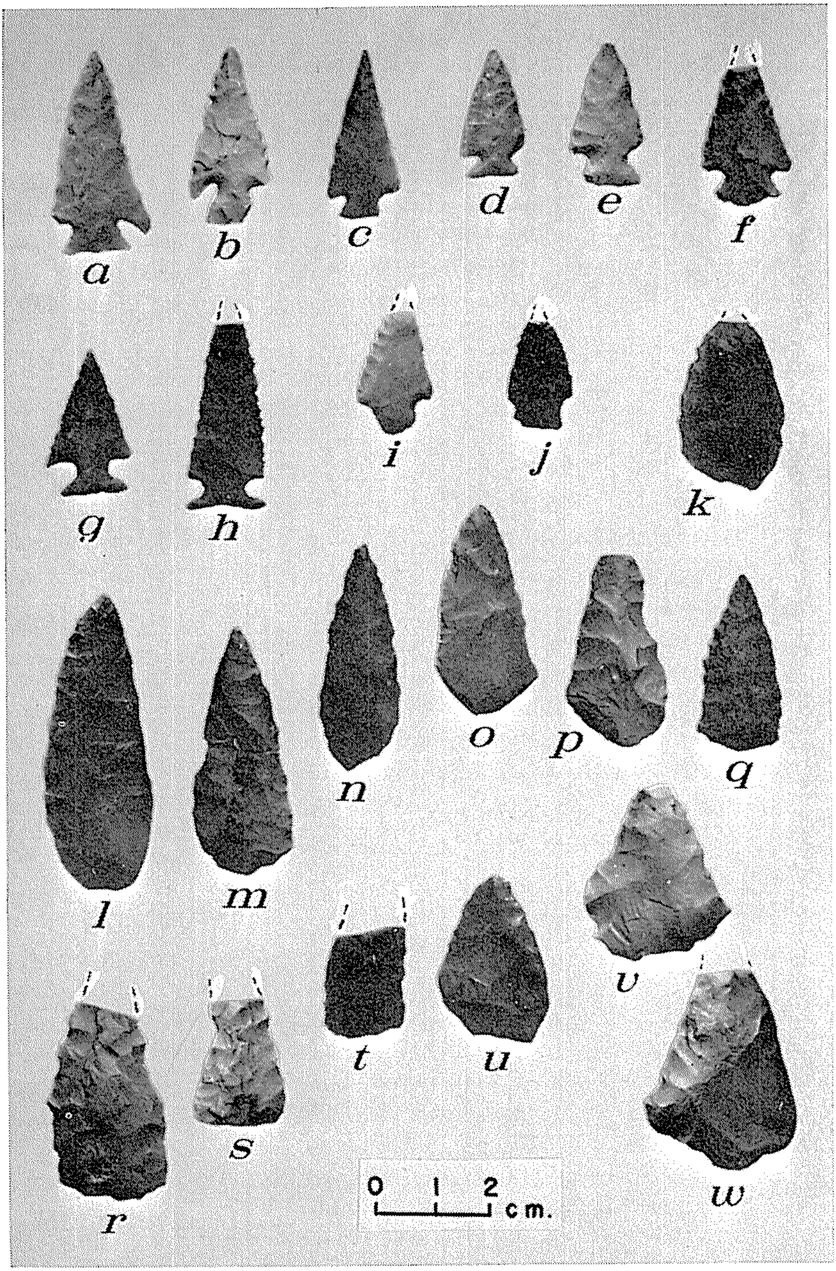

FIGURE 6. Arrow points. a-d, *Scallorn coryell* points. e-g, *Scallorn sattler* points. h, *Scallorn* miscellaneous point. i, j, Miscellaneous stemmed points. k, *Young* point, l, m, *Granbury parker* points. n-q, *Granbury* variants. r-t, *Granbury joshua* points. u-w, Miscellaneous subtriangular points.

YOUNG TYPE (1 specimen, Fig. 6, k)

This point is unworked on the concave, bulbar face except for some faint retouching along some portions of the edges. The dorsal face is crudely chipped over the entire surface. Its lateral edges are convex, and the base is convex to irregular in outline.

Dimensions: length 2.9 cm. (tip missing), width 1.8 cm., thickness 4 mm.

GRANBURY TYPE (9 specimens, Fig. 6, l-t)

Members of this group of subtriangular arrow points are characterized by slight to strongly convex bases and bifacial chipping. They fit into the *Granbury* type described from the Kyle Shelter, Hill County (Jelks 1962: 35-36, Fig. 14).

Four of the specimens have bases that terminate in rounded to sharp points. This may represent a local variation in design. All except one of these are well worked across both faces.

Range of dimensions: length 3.0 cm. to 3.8 cm., width 1.3 cm., thickness 0.3 cm. to 0.5 cm.

joshua variety (3 specimens, Fig. 6, r-t)

Three of the subtriangular points are worked across both faces and have very mildly convex bases. All are missing their distal portions.

Range of dimensions: length (broken) 2.0 cm. to 3.3 cm., width 1.4 to 1.8 cm., thickness 0.3 cm. to 0.5 cm.

parker variety (2 specimens, Fig. 6, l, m)

Two long, narrow specimens are worked across both faces and have pronounced convex bases. The larger point is longer than the maximum length of 4 cm. of the Kyle Site specimens. The lightness of this point, which is made from a very thin flat flake and displays excellent workmanship on both faces, seems to indicate that it was intended for use as an arrow point.

Dimensions of larger point: length 5.0 cm., width 2.3 cm., thickness 0.3 cm. Smaller point: length 4.1 cm., width 2.2 cm., thickness 0.4 cm.

MISCELLANEOUS SUBTRIANGULAR ARROW POINTS (3 specimens, Fig. 6, u-w)

One of these 3 specimens has a concave base (Fig. 6, u). Another has a convex base, is irregular in outline, and is crudely chipped across one face and partially across the remaining face (Fig. 6, v). The remaining example is partially worked on both faces and bears some resemblance to the *Cliffton* type.

Range of dimensions: length 3.0 cm., width 2.2 cm. to 2.5 cm., thickness 0.4 cm. to 0.6 cm.

SCALLORN TYPE (8 specimens, Fig. 6, a-h)

The bodies of this type point are triangular in shape with straight lateral edges which are serrated on several specimens. The stems range from slightly expanding to strongly expanding examples. One *Scallorn* has a long slender serrated body, a wide thin concave base, and is deeply notched to form a stem which is as wide as the body. Four of these 8 points fit into the *Scallorn coryell* variety and three fit into the *Scallorn sattler* variety (Jelks 1962: 28, Fig. 13, a-1).

coryell variety (4 specimens, Fig. 6, a-d)

These have slight to moderately expanding stems with straight bases and long serrated bodies. Two of the specimens have long barbs while the others have rather short ones.

sattler variety (3 specimens, Fig. 6, e-g)

These have strongly expanding stems and short barbs. Two have straight bases, and one has a convex, slighlty irregular base.

Range of dimensions: length 2.1 cm. to 3.5 cm., width 1.0 cm. to 1.7 cm., thickness 0.2 cm. to 0.3 cm.

MISCELLANEOUS STEMMED ARROW POINTS (2 specimens, Fig. 6, i-j)

One specimen with asymmetrical shoulder, base, and stem area, is chipped only around the edges on both faces (Fig. 6, i). The other point is of black flint and is worked across both faces (Fig. 6, j).

KNIVES

Unstemmed, relatively well-worked bifaces with sharp cutting edges are classified here as knives. Bifacially chipped tools of the same shape but lacking sharp cutting edges were recovered in a variety of thicknesses and degrees of workmanship. Possibly some of these pieces were blanks intended for later modification into knives, but will not be included as such in this description.

There were 20 complete (unbroken) specimens, 85 fragments.

RECTANGULAR KNIVES (4 specimens, Fig. 7, a-c)

One complete specimen and four basal fragments make up this group. They are roughly rectangular and have straight bases. They are all thin and the workmanship is generally good.

Range of dimensions: length 5.8 cm., width of bases 2.0 cm. to 2.2 cm., thickness 0.6 cm. to 0.8 cm.

BEVELED KNIVES (2 specimens, Fig 7, d)

A rectangular-shaped fragment has parallel edges and straight base. The base is steeply chipped on one side. The left side of the body is beveled on the same side as that on which the basal chipping occurs.

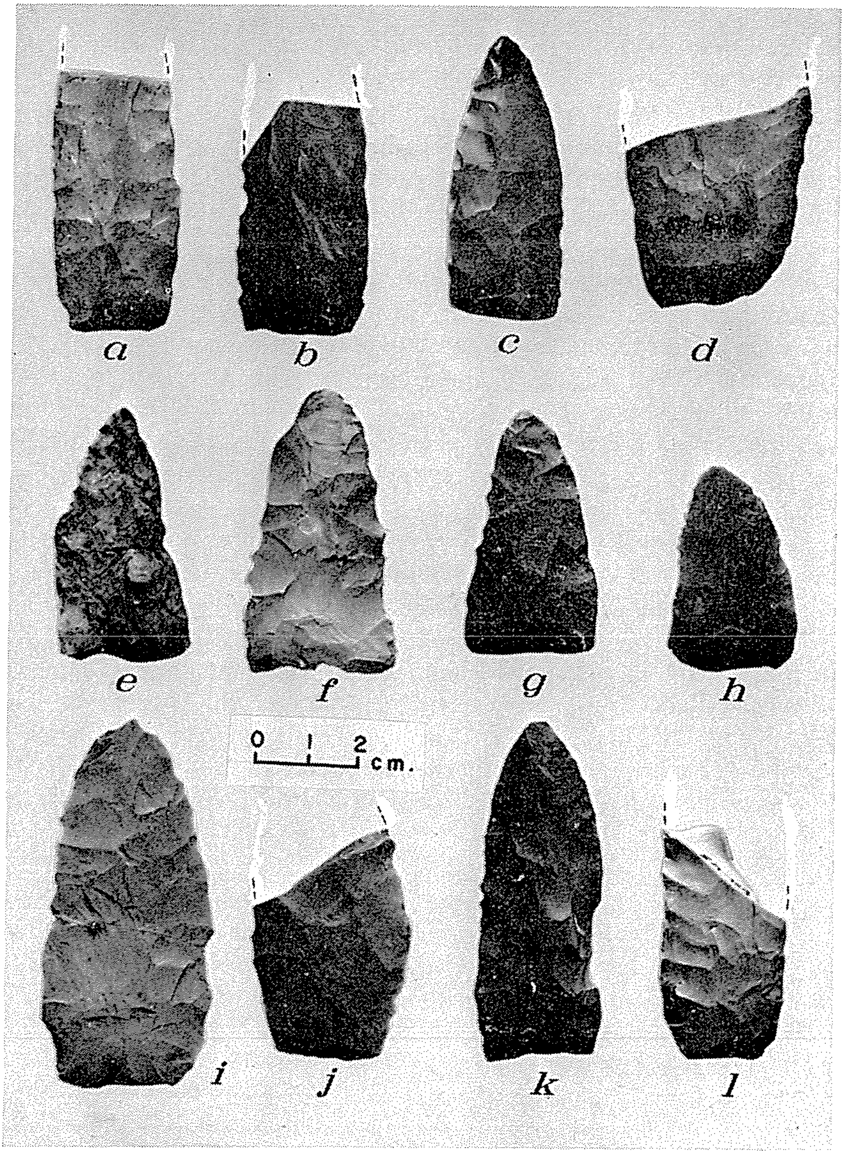

FIGURE 7. Knives. a-c, Rectangular knives. d, Beveled knife. e, Curved knife. f-h, Triangular knives. i-l, Miscellaneous knives.

The second fragment has a wide bevel down the right edge. The side with the bevel expands in width up to the point of the break. The opposite side is straight and the base is straight.

Dimensions of first knife: basal width 2.7 cm., thickness 0.7 cm. Second knife: width at base 2.0 cm., width at break 3.8 cm., thickness 0.9 cm.

CURVED KNIFE (Fig. 7, e)

This knife has a curved outline and a pointed tip at the distal end and resembles a knife from the Kyle Site (Jelks 1962: fig. 19). It is difficult to tell whether the uneven base is simply unworked or partially broken.

Dimensions: length 5.1 cm., width 2.5 cm., thickness 0.6 cm.

TRIANGULAR KNIVES (5 specimens, Fig. 7, f-h)

Two of these triangular-shaped knives are broken at the distal tip. Bases range from straight to irregular. One with a concave base retains a small portion of cortex on the base.

These knives are shaped by percussion chipping. One is bifacially retouched along one lateral edge, another has use retouch along one edge, and a third has a serrated lateral edge.

Range of dimensions: length 4.0 cm. to 5.7 cm., width 2.5 cm. to 3.8 cm., thickness 0.4 cm. to 1.0 cm.

SMALL OVAL KNIFE (1 specimen, Fig. 8, a)

This broad specimen is constricted towards the tiny straight base. It is well made by percussion chipping with some retouching at points along the blade edges. The constricted area near the base shows fine retouching along the edges on one side. The tip of this knife shows a small outer portion of the original flint nodule.

Dimensions: length 4.8 cm., maximum width 2.7 cm., width at base 1.2 cm., thickness 0.6 cm.

SUBRECTANGULAR KNIFE (1 specimen)

A small knife has a convex base and a distal end which tapers to a rounded point. Both lateral edges are convex and it is concavo-concave in cross section. Percussion chipping on one face has produced a ridge at the mid-section. Edges on one face have some retouch.

Dimensions: length 4.5 cm., width 2.3 cm., thickness 0.9 cm.

CLEBURNE TYPE (22 specimens, Fig. 8, b-l)

This type of knife is the best represented knife from High Bluff Site (Jelks 1962: 44-45). Some examples of this subrectangular knife are long and slender while others are short and broad, but all have slight to pronounced convex bases. Some have convex lateral edges and others have lower lateral edges parallel to one another. The lateral edges are retouched on most examples and the bases of some are retouched.

The two smallest members of this group could possibly have been

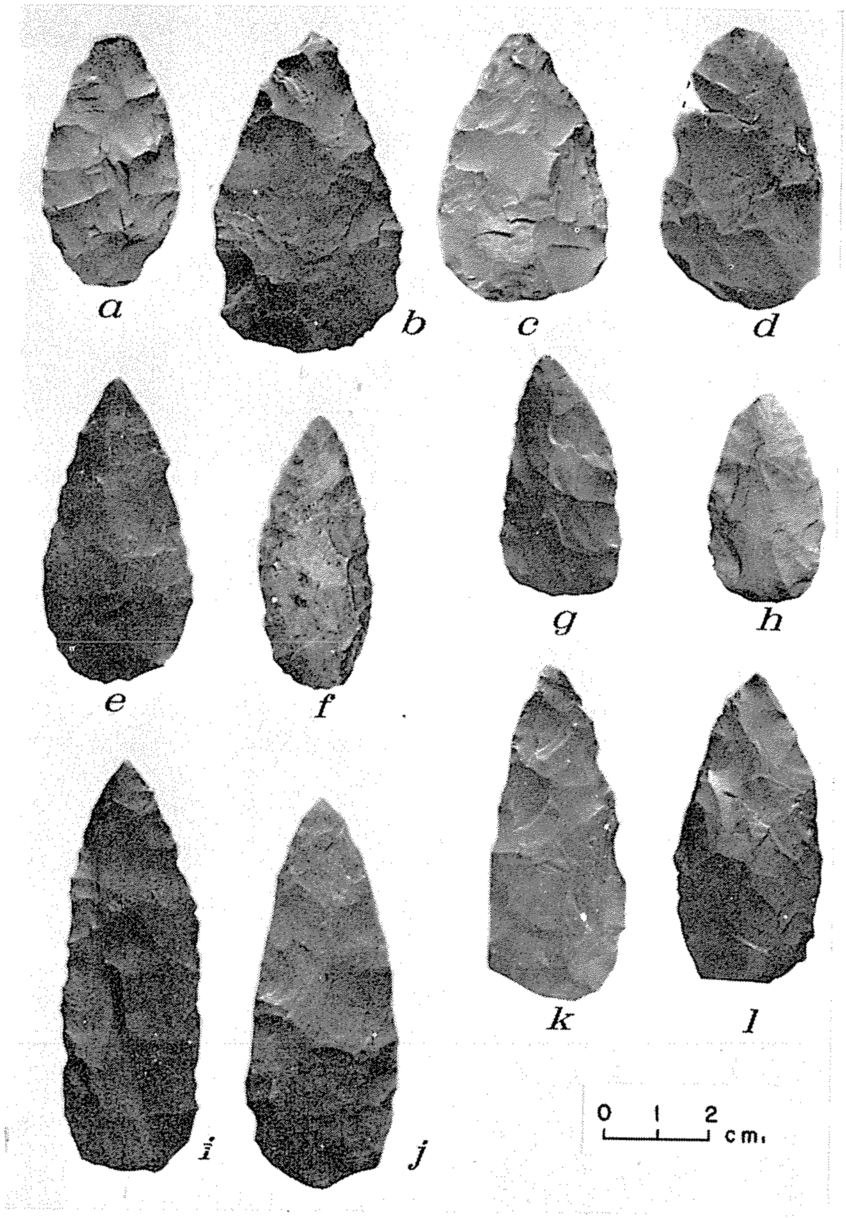

FIGURE 8. Knives. a, Small oval knife. b-l, *Cleburne* knives.

dart points instead of knives. They would have been suitable for either purpose.

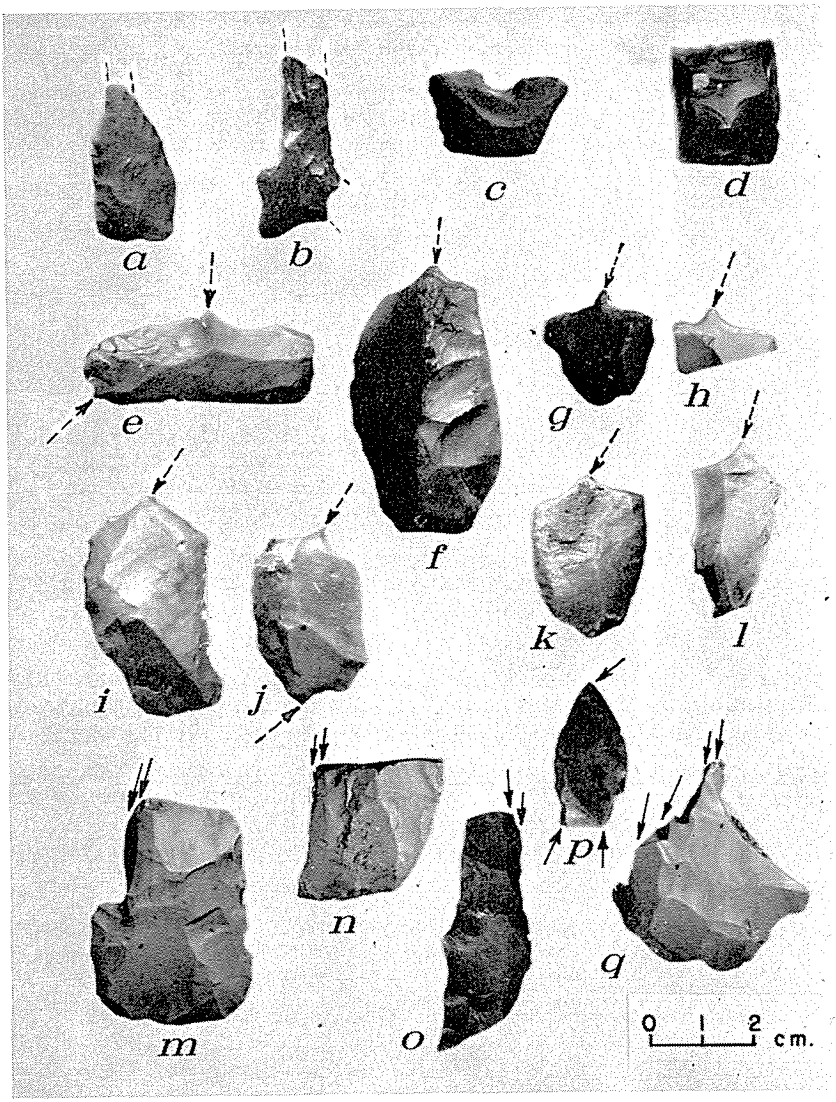

FIGURE 9. Miscellaneous tools. a, b, Drills. c, Spokeshave. d, Gunflint. e-l, Gravers. m-q, Burins. Broken arrows indicate graver beaks and solid arrows indicate number and direction of burin blows.

Range of dimensions: length 4.0 cm. to 8.0 cm., width 1.5 cm. to 3.5 cm., thickness 0.4 cm. to 1.2 cm.

MISCELLANEOUS KNIVES (6 specimens, Fig. 7, i-l)

The lower lateral edges of these knives have a distinct inward curve or taper near the base. The inward curve begins at the approximate midsection of the knife on one example and on three other fragments it begins closer to the base. Bases are straight to concave.

On one knife a chipped indented area occurs just below the midpoint of the knife. The edge below this is lightly smoothed. The indention is 1.6 cm. wide and 0.1 cm. deep.

Range of dimensions: length 6.6 cm. to 7.4 cm., thickness 0.6 cm. to 0.8 cm. Width at base 2.2 cm., maximum width 3.2 cm.

Drills
(5 specimens, Fig. 9, a-b)

Five fragmentary drills were discovered—a complete bit portion, a base and part of a bit, a rectangular base with broken bit, and two fragments of large drill bits.

An almost complete bit portion, 3.5 cm. long, is steeply beveled on both faces (Fig. 9, a). Viewed in cross section at the thickest point, it has two bevels 0.8 cm. wide that are parallel and two bevels less than 0.6 cm. wide running in alternate directions.

Two-thirds of the base and 2.1 cm. of the bit length remain of a badly heat-scarred drill of black flint (Fig. 9, b). Beveling on all four edges has produced a flat center ridge on both faces. The bit is 1.2 cm. wide where it joins the base. The base is shaped like the base of a *Darl* point.

Another specimen with a broken bit has a bifacially worked, rectangular base. The bit is 0.6 cm. long and 0.8 cm. wide. The base is 2.5 cm. long and 1.8 cm. wide.

Spokeshaves
(4 specimens, Fig. 9, c)

These are rather small concave depressions chipped onto flint flakes. The concave area would have been suitable for smoothing a small arrow shaft.

Two are semicircular notches chipped onto a small, otherwise unworked flint flake, one is chipped onto a flint spall from one face, and the fourth is a thick, rectangular cortex flake which also has a straight scraper edge.

Range of dimensions: width 0.6 cm. to 0.7 cm., depth 0.2 cm. to 0.3 cm.

Gun Flint
(1 specimen, Fig. 9, d)

A gunflint of smoky-gray translucent flint was discovered eroding from one edge of the dirt road near the site. It is square in outline and worked only on one face except for some flaking at one edge. The worked face is flat with steep chipping or beveling on all four edges. Three of the edges are finely retouched and the fourth edge is very heavily worn with one corner worn blunt. The one chipped edge on the other face is on this heavily worn edge.

Dimensions: length 2.1 cm. and 2.2 cm., width 1.9 cm. and 1.7 cm. (heavily worn edge).

Graving Tools

GRAVERS (23 specimens, Fig. 9, e-l)

Gravers were among the most common artifacts recovered. They were consistently present at all depths and in all parts of the site. These tools could have been used for engraving shell, bone, wood, and soft stone and possibly for tatooing.

Eleven of the gravers are points worked onto thick flakes which have been only slightly modified (Fig. 9, e, j, l), and they fit into Wright's Type IA (1940: 35, Pl. 7). The remaining 12 gravers are worked onto the ends of long oval or rectangular flint flakes which show fine chipping on either side of the graver point and down the sides of the flint flake (Fig. 9, f-i, k). They fit into Wright's Type I B. The graver end on some examples is snubbed or steeply chipped, and the undersides of these gravers are generally unworked. Almost all of these graver points are curved inward and have a hooked, beak-like appearance.

BURINS (5 specimens, Fig. 9, m-q)

The following description of the burins is by Harry J. Shafer.

All of the burins from High Bluff fit into Form B of Epstein's (1963: 72) classification: "points formed by the intersection of a burin facet with a broken or flake edge."

One specimen is manufactured from the basal end of a broken bifacially chipped knife by the removal of several spalls along one edge (Fig. 9, m). A corner of the transverse break was used as a striking platform. A tiny negative bulb of percussion is present at the point where the blow was delivered, leaving a concave cutting edge. Portions of the cutting edge are smooth from use.

Dimensions: length of faceted edge 4.3 cm., maximum length of facets 2.2 cm., width of cutting edge or striking platform 0.3 cm.

The second specimen is made from a biface fragment broken in a way that two broken edges intersect at an approximate right angle (Fig. 9, n). One of these edges was used as the striking platform. The surface of the adjacent edge is marked with tiny facets. The resulting cutting edge is convex and is worn smooth from use.

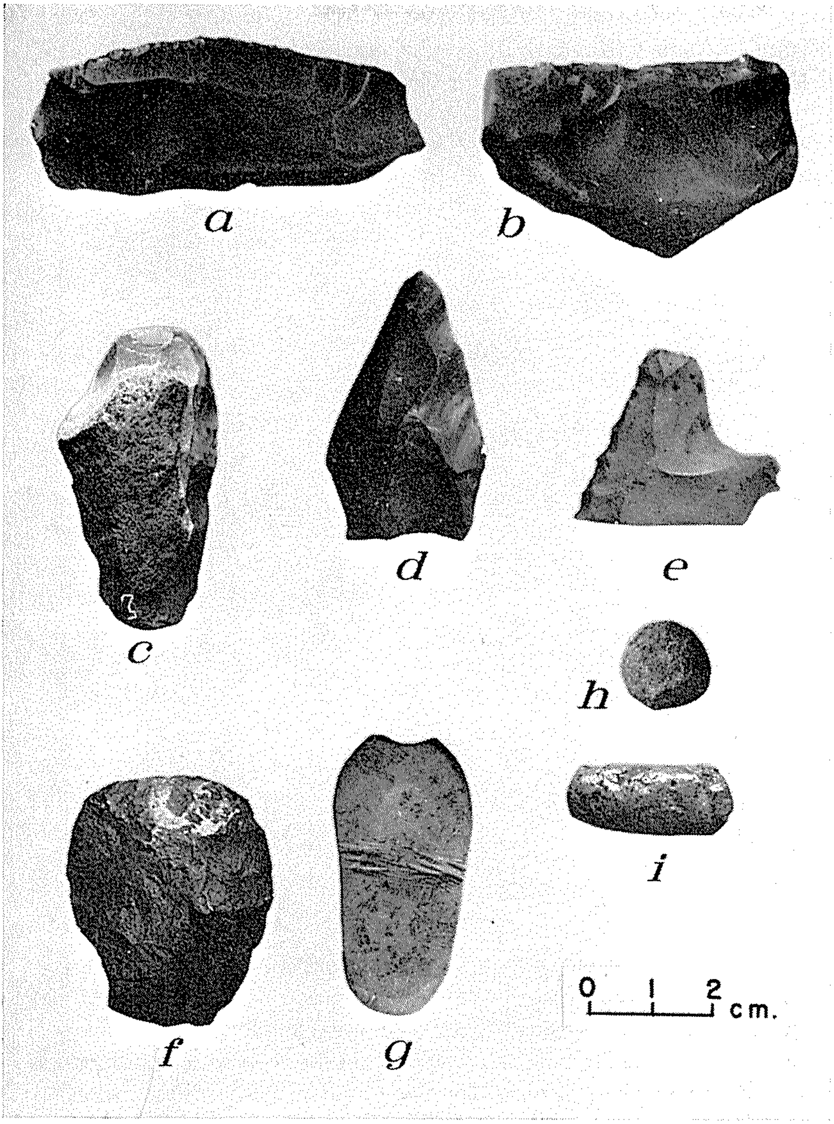

FIGURE 10. Miscellaneous artifacts. a, b, Side scrapers. c, End and side scraper. d, Utilized flake. e, Spall scraper. f, Hematite celt. g, Scratched limonite. h, Stone ball. i, Bone bead.

Dimensions: length of faceted edge 2.4 cm., maximum length of facet 0.9 cm., width of cutting edge or striking platform 0.7 cm.

A third specimen has several tiny burin facets at the pointed end

(Fig. 9, o). This end has been worn from use, and this wear can readily be seen without the aid of a microscope.

Dimensions: length of faceted edge 4.4 cm., width of bit 0.2 cm.

The fourth burin has several tiny facets at the pointed end and is burinated from the opposite end as well (Fig. 9, p). There is no visible sign of use.

Dimensions: length of faceted edge 2.8 cm., width of bit 0.1 cm.

The last specimen probably represents an exhausted burin (Fig. 9, q). It is made from a fragment of a bifacial implement and has a series of hinge fractures down one side.

Dimensions: length of faceted edge 3.4 cm.

Scrapers

SIDE SCRAPPERS (5 specimens, Fig. 10, a, b)

One fragment and four complete specimens have been chipped down one lateral edge of one face to form a working edge. The scraping edges are straight on three specimens, convex on one, and concave on the broken one. The chipped surfaces range from a very faintly worked edge to a steeply chipped one. The example with convex scraping edge is lightly serrated (Fig. 10, a).

Range of dimensions: length 4.6 cm. to 6.3 cm., width 1.6 cm to 3.3 cm., thickness 0.5 cm. to 0.9 cm.

END SCRAPPER (1 specimen, Fig 10, c)

This end scraper was fashioned out of a long, thick flint flake. It has a curved, unworked ventral side and a very high convex dorsal side. A large portion of the original outer core of the flint nodule remains on this specimen. Steep chipping extends from the bit down both lateral sides. The bit end shows heavy use.

Dimensions: length 4.8 cm., width across bit 1.5 cm.

SPALL SCRAPERS AND UTILIZED FLAKES (327 specimens, Fig. 10, d, e)

This group is made up of flakes which show small areas of chipping from use. They show little to no modification other than the small chipped or battered areas. Many retain a portion of the original flint nodular surface. Their shapes are generally irregular. Some have straight chipped areas (Fig. 10, e) while others have convex or small shallow concave working surfaces.

Crude Bifacial Tools

(56 specimens, Fig. 11)

All the implements from this group were made by means of percussion flaking. Several were also retouched along the lateral edges

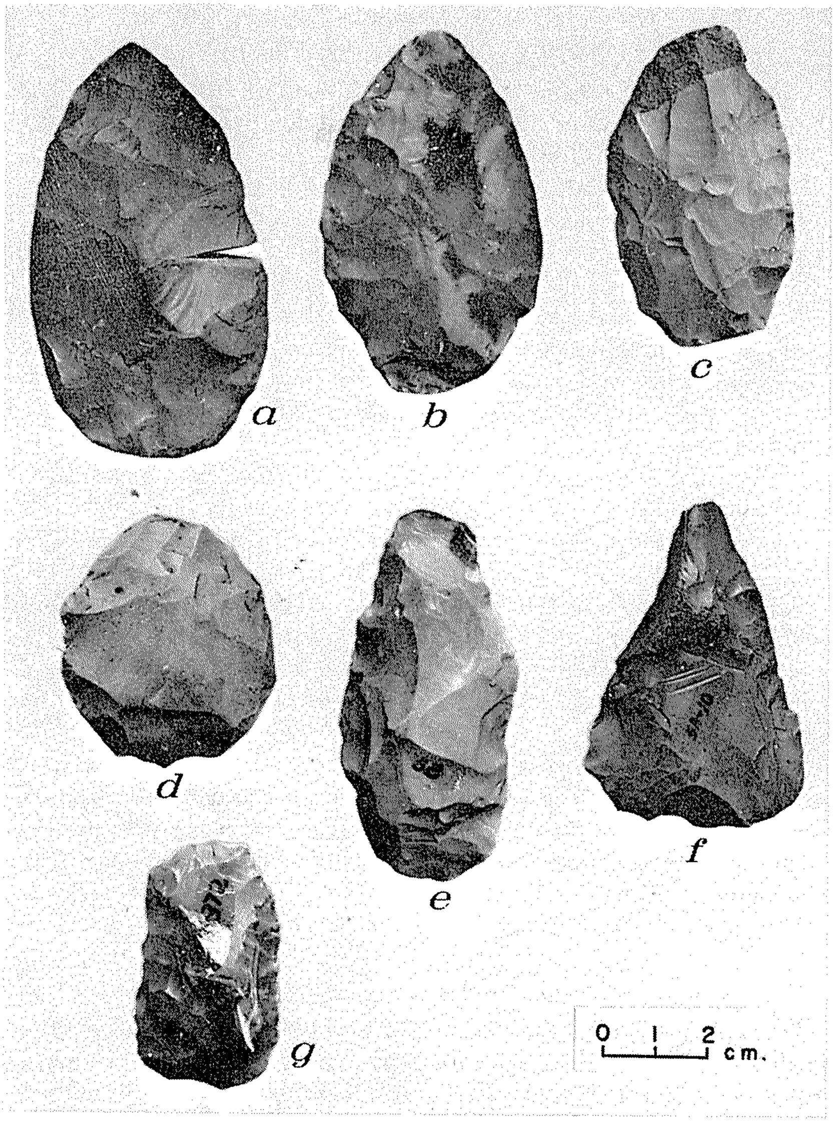

FIGURE 11. Crude bifacial tools.

but usually only on one face. Some show heavy use at the distal end, and others show wear on portions of their blade edges. Many of these resemble the knives in outline but not in workmanship—all of these tools are much thicker and cruder. Shapes most often are oval and subtriangular, but range to circular and irregular.

Choppers

(7 specimens, Fig. 12, a-b)

One chopper, or hand axe, was fashioned by striking off large flakes at one end of a stream-worn quartzite pebble. It has steep chipping on one face only.

Dimensions: length 6 cm., width 5.2 cm., thickness 1.8 cm.

A second chopper has been fashioned by steeply chipping one end of an oval stream-worn limestone pebble on one face.

Dimensions: length 6.5 cm., width 4.5 cm., thickness 1.4 cm.

Two choppers were fashioned from quartzite cobbles. On both of these, steep chipping from both faces forms a sharp jagged edge which shows battered areas. One of these choppers is chipped across the distal end; the other is chipped halfway across the distal end and on down one side.

A chopping implement was formed by chipping both faces of the distal end of a large thick flint nodule. The working end shows very heavy wear. This chopper fits perfectly into either hand—on one side a flat surface has been chipped back from the chopping end leaving a place for the ends of the fingers to rest. When grasped in the hand, the chopping end extends out about 3 cm. past the ends of the fingers.

A specimen is chipped from both faces out of a flat flint nodule. It has a working edge on part of the distal end and part way down one side.

The last example is fashioned onto a smooth, large stream-worn pebble (Fig. 12, a). It is bifacially chipped on one end and shows evidence of heavy use. One face is unaltered except at the chopper end. The other face is chipped to leave an end which fits the fingers when it is gripped.

Hammerstones

(26 specimens, Fig. 12, d-e)

Twenty-six nodules and stream-worn pebbles have been battered along the edges or over the entire pebble in some cases. Some are battered from use. Others have been chipped from both faces to form convex edges which show evidence of light to heavy battering.

Material: 14 quartzite, 9 chert, 2 quartz, 1 limestone.

Cores

(160 specimens)

One hundred sixty medium to large cores seem to have been used as sources for small and large flint flakes. Some of these also have

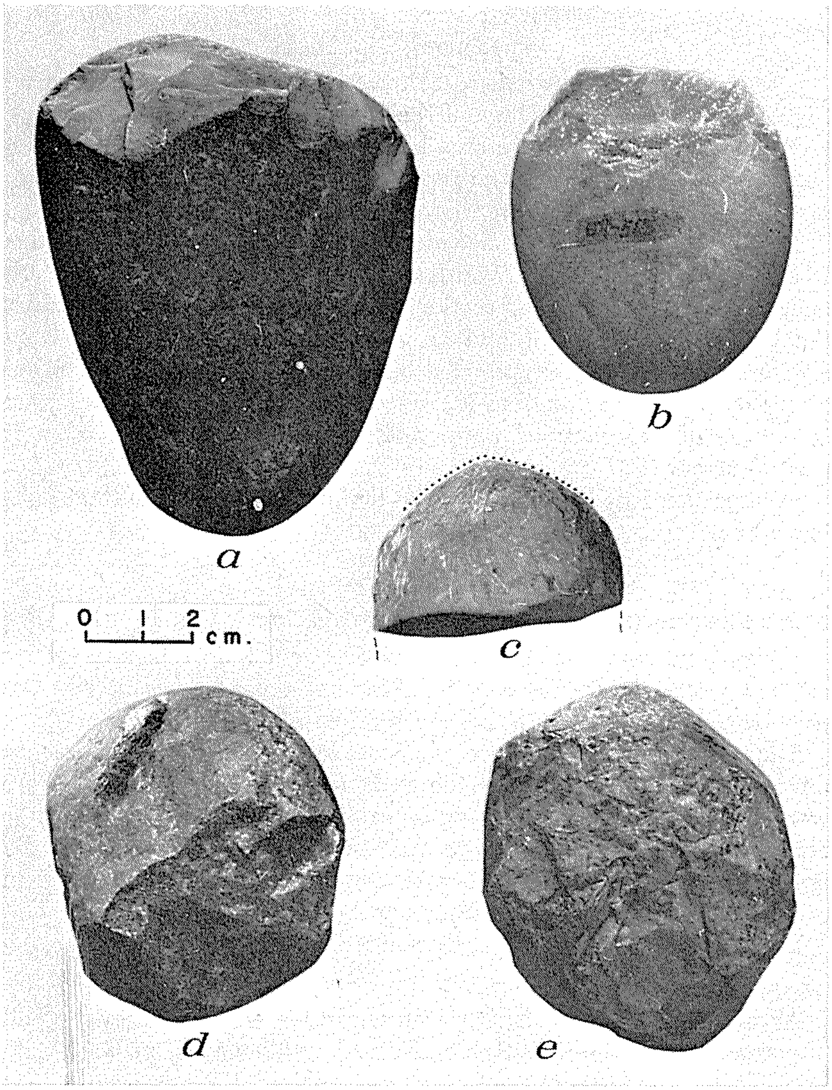

FIGURE 12. Miscellaneous artifacts. a, b, Choppers. c, Smoothed fossil. d, e, Hammerstones. Dots indicate area of smoothing.

small areas of edge retouching or wear, and some have small battered areas. It is likely that pieces from this group were used both as flint sources and as handy, quickly discarded tools when convenient.

Material: 158 flint, 2 quartzite.

Chipped and Polished Stone

(2 specimens, Fig. 10, f)

A fragmentary heat fractured celt was discovered in close association with a hearth area. Three of the four fragments which were scattered over a five-foot square area have been glued together to form a large portion of one face. The portions sloping down to the bit edge are heavily polished and are very smooth.

The second specimen was flaked on both faces to the desired shape. It decreases in thickness towards both the hafting end and the bit end. When viewed in cross section, the bid end somewhat resembles the bifacially-chipped bit end on a gouge. This celt is constricted somewhat at the end opposite the bit to facilitate hafting. It is probably only partially finished as it does not exhibit the heavy polish that is typical of so many of these artifacts. The hafting-end edge is ground smooth.

Dimensions: length 4 cm., width at end of bit 2.5 cm., width at hafting end 1.7 cm., thickness 1.1 cm.

Ground Stone

OCHER FRAGMENTS (21 small and 1 large specimen, Fig. 10, g)

Twenty-one red ocher fragments, none larger than ¾ inch, were recovered from all areas of the site. Many of these had scratched depressions where pigment had been scraped off for use.

A larger flat tablet-like piece of yellow limonite was ground smooth down both sides and around the ends (Fig. 10, g). Both faces are worn smooth. There is a shallow depression with deep scratch marks across it on one face, and there are also deep scratch marks on the opposite face. Upon close examination, tiny scratches running in every direction over every surface can be seen.

Dimensions: length 4.5 cm., thickness 0.7 cm.

GRINDING SLABS (8 specimens)

All of the grinding slabs were of sandstone and had been pecked preparatory to grinding. Seven showed evidence of pecking and grinding on one side. One of these was mainly a sill fragment. The eighth fragment had been pecked and worn down on both faces, one face more extensively than the other.

MANOS (9 specimens, Fig. 13, a)

The one complete mano recovered is of fine-grained sandstone and shows heavy usage on one side (Fig. 13, a). The broken manos, all made of sandstone, showed moderate to heavy wear. Three of these showed grinding facets at different angles along the sides and ends.

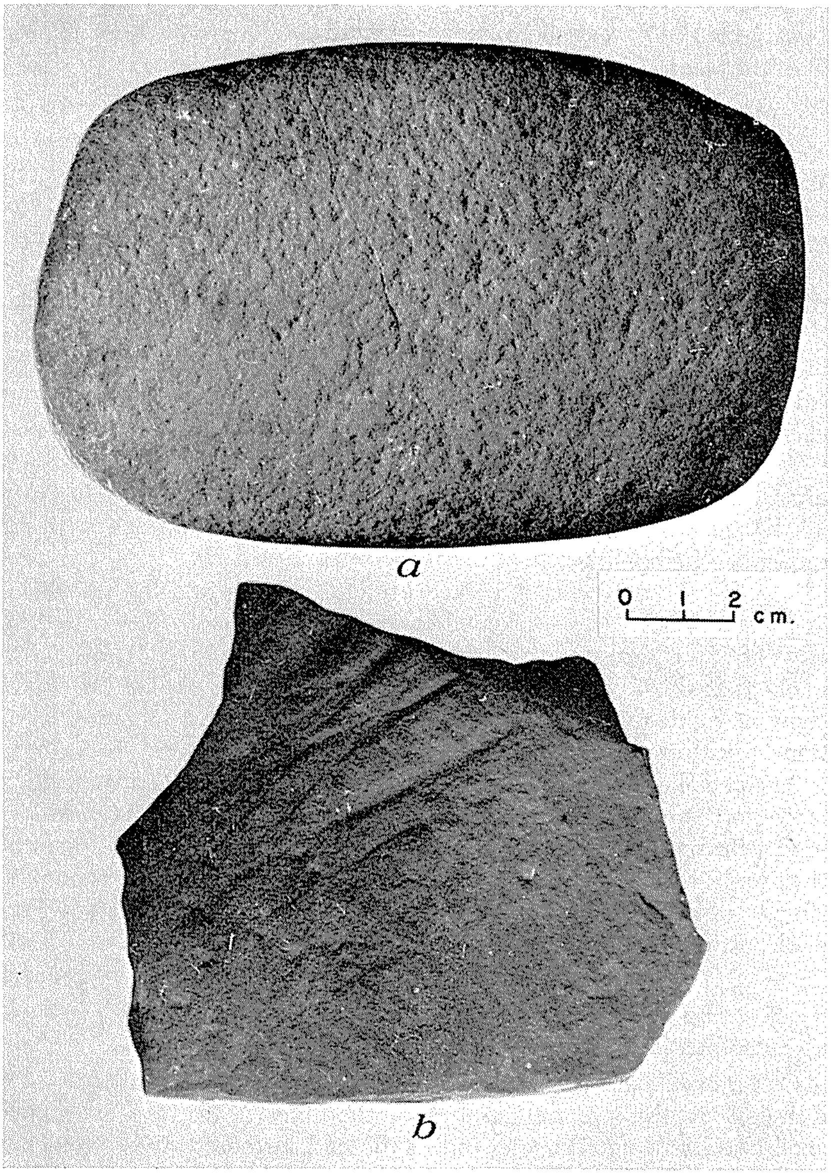

FIGURE 13. Ground stone. a, Manos. b, Grooved stone.

The other six were oval to rectangular in shape. One battered fragment was probably used as a hammerstone.

An oval stream-worn limestone pebble was perhaps intended for use as a mano, but it showed no evidence of wear.

Dimensions of complete mano: length 14.0 cm., width 9.0 cm., width 3.5 cm.

GROOVED STONE (1 specimen, Fig. 13, b)

A piece of sandstone has four V-shaped grooves running across the stone, possible evidence that it had been used as a hone for sharpening bone tools. Below these V-shaped grooves, there is a short, wide, somewhat rounded groove which possibly was used as a shaft abrader. Fainter grooves bisect the larger grooves at an angle. One edge of this sandstone piece has one short V-shaped groove extending down it at an angle.

Dimensions: length 10.5 cm., width 9.5 cm., thickness 3.0 cm. Typical groove: width 0.3 cm., depth 0.1 cm. Rounded groove: width at each end 0.5 cm. and 1.5 cm., depth 0.2 cm.

A small limestone object about the size of an average marble is almost a perfect sphere except for a slight flat area on one side (Fig. 10, h). It is 1.4 cm. in diameter and has a rough surface with no evidence of smoothing. Its purpose is unknown.

One fossil was evidently picked up and brought into the camp site as an object of interest or for other purposes. A smoothed area on the edge at one end extends on around one side (Fig. 12, c). It seems unlikely that this is natural since the other side and end of the fossil show no evidence of this wear. Dots at the upper part of the illustration indicate worn area.

A flint flake, showing some modification at one end, still retains a large portion of its original outer cortex. This flat brown cortex is covered with red ocher-colored marks. Most are faint, and it is apparent that some have worn away. Others are almost invisible. It is impossible to discern an apparent pattern except that many are roughly parallel and others form a zig-zag appearance.

Worked Shell

UTILIZED MUSSEL SHELLS (8 specimens, Fig. 14, a-d)

One mussel shell has a battered or chipped section worn down to a dull edge on the upper edge opposite the hinge (Fig. 14, b). Another shell also has a portion removed at the end fartherest away from the hinge (Fig. 14, a). The shell is broken alongside this area, leaving two concave areas side by side. The broken area is worn to a dull edge leaving no sharpness. A third shell is heavily smoothed along a broken edge on one side of the shell.

A fourth shell shows light smoothing extending from the upper area near the hinge around to about the half-way point on the oppo-

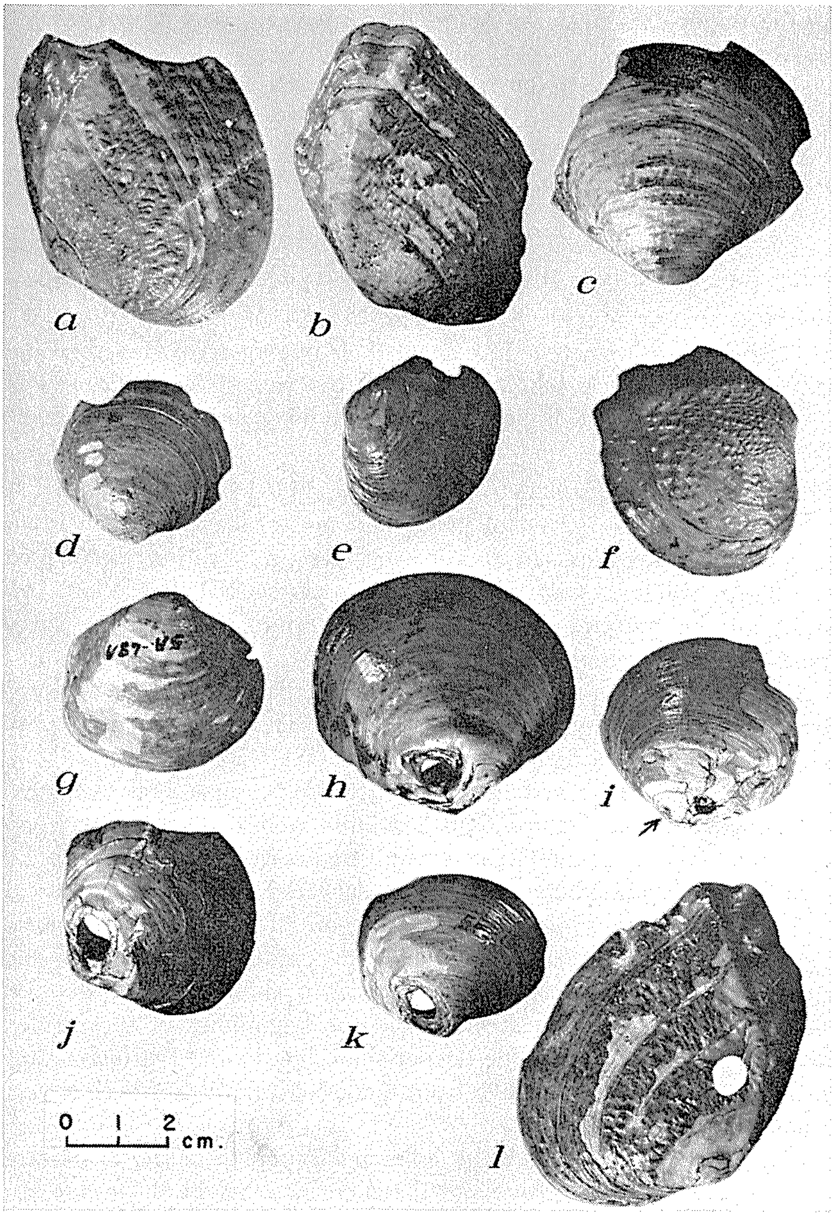

FIGURE 14. Shell artifacts. a-d, Utilized shells. e-g, Notched shells. h-l, Perforated shells. Arrow indicates perforation begun on exterior surface of the shell.

site side. A perforation near the hinge has been damaged by a break in the upper area near the hinge. This specimen was probably used as a scraper.

Two shells have a notch removed along one edge (Fig. 14, c, d). The notch on example *c*, which is 1.0 cm. wide and 0.5 cm. deep, is V-shaped and shows heavy smoothing or wear. The notch on example *d*, which is 0.9 cm. wide and 0.6 cm. deep, is rounded and smooth. It resembles a spokeshave in outline.

Two additional shells appear to have smoothed areas around their outer long edges indicating use as scrapers. The wear is very light.

NOTCHED MUSSEL SHELLS (5 specimens, Fig. 14, e-g)

Five shells show notched areas on their outer edges. One shell has a broad chipped area (slightly worn) to one side of the notches (Fig. 14, f). A second shell is perforated at the hinge in addition to being notched.

PERFORATED MUSSEL SHELLS (54 specimens, Fig. 14, h-l)

This rather large group of perforated mussel shells are in various stages of disintegration. In almost every case, perforations occur near the hinge, although some of the holes are closer to it than others. Almost all the perforated shells were small mussels, however, large mussels were uncommon in the midden.

One large broken mussel has a large circular perforation near the center intersected by another perforation. This leaves a hole with the appearance of a figure-eight.

Most of the shells had circular perforations, some had elongated oval ones, and one example had a definite well-made triangular perforation. The circular perforations ranged in size from 0.2 cm. to 1.0 cm. Other perforated mussels were discovered during the course of the digging, but these had crumbled beyond all possibility of removal.

Careful checking of all mussel shells for evidence of alteration and use revealed thirteen shells that seemed to show the first steps in making perforations. These shells had the beginnings of tiny drilled holes in the hinge areas. The deeper these holes went the larger they became. They appear to have been made with an object with a very small sharp point.

Two of these shells have the holes punctured from the outside of the shell, and the outer layers of the shell have flaked off around the hinge area (Fig. 14, i). The other 11 had these tiny perforations on the inside. One shell had three of these—a very small one, another larger one beside it, and a larger one below these two. It would seem that at times there was a bit of indecision as to just where the shells should be perforated.

Two shells each have one attempted perforation and one completed one (Fig. 14, i). The remaining shells have only one beginning of a hole.

Attempted perforations which almost puncture the shell range in size from about the size of a pin head to 0.2 cm.

The perforated mussels were most common in areas in which mussel shells were most numerous. This may or may not be of significance since the greatest concentration of other artifacts was here also.

Bone Artifacts
(4 specimens, Fig. 10, i)

Bone in any form was very scarce throughout the midden soil. No complete bone tools were found.

Four burned fragments of one tool included the basal end of a mammal long bone with part of the articular surface present, a portion which fitted onto this, and two mid-section fragments. Two other mid-sections from other tools were found.

One cylindrical bone tube bead was also recovered. It is smoothed at each end and the outer area is smooth except where it is slightly pitted. It has no decoration. It has been fashioned from what appears to be a bird bone or the long bone of a small mammal. It is 2.7 cm. long and 1.3 cm. in diameter.

FOODS

As already stated, bone material was extremely scarce at High Bluff. However, in most cases that which was discovered was well preserved, so the scarcity is probably not accountable to lack of preservation. Deer, one squirrel jaw bone, and turtle carapace fragments were recognizable. Bison bones were not present. Snails were almost non-existent.

Mussels seem to have been the principal staple (at least during the seasons when they were available) in the diet as attested by the tremendous quantities of shells. Presumably, most were either eaten raw or boiled as the only shells which were burned or charred were associated with hearth areas.

A few badly decomposed pecan shells were present, but these were probably introduced by burrowing rodents.

SUMMARY AND CONCLUSIONS

The High Bluff Site material appears to represent intermittent occupations of the Transitional Edwards Plateau Aspect (Johnson *et al.*

1962: 122). The dart point styles indicate a late placement of the material within the Edwards Plateau Aspect.

The *Darl* point was by far the most favored dart point style. They were common in every portion of the site. Four specimens of *Ensor* were also present. Both *Darl* and *Ensor* have been found to occur late stratigraphically in several Edwards Plateau Aspect sites (Miller and Jelks 1952; Suhm 1955) and were found just below *Scallorn* arrow points at the Smith Rock Shelter (Suhm 1957). Their presence at High Bluff along with *Palmillas* (1 specimen), which occurred at the bottom of the Austin Focus zone at Kyle (Jelks 1962: 39), and *Edgewood*, which is regarded as occurring during the latter part of the Archaic period (Suhm, Krieger and Jelks 1954: 418), adds further to this transitional placement. The four *Marcos* points from High Bluff resemble *Marcos* points found in the upper levels at Ham Creek, an Edwards Plateau Aspect site in Johnson County (Forrester 1964: 10, Pl. 4). The *Eliasville* dart points with their resemblances to both the *Darl* and *Godley* types seem to further indicate this late transitional placement.

The only projectile point with any Paleo-Indian attributes is the one *Meserve* point. It was possibly picked up and brought into the site by the inhabitants.

The Austin Focus of the Central Texas Aspect is represented at High Bluff by a small number of arrow points. It appeared at first that there would be vertical separation with arrow points overlying dart points. However, it soon became obvious that most of the dart points and the arrow points were coming from identically the same levels, namely, from between 3 to 5 inches below the surface. For some reason the majority of the projectile points were confined to this 3 to 5 inch zone although the midden soil and other cultural material extended on down to depths of 10 to 15 inches at some points. Some arrow point fragments (mostly tips) were found very close to the soil surface, whereas no dart points were present in the upper 3 inches of the deposit.

The arrow points *Scallorn* and *Grandbury*, both diagnostic of the Austin Focus at the Kyle Site, indicate an Austin Focus occupation following the principle Edwards Plateau occupation.

Diagnostic markers of the Toyah Focus, which follows the Austin Focus, are not present. Absent are arrow point types *Perdiz* and *Cliffton*, small snub-nosed scrapers, small drills worked onto flint flakes, and pottery.

The gunflint, which was the only historic item present, was likely dropped or lost in the vicinity long after the main occupation of the site.

In summary, the High Bluff material appears to represent occupations during the Edwards Plateau Aspect and the Austin Focus. The site was inhabited intermittently by hunting and gathering peoples with the later occupants using the bow and arrow.

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Scott, Louisiana

Cyrus N. Ray, 1880 - 1966

Bill Wright

Late on a wintry evening in October, 1928, a small group of men met to form what is now the Texas Archeological Society. Their interest had been stimulated by discoveries which led them to believe the bleak, red plains and limestone-capped hills of West Texas once were the hunting ground of primitive man.

Four years earlier, in a gravel deposit located northeast of Colorado City, Texas, a bison skeleton had been found with a spearpoint among the bones. The find established a much earlier date for human occupation in North America than had been previously imagined. The site was excavated by Dr. Cook, Curator of the Denver Museum of Natural History. The discovery, which was publicized in newspapers and scientific journals, caught the attention of an Abilene osteopath, Dr. Cyrus N. Ray, who began looking for similar sites in the gravels of Taylor County, some seventy miles to the east.

Dr. Ray enlisted the aid of other local people. With the help of E. B. Sayles and Dr. Otto Watts, he began systematically surveying the strata exposed by the meanderings of Big Elm Creek and the Clear Fork of the Brazos. As Ray searched and found other fossil bones among the gravel deposits of the streams, he also found many surface sites adjacent to them. More and more material was found, and the excitement mounted. In January, 1928, Ray's description of the Red Hill Artifacts was published in Scientific American and attracted national attention.

In the fall of 1928, Dr. Ray decided interest was strong enough to organize an archeological society. Invitations were sent to various people and institutions, including the three colleges then located in Abilene: Simmons College (now Hardin-Simmons University), McMurray College, and Abilene Christian College. The initial meeting was held in Cyrus Ray's osteopathic office, a large, barren upstairs room on Pine Street next to the old Citizens National Bank Building. Dr. Stewart Cooper of Simmons College attended along with his colleagues Dr. Julius Olson, Dr. Rupert N. Richardson, and Dr. Otto Watts. Professor LeRoy C. Glass and Dr. W. C. Holden of McMurray College, Judge Fred Cockrell, Ernest W. Wilson, W. A. Riney, and E. B. Sayles were among the fifteen persons who responded to the invitations.

At the time of organization of the society, no state organization existed. Setting their sights high, the group chose the name "Texas

Archaeological and Paleontological Society" with hopes that, as interest grew, the society would expand into a truly state-wide organization.

Cyrus Ray was the prime mover of the organization from the start. He was elected the first president, and for seventeen years he was The Society. He put in his own money when there were no other funds available. He began devoting practically all of his time to archaeological work.

In 1929, the fledgling Texas Archaeological and Paleontological Society published its first Bulletin. The publication was a promotional venture at the start. Dr. Ray walked the streets of Abilene selling memberships in the society to the hard-headed businessmen on the flimsy excuse that it would help publicize Abilene. His efforts were successful. By the time of publication of the first Bulletin the society had 160 members, even though many of them didn't know an artifact from an artichoke and cared less. The issue was three hundred copies and contained articles by Dr. Ray, E. B. Sayles, Rupert N. Richardson, M. L. Crimmins, George C. Martin, and Dr. W. C. Holden.

Dr. Ray proved to be an excellent editor. As Dr. Holden recalls, he was very meticulous and had the knack of correcting the grammar and spelling of submitted papers while retaining the original meaning and flavor of the article. Under Ray's editorship the Bulletin developed into a responsible scientific journal.

Cyrus Ray was born in 1880 in Kirksville, Missouri, attended public school there, and entered the American School of Osteopathy from which he received his D.O. degree in 1909. After graduation he came to Texas where he practiced for a while in Fort Worth. In 1911 he came to Abilene.

Dr. Ray's interests were not limited to archeology. He was a constant contributor to his chosen profession of Osteopathy. Articles on such subjects as the mechanical relief of hiccups and a chemical-mechanical cure for hay fever and asthma were published by The American Journal of Osteopathy. Dr. Ray's attention over the years was focused on such diverse fields as insect behavior and glass collecting, the mystery of patination and the making of pottery. He conducted researches in the hybridization of plants and developed a successful cross between the loganberry and the nessberry, which he called the rayberry. He worked for six years domesticating the native Texas Black Currant. His work with irises has been widely acclaimed.

Cyrus Ray's boundless enthusiasm was completely contagious. Dr. W. C. Holden fondly recalls many an hour long phone call at 1 or 2 a.m. when Ray would expound on some find or new project. The early cold hours were forgotten in the excitement of the conversation. There was something exhilarating about his enthusiasm.

Cyrus Ray was a hard-thinking man. He had the strength of his convictions and insisted upon individual freedom. His disagreements with critics became legendary with his professional colleagues as well as with the citizens of Abilene. He made his position known on all public issues—flood control, urban renewal, water conservation, and flouridation. No opponent escaped the fury of his pen. The vigor with which he assailed his critics, especially in his later years, could well have limited the scientific acceptance of some of his archeological work. But it was his nature to fight for what he believed. Along with the fight, however, he never lost his sense of humor.

Dr. Ray lived in an old house which was surrounded by a jungle of cactus, wild currant bushes, and shrubs of varying types and descriptions. Rocks were in piles bordering the walks and drives. The whole place had a wild, untamed look. Plants and rocks were some of the treasures brought home from his many walks on the Plains. At the back of the house in a separate building was Dr. Ray's garage-workshop.

This little shack was all a boy could wish for. Ancient sun-toasted bottles lined the walls. Big piles of worked flint—scrapers, gouges, spear points—lay in a profusion on walls and floor. In a basket in one corner of the floor lay the bleached and shellacked bones of some ancient human—his jawless skull looking like Andy Gump, buried to the neck in a pile of bones.

I was in junior high school when I first visited Dr. Ray. His reputation was vividly exaggerated in my mind. I had heard he was unpredictable, apt to lash out fighting at the slightest provocation. As I approached the workshop, I could see a flicker of yellow light through the open door. Uneasily I knocked and I was invited in by a gruff cough of acknowledgement.

Dr. Ray was flame-testing minerals on a platinum wire which flamed blue and red and yellow with various mixtures of powdered rock. His white hair was thin but curled like horns atop his massive head. He was a great huge man who wore small steel-rimmed glasses which seemed to intensify his light blue eyes. To me, he seemed to be Mephistopholes, brewing some fiendish incantation. But I need not have been uneasy. From the first, our mutual interests drew us together.

This meeting was the beginning of a friendship that lasted through the years. We tramped the hills together many times. I learned about

Indians from him—he showed me their signs, their arrowpoints, flint and grinding tools, and their beads.

With the passing years we drifted apart—he to undertake new projects, I to attend college. Later when I returned to Abilene, I saw him on the street, indomitable as ever, his coat flying in the wind. We enjoyed seeing each other again and recalling memories of past times. We weren't together much after that, a visit now and then was all. Then one day the call came—another walker of the Texas Plains was stilled.

Cyrus Ray had outlived most of his friends. To those who never met him, Cyrus Ray will remain a composite of what others have written and said about him. Knowing him personally was an experience—he was an unforgettable and unique character interested in past and present, science and art, ready to enter any controversy. He participated fully in life.

Others will continue to walk the plains with curious eyes and probing sticks and wonder about the riddles of the signs. Now for a quiet moment, let us think one last time—Goodbye, Old Friend.

Abilene, Texas

Cyrus N. Ray
Bibliography and Contributions to Texas Archaeology

R. K. Harris and Inus Marie Harris

Cyrus N. Ray, founder, first President, President Emeritus, and Fellow of the Texas Archeological Society[1] and Editor for 18 years of the Bulletin, died on Tuesday, June 21, 1966, at the age of 86. He died where he had lived and worked for 55 years, in Abilene, Taylor County, Texas.

He was of English and Scotch-Irish ancestry. His paternal ancestor came to Maryland from Manchester, England, in 1730. Dr. Ray was born near Kirksville, Missouri, on January 18, 1880, and spent his early years there. He received his degree as Doctor of Osteopathy there in 1909 and soon moved to Texas to practice.

In Abilene he became a prominent physician and surgeon, respected by patients and colleagues alike. He was noted for his inventive and original approach to medical problems. In 1921 he was honored by being elected President of the Texas Association of Osteopathic Physicians and Surgeons. In 1925 the Governor appointed him a member of the Texas State Board of Medical Examiners. He had been listed as a member of Who's Who in America since 1932.

Outside his medical work, he found time to study native floras and contribute articles to gardening magazines. In these articles he described native Texas plants, shrubs, plant-breeding experiments, and methods of gardening in dry regions.

Dr. Ray's research in Texas archaeology began in the Abilene area, an area—among others in Texas—practically unknown archaeologically at that time. In October, 1928, Dr. Ray called together a group to organize an archaeological society. Those present included Dr. Julius Olsen, Dr. Otto O. Watts, Dr. R. N. Richardson, Dr. W. C. Holden, E. B. Sayles, Ernest W. Wilson, Frank Grimes, W. A. Riney, O. K. Hobbs, and Dr. Ray.[2] As a result, the Texas Archaeological and Paleontological Society was founded on October 3, 1928.

Under Dr. Ray's guidance the society was devoted to the study of history and prehistory and to fossils of the past floras and faunas of Texas. The society encouraged proper collection and preservation of

[1] Formerly the Texas Archaeological and Paleontological Society.

[2] Listed in the Foreword of the Bulletin of the Texas Archaeological and Paleontologcial Society, Vol. 7, pp. 4-7, 1935.

artifacts and fossils for study and classification, and it urged the publication of research.[3]

The society began as an Abilene society, which met monthly to hear and discuss a scientific paper. From this beginning the Texas Archaeological and Paleontological Society has grown into a society of approximately 1,000 members. Although the name has been shortened, the scientific goals have remained the same.

Dr. Ray was untiring in his efforts on behalf of the society. He attended the annual meetings and gave papers whenever possible, took an active interest in all problems confronting the society, and responded to all controversial issues by taking pen in hand. Besides serving for many years as President and Editor, he contributed 66 articles on archaeology.

Had it not been for his pioneering and persistent efforts in exploring and understanding West Texas archaeology, Texas would have been far behind in archaeological research. His interest in archaeology began as an avocation, however, he found it productive and rewarding; therefore, more and more of his time was devoted to it. He wrote many informative articles on the subject of early man in Texas and lectured widely before university and other groups. He was called upon repeatedly to read papers and always responded. He was highly respected by both professionals and amateurs for his scientific studies in Texas archaeology.

The following list of Dr. Ray's publications does not include his medical, newspaper, or magazine articles on varied subjects. Only his contributions to Texas archaeology are given.[4]

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James Alfred Ford, 1911 - 1968

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With the death of James A. Ford on February 25, 1968, American archeology lost one of its most versatile practitioners, an ingenious innovator, and an excellent theoretician. He was the father of archeology of the Lower Mississippi Valley and the leader of a brilliant group who established the sequence of cultures in the Lower Valley —one of the cornerstones of Southeastern archeology. He was the leading spirit in establishing the Southeastern Archeological Conference and one of its regular attendants through the years. Above all, he was to many of us not only a true friend and an always-interesting companion but virtually a member of the family.

James Alfred Ford was born in Water Valley, Mississippi, February 12, 1911, to James Alfred and Janie David (Johnson) Ford. The father, appropriately, came from Coles Creek, in Yalobusha County, Mississippi. He was a railroad man and died of a train accident only three years after Jim's birth. The mother, a primary school teacher before her marriage, resumed her profession after her husband's death in order to support herself, Jim, and another son. She is a self-reliant person of considerable ability and still does remedial teaching for problem students in her native Mississippi.

Jim Ford became interested in archeology before finishing high school. He worked for three months each year during 1927-29 with Moreau B. Chambers for the Mississippi Department of Archives and History. With Chambers he made field surveys, excavated a number of sites, prepared collections and exhibits, and established a record of sites and specimens for the state museum. On completion of high school he entered Mississippi College.

During the summer of 1930 he went to Alaska as assistant to Henry B. Collins, Jr., of the U. S. National Museum. They excavated a series of sites at Gambel, St. Lawrence Island, from which the first chronology of western Eskimo prehistory, covering a period of 2000 years, was established. Ford was sent back to Alaska by the National Museum in May, 1931, and remained for 18 months. During the two summers he was in charge of excavation of a series of sites near Point Barrow. The chronology discovered here, covering about 1800 years, demonstrated how the Thule Culture, which the Maritime Eskimo carried to Central Canada and Greenland, had developed out of the early stages in the Bering Strait region. He returned to Alaska with Collins in the summer of 1936 and again with a party from Harvard

University under the auspice of the Arctic Research Laboratory in the summer of 1953. Out of these Alaskan studies came Ford's 1959 publication "Eskimo Prehistory in the Vicinity of Point Barrow, Alaska."

In the introduction to this volume, Ford recounted some of his experiences during the winter of 1931-32, when excavations were impossible. During that fall, he joined a boat crew which killed a bowhead whale east of Point Barrow and towed it to the land ice near the Point. As his portion of the kill, Ford was awarded the skull, which was detached and hauled up on the beach. There it was protected until the next summer when it could be shipped to Seattle, eventually to reach the National Museum for display.

In October he joined the annual reindeer round-up at Wapalta, where, within a week's time, he helped to pass 12,000 reindeer through the corrals, which included killing, castrating, and marking chutes. His compensation was a supply of skins for winter clothing and meat for the next summer's archeological camp. His mechanical ingenuity came to the fore. With the help of a Signal Corps sergeant and the local school teacher, a Model T Ford chassis was converted into a "rather primitive snowmobile." Trips were made to the deer corral, to Wainwright, and to the camp of the crew of the ice-bound steamer "Baychimo" near the Sea Horse Islands—a total of 1300 miles. During the cold winter months Ford lived with the medical missionary, Dr. Henry B. Griest. In the early spring he traveled with Alfred Hopson, with dogs and sleds, to the oil seeps at Cape Simpson to bring back two sled loads of asphalt to be used as fuel. To the powerfully-built Jim Ford, in the vigor of early manhood, these experiences must have been stimulating and exciting.

When he returned to the states, Ford received a grant from the National Research Council to conduct site surveys in central and northern Louisiana and to excavate the Peck Village Site. Ford's first publications on the Lower Mississippi Valley resulted from these studies, his earlier surveys with Moreau Chambers, and later studies by Chambers in Mississippi and by Ford in Louisiana. "Outline of Louisiana and Mississippi Pottery Horizons" was published in 1934, "Ceramic Decoration Sequence at an Old Indian Village Site near Sicily Island, Louisiana" in 1935, and the famous "Analysis of Indian Village Site Collections from Louisiana and Mississippi" in 1936. These studies and publications laid the groundwork for the establishment of the prehistoric culture sequence in the Lower Valley. The "Analysis" was the first attempt to set up a system of pottery typology in this area. Having tried two systems of analysis and indexing and discarding both because of impracticability or subjective variation, he devised an analytical system by which decoration motifs, decoration elements, and combinations or arrangements of these features were expressed by sets of numbers. Collections from 103 sites were so analyzed and seven complexes were recognized: Choctaw, Natchez, Caddo, and Tunica in the historic period; Deasonville, Coles Creek, and Marksville in the prehistoric period.

From September, 1933, through July, 1934, Ford assisted Frank M. Setzler in excavation of the Marksville Mound under auspices of the U. S. National Museum. This work established the Marksville cultural complex as a southern variant of Hopewell culture. During August of 1934 he worked for the Park Service, State of Georgia, excavating and studying a ruin near Brunswick which the Park Service was in the process of developing into a state park in the belief that it was the site of the 1680 Spanish Mission of Santo Domingo de Talajo. In Ford's succinct words "It proved to be the ruins of a sugar mill, built about 1820."

In September and October, 1934, he planned and constructed buildings for an "American Indian Exposition" held on the Fair Grounds at Atlanta, Georgia, by the Southeastern Fair Association. Again in Ford's words, he "managed the exposition, fed, housed, nursed, and bailed out of jail the 40 Cherokees, 30 Seminoles, and 30 assorted southwestern Indians who had been provided to staff the exposition by the Bureau of Indian Affairs."

In the fall of 1934, Jim Ford entered Louisiana State University as a student and Research Associate in the School of Geology. He brought to Baton Rouge his young bride, the former Ethel Campbell, whom he had married on March 3, 1934, in Jackson, Mississippi. His 1935 surveys in Louisiana were sponsored by the University. July and August of 1935 were spent in a summer field session in archeology at Chaco Canyon on a University of New Mexico Fellowship. He received the A.B. degree from L.S.U. in 1936 and retained the position of Research Associate in Anthropology until 1946.

Intermittently during this period Ford was engaged in archeological work in Georgia, where he met many of the young archeologists with whom he would be associated later in the Southeastern Archeological Conference and with whom he would collaborate in forging the entire picture of Southeastern archeology. For a short time during 1933 he worked with Dr. A. R. Kelly in excavating Brown's Mount near Ocmulgee. In 1937 he returned for the summer period to work for Kelly in reconstructing the Council Chamber in Ocmulgee National Monument near Macon, Georgia. This building, which had been excavated in 1934, is one of the major exhibits of the monument.

Working with Kelly, in addition to Ford, were Gordon Willey, Antonio Waring, Jesse D. Jennings, and Charles Fairbanks. During this climactic summer the Southeastern Conference, the binomial system of pottery nomenclature, the Southern Cult, and area-wide relationships of previously isolated culture sequences were discussed by this group. Preston Holder, who was working on the Georgia coast, also participated in the discussions. Initiated that year was the close professional relationship of Ford with Willey, who had brought knowledge of the binomial typing system and of tree-ring dating from the Southwest.

In the fall of 1937 Ford went to the University of Michigan as a graduate student with a Fellowship in the University Museum. He received the M.A. degree in Anthropology from Michigan in 1938. James B. Griffin was engaged in ceramic analysis in the Michigan Ceramics Repository; he and Ford assayed the first binomial classification of Eastern pottery in 1937 ("Conference on Pottery Nomenclature for the Southeastern United States"). In the Waring Papers, Stephen Williams gives the background for these developments. He states that this system was applied by Ford to pottery classification for the Lower Mississippi Valley to replace the cumbersome numerical symbols which he had used. The second region to profit was Savannah, where Caldwell and Waring applied a trinomial system to pottery types. The method was rapidly adopted and widely applied (the writer used the binomial system in typing Caddoan pottery from the Belcher Mound in 1940-41).

Ford and Griffin organized and hosted the First Southeastern Archeological Conference in Ann Arbor in the spring of 1938, with Wm. G. Haag, then at Kentucky, as the first secretary. From this early association Ford, Griffin, and Haag remained fast friends and close collaborators.

When Ford returned to Louisiana State University in June, 1938, he and Dr. Fred Kniffen, Chairman of the Department of Geology and Anthropology, began to formulate the state-wide W.P.A. Archeological Project. It was initiated in September, 1938, and continued until the fall of 1941, when it was terminated because of World War II. During these three years excavations were conducted at Marksville, Greenhouse, Crooks, Angola, Medora, Bayou Goula, Mansura, and the Tchefuncte sites around Lake Pontchartrain and at Lafayette (Ford had tested the Lake Louis Site near Sicily Island in the spring of 1937). Ford had gathered a number of archeologists for this work, some of whom were to become outstanding in the field. Included were Gordon R. Willey, George I. Quimby, Jr., Robert S. (Stu) Neitzel, Arden King, William T. Mulloy, Edwin B. Doran, Jr., Carlyle S. Smith, Andrew Albrecht, Preston Holder, Walter Beecher, and in addition a number of research consultants. The preliminary sequence of Lower Valley cultures, which Ford had set up by his earlier studies, was confirmed and expanded by these excavations and the resultant publications. The new sequence of Tchefuncte-Marksville-Troyville-Coles Creek-Plaquemine-Natchez/Caddoan has stood the tests of time and correlations all across the Southeastern United States. Ford and Willey's "An Interpretation of the Prehistory of the Eastern United States" (1941) is one of the finest interpretive syntheses in American archeology.

In the fall of 1939 Ford, James Griffin, and Philip Phillips planned an archeological survey of the Mississippi Valley in Arkansas and Mississippi, designed to extend the study of the Lower Valley prehistory northward of previous surveys. During March and April of 1940 they collaborated in the initial field-work; additional surface collections and limited excavations were done in 1941 and, after the war, there were tests and excavations in 1946 and 1947 in which Ford did not participate.

During 1940 and 1941, under a Rosenwald Fellowship, Ford worked toward his Ph.D. in Columbia University. In June, 1941, he went to Columbia, South America, for a year's work for the Andean Institute, Yale University Unit. For the first three months he assisted Wendell C. Bennett in the survey and excavation of sites in the Central Cordillera of Columbia, then continued the work until the end of May, 1942. Ford's report "Excavations in the Vicinity of Cali, Columbia," published by Yale University in 1944, outlined a short chronology in the vicinity of Cali and assembled information from private collections.

During the war years, 1942-1945, Ford was Senior Design Specialist, Arctic and Winter Warfare, in the Research and Development Branch, Office of the Quartermaster General, U. S. Army. He was engaged in correcting deficiencies and designing new items of clothing, web equipment, tentage, food and other items for operations under arctic conditions. He made thirteen trips to the Alcan Highway, Alaska, and the Aleutians.

After the war ended, Ford was in New York from September, 1945, until mid-January, 1946, devoting this time to reading and research in Columbia University Library in preparation for comprehensive examinations for his Ph.D. He then received a Guggenheim Fellowship for work in South America, participating in the Virú Valley Project on the north coast of Peru from February, 1946, until January, 1947. This was an immense collaborative project under the auspices of the

Andean Institute in which representatives of Yale, Columbia, the American Museum of Natural History, the Smithsonian Institution, Chicago Natural History Museum, and the Museo Nacional de Arqueología of Lima cooperated in the study of the perhistory and modern cultures of Virú Valley. The study provided relative dates for 315 prehistoric buildings, pyramids, and other prehistoric constructions. The results of Ford's and Willey's surveys were recorded in a joint publication in 1949; the Virú Valley study became Ford's doctoral dissertation.

On January 1, 1947, Ford went to the American Museum of Natural History in New York City as Curator for North American Archeology, where he remained until 1963. During this period many of his previous studies were sent to publication. He received the Ph.D. degree in Anthropology from Columbia University in 1949.

During analysis of the collections and preparation of the report of the Lower Mississippi Valley Archeological Survey, published with Phillips and Griffin in 1951, Ford developed two useful tools in archeology: the correlation of sites with river channel geology based on Fisk's monumental study of the Mississippi Valley River channel geology and the resurrection of seriation as a major tool. The combining of seriation and metric stratification analyses with the "battleship" diagrams of waxing and waning pottery types have become familiar sights in archeological literature.

While at the American Museum, Ford went out for field work at frequent intervals: to the Jaketown Site in Mississippi in 1951 for excavations with Phillips and Haag; to the Poverty Point Site in Louisiana in 1952, 1953, and 1955 for testing and excavations; and back to Alaska in 1953. He went back to Peru in 1958-59 for surveys and excavations in the valleys of Chira, Piura, and at Lambayeque.

Ford was aware of the Poverty Point Site from the time of his early site surveys in Louisiana and was cognizant of the unique culture which did not fit easily into the developing picture of Southeastern sequences. He and the writer were in correspondence during the 1930's when information about Poverty Point culture was gradually accumulating. After a Poverty Point component was identified in the lower levels of the Jaketown Site and an identical microflint industry was established at the two sites, his interest quickened. Studies at Jaketown, published with Phillips and Haag in 1955, were followed by field work at Poverty Point. The immense and remarkable geometric village construction on a solar-oriented axis was established from aerial photographs. Ford was assisted at Poverty Point by Junius Bird and Stu Neitzel; Haag, Griffin, Phillips, and I, with many others, visited whenever possible. It was reported to have been quite a spectacle to watch Jim and Junius—equally ingenious and investigative spirits—rolling clay balls between their fingers to see how they were formed (I was doing the same with modeling clay at home) or scraping and sawing on bones with lamellar blades to prove that "perforators" could be only worn-out blades. Ford's mechanical ingenuity was demonstrated during excavations at Poverty Point. He rigged up a mechanical dirt sifter which was shaken by attachment to a gasoline engine; it worked so well that he described it in a brief communication to American Antiquity. He also tinkered with and adjusted a bulldozer with back-hoe blade so that thin slices could be shaved to cut narrow trenches through Mound B and leave balks with vertical walls to establish profiles. The Poverty Point publication in 1956 combined information from these excavations with studies of the local collections, with Michael Beckman's studies, and with my studies of Poverty Point.

As extensions of the Lower Mississippi Valley Survey, Ford excavated at Menard Site on the lower Arkansas River. He identified it as the Quapaw Village of Osotouy, where the first European establishment in the Mississippi Valley was built by LaSalle's followers in 1686. He excavated the Hopewell Period village site and burial mound complex near Helena, Arkansas. Sponsored by the American Museum and the National Science Foundation, he surveyed Archaic sites on old courses of the Mississippi and tributaries in the floor of the alluvial valley between Cairo and Natchez. Here, again, Ford displayed mechanical ingenuity by developing an artifact-gathering machine with which he planned to make rapid surveys of village middens: the machine was to turn or loosen the soil, gather it to pass through a sifter, then—in harvesting machine fashion—turn out the artifacts. Unfortunately, thin middens and previous avid local collecting interfered with the success of this machine.

While working at Poverty Point Site, Ford also traveled to Baton Rouge and Marksville, in 1953, to plan with Neitzel the exhibits for the Marksville State Museum. In 1954, he returned to Marksville to assist in the installation of these exhibits. In June and July, 1961, with others from the U. S. National Museum, he gave intensive courses in chronological techniques to young professional archeologists from ten Central and South American countries at Universidad del Atlantico, Barranquilla, Columbia. Between 1962 and 1964 he advised and collaborated with Stu Neitzel in excavation and report of the Fatherland Site at Natchez, Mississippi.

Ford had a considerable interest in the Caddoan Area, although he conducted only two limited excavations in the area—at the Wilkinson and Allen sites in Natchitoches Parish—during his early surveys. He was in frequent touch with Krieger and the writer during the 1930's and 1940's when Caddoan archeological sequences were being formulated. He and Willey visited with Mrs. Webb and myself, in 1937, advising about excavations at the Belcher Site and photographing pottery from northwestern Louisiana. In 1939 he recognized the identity of the "Long-Nose God" masks from the Gahagan burial mound with the masks recovered by Moore from the Grant Mound in Florida. In his analytical study of pottery design movements, "Measurements of Some Design Elements in the Southeastern United States" (1952), the extension of these elements into Caddoan ceramics was included.

Ford attended a number of Caddoan Conferences and on several occasions the Ford-Griffin versus Krieger-Webb debates were fiery highlights of the meetings. There were some complications in that both Jim Ford and Alex Krieger were much more accomplished writers than they were public speakers. Often Ford couldn't (or wouldn't) understand Krieger and Alex couldn't (or wouldn't) hear Jim—there was even a suggestion that Alex turned his hearing aid down when Jim was talking—but all would eventually end peacefully and with mutual respect.

With all of his scientific ability and serious pursuit of knowledge, Jim Ford had also an enormous capacity for friendship and the avid enjoyment of life. Mrs. Webb and I discovered one of his capacities very early, when he and Willey visited with us in 1937. One day we were busy with other commitments and left Jim and Gordon photographing pottery. Our cook prepared lunch for them including her specialties, fried chicken, rice and gravy, and hot biscuits. On the next day, after they had left, Neecie came to Mrs. Webb with her eyes rolling.

"Mrs. Webb," she said, "I never seen two men eat hot biscuits like those two, especially that big Mr. Ford. Every time I went back in the dining room the plate was empty.

"I'd say "Gentlemen, would you like some hot biscuits?" and Mr. Ford would say "Just one or two more, Neecie, thank you, just one or two more." I'd bring another plateful and next time they'd be gone, too, until all I'd baked was gone. I never seen the like."

At archeological conferences a familiar sight was Jim Ford and Stu Neitzel, usually together, like two great bears. In the cool of the evening, when the relaxed conferring began, woe betide the ordinary man who tried to keep up with these two. At other times Jim told with huge relish tales of Sleepy Hollow, outside of New York, where he and his gentle Ethel lived. For instance, the tale of the snowy winter when Junius Bird dressed in a bearskin one night, claws and all, and made huge tracks down the valley and into the back yards of all their friends. This created a near-panic for the next few days over the giant animal aloose in Sleepy Hollow. Or the tale of the time when person or persons unknown, but generally suspected of being Jim and Junius, experimented with the firing of ceramic tiles in the Museum. What a hubbub when Gordon Ekholm discovered among his prized tiles from a Mayan site a certain number which were decorated with likenesses of Pogo and other comic strip characters from Okefenokee!

Jim was a leading exponent among dirt archeologists of the theory of cultural determinism. We had many long arguments about this: Jim, the culturalist, explaining patiently how man was caught and controlled by the sweep and flow of culture, and how supposed geniuses or inventors were produced, at the right time, by the forces of culture; I, the physician and humanist, objecting to the role of man as only a culture-bearer and maintaining that unusual men could, and often did, change the course of history and alter the flow of culture. Like the chicken and egg, or the heredity versus environment arguments, this was never settled, but it did help to pass the long, sometimes hot miles between sites in Louisiana, Mississippi, or Mexico.

Ford was active and influential in professional organizations. He was a member of the Society for American Archeology and served as its president in 1963-64. He helped to found the Southeastern Archeological Conference and attended most of its meetings. He was also a member of the American Anthropological Association, the Arctic Institute of North America, the Florida Archeological Society, and the Arkansas Archeological Society. He was awarded the Spinden Medal for noteworthy archeological concepts.

By the early 1960's new collections from the Poverty Point Site and new sites of this period had indicated the need for a revision of our 1956 publication. Plans were instituted toward this end by 1962 for tabulation of the immense Carl Alexander collection and a dozen others. Illustrations were prepared, but further work was interrupted by excavations in Mexico on Ford's part and medical duties on mine. Preparation of this revision was resumed in 1966 with a survey of new sites in Mississippi and a projected outline of the volume. Ford's participation was terminated by his illness in the spring of 1967. Just before the onset of his illness, Ford and Bill Haag excavated the Monte Sano Mounds, a Poverty Point site in Baton Rouge.

Between 1962 and 1966, convinced that elements of Formative Culture from South America and Mesoamerica had entered the Mississippi Valley during Poverty Point times, Ford sought a possible point of origin on the Gulf Coast of Mexico. With Alfonso Medellin and Matthew Wollrath, Ford excavated at the Limoncito and Chalahuites sites near Vera Cruz and studied the entire Trapiche Phase of that area. After the publication of "Early Formative Cultures of Coastal Ecuador" by Meggers, Evans, and Estrada, the conviction was reached by Ford that the early fiber-tempered ceramics of the Georgia and Florida coasts were expressions of the American Formative. His last published article "Early Formative Cultures in Georgia and Florida," in American Antiquity in 1966, expressed and explained this conviction. He was in frequent contact with Evans, Meggers, and other workers in the Formative cultures of South America and Mesoamerica, and arranged a conference on this subject at the University of Florida, where he had accepted the position of Curator of Florida State Museum in 1963. He was in the final stages of completing a comprehensive study of the American Formative when his untimely death occurred on February 25, 1968.

His was a full life and much too short. We shall miss him.

MAJOR PUBLICATIONS OF JAMES A. FORD

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1966 Early Formative Cultures in Georgia and Florida. American Antiquity, Vol. 31, No. 6, pp. 781-799.

Shreveport, Louisiana

Information and Contributors

The *Bulletin of the Texas Archeological Society* publishes original papers in the field of American archeology. Emphasis is placed on Texas and adjoining areas in the United States and Mexico, but papers on other areas are also acceptable.

Manuscripts should be typed on 8½ by 11 inch sheets of white bond paper, and *all material* should be double-spaced. Footnotes should be avoided or kept to a minimum.

Reference to published literature, by author, date, and page or figure number, should be placed within parentheses in the body of the text, with full bibliographic citations listed at the end. See this issue of the *Bulletin* for models.

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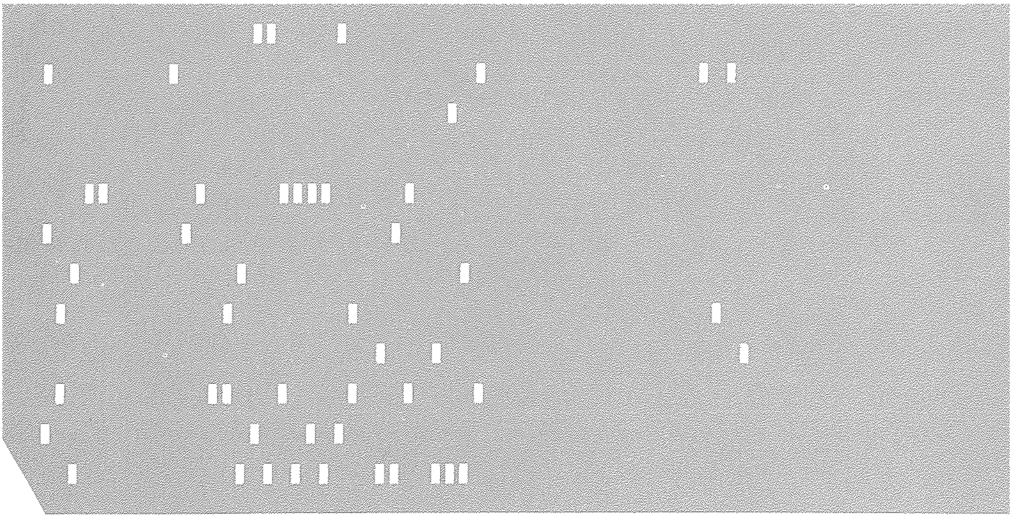
Each paper must be accompanied by an abstract (one or two paragraphs summarizing the main points of the paper).



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