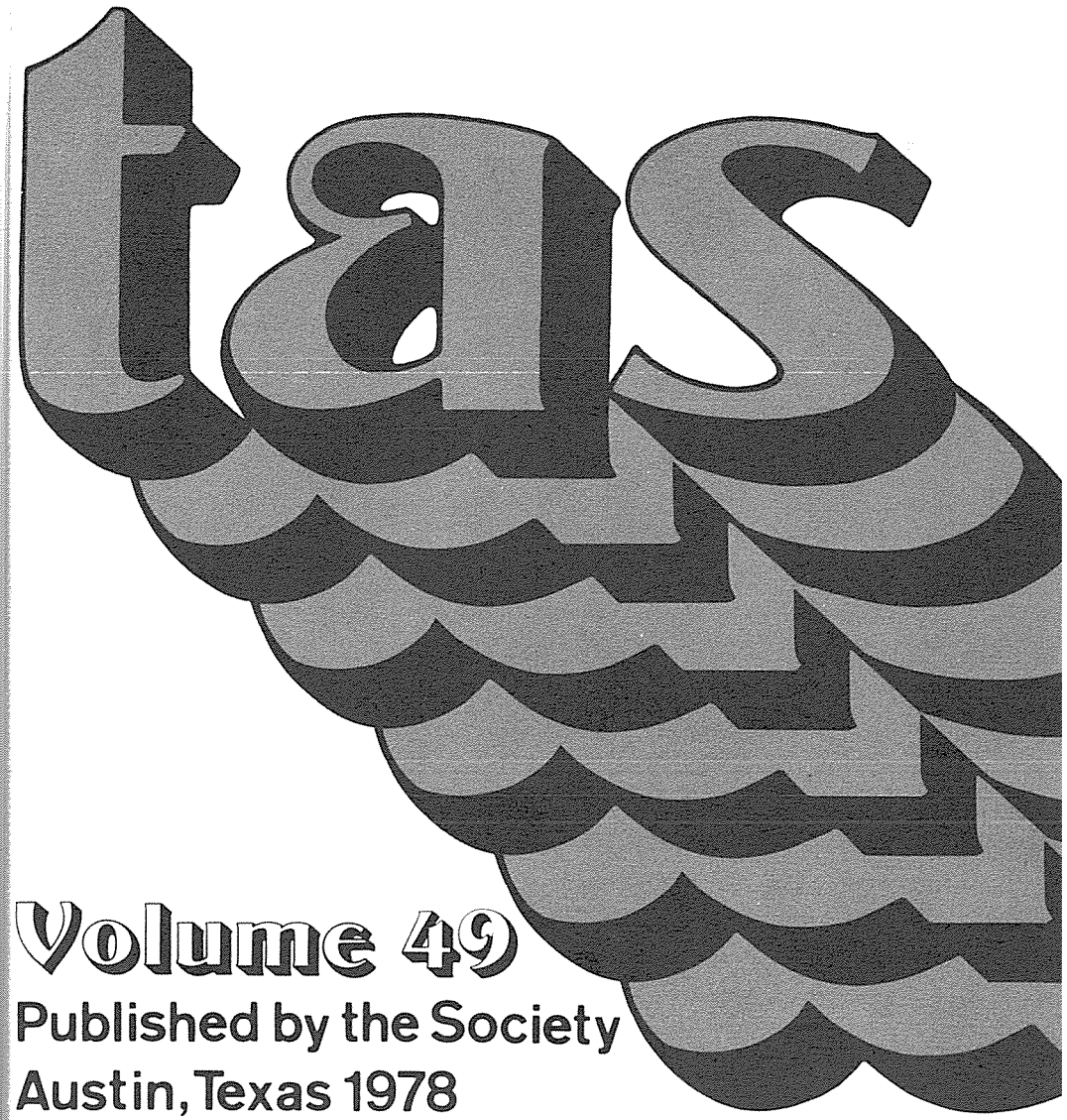
Bulletin of the Texas Archeological Society



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TEXAS ARCHEOLOGICAL SOCIETY

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Volume 49/1978

Thomas R. Hester, Senior Editor
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The Tuck Carpenter Site And Its Relation to Other Sites Within the Titus Focus

ROBERT L. TURNER, JR.

ABSTRACT

The Tuck Carpenter Site (41 CP 5) was excavated on weekends between May, 1963, and October, 1967 by the author and R. W. Walsh. It was located on the west side of Dry Creek, approximately three miles east of Pittsburg in Camp County, Texas. The site was a Titus Focus cemetery which contained 44 graves. Two graves contained two individuals each; 40 graves contained only one person. The remaining two graves contained no traces of bone. However, from the quantity and location of the burial offerings, they probably contained only one person. The skeletal material ranged from near-complete preservation to a complete absence in the graves. Usually, the skull and major leg bones were present, and pelvic fragments and arm bones appeared less frequently.

An analysis of the artifacts from the graves indicates that the graves were not all placed by the same people, but that early and late components were present.

The relationship of the Carpenter site graves to other Titus Focus sites and cemeteries is discussed.

INTRODUCTION AND BACKGROUND

Camp County in Northeast Texas is within the Coastal Plain. This region is crossed by several sizable creeks which eventually empty into Caddo Lake and then the Red River near Shreveport, Louisiana.

Most of Camp County is traversed by small streams or branches, which over the years have developed bottomlands or

flood plains bordered by upland or terraces 25 to 50 feet higher. The extreme eastern part of the county is hilly with occasional outcroppings of iron ore.

Camp County is in the area usually referred to as the Piney Woods of East Texas. The entire county is wooded except where land has been cleared for agricultural purposes. The predominant tree is the pine, and many varieties of oak and gum are present. Trees producing nuts are the oak, chincapin, hickory, pecan, and black walnut. Wild plum, muscadine, persimmon, and mayhaws may be found, and in the spring dewberries and blackberries grow in abundance.

The people of the Titus Focus were part of the Fulton Aspect of the Neo-American period and would mainly be placed in the Caddo IV time period (Davis 1970), the last prehistoric period. They were an agricultural people and lived in permanent villages. These villages, as far as is known, were located on the terraces above the flood plains.

It is the author's observation that small midden areas are located on the terrace along the streams. Each midden may represent one or two houses, and the entire group of middens probably composes the village. This observation applies to the environs of the Carpenter Site as well as others. Fig. 1 shows the relation of several middens to the Carpenter cemetery.

The cemetery is located on a projection or spur which protrudes into the flood plain of Dry Creek The elevation of the cemetery is 300 feet above mean sea level which is between that of the flood plain and the upland. The sandy soil rests upon a red clay base at depths of one to eight feet.

During periods of regular rainfall, which excludes the summer months and early fall, the ground is soft and may easily be dug. This characteristic of the soil probably was one reason why it was selected as a cemetery by these people.

The region, formerly occupied by the people now defined as Titus Focus, has as its axis Cypress Creek which lies between the Sulphur and Sabine Rivers. Fig. 2 is a map of this region which locates known Titus Focus and other sites that have been excavated. A few excavated sites are located on the major creeks, both to the north and south of Cypress as indicated.

The Titus Focus was defined by Suhm, *et al.* (1954: 189-195) using information obtained from excavations of cemeteries during the 1930's.

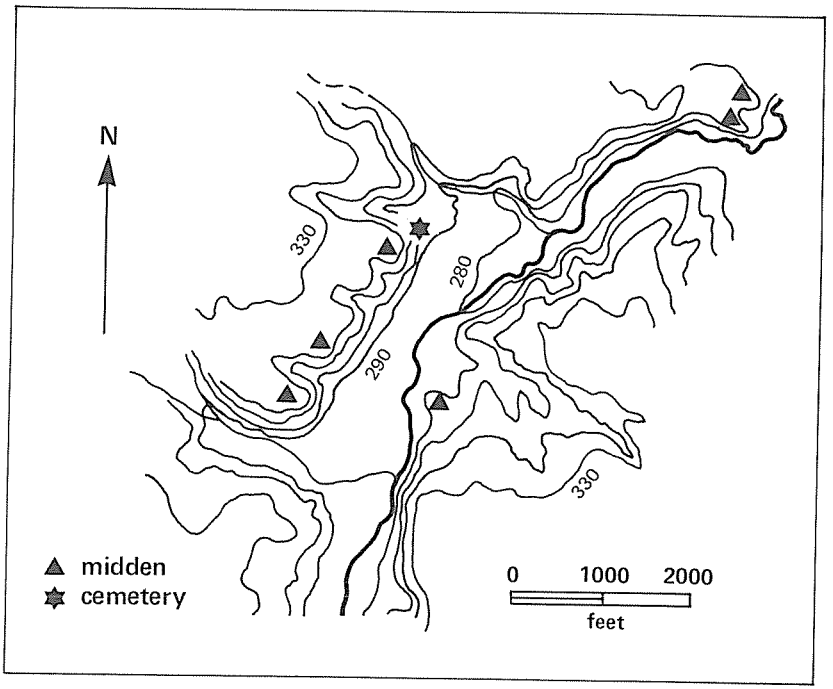


FIGURE 1. *Contour Map of Dry Creek With the Carpenter Site and Several Middens Indicated.*

During the 1930's, field parties under the direction of J. E. Pearce of the University of Texas excavated many cemeteries in Northeast Texas. Field foremen who did the actual work were A. T. Jackson, Walter R. Goldschmidt, Burleigh B. Gardner, and A. M. Woolsey (Davis 1970: 30-32). Among those excavated were the following Titus Focus cemeteries as noted in Fig. 2: the Russell, Caldwell, A. P. Williams, W. A. Ford, H. R. Taylor, Cash, Riley, Cason, Joe Justiss, Atkinson, Reese, Culpepper, Gandy, and Galt Sites. The Starrett cemetery was represented by purchased collection of artifacts and was not excavated by the field parties. All these cemeteries were used by Suhm, *et al.* (1954) to define the Titus Focus traits.

Suhm, *et al.* (1954) characterized the people of Titus Focus as producers of large quantities of pottery which they placed in the graves. Included in some of the graves were groups of arrow points primarily of the *Talco* type. *Bassett* and *Maud* points were

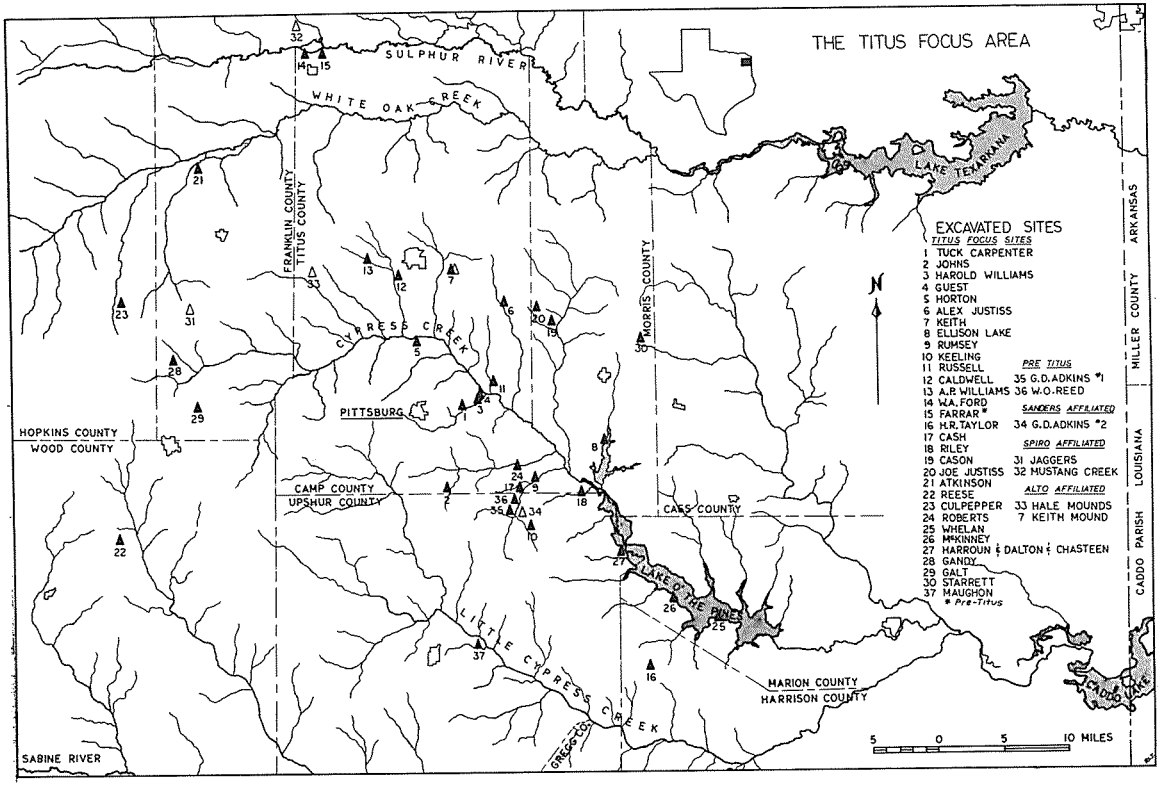


FIGURE 2. *Excavated Sites in the Northeast Texas Titus Focus Area.*

minor types in some areas. The most common vessel types that serve as markers for this Focus are *Ripley Engraved, Harleton Applique, Taylor Engraved, Wilder Engraved,* and *Bailey Engraved.*

Subsequent to the Handbook publication, (Suhm, *et al.* 1954) additional excavations of Titus Focus and other sites in the Cypress Creek basin were conducted by professional archeologists. The specific area was in the Ferrell's Bridge Reservoir or Lake O' the Pines which was then under construction.

The surveys and excavations which were carried out during the late 1950's were under the auspices of the River Basin Surveys office located in Austin. This office was initially under the Smithsonian Institution and later under the National Park Service. Titus-related sites that were excavated are: The Dalton Site (Davis and Gipson 1960), the Harroun Site (Jelks and Tunnell 1959), the Whelan Site (Davis 1958), and the McKinney Site (Davis and Golden 1960). In addition to these, the Roberts Site in Camp County was surveyed, and very brief excavations by Jelks and Tunnell were conducted. No formal report was submitted on the Roberts Site. The locations of these sites are also noted in Fig. 2.

Based on the findings at four of these sites (those above except McKinney), E. Mott Davis (Davis 1970: 47-50; also Davis 1958) defined the Whelan Complex which he equates in time with the Bossier Focus of the Fulton Aspect of the Caddo III time period. Characteristics of the Whelan Complex which differ from Titus Focus, as previously defined, are: (1) mounds built over the burned remains of circular structures which show no signs of having been lived in; (2) the presence of significant quantities of *Pease Brushed Incised* sherds (a type characteristic of Bossier Focus and absent in Titus as previously defined). Davis concluded that the Whelan Complex was ancestral to the Titus Focus. Radiocarbon dates from Whelan Complex sites indicate a principal overlap of 1450 A.D. to 1550 A.D. or possibly 1650 A.D. (Davis 1970: 48).

Of the five Caddo Periods, Caddo I and II encompass the Gibson Aspect, and III through V encompass the Fulton. The five periods were first proposed by Webb (in Davis 1961) to better differentiate the actual periods in the Caddoan sequence. This period arrangement was again introduced by E. M. Davis at the Eleventh Caddoan Conference in 1968.

It is emphasized that the various Caddo periods and the Gibson and Fulton foci do not necessarily begin and end with the turns of the centuries. As an example, recent samples from the Davis Site (reported by Story at the Thirteenth Caddoan Conference) provided radiocarbon dates which extended from the eighth into the thirteenth centuries.

During the late 1950's, the same time period that Davis, Jelks, Tunnell, Golden, and Gipson were working in the Lake O' the Pines reservoir, several Titus Focus cemeteries were excavated, or partially excavated, by the late Ed German of Lone Star, Ralph Nicholas of Daingerfield, and the author, formerly of Pittsburg. These sites were: B. J. Horton, Guest, Chasteen, Alex Justiss, Keith, and Harold Williams, which are also shown in Fig. 2. The Keeling Site was excavated by Mr. and Mrs. Roy Keeling of Upshur County. The Rumsey Site is represented only by a collection of artifacts, as is the Ellison Lake (Lone Star Lake) Site. The Johns Site was excavated primarily by Tommy Johns (formerly of Pittsburg, Texas) with the assistance of the author.

Although many Titus Focus cemeteries have been excavated, only one report with general distribution has been published about this specific type of site in northeast Texas (Scurlock, 1962: 285-316). As there is undoubtedly an end to these cemeteries, it is the intent of the author that a major cemetery of the Titus Focus people be reported. This paper is written to fulfill that purpose.

BURIAL ARRANGEMENT

Fig. 3 is a map of the cemetery which shows the relation of the graves with each other. The cemetery was arranged in rather loose north-south rows. No pattern in the location of male or female graves is apparent. That is, they seem to be intermingled.

Some of the graves shown in Fig. 3 have the skeleton and grave offerings sketched in, while other graves are shown in outline form only. This does not indicate any particular differences between graves. The areas outlined with dashed lines in the figure represent excavations by an unknown person or persons. The two holes just south of Grave 42 may represent graves. Whether graves were actually found is not known. The

author does not believe the excavations shown in the top, right-hand side of the figure uncovered any burials.

The small rectangle marked "28" in Fig. 3 does not represent a grave, but the location of a single vessel. A concentration of sherds was found at a depth of 19 inches from the surface. The sherds formed about three quarters of a nine-inch diameter compound bowl. About a foot to the east of the pot was one flint flake, a small fragment of burned bone, and several small, ferruginous sandstone rocks. The broken pot shows use as a cooking vessel, which is unusual for this form of pot. The burned bone fragment, flake, and sandstone rocks may not represent purposely placed objects, but accidental groupings of objects which occurred when the hole was filled. The significance of the burial of this broken and incomplete vessel is unknown. Fig. 4 and 5 are photographs of the site and of selected graves.

Figs. 6-9 are examples of drawings made of each grave. At the top of each figure is a plan view, or view looking down into the burial. At the bottom of each figure is a side view, which shows the depth from the present ground surface to the skeleton and each artifact. The scale which shows depth is applicable to all distances and dimensions in both the plan and side views of each figure.

Various artistic liberties have been taken to provide a clearer picture for the reader. First, the outline of the grave (in both views) is shown outside and below the artifacts and skeleton. Actually, the skeleton and many of the artifacts were resting on the floor of the grave. Also, in the plan view, vessels on the sides and ends of the grave were usually against the walls. Generally, the grave was no longer than necessary to accommodate the skeleton and artifacts shown.

Numbers are assigned to each pot as seen in the plan view. Letters are assigned to other types of artifacts, groups of artifacts, or special features.

The position of each vessel or artifact in the plan view shown in Figs. 6-9 should be correct to within an inch or so. Side view sketches are not as precise. To establish the relative positions between the artifacts and the skeleton in each grave, triangulation was employed. Two stakes were placed at the surface beside the grave in an east-west line by compass heading and at a measured distance apart, usually five feet.

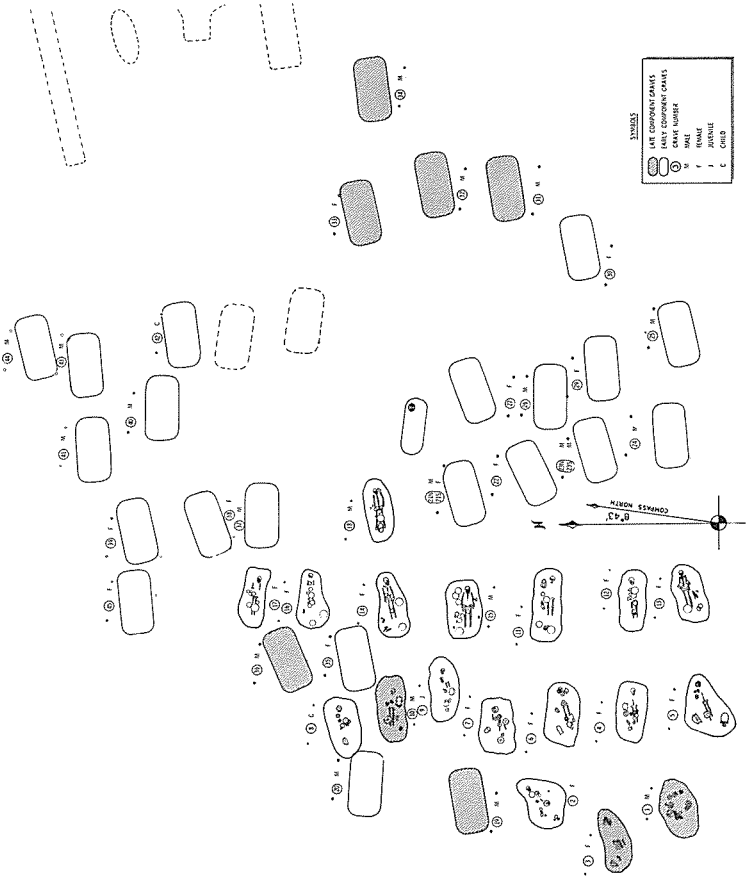


FIGURE 3. *Map of the Carpenter Cemetery.*

Using a steel tape and plumb line, the horizontal distance of each artifact from each stake was measured and recorded. The field notes for each grave included a sketch that noted the position on each artifact where the measurements were made, i.e., center of base, junction of neck and body, etc. In addition, the depth from the surface to the uppermost portion of each artifact was recorded. The inclination of each vessel with respect to the vertical and its direction of tilt were estimated, sketched, and recorded. Based on the field sketch, notes, measurements, and the artifacts after reconstruction, the grave drawings were completed.

The sketches show the vessels as unbroken, except for instances when incomplete vessels were placed in the graves. Actually, about 55% of the vessels were broken to some degree. This occurred most often when the grave floor was on, or into, the clay. The clay provided no cushion, but rather a fixed platform against which the vessels were crushed by the grave fill. When sand extended below the grave floor, vessel breakage was minimal. It is the author's opinion, based on the above observation, that the broken vessels were a result of crushing and not of deliberate breaking or "killing."

The direction of each skeleton with respect to west is indicated beside the plan view of each grave drawing. The cardinal points, north and west, are true and not magnetic compass headings.

In each grave the approximate quantity of skeletal material that was found is shown in the drawing. The amount varied from none, as in Grave 1, to almost complete preservation, as in Grave 18.

EARLY AND LATE COMPONENT GRAVES

An analysis of the artifacts from the cemetery indicates the graves were placed at two different time periods. Thirty-five of the graves are assigned to the early component or period, nine to the latter. The late component graves are numbered 1, 3, 10, 19, 31, 32, 33, 34 and 36.

The major difference between the graves of the two components, which will be apparent to the reader after inspection of the grave drawings, is the presence in the late component graves of a distinctive decorative motif on many of the *Ripley Engraved*

carinated bowls. This motif, which is widespread in the Titus Focus, is characterized by small pendant triangles attached just below the lip and similarly sized upright triangles at the shoulder of the bowl. Four panels encircle the rim. Fig. 12 (a-c) depicts typical bowls of this variety.

In addition to the vessels with the pendant triangle motif, seven of the nine graves contained *Talco* arrow points. Only two of the 35 graves assigned to the early component contained these points. The two late component graves which did not contain *Talco* points contained *Maud* points. Thus, all late component graves had triangular arrow points as offerings.

A third distinguishing feature of the late component graves is their location within the cemetery. All were on the outer fringes which indicates their later arrival on the scene.

Five additional graves contained triangular arrow points but did not include bowls with the pendant triangle motif. Graves 20 and 25 contained *Talco* points and graves 2, 23, and 44 *Maud* specimens. Like the late component graves four of these five were located on the outer edges of the cemetery. The one exception was number 23 which had one other grave between it and the outside edge.

These five graves show a closer relationship to the late component graves than do the others at the site. They are related through the triangular point forms and through their peripheral position within the cemetery.

The arrow points, from the interior graves which contained points, were of the stemmed varieties, *Bassett* and *Perdiz*. These graves and those among them which did not contain points were the oldest graves at the site. *Bassett* and a very few *Perdiz* points were also in some of the late component graves along with the triangular point types.

In many of the early component graves, a major percent of carinated bowls featured a triangular motif. In this design one to three vertical lines extend from the shoulder to the lip at the end of each design unit. A diagonal line connects one group of vertical lines to the next. The triangular space above and below the diagonal is filled with a smaller triangle that usually contains a semicircle or other simple shape set off by engraved bands or excised areas. This design repeats four to eight times around the rim. Fig. 12 (h, k, and m) pictures this motif. This, too,

may be classified as *Ripley Engraved*, but a motif that preceded the pendant triangle in time.

Eight of the nine late component graves contained bottles of *Wilder Engraved*. The ninth, Grave 3, contained a small bottle with a simple untyped design. None of the late graves contained the classic *Ripley Engraved* bottles of the first component. It appears that at this site, the *Wilder Engraved* bottle design survived from the earlier component to the late component, but the classic *Ripley Engraved* bottle design did not.

CEMETERY LOCATION

The graves were located in a midden established by the earlier component people, or at the same time the area was occupied by them. This conclusion is based on the fact that debris, typical of a midden area, was found both on the surface and in the grave fill.

Artifacts from both locations included: bottle sherds of *Ripley, Wilder,* and unidentified types; engraved, incised, brushed, appliqued, red slip, plain, and base fragments from other vessel types. In addition, flakes and chips, a few bone fragments, and small pieces of petrified wood were both in the grave fill and on the surface. Two celt fragments were found in the fills. Several ferruginous sandstone fragments, broken from larger pieces such as metates or other tools, were also in the grave fills. However, none were found on the surface.

Ripley Engraved bottle sherds from the same bottle were found in the fill of Graves 12 and 13. No sherds from either the surface or grave fills were of the pendant triangle type which is a marker type of the late component graves.

In modern times the cemetery site had been cultivated although at the time of excavation, the land was in pasture. As a consequence, the surface had been disturbed by the deep plowing. Therefore, no fire pits or other features were found.

In many cases the grave fill was difficult to distinguish from the undisturbed sandy soil. If the grave was dug into the clay, red clay fragments would be mixed with the sand of the fill which, of course, helped in defining the grave shape. Even when clay was mixed, it was usually much more evident in the lower part of the grave. This would indicate that the last dirt removed

when the grave was originally dug was the first returned when it was filled.

In graves which had not penetrated the clay, small flecks of charcoal, along with the midden debris, were the only indications of a grave. The charcoal flecks most likely came from the midden surface, as did the sherds, and became mixed with the dirt when the grave was filled.

GRAVE DESCRIPTIONS

In the descriptions of the graves and their contents that follow, the number that appears beside each vessel is its identifying number that corresponds to the number in that particular grave's plan view. Letters are assigned to other types of artifacts, groups of artifacts, and special features. They correspond, in a like manner, to those objects lettered in the same plan view.

Grave 1, a late component grave, probably male.
Depth to floor: 4'0"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—pendant triangle motif
4, *Ripley Engraved*—pendant triangle motif
5, *Ripley Engraved*—scroll motif
6, *Ripley Engraved*—scroll motif
7, *Ripley Engraved*—pendant triangle motif
9, *Ripley Engraved*—scroll motif
10, *Ripley Engraved*—pendant triangle motif
Compound bowls
#3, *Ripley Engraved*
Cooking vessels
#2, *Cass Applique* (Fig. 25)
12, *Harleton Applique* (Fig. 25)
13, *Bullard Brushed*
Bottles
#8, *Wilder Engraved*
Effigy
#11, Tail missing before placement in grave
Others
A, Pipe (Fig. 22), 4 large *Talco* points, 6 *Bassett* points, and 1 *Perdiz* point
B, 1 large *Talco* point and 1 *Bassett*
C, 3 *Talco* points, all smaller than groups A and B, and 5 *Bassett* points

D, Green pigment.

Remarks:

In none of the arrow point groups were the points parallel in direction which would indicate former attachment to shafts.

There was no trace of bone or tooth enamel.

Grave 2, probably female.

Depth to floor: 4'0"

Artifacts:

Carinated bowls

#5, *Glassel Engraved*-like

7, *Ripley Engraved*—triangular motif

8, *Ripley Engraved*—triangular motif

Compound bowls

#2, *Ripley Engraved*—scroll motif (Fig. 24)

Cooking vessels

#3, *Maydelle Incised*—vertical brushing on body

9, *Maydelle Incised*—vertical brushing on body

4, Untyped—six interdigitated applique ridges between body and rim

Bottles

1, *Wilder Engraved*

11, *Wilder Engraved*—red slipped (Fig. 27)

Others

#6, *Ripley Engraved*—square body in plan view, two suspension holes near lip

10, *Ripley Engraved*—"S" elements

A, 3 *Maud* points, 1 *Bassett*

B, Potters' clay; ½ pound, tan-grey color, excellent quality

C, Potters' clay; 3 pounds, tan-grey color, excellent quality

D, Tooth enamel from deer mandible

E, Tooth enamel from human tooth

Grave 3, a late component grave, probably female.

Depth to floor: 2'9"

Artifacts:

Carinated bowls

#1, Plain—identical to others in form, just not engraved

3, *Ripley Engraved*—pendant triangle motif (Fig. 12)

4, *Ripley Engraved*—pendant triangle motif

5, *Ripley Engraved*—pendant triangle motif

6, *Ripley Engraved*—scroll motif

7, *Ripley Engraved*—triangular motif

8, Plain—identical to others in form, just not engraved

Bottle

#9, Untyped

Others

#2, Plain jar, placed in grave with side missing

A, 1 *Talco* point, small

B, 1 *Talco* point, small
C, Deer mandible
D, Abrading stone; ½" thick, ferruginous sandstone, all edges are apparently smooth from rubbing
E, Assembled sherds, paint pallet with red paint on upper surface and in soil just above sherds

Grave 4, probably female.
Depth to floor: 3'1"
Artifacts:
Carinated bowls
#7, *Ripley Engraved*—semi-scroll with pendant triangles
8, *Ripley Engraved*—scroll motif
10, *Ripley Engraved*—triangular motif
Compound bowls
#6, *Ripley Engraved*—scroll motif
Cooking vessels
#2, Untyped—plain body, three horizontal punctate rows about rim
5, Untyped—vertical incising on rim, plain body
Bottle
#4, *Ripley Engraved*—square in plan view
Effigy
#1, Tail missing before placement in grave (Fig. 28)
Others
#3, Untyped globular jar—plain body, peaked rim with two parallel rows of punctates around it
9, *Ripley Engraved* conical jar
A, 1 *Bassett* point beside probable location of left tibia
B, Red pigment in Vessel 10
C, Double handful of small mussel shell valves

Grave 5, probably female.
Depth to floor: 3'8"
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—scroll and triangle combination
4, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—triangular motif
Compound bowl
#1, *Ripley Engraved*—scroll motif
Cooking vessels
#2, *La Rue Neck Banded*—4 node pairs around rim
5, Untyped—plain body with vertical incised lines on rim
Bottle
#6, *Ripley Engraved*—square in plan view (Fig. 26)
Others
#7, Untyped—rim missing, engraved

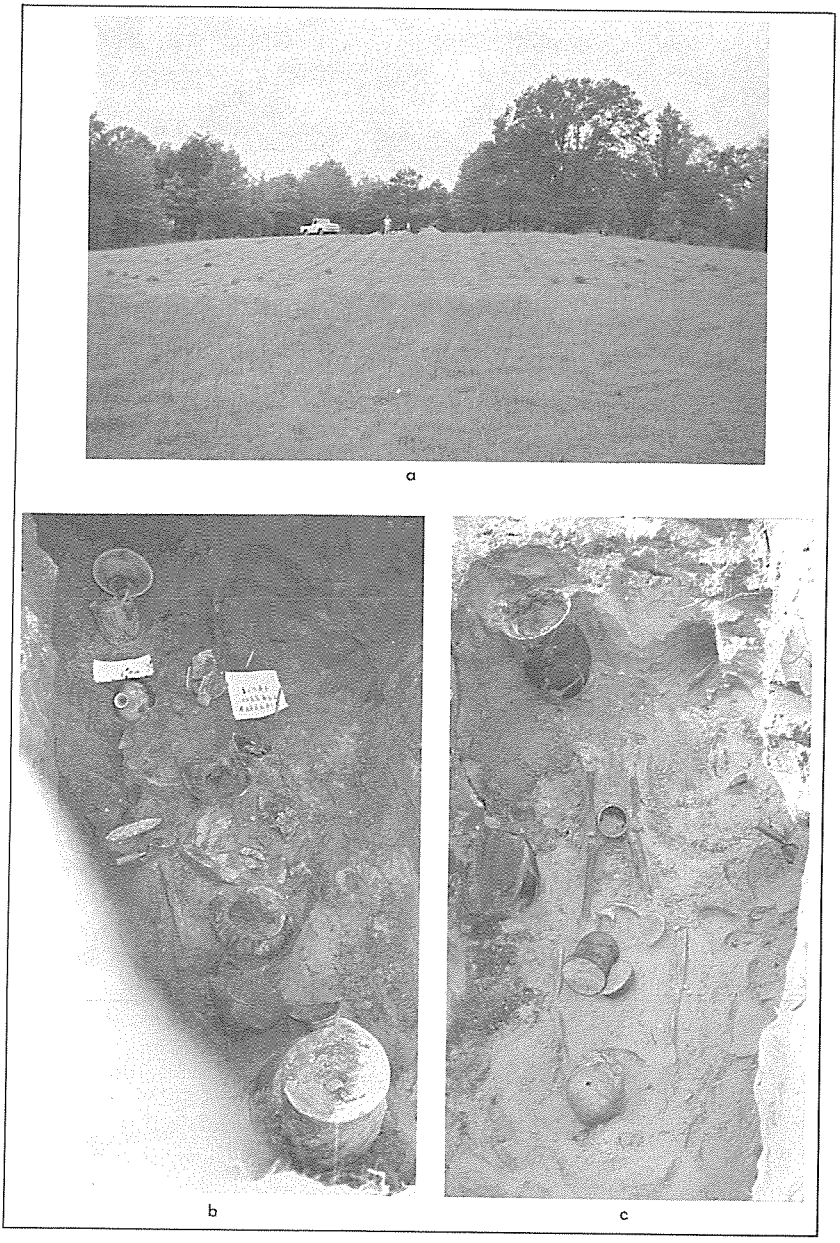


FIGURE 4. *The Carpenter Site and Two Graves.* a, view looking west; b, Grave 19; c, Grave 14.

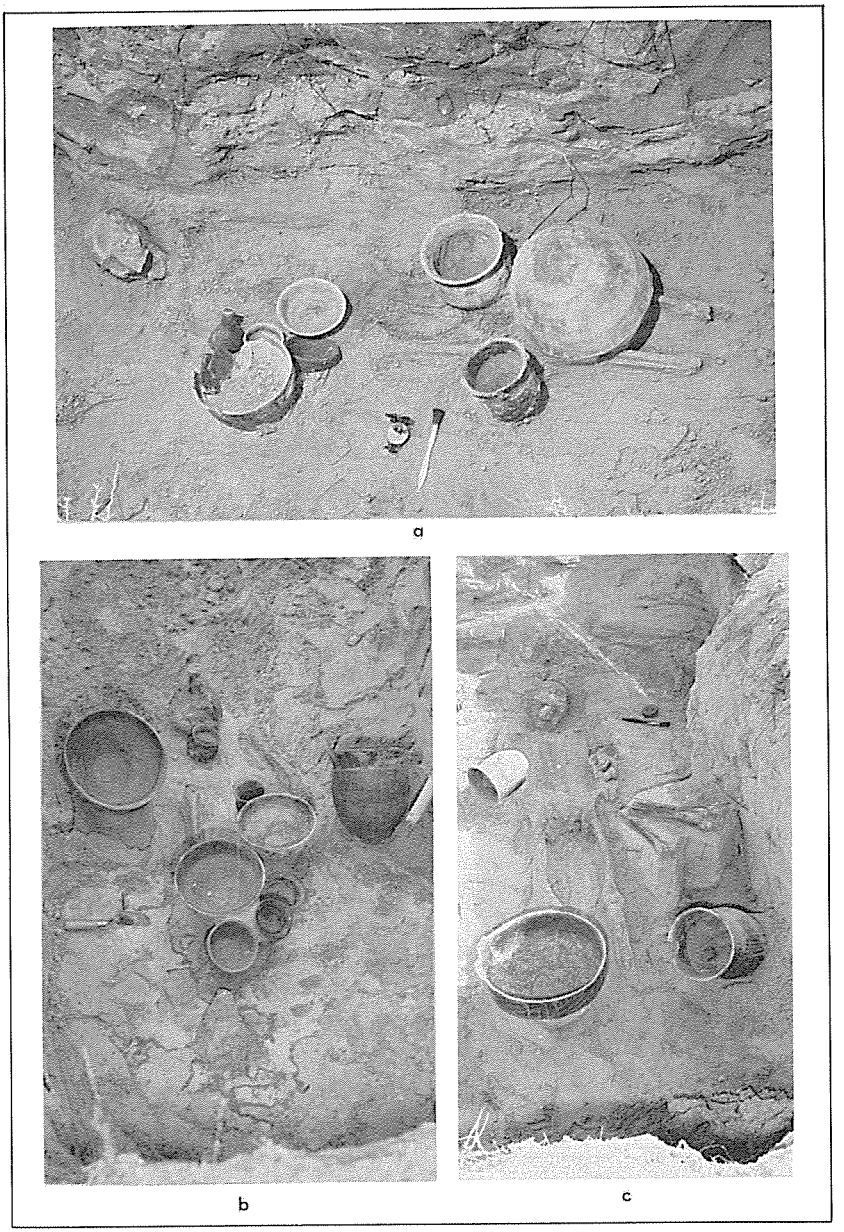


FIGURE 5. *Three Graves From the Site.* a, Grave 17; b, Grave 22; c, Grave 13.

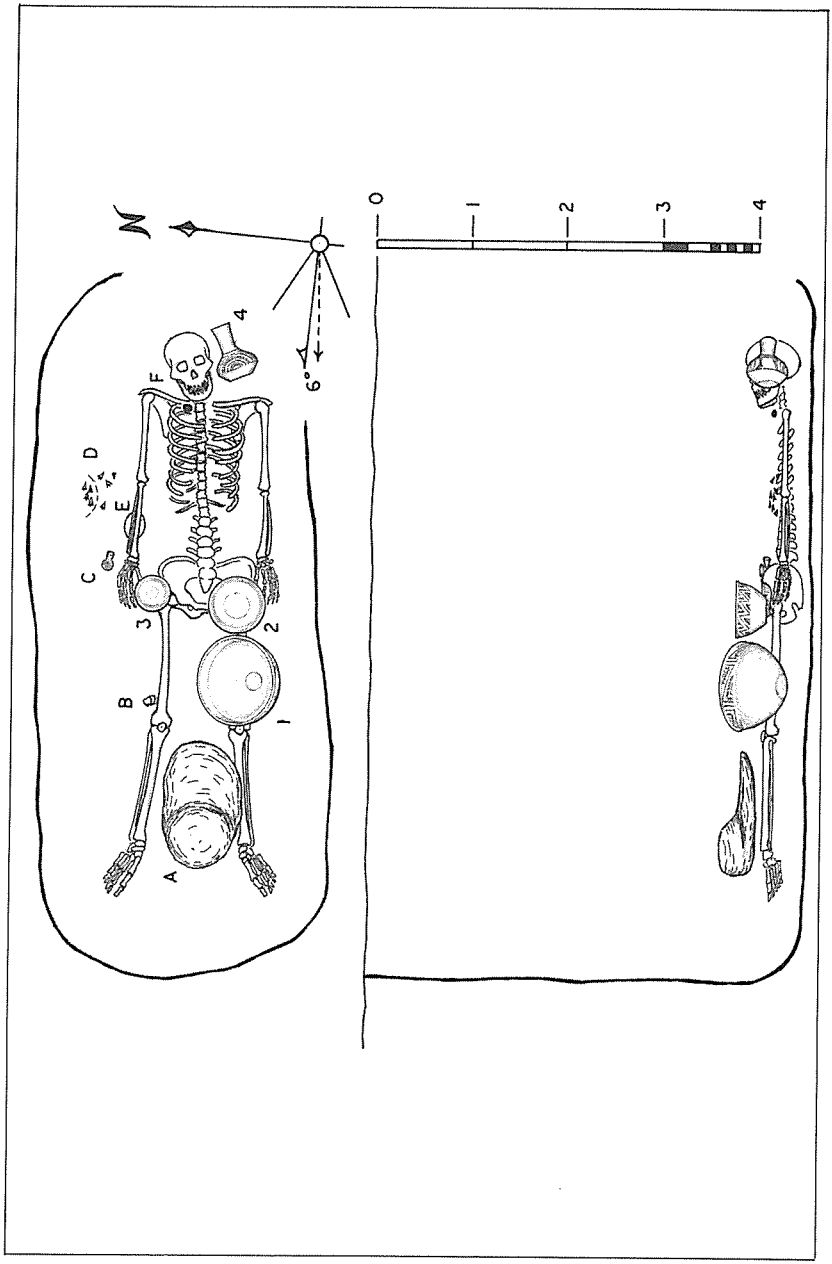


FIGURE 6. *Grave 18.* Probably male.

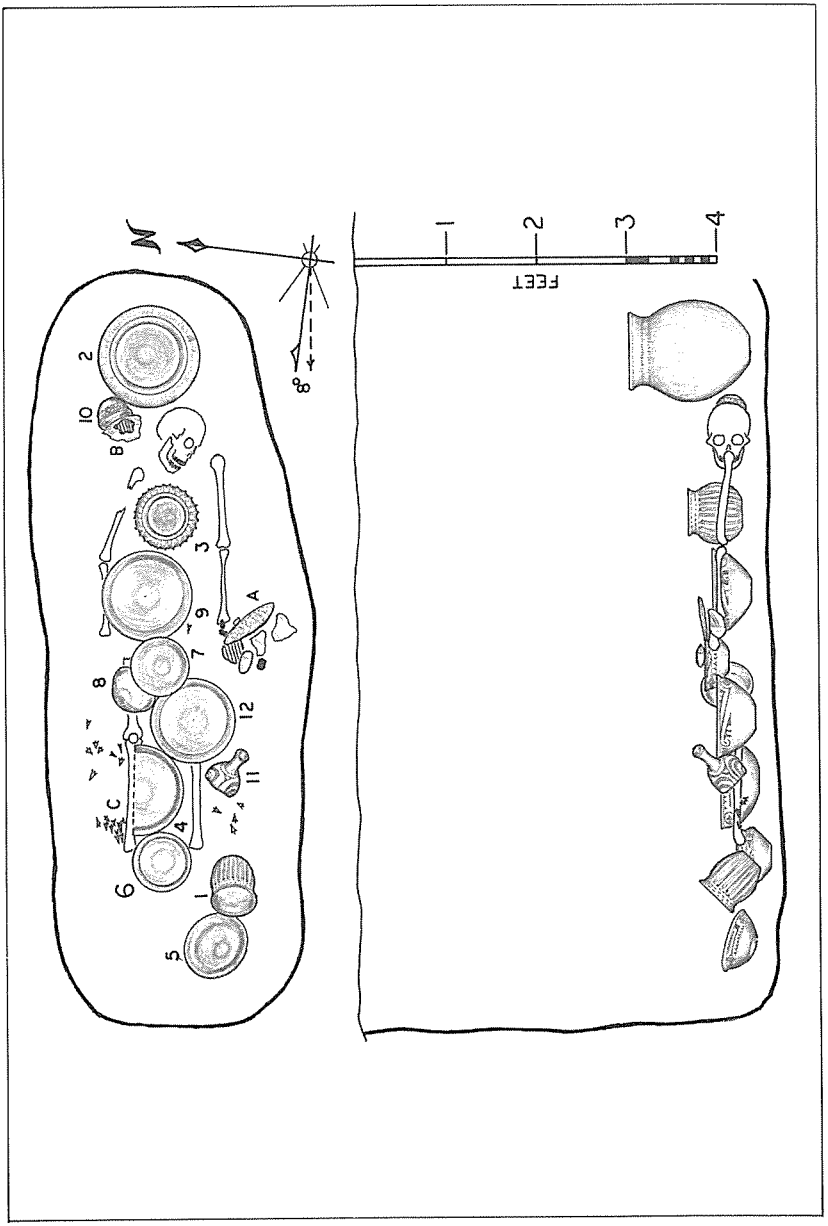


FIGURE 7. Grave 19. probably male; a late component grave.

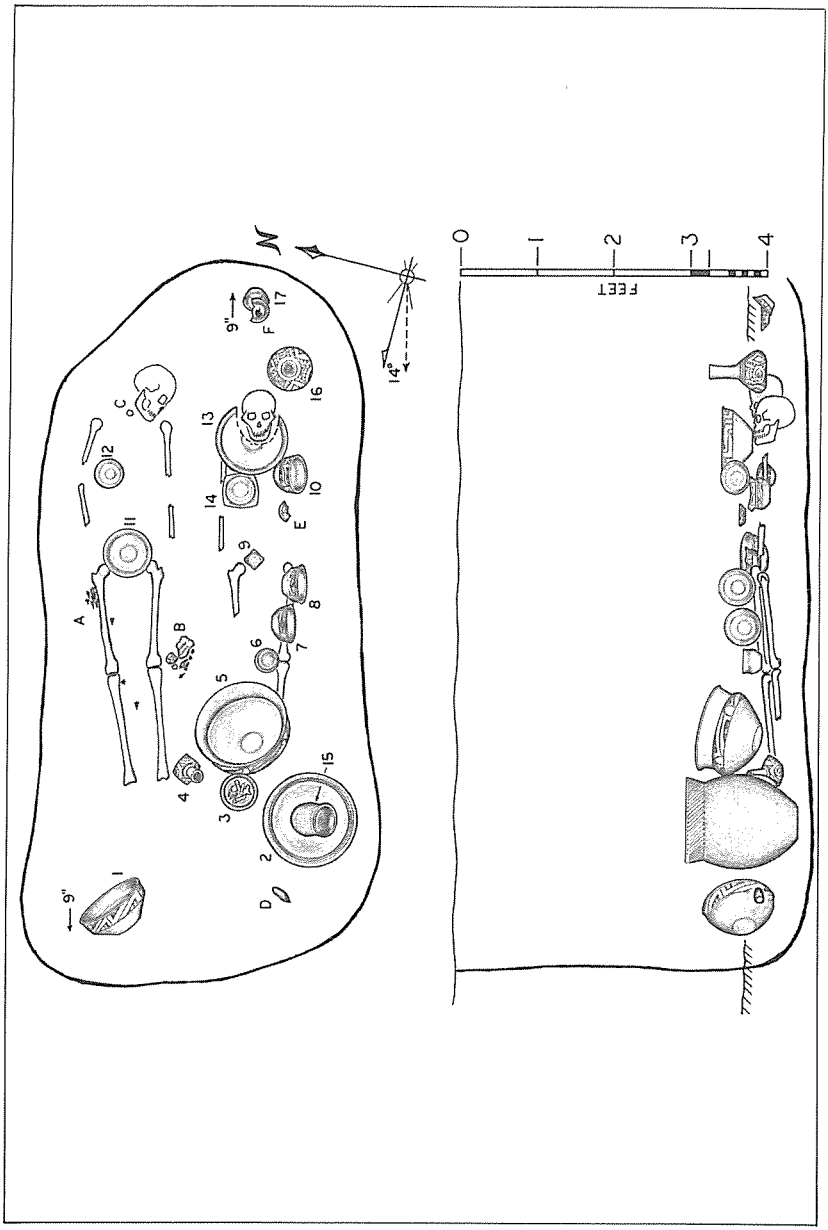


FIGURE 8. *Grave 21, Double Burial.* Probably male to north and female to south.

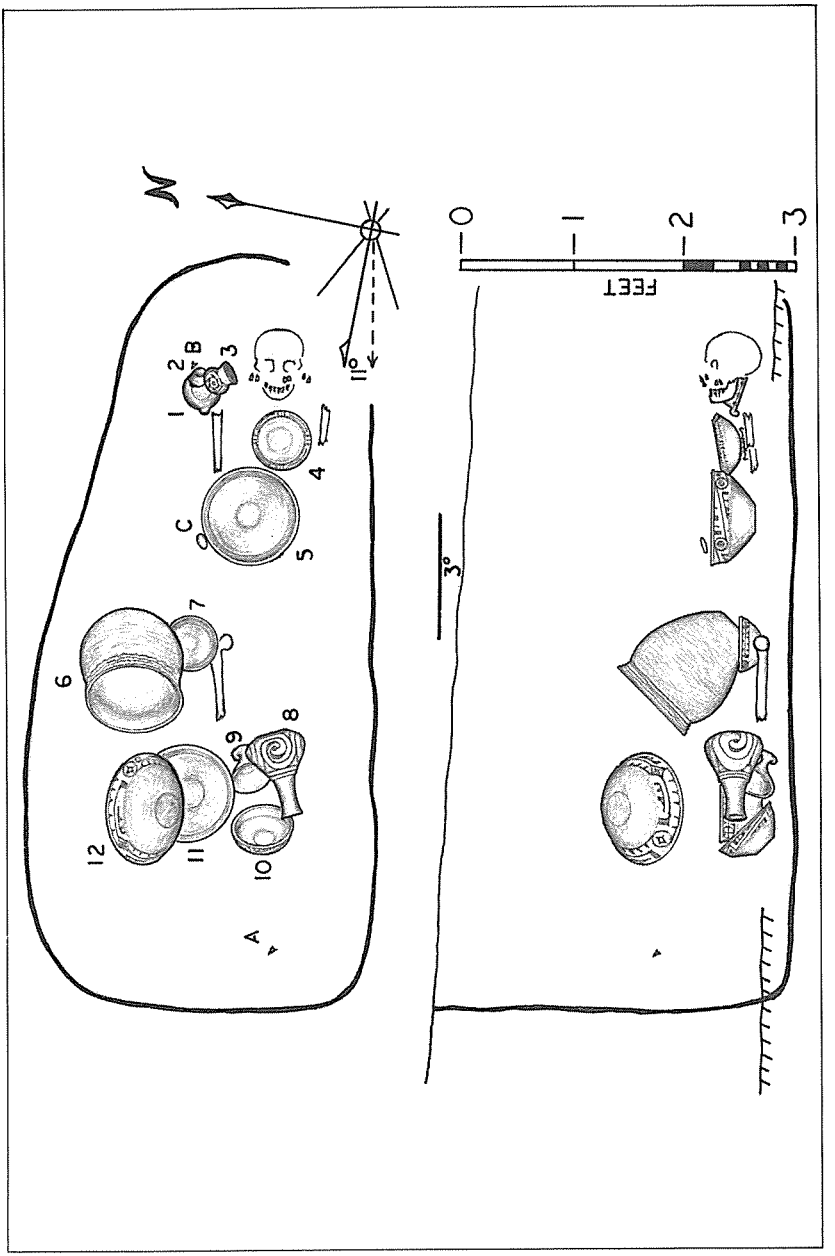


FIGURE 9. *Grave 33. Probably female; a late component grave.*

A, Kaolin lump; ¾ pound, ellipsoidal in shape with two half-inch-diameter holes punched into it. Also 1/8 pound greyish clay lumps beside kaolin
B, 1 *Perdiz* point below left knee
C, Deer mandible

Remarks:

Placement deviation of artifacts from the norm include a vessel over the skull and the distance of many of the artifacts from the skeleton.

Grave 6, probably female.
Depth to floor: 3'8"
Artifacts:
Carinated bowls
#2, *Ripley Engraved*—triangular motif
5, *Ripley Engraved*—triangular motif with small pendants
8, *Ripley Engraved*—triangular motif
10, *Ripley Engraved*—diamond and triangular motif
Compound bowls
#7, *Ripley Engraved*—two suspension holes near lip (Fig. 29)
11, *Ripley Engraved* motif—rim raised in four peaks, two wide strap handles
Cooking vessels
#1, Untyped—vertical rows of fingernail punctates on body and horizontal brushing on rim (Fig. 25)
3, *Bullard Brushed* (Fig. 25)
4, Untyped—vertical applique on body, peaked rim with horizontal punctates and brushing, twin nodes beneath each peak, proto Harleton
9, Untyped—plain body, two rows of punctates around rim
Bottle
#6, *Ripley Engraved*—square
Others
A, Deer mandible
B, 1 *Perdiz* point near left ankle
C, Large sherd with trace of red paint and charcoal on upper surface
D, Green pigment in Vessel 7

Grave 7, probably female.
Depth to floor: 3'2"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—triangular motif
3, *Ripley Engraved*—triangular motif
5, *Ripley Engraved*—triangular motif
6, *Ripley Engraved*—triangular motif
Compound bowl
#8, *Ripley Engraved*—rim lifted into four peaks

Cooking vessels
#2, Untyped—scattered punctates around rim, plain body
4, Untyped—three horizontal rows of punctates around rim, vertical incised lines between, plain body
7, Untyped—scalloped lip (8), incised design on body and rim
Bottle
#10, *Ripley Engraved*
Effigy
#11, Small—head missing before placement in grave
Others
#9, Rattle bowl—noded, two of four rattle nodes missing before placement in grave (Fig. 28)
A, 1 *Bassett* point
B, Deer mandible
Remarks:
An unusual feature is the spread of the femurs.

Grave 8, child.
Depth to floor: 2'10"
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—triangular motif
6, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—triangular motif
Compound bowls
32, *Ripley Engraved*—interspersed pendant triangles and lines
7, *Ripley Engraved*—interspersed pendant triangles and lines
Cooking vessel
#4, *Cass Applique*-like except punctates between appliques
Bottle
#5, Undecorated
Other
#1, Scalloped rim (8), non-repetitive engraving on body
Remarks:
An unsual feature of this grave is its length. It is approximately twice as long as necessary for the very young child.

Grave 9, juvenile.
Depth to floor: 2'10"
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—triangular curvilinear motif
5, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—triangular motif
Cooking vessel
#1, Untyped—four vertical body appliques and brushing, rim

raised into four peaks, three horizontal punctate rows on rim, twin nodes beneath each peak—proto-*Harleton* in appearance

4, Untyped—fingernail rim punctates, vertical body incising

Bottle

#6, *Ripley-Wilder* combination—Ripley design on upper "square" portion, Wilder on lower globular portion (Fig. 27)

Others

#2, Untyped—plain jar

7, Untyped—short squat jar with incurving rim

A, Two human teeth—canine and molar

C, Proximal 60% of *Edgewood* dart point

D, Green pigment lump

E, Handful of white sand by Vessels 1 and 2

Remarks:

An unusual feature is the elevation of Vessels 1 and 2 above the grave floor.

Grave 10, a late component grave, probably male.

Depth to floor: 2'10"

Artifacts:

Carinated bowls

2, *Ripley Engraved*—pendant triangle motif (Fig. 12)

5, *Ripley Engraved*—pendant triangle motif

Cooking vessel

#1, Untyped—large vessel with plain body, punctate rows on rim, four peaks, node under each peak

Bottle

#6, *Wilder Engraved*

Others

#3, Untyped—small conical bowl with punctates in body, contained large mussel valve with a smaller valve nestled in it

4, Unusual jar form, *Ripley* design motif

A, 10 *Talco* points

B, Human molar, also charcoal logs from which a radiocarbon date of A.D. 1590 ± 60 years was obtained at the University of Texas Radiocarbon Laboratory, Sample Tx-666.

C, Two mussel valves and quartzite river pebble showing some polish on one surface and slight use as a hammer stone, (Fig. 32).

Grave 11, probably female.

Depth to floor: 4'10"

Artifacts:

Carinated bowls

#3, *Ripley Engraved*—scroll motif

5, *Ripley Engraved*—scroll motif
7, *Ripley Engraved*—red slip
Compound bowl
#1, *Ripley Engraved*—semiscroll
Cooking vessels
#2, Untyped—plain body, slanted incised lines on rim
4, *Harleton Applique*
Rattle bowls
#8, Noded, originally with two rattle nodes (Fig. 28)
9, Plain body, nodes on rattles, two rattle nodes missing
Others
#6, *Ripley Engraved*—parentheses-type lines outside circle have spur-like offshoots
A, Loaf-like piece of sand colored potters' clay (Fig. 10)
B, Kaolin ellipsoid, ¾ lb. with ½ in. punctate holes, 2 oz. kaolin pieces, 1 oz. grey clay lumps
C, Green pigment in rattle bowl 8
Remarks:
An unusual feature of this grave is its length.

Grave 12, probably female.
Depth to floor: 3'7"
Artifacts:
Carinated bowls
#2, *Ripley Engraved*—triangles flanked by "S" elements
3, *Ripley Engraved*—triangular motif
Compound bowl
#1, Untyped—scalloped lip (11), deeply engraved
Cooking vessel
#4,
Bottle
#6, *Ripley Engraved*—square, red pigment in lines (Fig. 26)
Others
#5, *Ripley Engraved*-like—high rim, short bottom, unconventionally engraved rim design
A, Large sherd from *Bullard Brushed* cooking vessel, red pigment traces on inner surface

Grave 13, probably female (Fig. 5).
Depth to floor: 2'10"
Artifacts:
Carinated bowl
#1, *Ripley Engraved*—triangular motif
Compound bowl
#4, *Ripley Engraved*—scroll motif
Cooking vessels
#2, Untyped—vertical body incising, 3 horizontal rows of punctates on rim
3, *Bullard Brushed*

Bottle
#5, Miniature—triangular design elements (Fig. 29)
Others
A, Four beamers of deer cannon bone
B, Gouge of ferruginous sandstone
C, Roughly noded 6 oz. unworked fragment of iron ore placed between teeth of skull (Fig. 32)

Remarks:

Noteworthy features of this grave are: the placement of the rock between the teeth, the presence of the beamers, and the gouge in association with the beamers.

Beamers have been reported from the Clark Site near Waco by Watt (1965), the Pecan Springs Site near Ennis by Sorrow (1966), and from the Sanders Site on Red River by Krieger (1946). These locations are closer to the Carpenter Site than any other sites where beamers have been reported.

The beamers and gouge are pictured in Fig. 10.

Grave 14, probably female (Fig. 4).
Depth to floor: 3'8"
Artifacts:
Carinated bowls
#2, *Avery*-like semicircular design motif
3, Ripley Engraved—scroll motif
Cooking vessels
#1, Untyped—plain body, scattered rim punctates
5, *Bullard Brushed*
Bottle
#4, Base portion *Avery Engraved*-like circular and semi-circular concentric design elements
Others
A, Celt (Fig. 32)
B, Deer mandible
C, Deer ulna and handful of mussel shell, several shells show red pigment traces
D, Deer mandible

Remarks:

The grave sloped slightly upward from neck to feet.

Grave 15, probably male.
Depth to floor: 4'3"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—triangular motif
5, *Ripley Engraved*—triangular motif
6, Untyped—plain
7, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—diamond motif (Fig. 12)
10, Untyped—plain

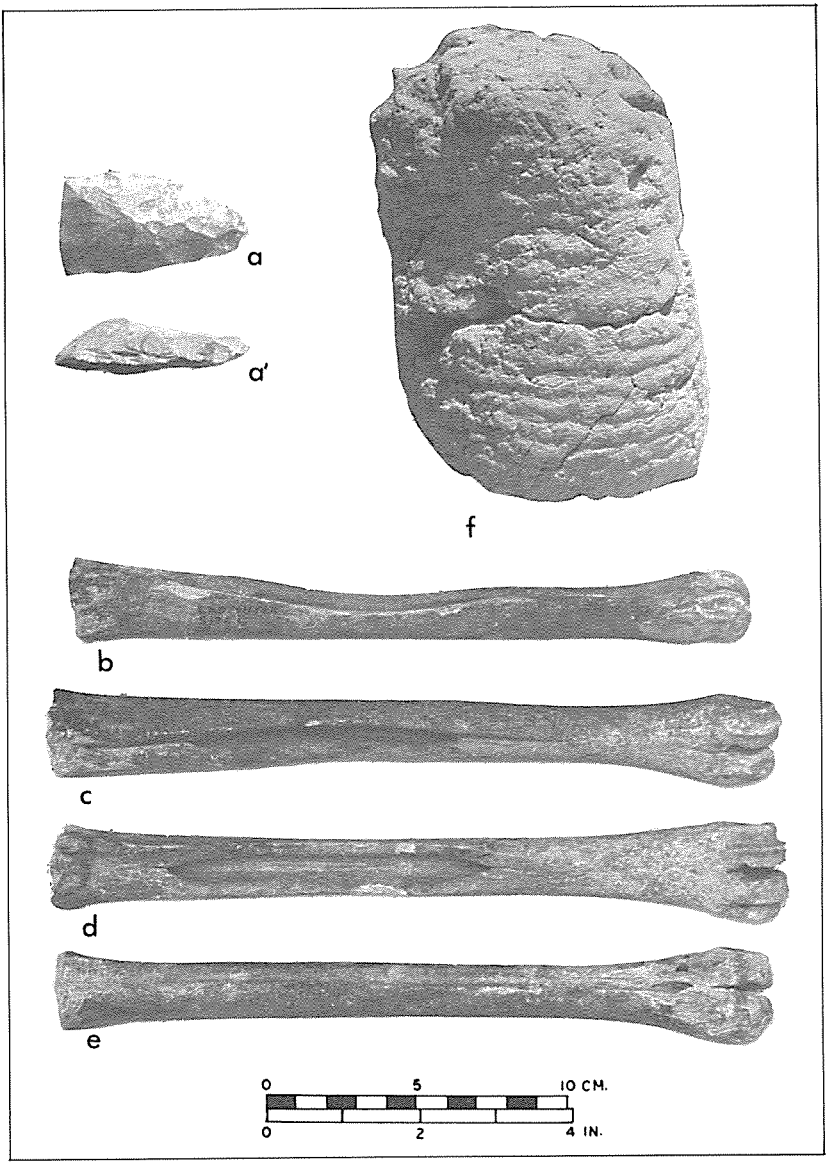


FIGURE 10. *Gouge, Beamers, and Potters' Clay.* a, a', ferruginous sandstone gouge, Grave 13; b-e, beamers of deer radius, Grave 13; f, 8 lb. loaf-shaped lump of tan potters' clay, basketry impressions in the clay indicate that the basket had a square bottom (Grave 11).

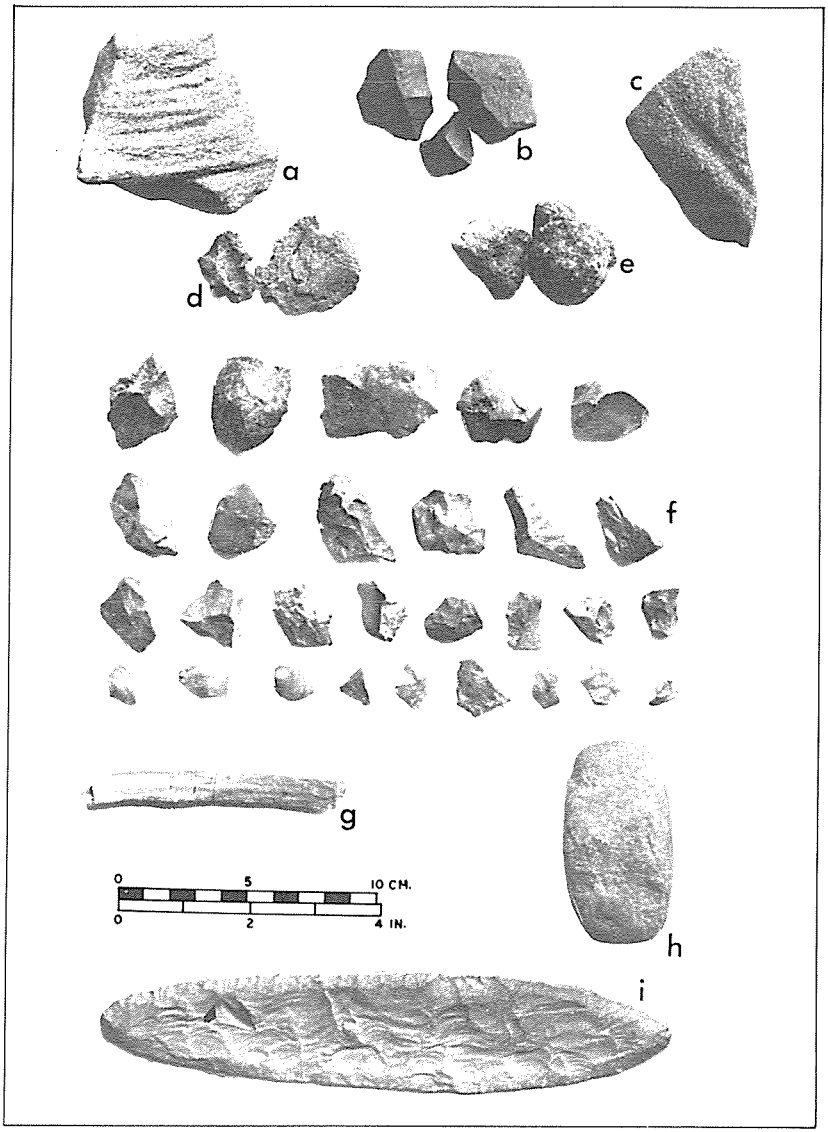


FIGURE 11. *Cache from Grave 19.* a, unworked ferruginous sandstone; b, hematite fragments; c, grooved abrading stone; d, green pigment (glauconite); e, red pigment embedded in sand matrix; f, flakes and chips of quartzite; g, petrified wood; h, celt; i, 8¾ in. flint biface.

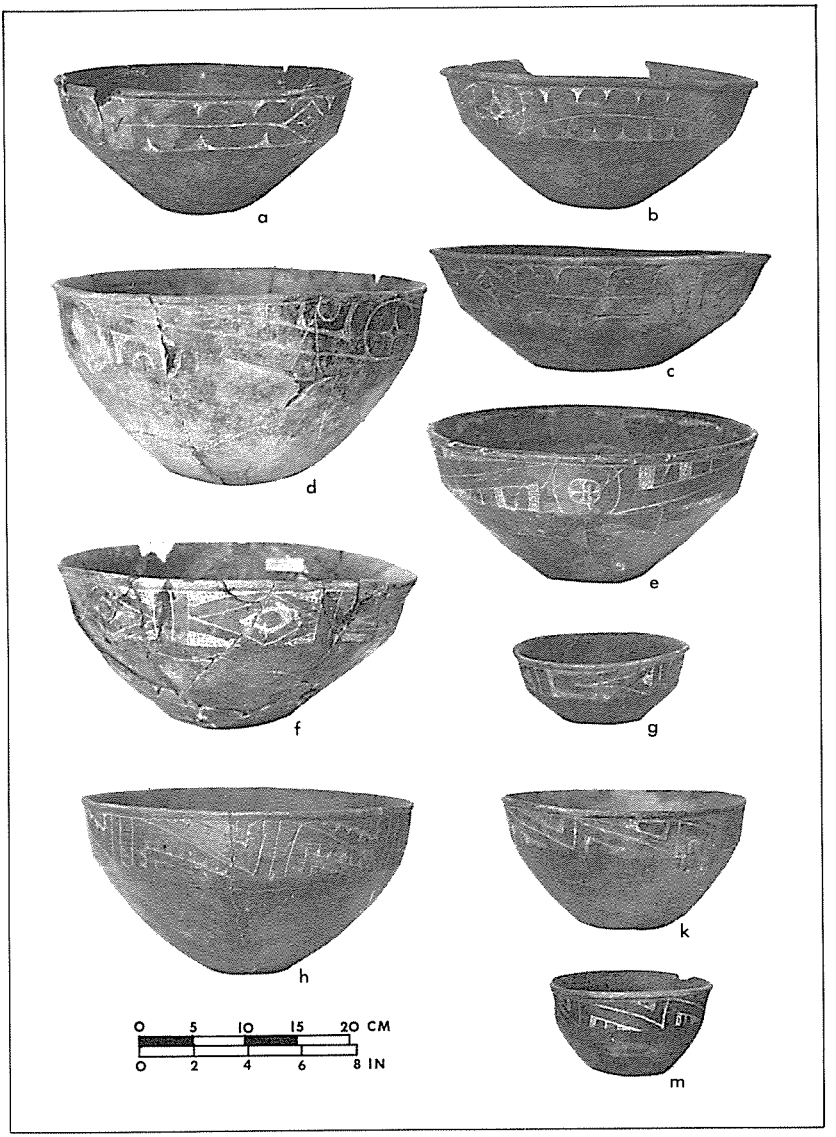


FIGURE 12. *Carpenter Site Carinated Bowls.* a-c, pendant triangle motif: a. Grave 10; b, Grave 3; c, Grave 33. d, e, scroll motif: d, Grave 31; e, Grave 25. f, g, horizontal diamond and bisected diamond motifs: f, Grave 15; g, Grave 42. h, k, and m, triangular motif: h, Grave 18; k, Grave 16; and m, Grave 43.

Cooking vessels
#4, *Pease*-like—conforms in all characteristics except that rope-like appliques on body (5) are not straight
9, *Maydelle*
Bottle
#2, Plain, undecorated (Fig. 27)
Others
#3, Untyped—compound form, scalloped lip (8), rim engraved with unique design
A, Pipe (Fig. 22)
B, Three *Perdiz* points
C, Celt (Fig. 32)
D, One mussel valve

Grave 16, probably female.
Depth to floor: 4'0"
Artifacts:
Carinated bowls
#2, *Ripley Engraved*—triangular motif (Fig. 12)
3, *Ripley Engraved*—diamond motif
7, *Ripley Engraved*—scalloped rim, scroll with semicircles
8, *Ripley Engraved*—scalloped rim, scroll with semicircles
10, *Ripley Engraved*—rectilinear with hook element
Cooking vessels
#4, *Pease Brushed* Incised
5, Untyped—plain body, scattered rim punctates
9, Untyped—four appliques on rim, three horizontal punctate rows
Bottle
#6, *Wilder Engraved*
Effigy
#1, Comical bowl with flattail and abstract head shape opposite
Others
A, Mussel shell
B, Small clay lumps
C, Two *Perdiz* points

Grave 17, probably female (Fig. 5).
Depth to floor: 4'6"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—triangular motif
4, *Ripley Engraved*—modified triangular motif
5, *Ripley Engraved*—scroll motif
Cooking vessels
#2, Untyped—plain body and plain roughened rim with four narrow handles below lip
6, Untyped—plain body, three horizontal punctate rows

around rim and double nodes in four positions

Bottle

#8, Untyped—plain, no decoration

Others

#3, *Ripley Engraved*—globular jar, pendant triangles suspended from intersection of body and rim

7, *Johns Engraved*—conical bowl with bird head design motif

Remarks:

This grave was in deep sand. Only one of the eight vessels had been broken by earth pressure.

Grave 18, probably male (Fig. 6).

Depth to floor: 4'6"

Artifacts:

Carinated bowls

#1, *Ripley Engraved*—triangular motif with pendant triangles on diagonal lines (Fig. 12)

2, *Ripley Engraved*—triangular motif

3, *Ripley Engraved*—triangular motif

Bottle

#4, *Avery Engraved*—concentric semicircular motif with spurred enclosing lines (Fig. 29)

Others

A, Ash bed of fine, light grey texture, burned soil underneath, no charcoal in bed

B, Right heel or tarsal bone plus one smaller tarsal bone from skeleton

C, Pipe (Fig. 22)

D, Eight *Perdiz* points; those inside dashed line of Fig. 6 were part of the group of eight disturbed by the trowel, so direction is unknown. The undisturbed remaining points were all grouped as shown and pointed the same direction as if previously attached to shafts.

E, Fragments of turtle carapace beneath right forearm; no trace of small stones or other material to indicate this was a rattle

F, Mussel valve

Remarks:

The skeleton in this grave was the best preserved of all in the cemetery. The small bones of the hands and feet were present and in an excellent state of preservation. The grave was in deep sand.

Grave 19, a late component grave, probably male (Figs. 4, 7).

Depth to floor: 4'4"

Artifacts:

Carinated bowls

#4, *Ripley Engraved*—pendant triangle motif

5, *Ripley Engraved*—pendant triangle motif

7, *Ripley Engraved*—pendant triangle motif
8, *Ripley Engraved*—pendant triangle motif
9, *Ripley Engraved*—scroll motif
10, *Ripley Engraved*—pendant triangle motif
12, *Ripley Engraved*—scroll with cross motif

Compound bowl
#6, *Ripley Engraved*—scroll motif

Cooking vessels
#1, *Cass Applique*
#2, *Bullard Brushed*
#3, *Cass Applique* (Fig. 25)

Bottle
#11, *Wilder Engraved*—square body

Others
A, Cache by left wrist, Fig. 11: Celt; 8¾" biface of flint; abrading stone of ferruginous sandstone; unworked stone of ferruginous sandstone; three hematite fragments; flakes and chips; petrified wood fragment; red stain; green pigment; charcoal under blade (midpoint of blade to wrist); fragments of two deer ulna.
B, Red pigment in large rim sherd from *Ripley Engraved* carinated bowl; small lumps of green pigment in Vessel 10.
C, 25 arrow points: 10 *Talco* with eared base; one *Maud* point; 11 *Bassett* points; two *Perdiz* points; and one untyped point of grey flint. Four stemmed points near Vessel 11 did not have a consistent orientation, nor did the eight points by the right knee. One point by the right ankle was disturbed, and its direction was not noted. However, the remaining points were oriented as shown, indicating former attachment to arrow shafts. A single point was located in the pelvic area.

Remarks:

The cache at 'A' included three items which indicated this cache may include an arrow point-making kit. These items are the deer ulna fragments, the flakes, and the petrified wood piece.

Artifacts from a grave cache at the Alex Justiss Site which probably included such a kit were the following:

½ lb. hematite stone, scraped all over, apparently to manufacture red paint;
10 deer ulnae;
15 pieces petrified wood, 1-4 in. long;
10-20 flakes;
2 dart points (nondesciript, may represent an additional flint supply);
6 small *Talco* points;
2-8" long bones, ½" in diameter (probably deer);
5/8" length of tooth enamel (beaver?).

Artifacts pictured in Fundaburk and Foreman (1957: Pl. 66) and

described as a Caddo flint working kit contained:
2 arrow points;
9 bone points;
16 antler tines;
10 ulnae;
2 bone pins;
1 twisted bone;
1 beaver tooth;
1 novaculite chip;
3 jasper pebbles.

Grave 19 was that of an important person as indicated by its depth and the quantity of grave offerings. It was probably that of a male. The large blade of the cache is an unusual artifact for a Titus Focus grave. The only similar artifacts known to the author from a Titus Focus cemetery were from the Galt Site. Grave 2 of the Galt cemetery yielded two large ceremonial blades, both in excess of 14" in length. The blade from Grave 19 is off-white in color, resulting from a uniform layer of patination. A small flake shows a grey color beneath its outer layer. The darker color probably represents the original coloration of the flint.

Grave 20, probably male.
Depth to floor: 3'3"
Artifacts:
Carinated bowls
#5, *Ripley Engraved*—scroll design
Cooking vessels
#2, *Harleton Applique* (Fig. 25)
4,*Maydelle Incised*—elongated punctates rather than lines
Bottle
#3, *Ripley Engraved*
Others
#1, Untyped—small jar, low relief applique, rim brushed
6, Untyped—somewhat like *Simms Engraved*
A,3 *Talco*, 1 *Maud*, and 2 *Bassett* points
B,Small lumps of green pigment
C,Small lumps of green pigment

Grave 21, double burial, probably male and female (Fig. 8).
Depth to floor: 4'3"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—red slipped, triangular motif
7, *Ripley Engraved*—diamond motif
8, *Ripley Engraved*—diamond motif
10, *Ripley Engraved*—wavy triangle motif
11, *Ripley Engraved*—like #13, but panels flanked by "S"
12, *Ripley Engraved*—triangular motif

13, *Ripley Engraved*—as depicted in Figure 8
17, *Ripley Engraved*—semicircle scroll motif

Compound bowls

#5, *Ripley Engraved*—semicircle scroll motif
9, *Ripley Engraved*—lip formed into four peaks
14, *Ripley Engraved*—semicircle scroll, four peaks

Cooking vessels

#2, Untyped—slanted parallel incised lines on rim, two punctate rows (Fig. 24)
3, *Bullard Brushed*
15, Untyped—punctate rows (3) around rim, vertical incising on body

Bottles

#4, *Ripley Engraved*—square in plan view
16, *Ripley Engraved*—classic design (Fig. 26)

Other

#6, Untyped—small plain jar
A, Arrow points—3 *Bassett* and 8 *Perdiz*; 7 points by letter A all pointing as shown, probably all originally attached to arrow shafts; 3 between legs as shown; one at position B.
B, Cache: Kaolin; grooved ferruginous sandstone abraiding stone; fragment of bone, probably deer ulna; two canine teeth from dog or wolf; one arrow point; charcoal trace; small lump of green paint; small lumps of yellow ocher.
C, Semirectangular piece of mussel shell
D, Celt (Fig. 32)
E, Two Kaolin lumps in sherd
F, Green pigment in major fragment of small *Ripley Engraved* carinated bowl with scroll motif. Sherd at E fits vessel at F to complete the vessel.

Remarks:

This grave is particularly unusual because it was a double burial; that is, two individuals were buried simultaneously in the same grave. The individual to the north was probably male and the other, female. Grave 23 was also a double burial. Of 391 Titus Focus graves from 32 different sites, the only other double burial was Grave X-8 at the Ford Site.

Of the 17 vessels in Grave 21, four seemed to be associated with the skeleton to the north and the remaining 13 with the one to the south. All arrow points were associated with the northern skeleton.

Vessel #3 contained a number of bone fragments about the size of those that would come from a deer though they are not positively identified as such. In order to get the drawing on the page, both Vessels #1 and #17 were moved inward nine inches. True distance across the grave to encompass these vessels would be about 10½ feet. Vessel #15 was inside vessel #2 as shown. The grave floor was dug into the clay about 6 inches.

Grave 22, probably female.
Depth to floor: 3'6"
Artifacts:
Carinated bowls
#2, Untyped—undecorated
4, *Ripley Engraved*—triangular motif, small pendants on triangles
6, *Ripley Engraved*—triangular motif
7, *Ripley Engraved*—triangular motif
Compound bowls
#5, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—semicircle and triangle motif
Cooking vessels
#9, Untyped—punctate rim pattern, vertical incised body lines
11, *Wilder Engraved*—this vessel covered with carbon deposits
3, Untyped—applique on body enclosing checkered incising, rim raised into four peaks
10, Untyped—plain undecorated jar
Bottle
#1, *Wilder Engraved*
Remarks:
Only the tooth enamel remained to show the skull location. The legs were more askew than usual. No artifacts other than pottery vessels were in this grave.

Grave 23, double burial, both probably male.
Depth to floor: 3'10"
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—triangular motif
7, *Ripley Engraved*—modified scroll with "S" motif
8, *Ripley Engraved*—bisected diamond motif
Compound bowls
#1, *Ripley Engraved*—triangular motif
6, *Ripley Engraved*—scroll motif
Cooking vessels
#4, Untyped—horizontal punctate rows on rim, vertical body incising
11, *La Rue Neck Banded*
Bottle
#9, *Avery Red*—red slip, a trade vessel (Fig. 29)
Others
#2, *Ripley Engraved*—small jar, rim raised into four peaks
5, *Ripley Engraved*—globular jar (Fig. 26)
10, *Ripley Engraved*—square
A, Pipe (Fig. 22)
B, Deer mandible

C, Celt (Fig. 32)
D, Four points; two *Maud*, two *Perdiz*
E, Six *Perdiz* points
F, Seven *Bassett* points
G, Four *Maud* points
H, One *Maud* point
J, Small deposit of fine charcoal or dark ash

Remarks:

This grave was the second double burial at the Carpenter Site. The grave was dug very slightly into the clay. Extremely few bone pieces remained. The skulls were crushed against the clay floor. Arrow points were associated with both skeletons. Point groups D, E, and G were aligned as if they had formerly been attached to arrow shafts. Group F was not.

Vessel 9 is quite similar to bottles described by Skinner, *et al.* (1969; 42 and 44) which were found in the shaft and multiple burials at the Sam Kaufman Site (McCurtain Focus component) in Red River County. Six of the seven bottles described were polished red-slipped vessels with the marks of the polishing stone still remaining. One vessel was not red-slipped. Five of the vessels were decorated at the base of the neck with a distinctive four point diamond applique. The Kaufman bottles were quite large. The mean diameter and height were 27 and 33 cm., respectively. Their paste contained shell temper and a gray core. Vessel 9 is not as large as the Kaufman vessels nor does it contain shell temper. It does have the gray core, smoothing-stone marks, a red slip, and a diamond applique about the neck. The Carpenter vessel does have a slight shoulder where the neck intersects the body that is not on the Kaufman bottles. The applique found on both the Kaufman and Carpenter bottles is a raised, smooth area above the body contour. The Kaufman bottle type described above, as well as a deep carinated bowl type with red slip, incurving rim, and slightly scalloped lip were not given a type name in the Kaufman report. Skinner has since designated this type as *Avery Red*. Vessel 9 of Grave 23 is identified as this type.

The arrow points from this grave are pictured in Fig. 17.

Grave 24, probably male.
Depth to floor: 3'9" average
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—scroll motif
4, *Ripley Engraved*—triangular motif
6, *Ripley Engraved*—triangular motif
10, *Ripley Engraved*—triangular motif
Compound bowls
#8, *Ripley Engraved*—triangular motif
9, *Ripley Engraved*—scroll motif
Cooking vessels

#1, *Maydelle Incised*
2, Untyped—body covered with sweeping downward, incised lines; rim has three horizontal punctate rows; lip raised into four peaks, beneath alternate peaks are twin nodes and a vertical applique strip
7, Untyped—Unusual rim decoration, horizontal lines with different crosshatched patterns; body brushed

Bottles
#5, *Ripley Engraved*—cross elements
11, Base and body section, neck missing
A, Two *Perdiz* points
B, Four *Perdiz*, one *Bassett* point—all aligned as if formerly on arrow shafts
C, Celt, (Fig. 32)
D, Pipe, (Fig. 22)

Remarks:
Only slight traces of bone remained. The celt position above the level of most of the vessels is unusual.

Grave 25, probably male.
Depth to floor: 3′ average
Artifacts:
Carinated bowls
#2, *Ripley Engraved*—scroll motif (Fig. 12)
5, *Ripley Engraved*—diamond and triangle motif
7, *Ripley Engraved*—triangular motif

Compound bowls
#4, *Ripley Engraved*—major fragment red-slipped
6, *Ripley Engraved*—scroll motif, pendants on diagonals (Fig. 24)

Cooking vessel
#1, Untyped—vertically incised body, short horizontal rim

Bottle
#3, *Wilder Engraved* (Fig. 27)

Effigy
#9, Head missing

Others
A, Pipe, (Fig. 22)
B, Sherd with red pigment
C, Two *Talco* points, and one *Perdiz* at left femur

Remarks:
The grave floor was six inches into the clay. Also, the pipe was elevated above skeleton.

Grave 26, probably male.
Depth to floor: 3′7″
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—scroll motif (Fig. 29)

4, *Ripley Engraved*—triangular motif
9, Untyped—nonrepetitive diagonal and vertical lines

Cooking vessels
#3, *Bullard Brushed*
6,Untyped—plain body, vertical and slanted dashed rim lines
7, Untyped—plain body, slanted elongated punctates
8, *Bullard Brushed* (Fig. 24)

Bottle
#10, *Wilder Engraved*

Others
#2, *Avery Engraved*—red-slipped engraved into buff; a trade vessle, (Fig. 29)
5, Rattle bowl (Fig. 28)
A, Pipe, (Fig. 22)
B, One small mussel valve and red pigment in Vessel 1; green paint directly under vessel

Remarks:
The grave was dug approximately 12 inches into a clay-sand mixture.

Grave 27, probably female.
Depth to floor: 4'0"
Artifacts:

Carinated bowls
#4, *Ripley Engraved*—scroll motif
6, *Ripley Engraved*—scroll motif
9, *Ripley Engraved*—modified scroll flanked by "S" elements
12, *Ripley Engraved*—diamond motif
13, *Ripley Engraved*—modified scroll flanked by "S" elements
11, *Ripley Engraved*—scroll motif

Compound bowls
#1, *Ripley Engraved*—triangular motif
2, *Ripley Engraved*—scroll motif (Fig. 24)

Cooking vessels
#5, *Harleton Applique* (Fig. 25)
7, *Harleton Applique*

Bottle
#10, *Wilder Engraved*

Effigy
#14, Untyped—trade vessel, (Fig. 29)

Others
#3, Untyped (Fig. 29)
8, Untyped—plain bodied small jar
A, Fragment of human mandible.
B, Group of human bone fragments in grave fill; top right fragment in both views is a pelvic piece. The remaining

three are from a skull.

C, Three *Bassett* points; two by right knee, one by left

D, Cache—A small jar, Vessel 3, contained green pigment and was resting on tan potter's clay beside lumps of kaolin. Along with the clay was a piece of petrified wood, a mussel valve, and a ferruginous sandstone smoothing stone, polished on the convex portion. One human tooth was close to Vessel 3. The human mandible fragment was close by at A. Two extremely worn molars were in the mandible. Whether the mandible, skull, and pelvic fragments were accidental and mixed with the fill dirt or purposely placed is impossible to ascertain. If an earlier grave was disturbed when this one was dug, then a few bones located between the skull and pelvis probably would have been present in the fill dirt. Also, the close grouping of the skull and pelvic fragment tend to point to a placement, rather than to accident.

E, Deer mandible inside Vessel 1 near base;

F, Conch columella bead found in dirt stuck to skull after removal from grave.

Remarks:

The effigy vessel, Fig. 29, is a unique form at the Carpenter Site and in other Titus Focus sites as well. The vessel is hollow within the head region; the wall thickness is no greater there than in the bowl proper. Two suspension holes are on opposite sides of the opening. Engraving consists of a single line around the opening, three horizontally oriented, crosshatched diamonds on each side, and hook elements similar to that of *Wilder Engraved* on the upper surface of the tail.

The only similar vessel to this, known to the author, is pictured in the *Handbook of Texas Archeology* (Suhm, *et al.* 1954: 279). The vessel described seems to represent a frog. Similarities between the two vessels are the hollow head, two nodes which may represent eyes, crosshatching of design elements (though the elements are different), suspension holes similarly placed, and over all similarity of form. The vessel pictured in the *Handbook* has the tail missing; but from the break, it can be determined that it also had a very broad tail. The *Handbook* vessel was found in Red River County and was described as belonging to either the Texarkana or McCurtain Focus.

Vessel 14 probably represents a human head in very abstract form. The nose has nostrils clearly indicated. A small engraved line in the expected position probably represents the mouth. No eyes are apparent other than the two nodes.

Because of the similarity of the vessels, it is probable that Vessel 14 is a trade piece from McCurtain or Texarkana Focus people.

Grave 29, probably female.

Depth to floor: 3'4" average

Artifacts:
Carinated bowl
#2, *Ripley Engraved*—interlaced hook motif
Compound bowls
#1, *Ripley Engraved*—triangular motif
3, *Ripley Engraved*—triangular motif, four rim peaks
7, *Ripley Engraved*—red-slipped; triangular motif (Fig. 24)
8, *Ripley Engraved*—modified triangular motif flanked by "S"
Cooking vessels
#4, Untyped—vertical incising on body and rim; high rim
5, Untyped—vertical body incising; four punctate rows on rim
9, *Bullard Brushed*
Bottle
#6, Untyped—undecorated red slip (Fig. 27)
Other
A, Deer mandible inside Vessel 8
Remarks:
The over all grave length from outside Vessel 2 to outside Vessel 8 was eight feet.

Grave 30, probably female.
Depth to floor: 3'8" average
Artifacts:
Carinated bowls
#3, *Ripley Engraved*—modified triangular motif
4, *Ripley Engraved*—triangular motif
8, *Ripley Engraved*—triangular motif
9, *Ripley Engraved*—scroll motif
11, Unclassified—plain, undecorated
Compound bowl
#2, *Ripley Engraved*—scroll motif
Cooking vessels
#5, *Maydelle Incised*—with vertical incising on body (Fig. 25)
7, Untyped—rim in four peaks decorated with vertically incised lines
10, *Cass Applique*
Bottle
#1, *Wilder Engraved*
Others
#6, misplaced; unavailable for sketching
A, Two *Perdiz* points, aligned as if formerly on shafts
B, One and one half pounds of white clay
Remarks:
All traces of the skeleton had disappeared.

Grave 31, a late component grave, probably male.
Depth to floor: 3'8"

Artifacts:

Carinated bowls

#1, *Ripley Engraved*—scroll motif (Fig. 12)

3, *Ripley Engraved*—pendant triangle motif

4, *Ripley Engraved*—modified triangle motif

5, *Ripley Engraved*—unique motif

6, *Ripley Engraved*—scroll motif

7, *Ripley Engraved*—pendant triangle motif

9, *Ripley Engraved*—pendant triangle motif

Cooking vessels

#2, Untyped—vertical line and circular appliques, incised lines and punctates

10, *Bullard Brushed*—base region of large cooking vessel

Bottle

#8, *Wilder Engraved* (Fig. 27)

Others

A, Cache containing a small metate and four manos.

B, Green pigment in large sherd from *Wilder Engraved* bottle.

C, Four aligned arrow points; two *Maud* and two *Bassett*, probably originally located just outside right femur.

D, Ceramic earspools; inner surfaces most highly polished (Fig. 21).

E, Burned area, some charcoal pieces, several rib fragments imbedded in the matrix.

F, Vessel 10 fragment was filled to the rim with the local red clay.

Remarks:

This grave was dug into the clay an average depth of about 18 inches. Because of the clay floor, most vessels were badly crushed. The burned area beneath the upper body probably was the result of a fire built on the grave floor prior to the body placement.

The cache at position "A" was beside the grave, not in the fill. This may have been an additional offering or may have had no relation to the grave at all. There were no similar caches or tools associated with the other graves at the Carpenter Site.

Grave 32, a late component grave, probably male.

Depth to floor: 2'9" average

Artifacts:

Carinated bowls

#2, *Ripley Engraved*—scroll motif

3, *Ripley Engraved*—modified triangular with horizontal line and with reversed hooks on opposite ends

4, *Ripley Engraved*—pendant triangle motif

8, *Ripley Engraved*—pendant tringle motif

Compound bowl

#1, *Ripley Engraved* (Fig. 24)

Cooking vessels
#5, Untyped—plain body with three rows of punctates around rim
7, *Harleton*-like on rim body with four vertical appliques only
Bottle
#6, *Wilder Engraved* upper body, *Cass*-like lower body; (Fig. 27)
Others
#9, Small plain jar
A, Small lump of tan clay, about the size of a quarter, beside small red stain; may have been accidental inclusion in fill.
B, 13 *Talco* points—1 by right shoulder; 1 inside Vessel 4 beside slight red stain; 11, 5 to 6 inches above right forearm. Points range in size from 16 to 28 mm. in length. The points above the forearm varied in direction.
C, Ceramic earspools, (Fig. 21)
D, Red pigment in Vessel 9.

Remarks:

This grave was completely in sand. Vessel 6 resembles a bottle resting inside a bowl. This technique is rare but does occur infrequently in the Titus Focus.

The grave floor was slanted downward approximately parallel to the surface. The head was the lowest skeletal part. Vessels 3, 4, and 5 were at higher elevations than the skeleton. This might mean they were placed in the grave after filling had started. Or, it could have represented their placement on a shelf in the side of the grave which collapsed inward as settling occurred.

Grave 33, a late component grave, probably female (Fig. 9).
Depth to floor: 2'10"
Artifacts:
Carinated bowls
#5, *Ripley Engraved*—scroll motif
7, *Ripley Engraved*—pendant triangle motif
10, *Ripley Engraved*—triangular motif
11, *Ripley Engraved*—pendant triangle motif
12, *Ripley Engraved*—pendant triangle motif (Fig. 12)
Cooking vessel
#6, *La Rue Neck Banded*—horizontally brushed body (Fig. 25)
Bottle
#8, *Wilder Engraved* (Fig. 27)
Effigy
#1, engraved line below lip with gouged out circles at eight places; appendages missing from both sides of bowl
Others
#2, Extremely small, plain bowl, (Fig. 29)

3, *Ripley Engraved*—jar, two opposed suspension holes in rim
4, *Simms Engraved*—bowl, black polished; four engraved panels around the rim; 2-4 mm. thick walls; no indication of shell temper; a trade vessel from McCurtain or Texarkana Focus. (Fig. 29)
9, Stemmed vessel of "chalice" form (Fig. 34)
A, One *Talco* point
B, One *Talco* point
C, Mussel valve

Remarks:

This grave was against a sand-clay layer but into it slightly at the foot of the grave. Four teeth from the skull were spread over six inches. This probably resulted from a normal disintegration and collapsing of the facial structure. The most unusual feature of Grave 33 is the stemmed vessel, Vessel 9, which will be discussed in more detail in a later section.

Grave 34, a late component grave, probably male.

Depth to floor: 2'3" average

Artifacts:

Carinated bowls
#2, *Ripley Engraved*—pendant triangle motif
4, *Ripley Engraved*—pendant triangle motif
5, *Ripley Engraved*—pendant triangle motif
7, *Ripley Engraved*—pendant triangle motif

Cooking vessels
#3, *Cass Applique*
6, *Untyped—punctate rim, plain body*

Bottle
#1, *Wilder Engraved*

Others
A, Seven *Talco* points located as shown in sketch
B, Sandstone earspool with copper plate, (Fig. 21)

Remarks:

The grave floor was in the clay one or two inches. An extremely unusual feature of this grave was the position of the two *Talco* points at the skull. One is resting at about the position of the right eye, and the other appears to be protruding, point first, from the left side of the skull. On the side of the cranium opposite the protruding point is a hole which could have been caused by the penetration of an arrow. However, since the bone had disintegrated at both point locations, there is no absolute evidence that this actually occurred.

The two points are at a higher elevation than the skull. Both were pointing downward at an angle, as was the point near the left knee. The over all impression was that after the body was placed in the grave, arrows were shot at or near it. If such were the case, the two points would probably have been shot after the

grave filling had commenced since they were at a higher elevation than the body.

Grave 35, probably female.
Depth to floor: 3'5"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—stretched bisected diamond motif
3, *Ripley Engraved*—triangular motif
Cooking vessel
#2, *Harleton Applique*
Others
A, Deer mandible
B, Two *Bassett* points
Remarks:
This grave was in deep sand. The skeleton was in a better state of preservation than most. The presence of only three vessels as offerings was unusual. This grave contained the smallest quantity of pots of any grave in the cemetery.

Grave 36, a late component grave, probably male.
Depth to floor: 4'0"
Artifacts:
Carinated bowls
#2, *Ripley Engraved*—pendant triangle motif
3,
4, *Ripley Engraved* scroll motif with ticked diagonals
5, *Ripley Engraved*—modified triangular motif
Cooking vessels
#7, *Wilder Engraved*—carbon deposits on body
8, *Harleton Applique*
10, *Bullard Brushed*—twin nodes on rim, four locations
Bottle
#11, *Wilder Engraved*
Others
#1, *Ripley Engraved*—conical bowl
6, *Wilder Engraved*—large globular bowl
9, Untyped—three engraved lines around rim
12, misplaced
A, Two *Maud* and six *Bassett* points—all aligned as if formerly on arrow shafts
B, One *Maud* and three *Bassett* points—not aligned
Remarks:
The grave was completely in sand.

Grave 37, probably male.
Depth to floor: 4'0"
Artifacts:
Carinated bowls

#2, *Ripley Engraved*—modified scroll motif
3, *Ripley Engraved*—triangular motif
5, *Ripley Engraved*—nonrepetitive scroll, triangular elements
6, *Poynor Engraved*—or replica of *Poynor Engraved* (Fig. 29)

Cooking vessel
#4, Untyped—six vertical nodes on body at four places and four vertical, smoothed appliques; horizontal brushing on rim; four peaks with strap handle under each.

Effigy
#1, head missing

Remarks:
The shape of the lip of Vessels 2, 5, and 6 is different from all other carinated bowls at the Carpenter Site. The lips were rolled out and down but were not smoothed or blended into the rim. Vessel 6 is a lighter shade than most at this site. It is yellow-brown with fire mottling present on the rim. This coloration is typical of *Poynor Engraved*. The rim of Vessel 6 is slightly inverted, another characteristic of *Poynor Engraved*. The rim design incorporates *Poynor* elements as well.

The grave was completely in sand.

Grave 38, probably female.
Depth to floor: 3'10"
Artifacts:

Carinated bowls
#2, *Ripley Engraved*—modified triangular motif
4, *Ripley Engraved*—triangular motif
6, Untyped—plain

Compound bowl
#7, *Ripley Engraved*

Cooking vessels
#3, Untyped—vertical body incising, peaked rim, twin nodes below peaks
5, Untyped—vertical body incising, horizontal dashes around rim

Bottle
#1, Plain, undecorated

Other
A, a hemispherical lump of sandy yellow clay upon which a major piece of soft, white sandstone earspool was partially embedded. (Fig. 21)

Remarks:
The grave was completely in sand.

Grave 39, probably female.
Depth to floor: 3'4"
Artifacts:

Carinated bowl
#6, *Ripley Engraved*—triangular motif
Compound bowl
#1, Untyped—plain body, incised lines around rim
Cooking vessels
#4, Untyped—peaked rim with incised triangular elements
8, Untyped—plain body, punctate rim with vertical appliques
Bottle
#5, Untyped—plain
Others
#2, Untyped—plain jar
3, Untyped—small plain conical bowl
7, Untyped—large plain conical bowl
A, Double handful of mussel shell; one ounce piece of potters' clay; a small piece of green pigment in one large shell.
B, Double handful of mussel shell resting against Vessel 8.
C, Two large mussel valves.
Remarks:
The grave was completely in sand.

Grave 40, probably male.
Depth to floor: 4'-5'
Artifacts:
Carinated bowls
#4, Untyped—scroll motif
6, *Ripley Engraved*—triangular motif
11, *Ripley Engraved*—triangular motif
Compound bowls
#1, *Ripley Engraved*—scroll motif
9, *Ripley Engraved*—peaked rim, triangular motif
Cooking vessels
#2, Untyped—vertical incising and punctate rows on rim
5, *Maydelle Incised*—peaked rim
10, Untyped—punctate rows around rim
Bottle
#3, *Ripley Engraved*, (Fig. 26)
Effigy
#8, punctate suspension holes made while vessel was still plastic before firing (Fig. 28)
Others
#7, Untyped—plain jar (Fig. 29)
A, Cymbal-shaped wooden ear ornament and a fragment of another on the opposite side of the skull, (Fig. 21)
B, Seven *Perdiz* points—all aligned beside right femur as if formerly attached to arrow shafts.
C, Red pigment in Vessel 7, green lumps of pigment in Vessel 6.

Remarks:

This grave was unusual because of the depression in the grave floor in which the legs and three vessels were located. This might have resulted when those digging the grave decided they had gone too deep, so did not dig as deeply on the other end. On the other hand, there might have been some unknown significance to the arrangement.

The wooden ear ornaments are extremely unusual. No other wooden artifacts were found in any of the Carpenter Site graves. And, this is the only occurrence of artifacts of this type in the Titus Focus so far as the author knows.

Grave 41, probably male.
Depth to floor: 3'7"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—scroll motif
2, *Ripley Engraved*—combination scroll triangle motif
3, *Ripley Engraved*—triangular motif flanked by "S"
4, *Ripley Engraved*—scroll motif
6, *Ripley Engraved*—scroll motif
Cooking vessels
#7, *Bullard Brushed* body, vertical rim incising
8, *Maydelle Incised* rim with vertical body incising
Bottle
#5, *Ripley Engraved* (Fig. 26)
Others
#9, Untyped—undecorated conical bowl
A, Celt, (Fig. 32)
B, Two *Perdiz* points by right femur; one outside left knee; one under left wrist.
C, Large unidentifiable mass of charcoal, appearing as shown; possibly very thick bark from a pine tree. It could not be positively determined whether this was in or out of the original grave pit.
Remarks:
The grave was completely in sand.

Grave 42, young child.
Depth to floor: 3'8"
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—scroll motif with pendant triangles
2, *Ripley Engraved*—trangular motif
4, *Ripley Engraved*—scroll motif
7, *Ripley Engraved*—bisected diamond motif (Fig. 12)
Compound bowls
#5, *Ripley Engraved*—triangles and vertical lines
8, *Ripley Engraved*—scroll motif

Cooking vessel
#3, *La Rue Neck Banded*—punctate body pattern
Bottle
#9, Untyped
Others
#6, *Wilder Engraved*—globular jar with high rim
A, Red paint smeared around inside of rim of Vessel 6; also large quantity in base.
Remarks:
The burial was completely in sand.

Grave 43, probably male.
Depth to floor: 3'7'
Artifacts:
Carinated bowls
#1, *Ripley Engraved*—triangular motif (Fig. 12)
3, *Ripley Engraved*—triangular motif
4, Untyped—small and plain
6, *Ripley Engraved*—triangular motif
Cooking vessels
#2, Untyped—vertical brushing on rim
5, *Harleton Applique*
Bottle
#7, *Ripley Engraved* (Fig. 26)
Others
#8, Untyped—small jar, punctates around rim, two opposed suspension holes
A, Biface fragment; one and one half pounds of reddish-brown clay in Vessel 1, red paint on base region of same vessel. Fig. 32 shows biface.
B, Pipe (Fig. 22)
C, Green pigment lumps
D, One *Perdiz* point
E, Red pigment stains in soil as indicated; mussel shell on stain between Vessels 3 and 4.
Remarks:
Only tooth fragments and the skull cap remained. The grave was completely in sand. The clay level was two feet deeper than the grave floor. The presumed location of the leg bones, indicated with dashed lines, was based upon the positions of the teeth and artifacts.
The bottle in this grave was the most graceful and perfectly proportioned of any at the site.

Grave 44, probably male.
Depth to floor: 4' plus
Artifacts:
Carinated bowls
#5, *Ripley Engraved*—triangular motif

6, *Ripley Engraved*—triangular motif
13, *Ripley Engraved*—modified scroll motif

Compound bowls
#1, *Ripley Engraved*—scroll motif
2, *Ripley Engraved*—triangular motif
10, *Ripley Engraved*—triangle and vertical line motif

Cooking vessels
#7, *Bullard Brushed*
8, *Harleton Applique*—four peaks
9, Untyped—four peaks, nodes, dashed incised body lines
11, Untyped—four peaks, trisected appliques under each peak, vertical brushed body lines, rim punctates

Bottle
#3, *Ripley Engraved*

Others
#4, Untyped—squat bowl with inverted rim, indeterminate engraved design
12, *Ripley Engraved* or *Hodges Engraved*—rectangular shaped pot (Fig. 28).
14, Untyped—globular body, short rim, somewhat roughened rim.
A, Two *Maud* points
B, Two *Perdiz* points
C, Red clay smeared at several places on the body interior; approximately one quarter pound of red clay near base of vessel.

Remarks:

Several vessels in this grave are different in style and decorative technique from most others at the site. For example, compound Vessels 1, 2, and 10 are not turned as radically at the shoulder as most other vessels of this type. The design on Vessel 1 features crosshatching and ladder-like elements in semicircular form, which are similar to *Avery Engraved*. The triangular motif on Vessels 2 and 10 are similar in concept to others at the site. This may simply represent one potter's slight deviation from the norm.

Vessels 2 and 11 were higher than the grave floor. These vessels may have been on a platform or shelf at the end of the grave. However, no positive variation in the soil composition was determined. The alternative, of course, would be that these were placed in the grave after filling had started.

The only skeletal remains were teeth fragments.

Grave 45, probably female.
Depth to floor: 3'9"
Artifacts:
Carinated bowls
#4, *Ripley Engraved*—triangular motif

5, *Ripley Engraved*—diamond and triangular motif combined

Cooking vessels

#1, Untyped—peaked rim, small handles beneath each peak, punctate rows around rim, punctate and incised body lines

2, Untyped—brushed body, punctate inset triangle design on rim.

Bottle

#8, *Ripley Engraved*—crudely done sun symbols and circles

Effigy

#9, plain body (Fig. 28)

Others

#3, Untyped—plain conical bowl

6, Untyped—small square bowl, ladder-like engraved

7, Untyped—small square bowl, vertical incised lines (Fig. 28)

A, Two *Perdiz* points by left tibia aligned as if formerly attached to arrow shafts

B, Abrading stone (Fig. 32) and deer ulna; mussel shell fragment in Vessel 1.

C, Deer mandible inside Vessel 2.

Remarks:

The skeleton in this grave was in fairly good condition. Several ribs remained. However, the right tibia was completely missing except for a slight trace at the ankle position. The grave was completely in sand.

THE GRAVE DIRECTIONS

All burials at this site in which skeletal material was found indicated that the person was buried in an extended supine position, usually with arms parallel to the sides. Sometimes the elbows were bent, or the leg bones were somewhat askew. In all cases the head was to the east, and the feet pointed westerly. An inspection of the burial drawings will show this arrangement.

It occurred to the excavators that as the graves in this site were all with feet pointing westward, but not exactly so, that perhaps the position of the sun at sunset was the guide used in fixing direction. To explore this possibility the direction at which the sun sets at this site (33° N latitude) during the year was calculated. The results of this calculation show that on the first day of summer the sun would set at approximately 28⅓° north of due west and that on the first day of winter it would set at 28⅓° south of due west. At the fall and spring equinox the sun

would set due west. The variation of direction with time at which it sets, between these dates, will be that of a sine curve.

This variation with the time of year is shown in Fig. 13. Also shown on this chart are the mean first and last calendar dates of freezing and subfreezing weather in this area of Texas. The numbered circles in this figure represent the number assigned to particular graves and are located on the angle scale at the angle the particular burial points.

Inspection of this figure shows that most burial directions are at angles which are south of due west. If it is assumed correctly that the burials were in fact made with feet toward the setting sun, then this would indicate that 80% of the burials occurred between September 21 and March 21, the autumnal and spring equinoxes. Therefore, it should be possible to arrive at a good guess as to what month of the year the persons may have died.

As an example, Burial 6. shown in Fig. 13, has a direction of 15° south of west. If a line is drawn horizontally until it intersects the curve it would intersect twice, which would indicate the individual may have died in either October or February. It is readily apparent that there is no way of knowing which of these two months is the correct one. However, it is probable that more died in February than in October. Reasons for this would be depletion of the stored food supply, the miserable weather (note the temperature scales on the figure), and more difficulty in hunting and food gathering. October, on the other hand, usually provides excellent weather with a large quantity of forest products and a mean temperature of 66° F. In general, it is a time of harvest and well-being. Usually, the fall weather from mid-September to some time in November is mild. The bad, uncomfortable, wet, cold period extends into March. Though there is usually snow or sleet several times during the course of a winter, snow would be a relatively small problem as the average snow cover is only eight days. Recent weather conditions in this area are summarized by Blood (1960).

Fig. 14 shows in bar chart form the grave directions at the Carpenter Site compared with those of the Johns Site, another Titus Focus cemetery in Camp County. Each bar represents various angular increments as indicated, i.e. 0°-10°, inclusive, for example. The time periods when the sun sets at or between the indicated angles is also show. The height of the bar indicates

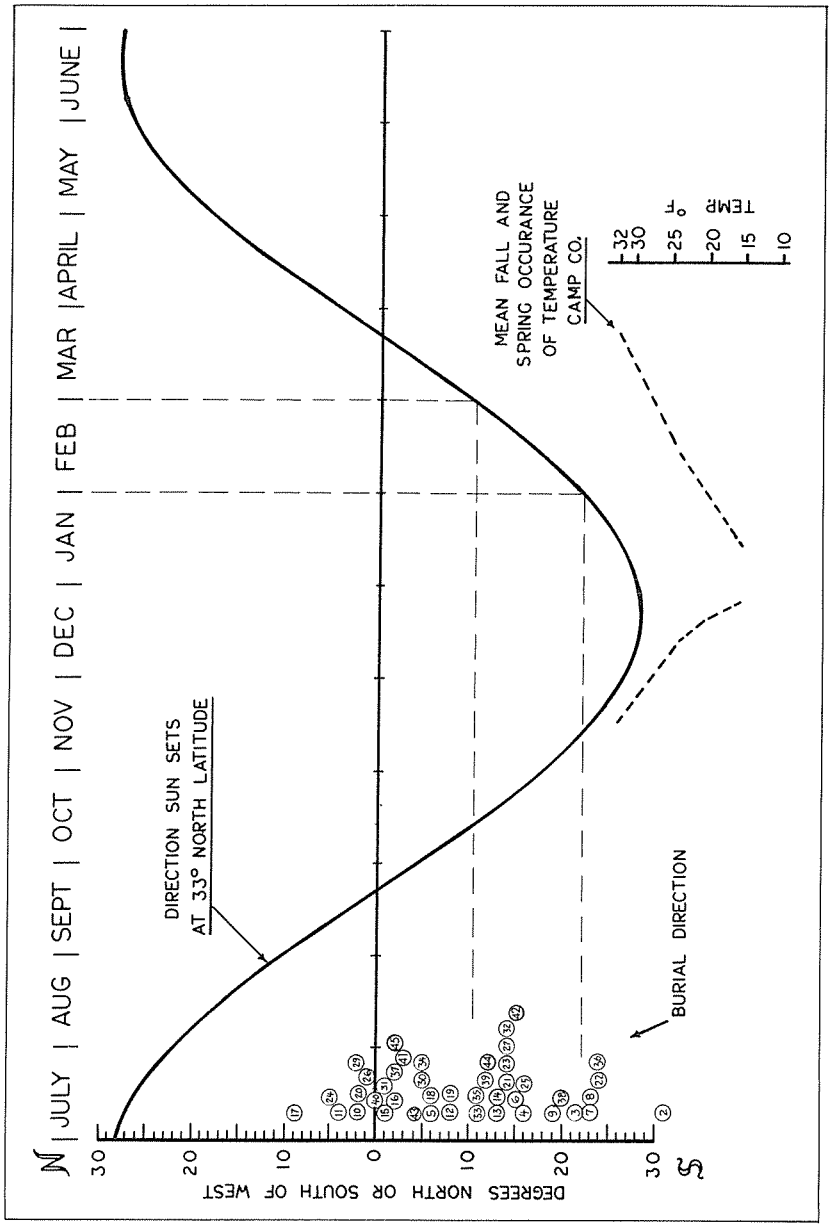


FIGURE 13. *Direction of the Sun at Sunset During the Year at the Carpenter Site and the Direction Each Grave Pointed.*

the percent of graves which were oriented at or between the indicated angles.

Inspection of the figure shows the similarity of the grave directions between the two sites. This similarity would be expected if the people died at the same time of year and the position of the sun was the determining factor in grave alignment.

The east-west orientation of the Carpenter Site graves is not unique in the Titus Focus. In fact this should be regarded as a major diagnostic trait of the Titus Focus in northeast Texas.

All graves (from all northeast Texas Titus Focus cemeteries listed in this report for which the grave directions are recorded) were generally east-west oriented with head to the east and feet to the west. However, no records concerning the grave direction are available for Rumsey, Chasteen, Starrett, Keith (except for one which was with feet to west) Keeling, and Ellison Lake.

In several of the sites excavated during the 1930's, the burial direction was noted as due east, north east, or south east—a general direction rather than an exact one.

In only two sites, the A. P. Williams and the Taylor cemeteries, were more graves oriented with feet north of west than south of west.

Titus Related Sites, Toledo Bend Reservoir Area

The Bison "B" (Woodall 1969) and Salt Lick Sites (McClurkan *et al.* 1966) located in the Toledo Bend Reservoir yielded both extended and flexed burials. The grave direction of the extended burials was predominately with feet to northeast and north, not westerly as in northeast Texas. The relation of these sites to Titus Focus will be discussed in more detail in later sections of this paper.

Allen and Frankston Foci

The east-west grave orientation is also probably a trait of the Allen Focus (historic) and Frankston Focus (prehistoric focus from which Allen derived).

Written records of burial customs of the Hasinai are available from reports of the Spanish missionaries (Griffith 1954: 94-96). The Hasinai, who are identified archeologically as the Allen Focus (Suhm, *et al.* 1954: 218-221) were located ap-

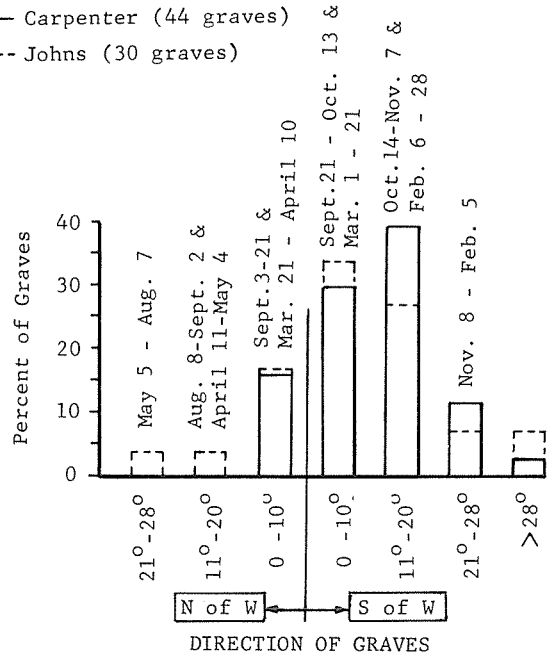


FIGURE 14. *Comparison of Grave Directions at the Carpenter and Johns sites.*

proximately 70 to 80 miles south of the northeast Texas Titus Focus area.

Espinosa who entered the Hasinai country in 1715 was a major chronicler. Espinosa (Swanton 1942: 204) had this to say about burials and beliefs concerning the soul:

> These Indians understand well and confess a belief in the immortality of the soul. This is evidenced by the burials and funeral honors they pay as follows. They prepare the dead body for burial, after first bathing it, by clothing it in the best clothes they have or in fresh deer skins. With great lamentations, they keep it for several hours in the home. They provide great quantities of pinole, corn and other eatables. If it be a man, they collect his bows and arrows, his knife, and the other things needed in life and, if it be a woman, all her domestic utensils, canisters, grinding instruments, and earthen-vessels, because they say the dead will have need of them where they are going. When asked where the souls of those who die go, they answered, that, as soon as the souls leave the body they travel towards the west and from there they rise once more into the air and

> go close to the presence of the great captain whom they call *caddi ayo*. From thence they go to wait in a house located towards the south called the House of Death.

In a letter dated August 15, 1691, to the Viceroy of Mexico, Casanas, the first missionary to the Hasinai, provided much information about these people. Concerning the mortuary customs, Casanas (Swanton 1942: 207) says:

> For this function, there are two Indians who serve as priests. They say their duties are to talk to God and that He speaks to them. These two Indians order a coffin for the dead man. Their order is promptly obeyed. When the coffin is finished, the two Indians put into it some tobacco and some of the herb they call *acaxio*, and also a bow and arrows. All these things they move about over the coffin. They keep talking in a low voice as if they were praying. Their mode of speaking is so strenuous that they perspire even though it be cold. During this ceremony, the two wear skins. The ceremonies around the coffin being finished, the Indians go to the place of interment which is always near the house. There they talk again to themselves; but the grave is not opened until, with an axe, they have made a stroke at the place where the head of the dead man is to rest and another where the feet are to lie. While the grave is being dug, the two return to the house and give directions for placing the dead man in the coffin.

Though Casañas did not record the direction of the grave with respect to the compass or the reason for its particular placement, it is clear that its orientation was a matter of importance to those directing the affair.

Swanton (1942: 210) states:

> When I visited the Caddo in 1912, (in Oklahoma) I was given to understand that they buried their dead at full length, feet to the west, so that the bodies faced west, the way the soul goes. This may have been an error but not certainly so, as the custom of laying bodies head to the west came in with Christianity, and in aboriginal times the soul was supposed to travel west, not east . . .

Although the writings of Espinosa and Casanas date from the late 1600's and early 1700's and concern the people of the present Allen Focus, the Hasinai, there is every reason to believe the same burial practices were in effect with the people of the area (Frankston Focus) for a considerable period prior to the historic. The archeological evidence indicates the same burial practices also belonged to the people characterized as Titus Focus as well.

The ability to place a grave in a particular direction, such as toward the sun at sunset with any prevision, would be hampered by various conditions. Cloudy or overcast skies on some fall or winter days would have forced them to estimate the direction of the sun. Additional problems would, of course, be the location of the cemetery with respect to forests and hills that might obscure the actual location of the sun at its setting. In addition, an error of six inches in the placement of one end of a six foot grave with respect to the other end would result in a 5° error in direction.

Whether or not a grave was oriented to a certain degree of precision such as 5° or 10° in our measurement system was surely of little importance to the Indians. The ritual would be the important thing.

Other Caddoan Burial Practices

The Sanders Site

The oldest nearby cultural group in which the east-west grave orientation predominated is that at the Sanders Site, the type site of Sanders Focus.

Krieger (1946: 175), in describing the burials states:

> The 21 graves were in two groups, one scattered over the highest part of "mound 1" and the other along the eastern end of the eminence where it levels out along the terrace edge. There were no distinctions in placement or content between the two groups. They contained a total of 60 individuals. Twelve graves contained a single individual; the other nine contained 48 with from three to eight persons each. Without exception the body was extended at full length, usually on the back but at times on the side or twisted to one side.

Concerning the grave orientation, Krieger states:

> Grave pits were all rectangular. One skeleton lay with head to the west, the direction of another was uncertain, and the remaining 58 lay with head due east or within about 15 degrees of east; i.e. within the range of seasonal variation in the point of sunrise.

It may be noted that this is also within the variation of the point of sunset.

Angelina Focus

The Angelina Focus, defined by Jelks (1965), which was centered in the McGee Bend Reservoir in Southeast Texas, contained burials in four sites attributed to this focus. In these sites were eleven burials—six were flexed in various compass orientations, and five were extended and supine. Of the latter, two burials were with the head to the north, two with head to the south, and one with head southeast. The east-west orientation did not play a part with these people.

Belcher Focus

At the Belcher Site (Webb 1959) the two burial pits assigned by Webb to the Haley Focus were oriented west-southwest to east-northeast with the heads west-southwest. The skeletons were extended and supine.

The remaining burials, which were assigned to the Belcher Focus occupation, included one bundle burial and a disturbed burial with pelvic region and legs remaining, (Burial 1) apparently extended and supine with feet pointing almost due west. There were two additional disturbed burials, one with head south. Also included were two infant burials for which direction could not be determined and an infant burial with head to the southeast. There were 11 graves with the skeletons all extended and supine, oriented with heads between 5° and 21° east of south. A group of three graves was located with heads between 15° and 23° west of south. One grave was oriented with head 39° east of south and one with head about 25° east of north. One burial which contained seven skeletons was oriented south-southeast to north-northwest. Webb notes that this is the only burial at the site in which the burials were carelessly or irregularly placed.

> In this pit, however, one body was prone, another on the side, a third lying transversely across the pit, and a fourth with the head directed northwest, although most had the heads toward the southeast end of the pit.

In other sites with components now assigned to Belcher Focus—Foster Place, Friday Place, and the McClure Mound—Moore (1912) noted that individuals were placed with

head to south except for three at Foster Place which were with heads to north, northwest, and northeast.

Except for the single disturbed burial at the Belcher Mound, no other burials were oriented with feet westerly as in the Titus Focus.

Texarkana Focus

Graves from cemeteries attributed to the Texarkana Focus do not conform with the east-west orientation of Titus.

At the Paul Mitchell cemetery where the direction of 52 graves was determined, 47, or 90%, were oriented with feet between true north and 36° W of true north. An average direction for the 47 is 22½° or exactly north-northwest. Three graves were oriented with feet to the northwest, one with feet toward west, and one with feet about 5° or 10° east of north. The direction of 5 burials was not determined.

At the E. H. Moores plantation, where the direction of seven of eight burials could be determined, four were oriented with feet approximately northwest, one with feet toward the south, one with feet to the east, and one with feet to the west.

Two different burial plots were excavated near the Hatchell Mound. In Plot I where the directions of seven graves were determined, three were with feet between 9° and 34° north of west, one with feet toward north-northeast, one with feet 9° west of south, and two oriented 11° west of north, one of which had feet to the north and the other with feet to the south.

Plot II yielded six burials with notes on the direction of three. All three were with feet toward the north.

Spiro Site

Bell and Baerreis (1951) in commenting on the burials in the Craig Mound of the Spiro Focus state:

> The Craig mound produced a variety of burials, single burials, extended, flexed and semi-flexed burials; bundle burials and cremations. Group burials are probably the most common and may contain from two to thirty individuals. Grave goods were found with a large number of the burials although not all graves contained artifacts. Some burials were especially rich in grave goods while others produced relatively litle, if any, associated material.

Brown (1966) in his description of the Craig Mound burials and their contents has divided the burials into 16 different classes. Although an occasional skeleton was oriented with head to east and feet westerly, an east-west grave orientation was no trait of importance at the Craig Mound.

Haley Site

A map prepared by Moore (1912: 529) indicates that at the Haley Mound, type-site of the Haley Focus, seven skeletons were oriented generally northwest-southeast with heads to the southeast. One skeleton was north-south with head to the north and one northeast-southwest with head to the northeast.

Gahagan Mound

At Gahagan the skeletons were parallel to the walls of the rectangular pits in which they were placed. All were extended and on their backs. In Pit 1 the heads were to the northwest and northeast; in Pit 2, northwest, southwest, southeast; in Pit 3 all were north-northwest. These arrangements are noted by Moore (1912: 513) for Pit 1 and by Webb and Dodd (1939) for Pits 2 and 3.

George C. Davis Site

Mound C at the Davis site (type site of Alto Focus) was partially excavated by Story from 1968-1970 (Story 1972). Eleven pit burials were excavated during this period. Other grave pits were located but were not excavated.

The grave pits were arranged in a sequence of Stages from I to VI by Story. Stage I was represented by a single pit containing eight individuals. This pit, over which the mound was built, originated at the ground surface. The following stages were related to various stages of the mound construction which occurred over the following centuries.

In grave pits of Stages I through IV, sufficient skeletal remains were found to determine that the individuals had been placed in a supine position, and in all cases with head to the north and feet to the south. Soil acidity had caused the loss of all skeletal material from the graves of Stages V and VI.

McCurtain Focus

Burials from McCurtain Focus sites appear mainly to have east-west orientations like Titus Focus graves. Oklahoma sites of this focus partially follow this trend.

Reporting on the E. Johnson Site, Wyckoff (1967) listed seven burials which he attributed to the McCurtain Focus. Six graves were east-west oriented, and one was northeast-southwest. Enough skeletal material remained in four graves to determine the skull position. In all four cases, it was to the east.

Reporting on the Sam Kaufman site in Texas, Harris (1953) described eleven burials. Of these burials, four were east-west oriented with head to east. Three were northeast-southwest oriented with head to the northeast. Three were with head to the north. One of these burials contained 28 blue glass beads. In the remaining burial, a direction could not be determined. Perhaps by historic times in this site, the east-west orientation was not rigorously adhered to.

Skinner *et al.* (1969: 26) reported on additional excavations at the Kaufman site which were conducted by salvage crews from Southern Methodist University. During the excavations, 23 burials were found. Orientation was consistently east-west with head to east. Skeletons were extended on their backs in individual graves except for one multiple burial containing four individuals and a large shaft burial containing eleven individuals.

At the Eleventh Caddo Conference in March, 1968, Wyckoff listed various sites which he equated with an early phase of the McCurtain Focus and which he has grouped as the Mountain Fork Complex. These sites are: Biggham Creek, Lamas Branch, E. Johnson, Woods Mound Group, Bill Hughes, and Beaver.

Concerning burials at these sites he noted

> single individuals, extended and supine with heads to east, north east, or southeast. Association usually pottery, from 1 to 5 vessels usually clustered around head and shoulders.

In summary, the east-west grave orientation of the Titus Focus with head to east and feet to west also seems to be a trait of the Frankston and McCurtain foci which were contemporaneous, of the historic Allen Focus, and of the Sanders Focus which preceded it in time. Contemporaneous foci which did not exhibit this trait

were: Texarkana, Belcher, and Angelina. Three Gibson Aspect foci that also did not exhibit this trait were Alto, Haley, and Spiro.

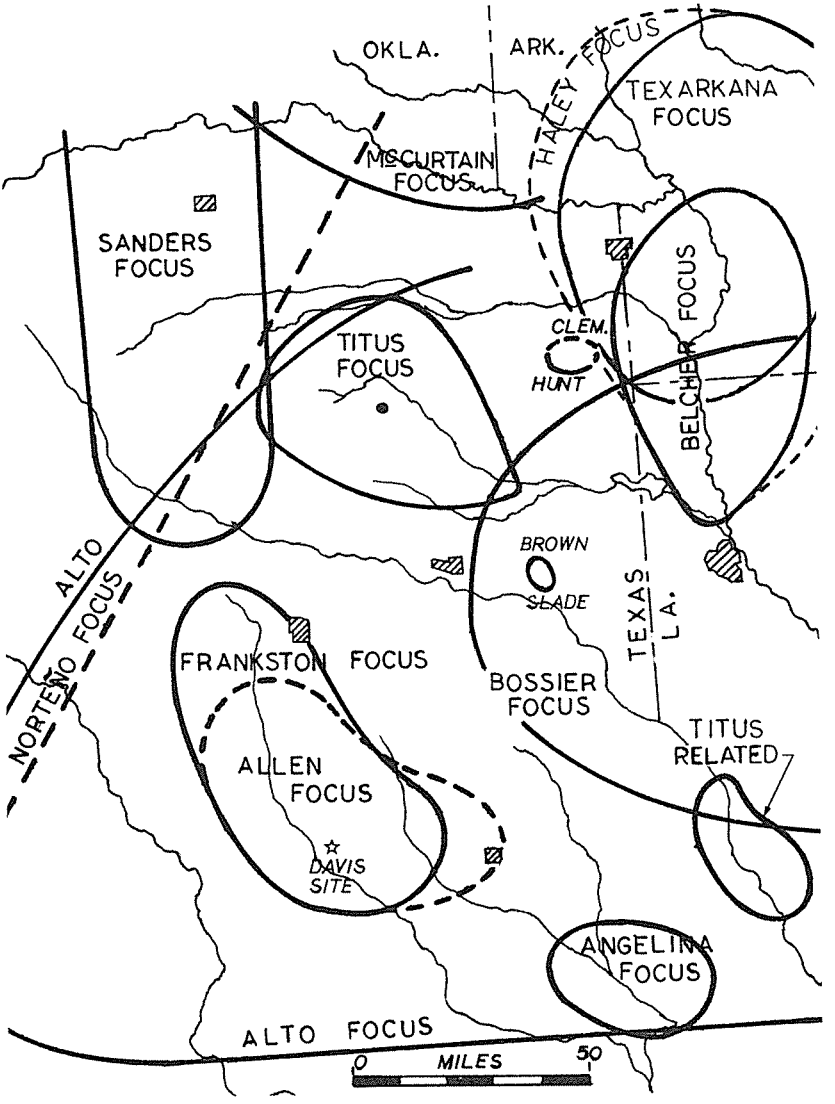


FIGURE 15. *Approximate Extent of Various Gibson and Fulton Aspect Caddoan Foci Near the Titus Focus Area.*

SEX IDENTIFICATIONS FOR BURIALS AT THE CARPENTER SITE

The skeletal remains from the Carpenter Site graves were analyzed as to sex by Duncan F. Wilson (who at the time of the analysis was a student assistant in the Department of Anthropology at The University of Texas at Austin). Two separate analyses were made by Wilson. The first was in December, 1967, and the second was in February, 1968. The second analysis by Wilson was made without reference to the results of the first.

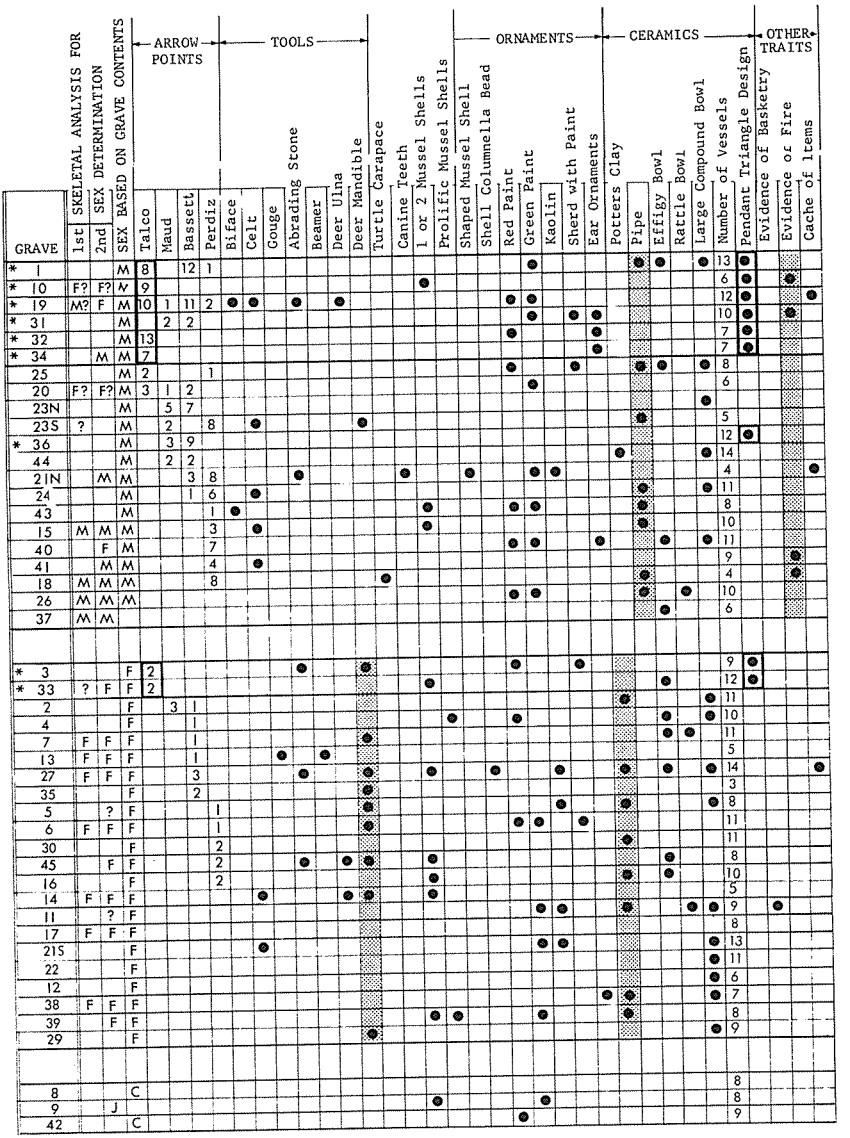
The results of the two analyses are shown in the first two columns of Fig. 16. The two analyses agree very closely, even for the cases where the sex was questionable. The next column is the author's opinion as to the sex of the individual. It is based on the two analyses and on the grave contents. Where the third column differs from the first two, the author has weighed the grave contents against the uncertainty of the skeletal analyses and decided the sex on this basis.

Additional columns in this figure list arrow point types, tools, ornaments, ceramics, and other items and traits. If an item or trait is associated with a grave, a black dot was placed in the appropriate square. The four shaded columns indicate traits or artifacts that seemed to be almost completely associated with only one sex. The shaded columns show that deer mandibles and potters' clay were associated with the female burials. Pipes and evidence of fire were associated with male burials. Celts were associated with both sexes, but mainly with the male at a ratio of 5 to 2. Paint was more frequent in male graves by a ratio of 10 to 6, whereas the presence of mussel shell was more frequent in female graves with a ratio of 8 to 3.

Arrow points were in both male and female graves. However the quantity in the female graves was generally much smaller than in those of males.

The two graves of young children and that of a juvenile contained few offerings other than pottery vessels.

The late component graves, which are identified with an asterisk, are emphasized because of the presence of *Talco* arrow points and the pendant triangle motif on bowls.



* Late component graves, i.e, those that contain carinated bowls with pendant triangle rim decoration and usually contain Talco points.

FIGURE 16. *Abridged List of the Carpenter Site Grave Contents With Traits, Predominantly Associated With One Sex, Emphasized.*

THE ARTIFACTS

Arrow Points

Of the 44 graves, 31, or 70%, contained one or more arrow points. It is possible that some of the remaining graves may have contained one or two which were missed. Fig. 16 itemizes the number and type found in each grave. There were four distinct point classifications in the graves. Stemmed points were *Bassett* and *Perdiz*, and triangular points were *Maud* and *Talco*. Some stemmed points had stems which seemed a little too long to be classified as *Bassett* and a little too short to be *Perdiz*. Also, some triangular points had basal concavities which were not quite deep enough to fit the *Maud* type, but too deep to be classified as *Talco*. Nevertheless, all were placed in one of the four categories on a best-judgement basis.

An example of point types from a single grave is pictured in Fig. 17. The letters under each group of points indicate the location in the grave where they were found. Group D includes two *Maud* and two *Perdiz* points. Group E is solely *Perdiz* points. Group F is classified as *Bassett*, though this is a case where the stems seem a little long for *Bassett*. Group G and Point H are *Maud*.

Fig. 18 shows typical triangular points from several graves. Points A through F in this figure are *Talco* points. Those shown indicate the size range at the Carpenter Site. Point D is representative of the size of most *Talco* points found.

Points G through M are all from Grave 19. These points are classified as *Talco* but have a different form in the base region. They are identified by a straight or convex region in the basal concavity, flanked by ear-like protuberances. This modification of the basic *Talco* point has been noted as a minor type at three other Titus Focus sites.

Points N through R are *Maud* points from several different graves. Point S is gray flint and is an unidentified type. This was the only point of this material and style in all the graves.

Fig. 19 shows short stemmed points which are classed as *Bassett*. These are from various graves which are indicated in the figure caption.

Fig. 20 illustrates points classed as *Perdiz*. These are also from various graves.

There are no known flint outcrops in this portion of Texas. As a consequence, the material utilized to manufacture a large majority of the points at this site was a fine-grained quartzite which was probably obtained locally. Nodules of quartzite, which range in size from a few ounces to several pounds, erode from the red clays of the area. It also occurs in the outwash of ancient mountain ranges in Oklahoma, such as the Arbuckle (Shafer 1973: 51). The colors of the local quartzite are various shades of yellow-tan, gray, and pink-maroon.

In addition to the quartzite used for point manufacture, various cherts were also employed. The cherts graded from cream to brown in color with occasional shades of gray and red.

All *Maud* and *Talco* points were of the quartzite material. Ninety percent of the *Bassett* points were of quartzite with ten percent chert. The material of 56° of the *Perdiz* points was chert, however, with the remaining 45% quartzite.

The use of chert (probably from stream pebbles) for many of the *Perdiz* points and the virtual abandonment of chert as a material for the *Bassett* and triangular point types seems to indicate that at the Carpenter Site, the choice of material changed with the change in point styles.

Quartzite was used in a large majority of the dart points associated with the archaic period in this region of Texas.

A fragment of a single dart point the proximal end of an *Edgewood* point was found in Grave 9. Since Grave 9 was a child's burial, the broken point may have been a toy or curiosity belonging to him.

No other dart points were found in the graves or in the grave fill. A single *Gary* point was found on the surface at the southwestern extremity of the cemetery. A single *Catahoula* arrow point, 21 mm long, was also found on the surface. This is the only occurrence of this type point at the site.

Green Pigment

Green pigment was found in 12 graves. Usually it was located in a very small pot or bowl, but sometimes it would be on a fairly large potsherd used like a saucer. Occasionally, a few small bits would be under a vessel or in the dirt as if sprinkled or tossed into the burial. In some instances it would be in a cache of items perhaps included in a perishable container. In one instance a small cylindrical-shaped piece of green pigment

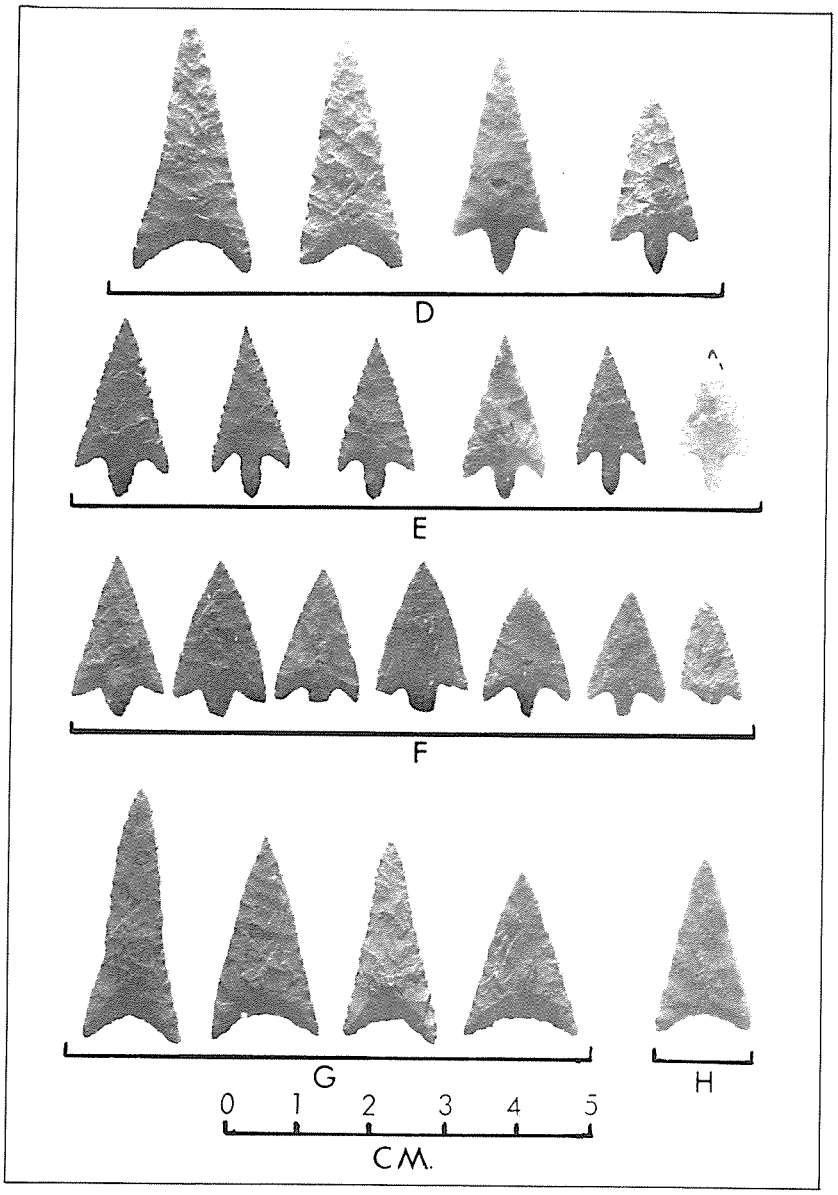


FIGURE 17. *Arrow Points.* From positions D, E, F, G, and H of Grave 23. (D, *Maud* and *Perdiz* points; E, *Perdiz* points: F, *Bassett* points; G and H, *Maud* points)

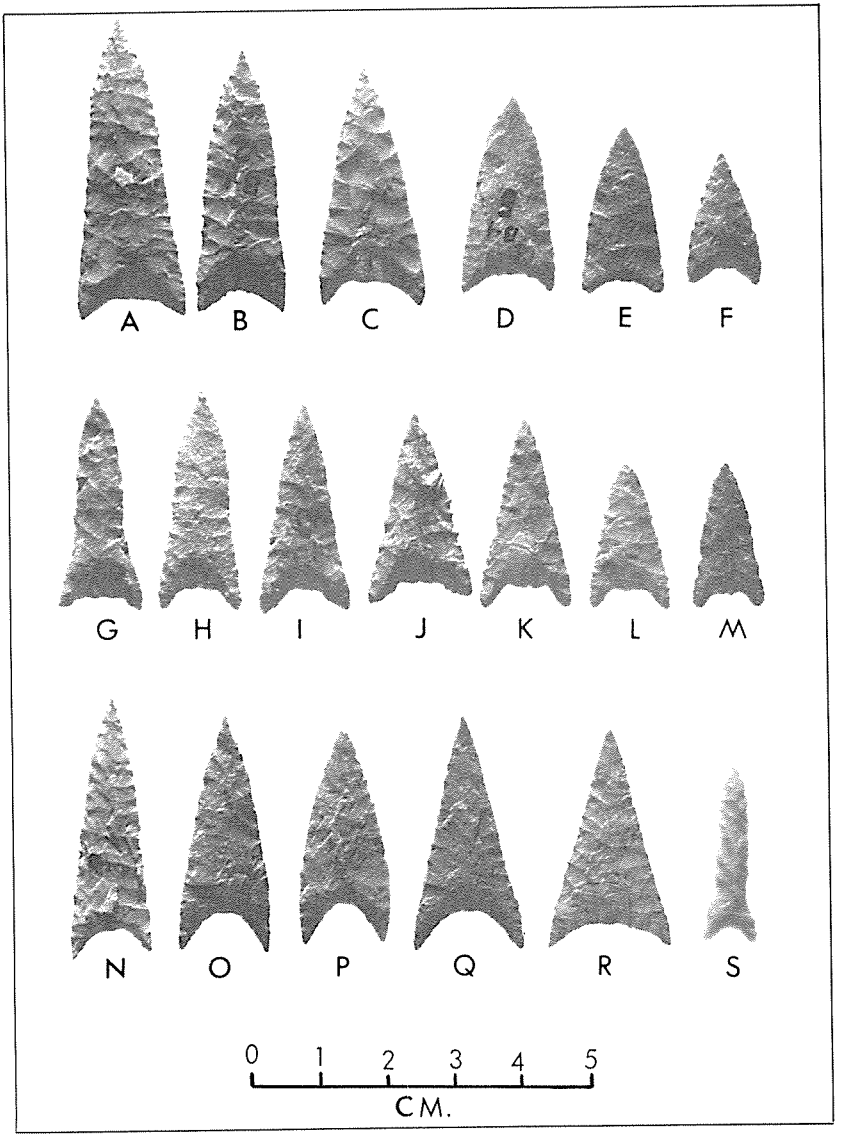


FIGURE 18. *Triangular Arrow Points. A-F, Talco* points, Grave 1; G-M, *Talco* points with straight to convex contour in the basal concavity, flanked by ear-like protuberances, Grave 19; N-R, *Maud* points: N, Grave 36; O-P, Grave 2; Q-R, Grave 44; S, Untyped, Grave 19.

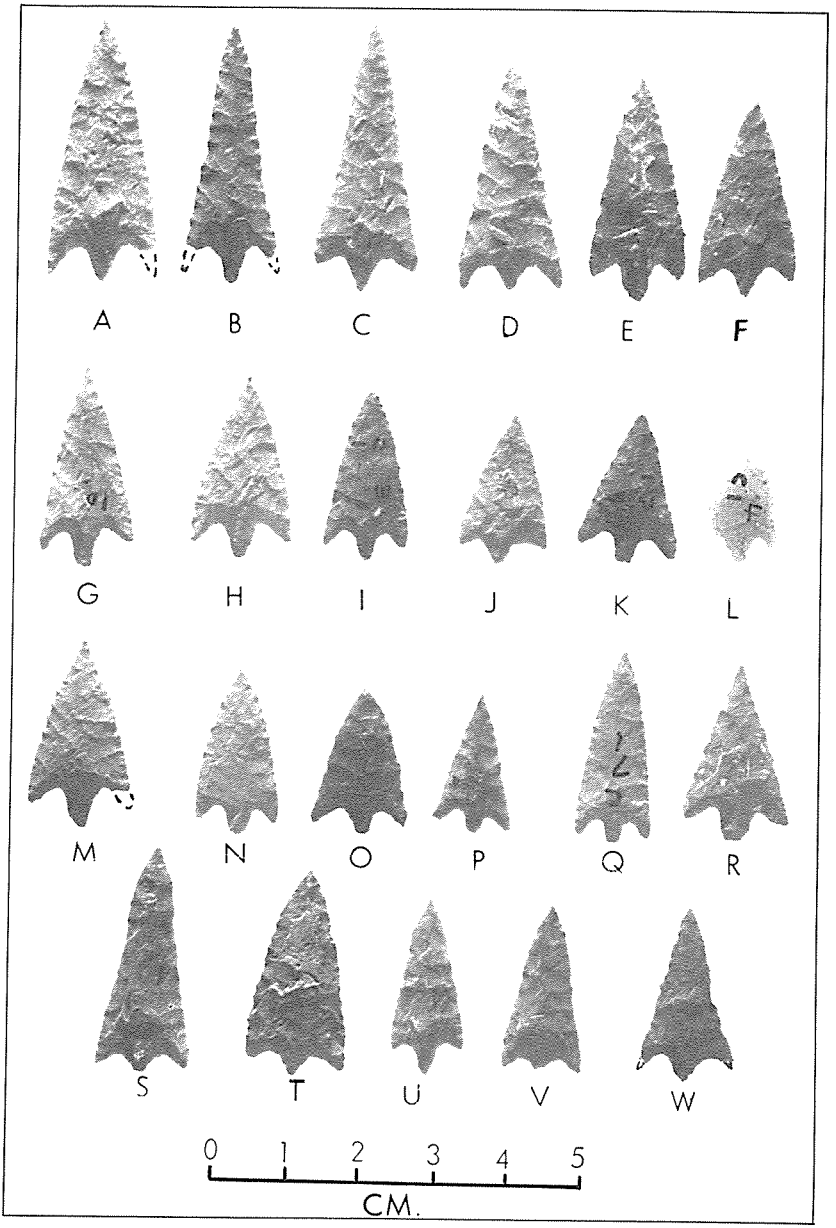


FIGURE 19. *Bassett Points.* A-F, Grave 36; G-O, Grave 1; P. Grave 4; Q, Grave 7; R, Grave 24; S-V, Grave 19; W, Grave 44.

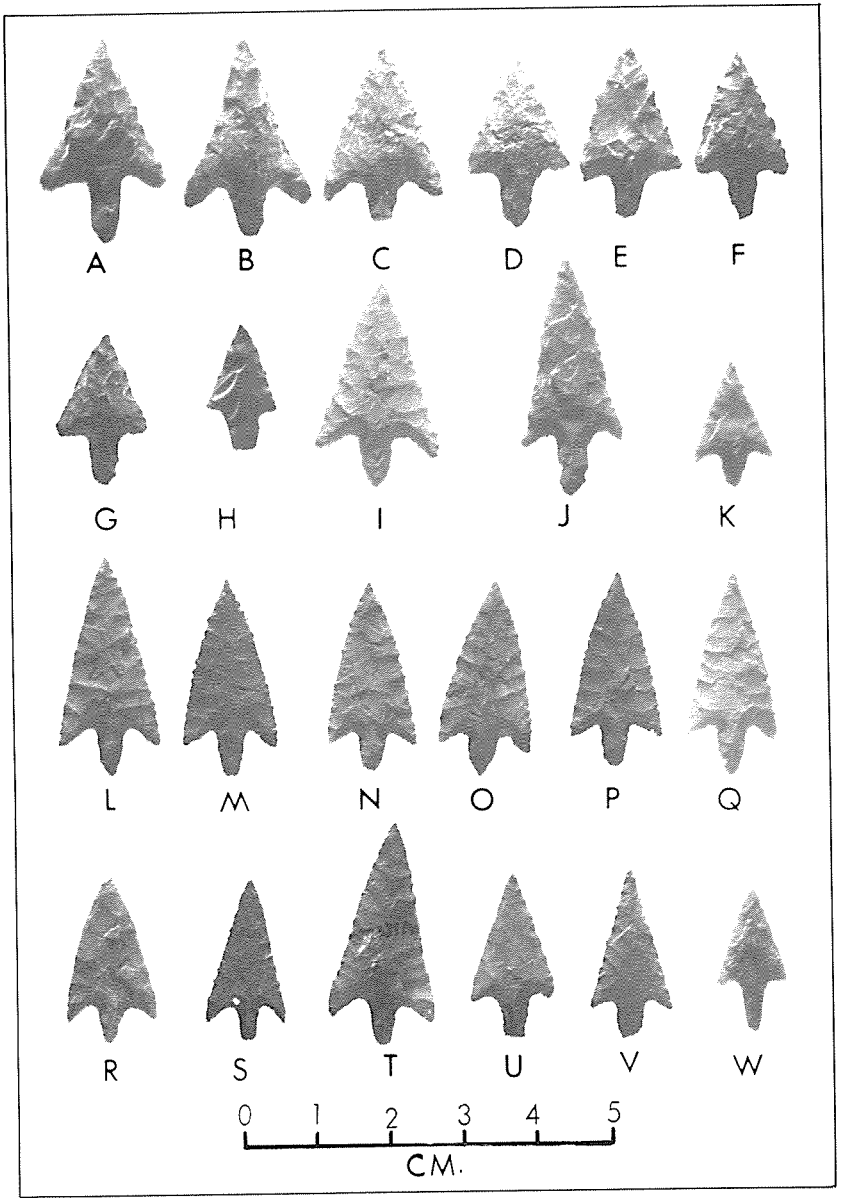


FIGURE 20. *Perdiz Points.* A-H, Grave 18; I-J, Grave 45; K, Grave 6; L-Q, Grave 40; R-S, Grave 30; T, Grave 5; U-V, Grave 16; W, Grave 43.

was found. Most examples of green pigment were usually in small irregularly shaped lumps. The pigment did not have much tendency to leach or dissipate into the surrounding sand but held its original shape well.

No vessels were found with green pigment worked into the engraved or incised lines of decorations. When wet, the green pigment has the feel and consistency of wet clay. The color is not a bright green, but an olive green.

A sample of material from a burial at the Keeling Site is apparently the raw material used in the preparation of the green pigment. This was identified by L. E. Garner, geologist with the Bureau of Economic Geology, University of Texas at Austin, as

> a glauconite sandy clay which is a complex silicate rich in iron. Unweathered glauconite is green. Weathered glauconite is generally reddish-brown because the iron has been altered to iron oxide.

When crushed, the sample from the Keeling Site formed a fine powder, and when wet it yielded the same color and had the same feel as the material from the Carpenter Site. The conclusion concerning the green pigment found in the burials is that it is a glauconitic sandy clay which had been crushed into a fine powder. It is probable that the powder was then mixed with animal fat or water by the Indians to give it the required body for easy application.

Red Pigment

Red pigment was in 10 graves. Like the green pigment it was contained on sherds or in small vessels. However, unlike the green pigment, the red pigment leached into the surrounding sand. Sometimes a reddish smear in the sand was the only indication of its presence. On occasion, the location of a vessel containing red pigment could be detected by the reddish color of the sand directly above it even before the vessel itself was uncovered.

The red pigment is iron oxide and probably came from scrapings from hematite. This particular region of east Texas contains large quantities of iron ore, so wide varieties of hematite or iron oxide rocks were readily available. However, the only hematite found in the cemetery was in the cache of Grave 19.

Five graves contained both red and green pigment.

Ornamentation

Items of ornamentation were relatively scarce in the Carpenter burials.

The red, green and white pigment (kaolin) when suitably mixed with water or grease probably served for painting on the face and body.

Artifacts for ornamentation consisted of a single columnella of a conch shell which was found in the neck region of the individual in Grave 27.

A rectangular mussel shell fragment with rounded corners was in Grave 21. This could have been some type of inset but cannot be positively identified as such.

Spool shaped ceramic ear plugs were in Graves 31 and 32. A single, similarly shaped stone earspool with a copper plate on one face was found in Grave 34. A major fragment of a soft sandstone earspool was embedded in a lump of clay in Burial 38. Two wooden disc-shaped objects were found on either side of the skull in Grave 40. The one located on the left side of the skull was nearly complete, and the other was just a fragment. (Fig. 21 shows these items as well as the ear plugs.) The larger piece is contoured on its outward side like the cymbal-shaped copper ornaments from the Coral Snake Mound (McClurkan, *et al.*, 1966).

On both objects a green powdery residue was present on small irregularly shaped areas. A wet chemistry qualitative analysis of this residue indicated it is probably a copper salt. The same test run on scrapings from the copper plate on the stone earspool from Grave 34 gave the same result. This indicates that the wooden discs were once associated with a copper sheath like the one on the stone earspool. Unfortunately, the case is not that clear cut; in addition to the green areas, certain areas have a reddish cast or appearance. Microscopic examination shows a red pigment in the grains of the wood. One explanation could be that the ornaments originally had a copper cover that was removed. Then, red pigment could have been smeared on the wood as a substitute. Whether this explanation is valid or not, the main significance of the wooden ornament is that it shows the cymbal shaped ornament persisted into Titus Focus times from earlier cultures.

The ceramic earspool and the stone earspool with the

copper plate were all found against the skulls in positions that definitely identified them as ear ornaments as opposed to lip or nose ornaments. The wooden cymbal-shaped plate and fragment were located at a lower level—more beside the jawbone of the individual. This would indicate that they were suspended in some manner.

The ceramic earspools are a known trait of the Titus Focus, whereas the stone earspool with copper plate and the cymbal-shaped wooden artifact have not been reported before.

Pipes

Fig. 22 pictures the pipes from the graves. Those identified with letters "a" through "d" look as if a stem that extended past the bowl folded up against the bowl while the clay was still plastic. This pipe form was first pointed out by Moore (1912: 637) and has also been discussed by Hoffman (1967: 4).

Pipe "e" has a small keel-like protuberance which may represent the vestigial remains of the stem as mentioned above. Pipes "f", "g", and "h" have conical bowls. Pipe "h" has an engraved ladder motif and small holes. Kaolin had been inserted in these engraved areas.

Pipe "a" which was from a late component grave did not differ in form from pipes "b" through "d" which belonged to earlier component graves.

No uniform position for placing a pipe in the grave was evident in this cemetery. The relation of the pipe to the skeleton in Grave 1 is unknown, as the skeleton was completely absent. However, it was probably on the right side of the body. In Graves 23, 25, and 43, the pipes were in proximity to the skull but at a higher level. In Graves 18, 24, and 26, the pipes were at the same elevation as the skeleton. In Grave 18 it was beside the right wrist, in Grave 24 it was probably near the left elbow, and in Grave 26 it was near the left knee.

Pottery

The major Titus Focus pottery types have been defined as to paste and vessel form by Suhm, *et al.* (1954). The vessels from the Carpenter Site fall within their definitions

The average number of vessels per individual at the Carpenter cemetery was approximately 8.8. This average is neither

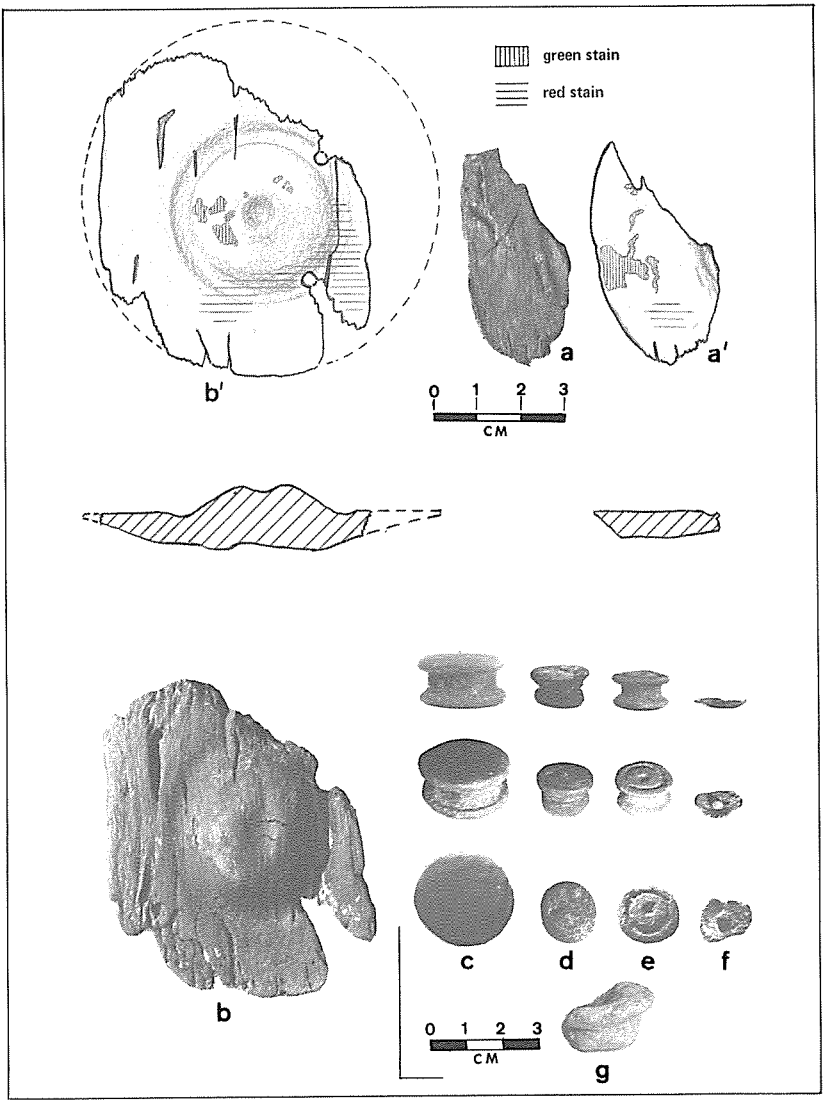


FIGURE 21. *Ear Ornaments.* a, a′, fragment of wooden ornament from right side of skull; b, b′, ornament from left side of skull, Grave 40; c, one of identical pair of ceramic earspools, Grave 31; d, one of identical pair of ceramic earspools, Grave 32; e, f, single polished stone earspool with copper plate, Grave 34; g, major fragment of soft sandstone earspool, Grave 38.

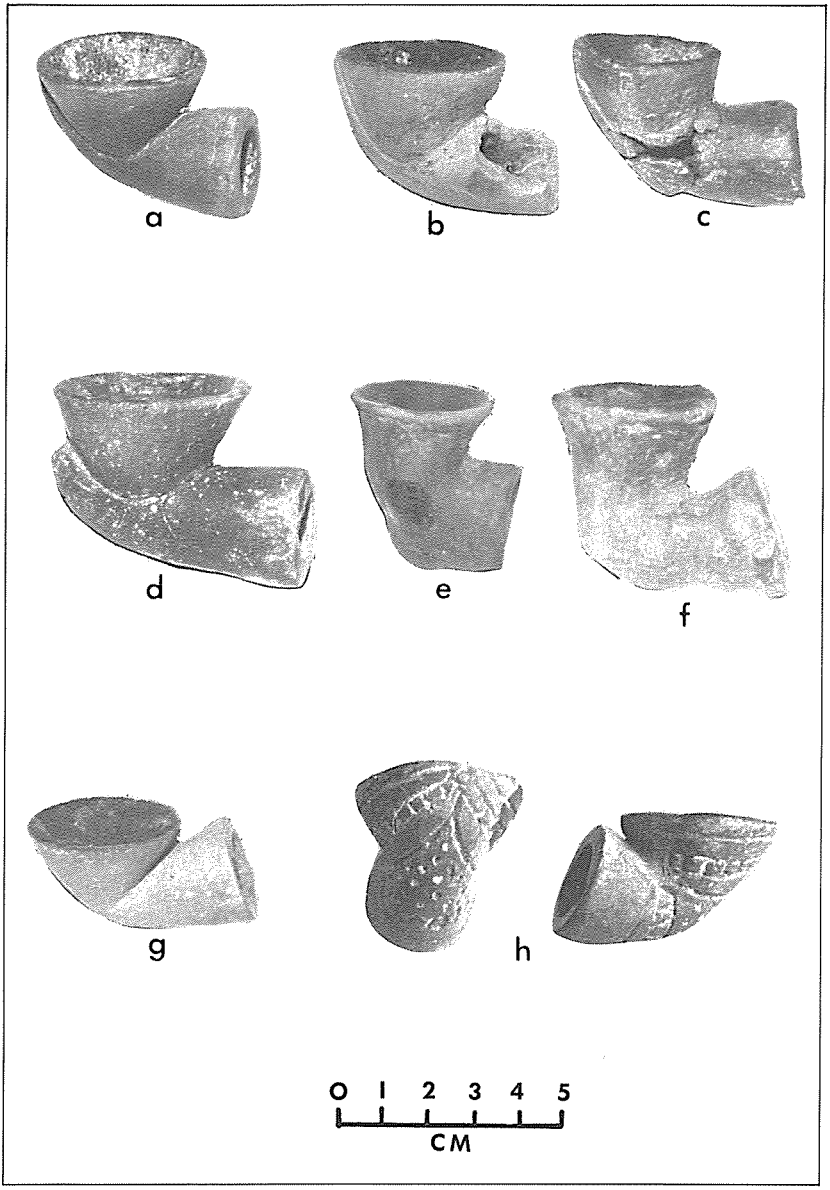


FIGURE 22. *Pipes.* a, Grave 1; b, Grave 23; c, Grave 25; d, Grave 24; e, Grave 18; f, Grave 26; g, Grave 15; h, two views of engraved pipe, Grave 43.

high nor low in relation to other Titus Focus cemeteries. At the McKinney Site there was an average of 10.7 vessels for nine graves. (There were two additional graves, but the exact number of vessels for them was not available.) This represents the highest average within the Titus Focus known to the author. At the opposite end of the scale, there was an average of 4.4 vessels for 5 graves at the Atkinson Site.

Within the Carpenter cemetery, Grave 21, which was a double burial, contained 17 vessels. Grave 35 contained only three. These represented the extremes.

From an inspection of the grave drawings, it is apparent that the carinated bowl was present in the greatest quantity. These bowls rarely showed use as cooking vessels. Small vessels of this type sometimes contained paint, but the larger ones give no indication as to their actual use. Casanas, (Swanton 1942: 157) referring to the Hasanai, said that "the plates they use are round earthen pans." Espinosa (*ibid.*) mentioned "earthen vessels, some large and some small, in which to serve the old and the young." From these brief descriptions and from a lack of evidence to the contrary, it appears the carinated bowls may have been used in this manner. Obviously, they could have been used to hold most anything.

Large and small compound bowls were present in many graves. Very small bowls sometimes contained paint, as did small carinated bowls. Like the carinated bowls, these vessels seldom showed use as cooking vessels, either. Occasionally, one showed a trace of having been in a fire. Two large compound vessels which were in Graves 27 and 29 contained a deer mandible each. The large compound vessels would serve well for storage of food, whether agricultural products such as corn or beans, or that gathered from the forest.

The other major categories of vessels include the cooking vessels, bottles, and jars. Effigy vessels were only occasionally included, and rattle bowls were included in the grave offerings even less frequently.

Figs. 12 and 23 picture selected *Ripley Engraved* carinated bowl designs from the Carpenter Site and from other Titus Focus sites. In Figure 12 vessels "a" through "c" are vessels which exhibit the pendant triangle motif common to the nine late component graves. This motif did not occur in the other 35 graves. Vessels "d" and "e" are decorated with the scroll motif.

This design was present in both the early and late component graves. Vessels "f" and "g" were engraved with the horizontal diamond motif. In addition, the diamonds on vessel "g" were vertically bisected. Vessels "h", "k", and "m" feature the triangular motif. Vessel "k" and "m" styles were most common in the earlier component graves. Vessel "h", which has the small engraved triangles appended to some of the diagonals, occurred less frequently.

Fig. 23 pictures several carinated bowls from sites other than Carpenter. Several of the motifs on these bowls were also present at the Carpenter Site. Vessel "a" is a modification of the scroll motif. In this variation the usual circles appear as semicircles which alternately originate from the shoulder and rim. The usual diagonal that connects the top of one circle to the bottom of the next is more horizontal in this design. Vessel "c" is also a special form of the scroll motif. The motif on vessel "b" was not present at Carpenter but does appear in other Titus Focus sites as well as in other Fulton Aspect foci. Vessel "e" represents a combination of a scroll motif and inverted triangle design. Vessels "d" and "k" are rectalinear designs that occur in several sites. Vessel "i" from the Johns Site in unique. It seems to portray stemmed arrow points as the filler under and above the diagonal lines. Vessel "g" from the Rumsey Site is *Killough Pinched*. Vessel "f" from the Harold Williams Site is a spherical jar with the *Wilder Engraved* design. Vessel "m" is one of several bottles from the Russell Site with this decorative motif. A single identical bottle was in a grave of the Caldwell Site and was probably a trade vessel from Russell. A slight variation from this motif was on a vessel from the Starrett collection.

Fig. 24 pictures several compound vessels. These vessels "a" through "e" are all classified as *Ripley Engraved*. Vessels "a", "b", and "e" exhibit scroll or modified scroll design motifs. Vessels "c" and "d" have excised triangular areas with either vertical or slanted lines between them. Small compound vessels frequently have peaked rims. Several of these are shown in the grave drawings. Vessel "f" of Fig. 24 is a very large vessel with horizontal punctates below the lip and at the junction of body and rim. Between these rows are roughly parallel, incised slanted lines. The body is plain. No type-name has yet been given

vessels with this decorative motif. Vessel "g" is a large *Bullard Brushed* cooking pot.

Fig. 25 pictures several Carpenter Site cooking vessel types. Vessel "a" is *La Rue Neck Banded*, and "b" is *Maydelle Incised*. Vessels "e" and "f" are *Cass Appliques* and "g", "h", and "k" are *Harleton Applique*. Vessel "c" was unique at this site. The body is covered with parallel rows of fingernail punctates, and the rim is horizontally brushed. Vessel "d" is *Bullard Brushed*. It is covered from the rim to near the base with vertical brushing, while the rim is decorated with punctates. Vessels "c" and "d" do not fit any defined type.

Most of the vessels pictured in Fig. 25 show a cleaner exterior near the base than higher on the vessel side. This appearance would be expected for vessels which were nestled in a bed of coals. The more intense heat near the coals would burn away the soot or grease while the cooler flame higher up would not.

In addition to the vessel types pictured (*Bullard, Cass, Harleton, Maydelle,* and *La Rue*) many vessels with other combinations of decorations were present. There were many cooking vessels with two to four rows of punctates around the rim. About half of these vessels had the rim raised into four peaks. Most of these vessels also had small nodes below each peak. Their bodies were plain, had vertically incised lines, or were brushed.

Four vessels were decorated on the rim with geometric punctate designs. On these vessels the bodies were plain, vertically incised, or brushed, too. Vessels with *Maydelle* incising on the rim were also plain, vertically incised, or brushed on the body.

Several cooking vessels had vertically incised or combed lines on the rim with a plain, brushed, or vertically incised body. Other combinations of rim and body decoration were present, but are not described. These can be noted by the reader in the grave drawings.

Cooking vessels at the Carpenter Site and in all Titus Focus sites are decorated with appliques, nodes, brushing, punctating, incising, and infrequently, combing. Engraving was not used on vessels constructed for cooking. The rough exterior of cooking vessels which resulted from brushing anv applique may have facilitated handling of the vessels when they were hot or increased the surface area for heat absorption.

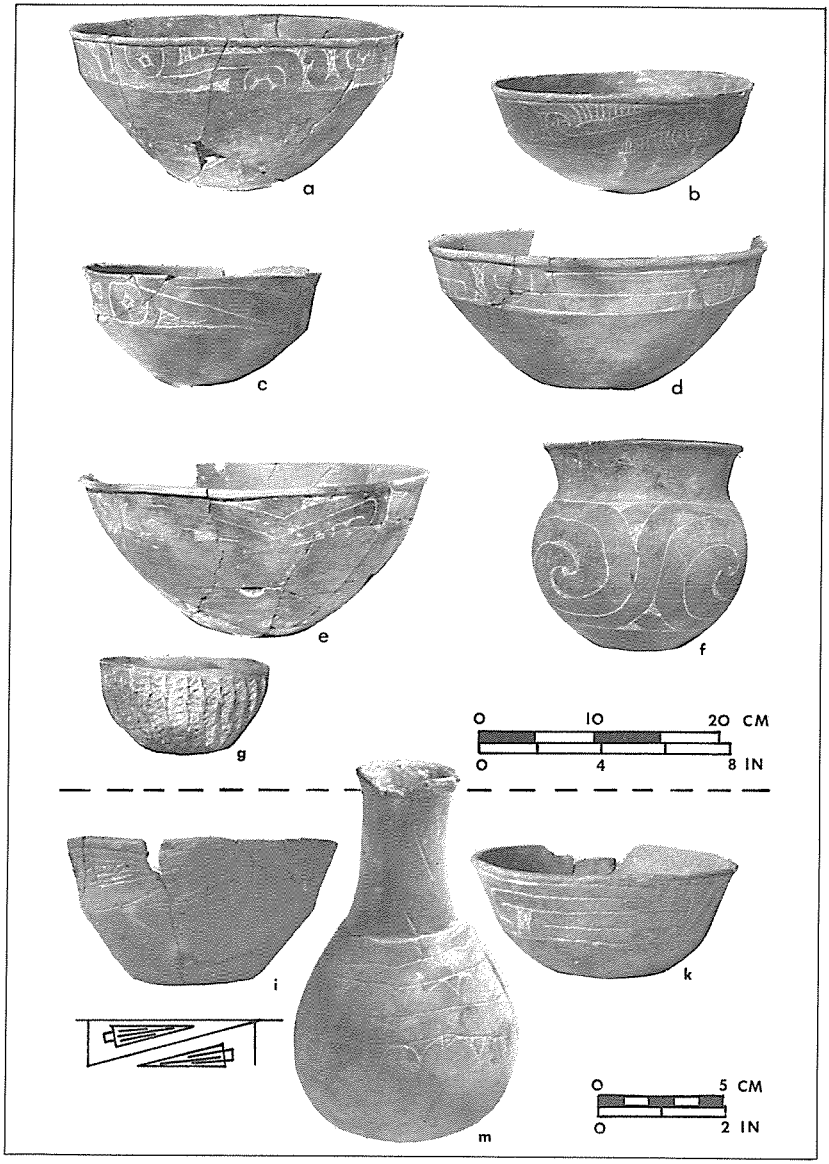


FIGURE 23. *Vessels from Various Titus Focus Sites.* a-e, i, and k, *Ripley Engraved*; f, *Wilder Engraved*; g, *Killough Pinched.* a, e, and i, Johns Site; b, Ellison Lake; c, Keith Site; d, Alex Justiss; f, Harold Williams; g and k, Rumsey Site; m, Russell Site.

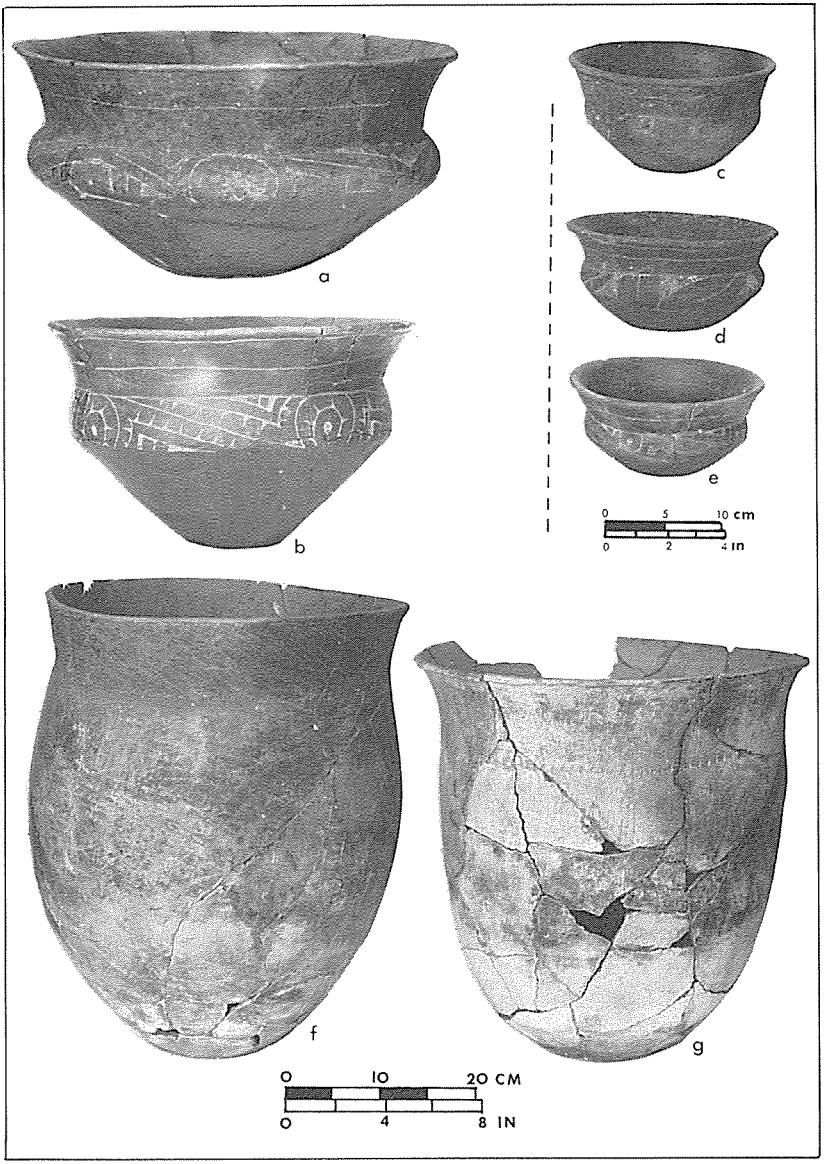


FIGURE 24. *Carpenter Site Vessels.* a-e, *Ripley Engraved* compound bowls: a, Grave 2; b, Grave 25; c, Grave 32; d, Grave 29; e, Grave 27; f, untyped cook vessel, Grave 21; g, *Bullard Brushed*, Grave 26.

Fig. 26 pictures bottles and a spherical jar with *Ripley Engraved* decorative motif. All vessels are from the Carpenter early component graves. The bodies of vessels "a" and "b" are formed into four points that give the bottle a square appearance when viewed from above. These bottles are polished and nearly black. Red pigment was worked into the engraved lines. Though not identical in design, the workmanship of these vessels is so similar that they might have been made by the same person. Vessel "c" does not have a typical bottle design. However, it does incorporate the ticked circle and one half the diamond element of the bottles that have the classic, concentric circle and diamond design. Vessels "d", "e", and "f" are all similar in their designs, which have crosses inside the inner circles. Vessels "e" and "f" have red pigment in the engraved lines. Vessel "d" showed no pigment in the lines. Vessel "g" had slight traces of white pigment, probably kaolin, in the engraving.

Fig. 27 shows additional bottles from the Carpenter graves. Vessels "a" and "b" are undecorated, but "b" is covered with a red slip. The design motif on vessels "c" through "h" is *Wilder Engraved*. The *Wilder Engraved* bottles were in both the early and late component graves, (8 out of 9 of the latter). Vessels "d", "g", and "h" are from the late component. Vessel "c" is a double bottle with a *Ripley Engraved* design on the square top part and *Wilder Engraved* on the circular lower portion. Vessel "f" is red slipped with the design cut through to the buff paste. All other bottles have red pigment in the engraving. the vessels shown are representative of the bottle shapes and sizes from the Carpenter Site. However, vessel "h" is unique.

A study of bottle placement with respect to the skeleton in the Carpenter graves has shown the following. Placement on the right side of the body was favored over left side by a ratio of two-to-one. Favorite specific locations in the order of descending popularity were: right knee, 6 cases; right wrist or hip, 5; right elbow, 4; between the feet, 4; right side of skull, 3; left side of skull, 3; and left knee, 3. The remaining locations, represented by only one or two cases, were: The ankles; midway on the left tibia; midway on the right femur; midway on the right and left radii; left elbow; the left shoulder; and midway on the right humerus.

Fig. 28 shows vessel types that occurred infrequently in the Carpenter graves. Vessels "a" and "b" are small bowls that

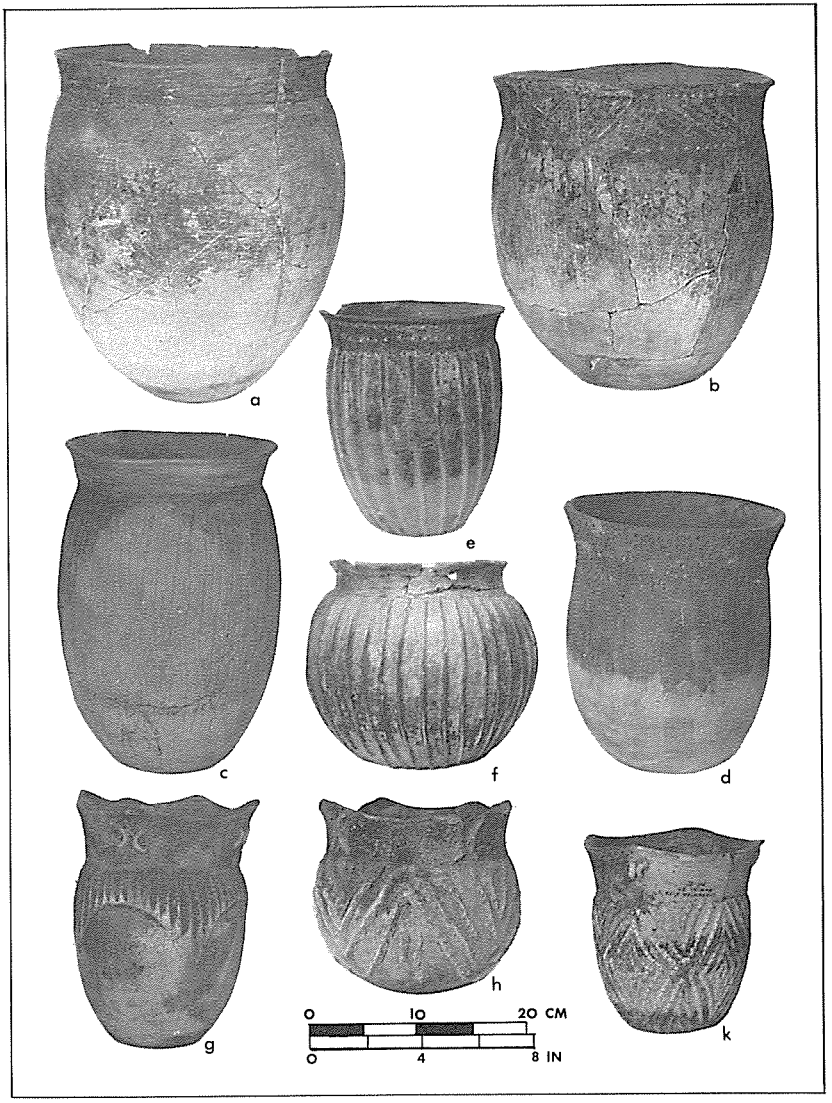


FIGURE 25. *Carpenter Site Cooking Vessels.* a, *La Rue neck Banded*, Grave 33; b, *Maydelle Incised*, Grave 30; c, untyped vessel with vertical rows of fingernail punctates on body, Grave 6; d, *Bullard Brushed*, Grave 6. e and f, *Cass Applique:* e, Grave 1; f, Grave 19. g, h, and k, *Harleton Applique:* g, Grave 1; h, Grave 27; k, Grave 20.

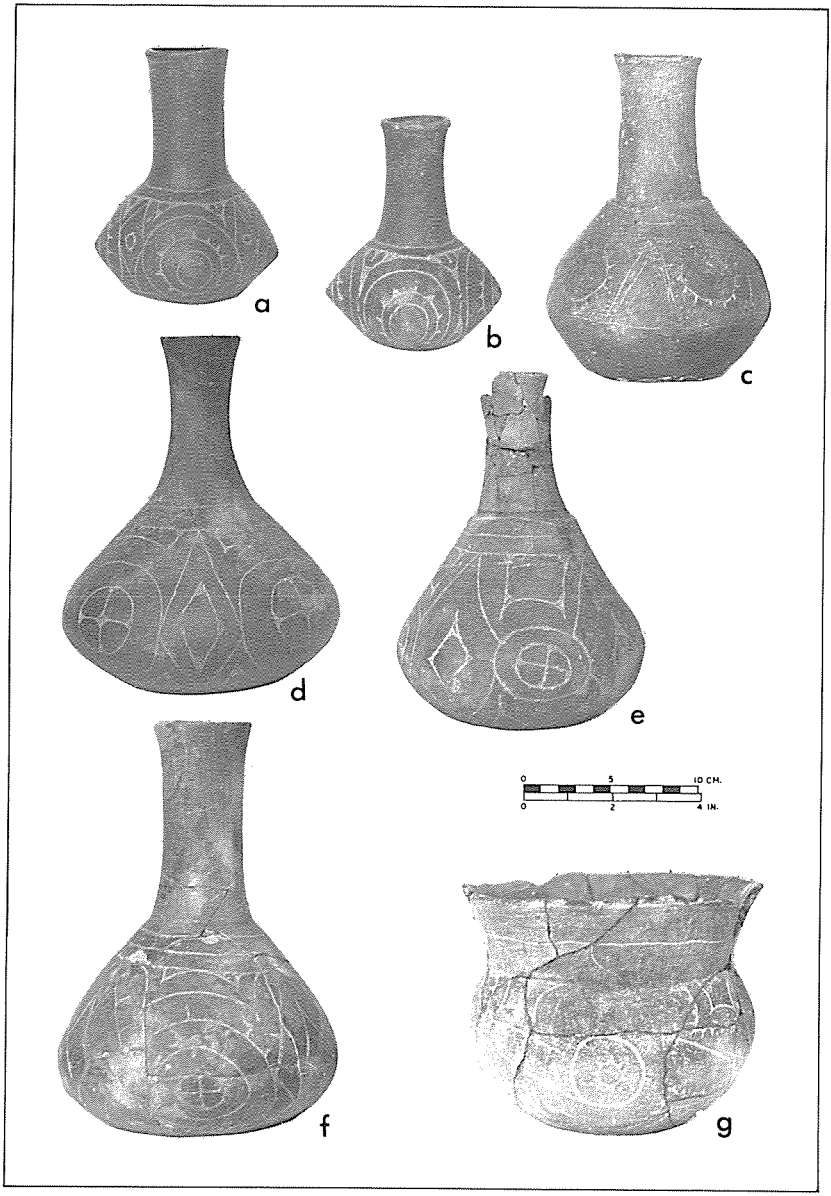


FIGURE 26. *Ripley Engraved Bottles and Jar From the Carpenter Site.* a, Grave 12; b, Grave 5; c, Grave 40; d, Grave 43; e, Grave 41; f, Grave 21; g, Grave 23.

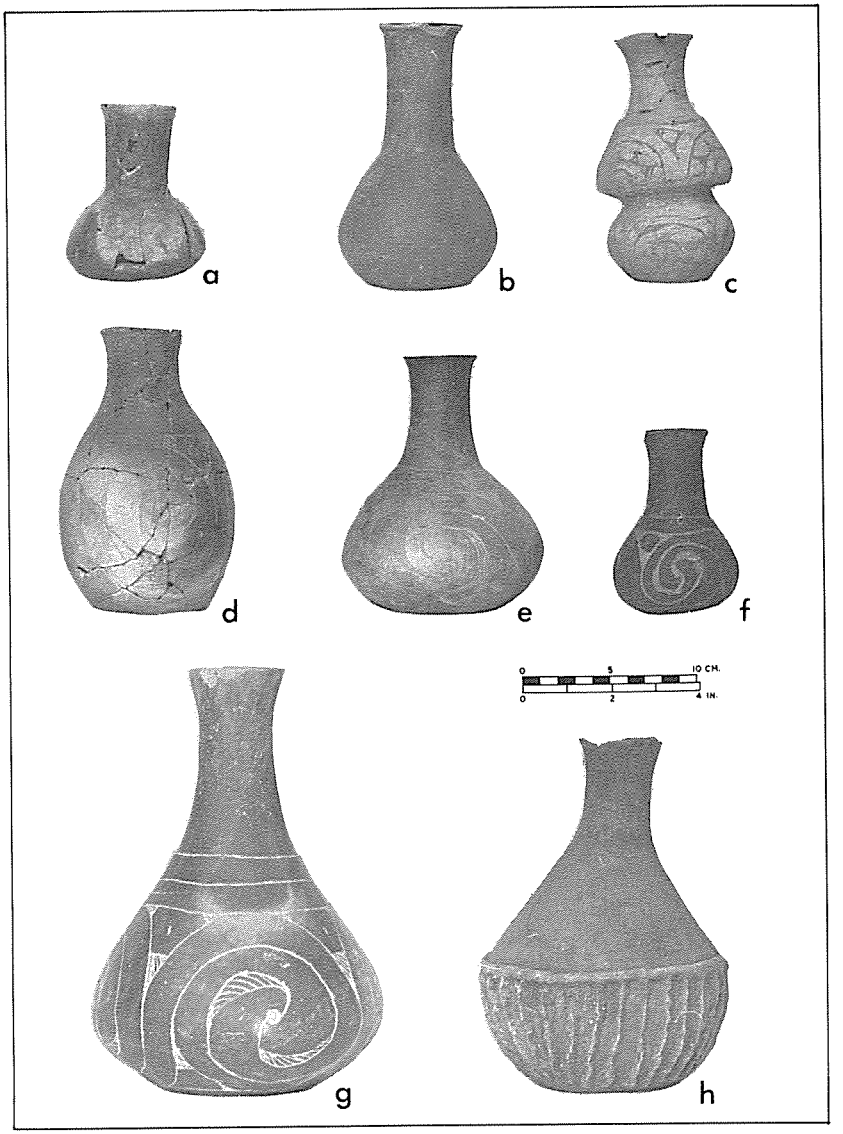


FIGURE 27. *Undecorated and Wilder Engraved Bottles From the Carpenter Site.* a, undecorated, Grave 15; b, red slip undecorated, Grave 29; c, double bottle, Grave 9. d-f, *Wilder Engraved:* d, Grave 31; e, Grave 25; f, red slip, Grave 2; g, Grave 33; h, Grave 32.

appear square in the plan view. Three graves contained vessels of this type. Vessels "c", "d", and "e" are typical of the effigy vessels from this site. All are small vessels with flat tails pointing outward from the bowl. The heads are on the opposite side. In all cases the heads were abstract in form and no identification with a particular animal, bird, or human head could be made. Vessels of this type were in nine graves. Vessels "f", "g", and "h" are rattle bowls. One node of vessel "f" came loose after the vessel was removed from the grave. The node contained several baked clay balls about the size of small peas. Only three graves contained rattle bowls.

In Fig. 29, "a" through "f" picture probable trade vessels which were in the Carpenter graves. Bottle "a" has an orange-tan external coloration (not a slip) unlike all other bottles at the site. The design consists of concentric semicircles and spur-like elements. The drawing of Grave 18 shows this design in better detail. These elements are common on *Avery Engraved* vessels of the Texarkana and McCurain foci, and more often on bowls than bottles. This bottle is probably a trade vessel from the north, either from the Texarkana or McCurtain Focus.

Vessel "b" is classified as *Avery Red* (red slipped) and is like those found in the pit and shaft burials at the Kaufman Site. These graves belonged to the McCurtain component at that site. The description of the artifacts from Grave 23 provides more detailed information about this bottle type.

Vessel "c" from Grave 26 is *Avery Engraved*. It is covered with a red slip and is engraved to expose the buff paste. No pigment was used in the engraved lines. This is a trade vessel from the Texarkana or McCurtain foci.

Vessel "d" is a *Simms Engraved* bowl from Grave 33, a late component grave at the Carpenter Site. This vessel is also an import from the Texarkana or McCurtain foci.

Vessel "e" is from Grave 37. This pot has several characteristics which point to a *Poynor Engraved* classification. *Poynor Engraved* is a Frankston Focus type. The Frankston Focus area is to the south of the Titus area. Further information concerning this vessel is included in the description of the materials of Grave 37.

Vessel "f" from Grave 27 is a large effigy which is completely different in form from those in the nine other graves that contained effigy vessels. This vessel is described more fully in

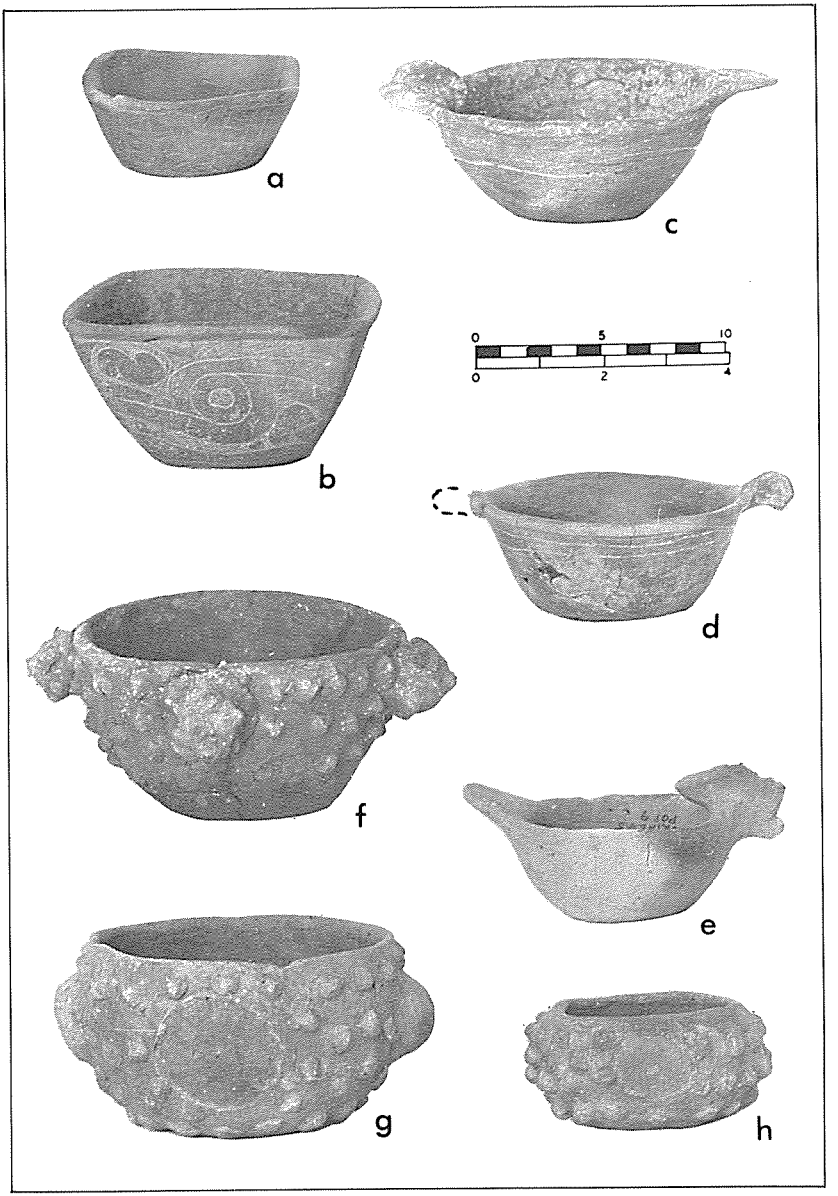


FIGURE 28. *Carpenter Site Effigy, Rattle, and Square Bowls.* a, Grave 45; b, Grave 44; c, Grave 40; d, Grave 4; e, Grave 45; f, Grave 26; g, Grave 7, h, Grave 11.

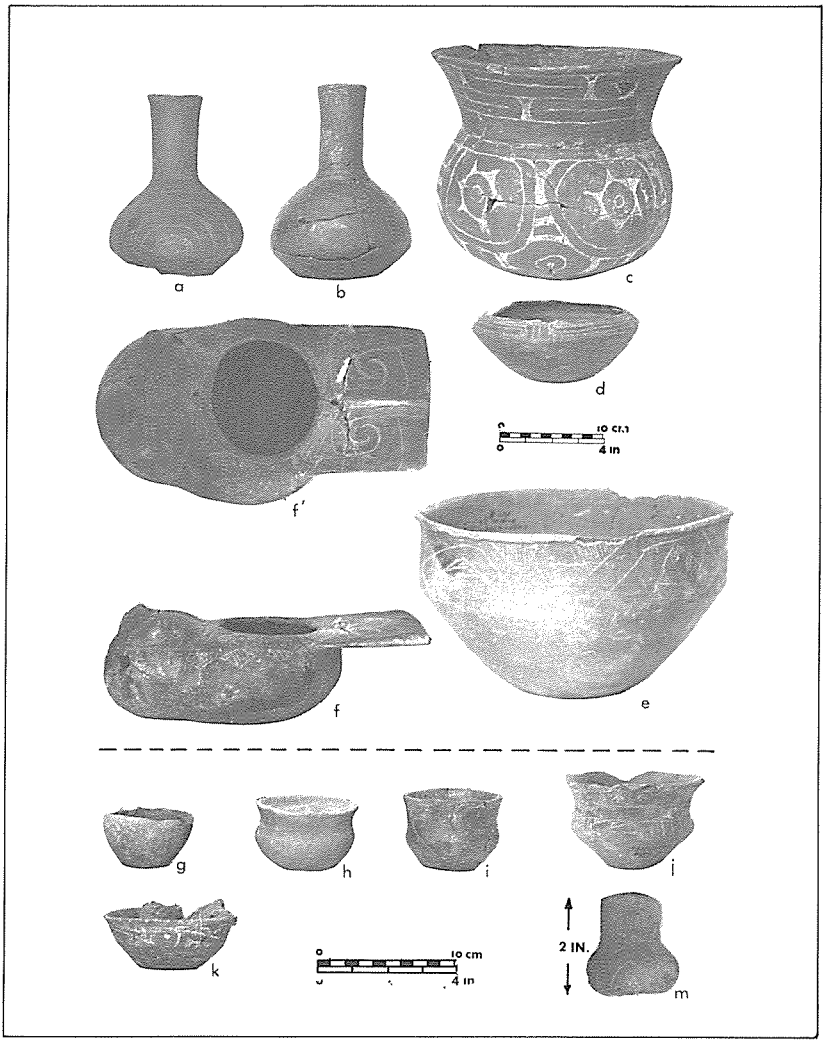


FIGURE 29. *Trade Vessels and Small Vessels from the Carpenter Site.* a, *Avery Engraved*, Grave 18; b, *Avery Red*, Grave 23; c, *Avery Engraved*, Grave 26; d, *Simms Engraved*, Grave 33; e, *Poynor Engraved*, Grave 37; f and f′, large effigy vessel, Grave 27. Small vessels: g, Grave 33; h, contains red pigment, grave 40; i, contains green pigment, Grave 27; j, contains green pigment, Grave 6; k, contains mussel valve, red and green pigment, Grave 26; small bottle from Grave 13.

the description of the contents of Grave 27. It is probably from either the Texarkana Focus or McCurtain Focus.

Vessels "g" through "m" in Fig. 29 are various small vessels from the Carpenter graves. Several of these contained pigment.

Johns Engraved

Johns Engraved is a new pottery type proposed here. The feature which differentiates it from other pottery types is the design motif. This motif in its most easily identified form consists of several bird heads. The engraved bird head is the only known representation of a living creature (other than modeled effigies) depicted on Titus Focus pottery. A variation of the motif employs interlocking hooks, and a third design consists of a combination of the two. These designs are shown in Figs. 30 and 31. The vessels pictured are all *Johns Engraved* pots known at this time.

The definition for *Johns Engraved* is as follows:

PASTE—
Temper: kaolin, bone, or none visible
Texture: compact, not crumbly
Color: shades of buff and gray, both on exterior and in core; fire mottling
Surface finish: fairly smooth, both inside and out on the bowls and just outside on the bottles

FORM—
Wall thickness: 5-8 millimeters
Lip: rounded, rolled outward and smoothed, except on vessel "a", Fig. 30, where it is rolled outward but not blended into the body
Bases: flat to slightly convex
Vessel shapes: bottles, conical bowls, carinated bowls, and jars

DECORATION—
Treatment: engraving; white kaolin may be inserted in the engraved lines
Designs: bird head elements with hooked beak; lines which outline beak may not close (Fig. 30, "d" and Fig. 31, "c"); These elements may be either upright, suspended, or horizontally oriented as in Fig. 30, "b". A hook-like element as in Fig. 31, "d" and "e". Bird head may be used in conjunction with hook-like element Fig. 31, "b" and "c".

CULTURAL AFFILIATION—
A Titus Focus type. So far recognized only in the Carpenter, Johns, and Horton sites in Camp County and the Caldwell Site in Titus County.

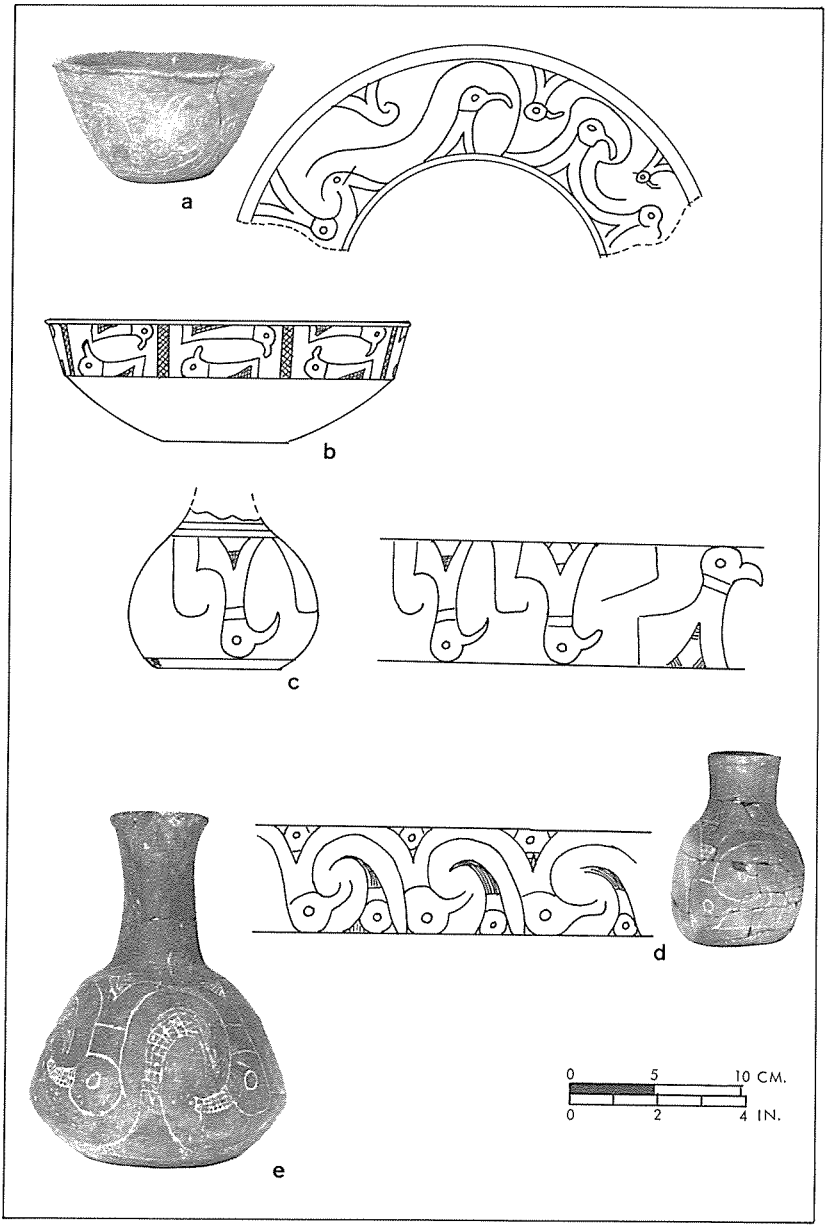


FIGURE 30. *Johns Engraved Vessels.* a, Carpenter Site, Grave 17; b, Caldwell Site; c, Horton Site; d and e, Johns Site.

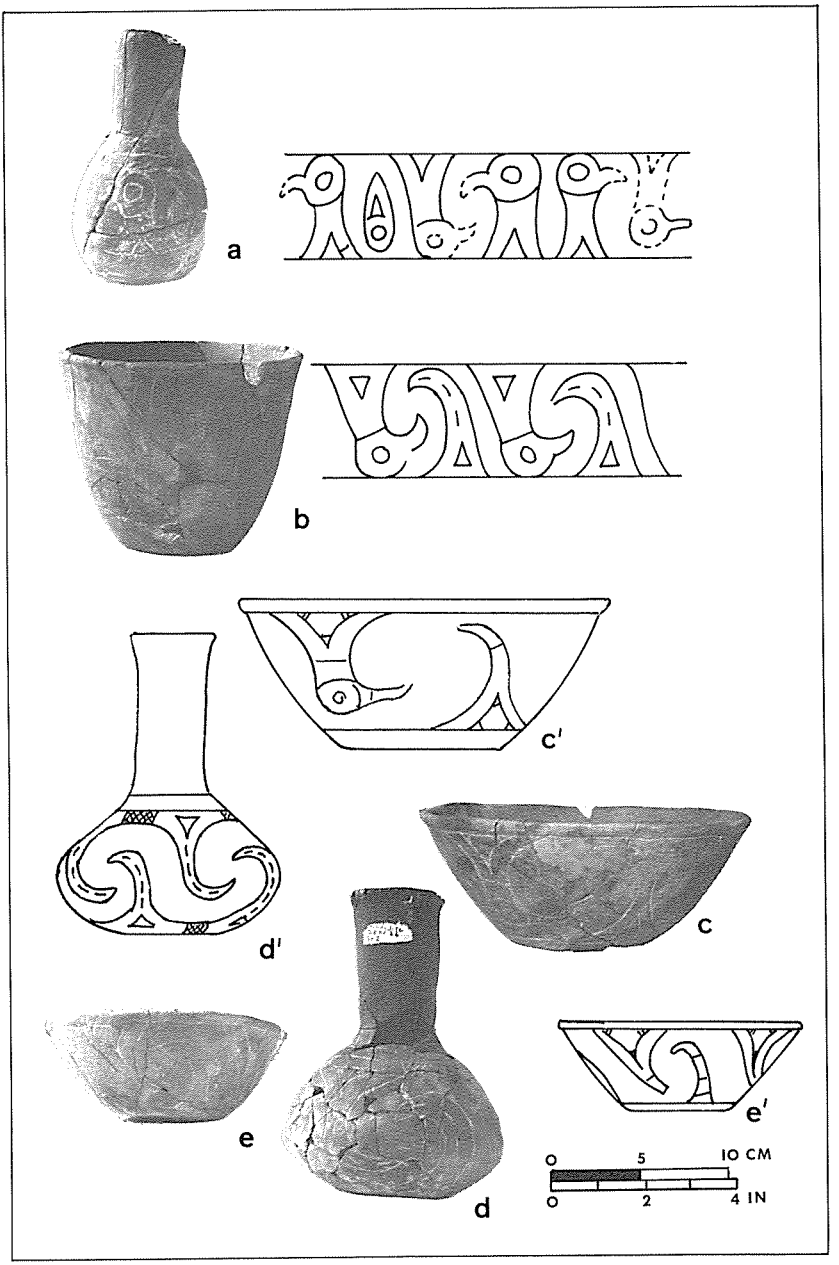


FIGURE 31. *Johns Engraved Vessels.* a-d, Johns Site.

Bone and Shell

Deer ulnae appear to have been placed in the graves as complete pieces. They are not shortened from wear as would be expected if used as flaking tools. Ulnae were in three graves.

Deer mandibles were included as offerings in 10 graves. It has been postulated by various authors that the mandibles may have been used as corn shelling tools or as sickles. Mandibles were found in large compound bowls in Graves 27 and 29 and one in a large cooking vessel in Grave 45. If these vessels had contained corn still on the cob when placed in the graves, presence of the mandible would support the proposition that it was used as a shelling tool. A deer mandible sickle is pictured in Swanton (1942: Pl. 16). This was collected from the Caddo in Oklahoma in historic times. The mandible very likely was used for both purposes.

A nearly rectangular piece of mussel shell from Grave 21 was found at the neck region of the north skeleton of this double burial and may have been mounted as an ornament. A columnella bead from a conch was recovered in Grave 27. Both the mussel shell and conch shell items were previously discussed under Ornamentation.

Stone Artifacts

Fig. 32 illustrates various stone artifacts from the Carpenter graves. Items "a" through "g" are petaloid celts. All are pecked and ground and show considerable battering on the butt end. The bit is finely ground on all except "g". Celt "g" has a very dull bit, apparently from use. The bit of celt "f" had been broken and then reground resulting in the asymmetrical shape. A diagonal hinge fracture which was probably a result of the break is visible in the picture. The material of the celts, probably Ouachita sandstone, is not locally available.

Item "h" is a quartzite stream pebble from Grave 10. It is polished on one surface and shows some use as a hammer stone on another side. Item "i", an abraiding stone of ferruginous sandstone, was associated with a deer ulna in Grave 45. Item "k" is a roughly noded, natural ferruginous sandstone rock with two flat breaks where protuberances had apparently been knocked off. This rock had been placed between the teeth of the individual of Grave 13. Item "m" from Grave 43 is either a utilized biface fragment or a small gouge. The edges and the bit show wear from use. The material of this item is a tan, fine grained quartzite.

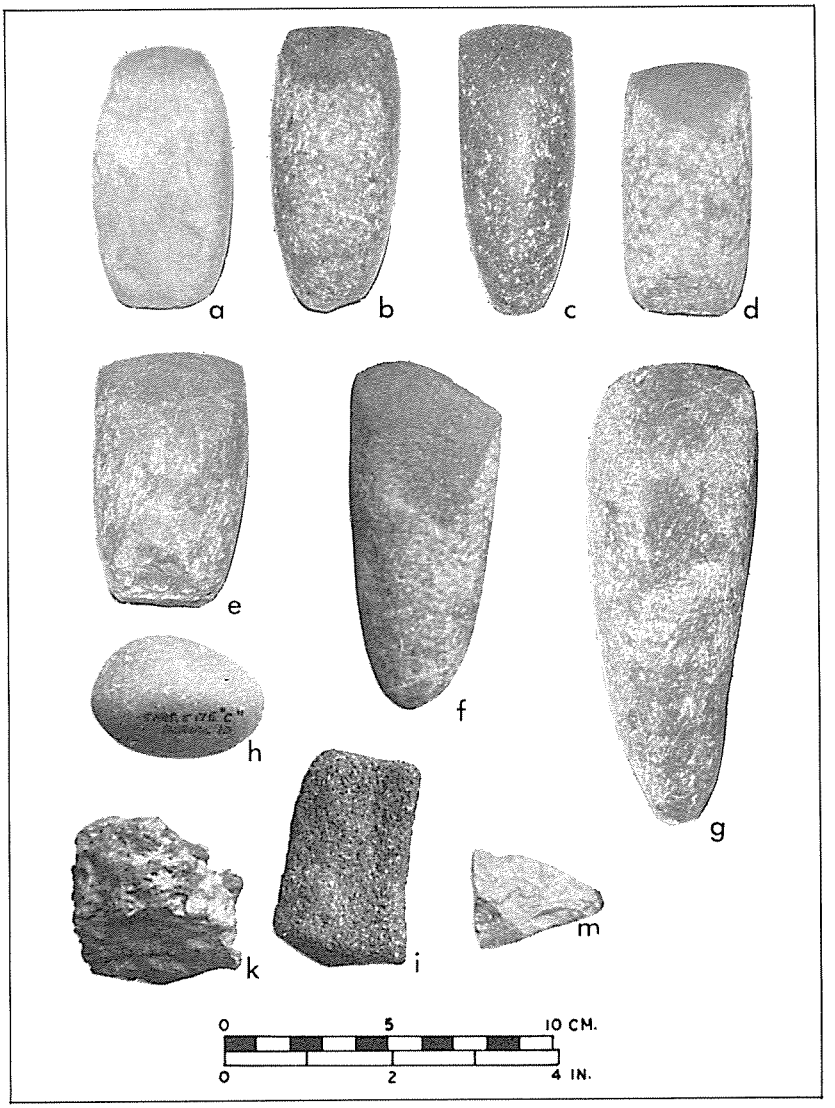


FIGURE 32. *Stone Artifacts From the Carpenter Site.* a-g, petaloid celts: a, Grave 19; b, Grave 21; c, Grave 14; d, Grave 23; e, Grave 15; f, Grave 41; g, Grave 24. Miscellaneous stone items: h, smoothing stone, Grave 10; i, abrading stone, Grave 45; k, stone from mouth of skeleton, Grave 13; m, gouge or broken biface, Grave 43.

THE RELATION OF THE CARPENTER SITE TO OTHER TITUS FOCUS SITES

A proposed temporal position of the Carpenter Site components with respect to other Titus Focus sites is indicated in Fig. 33. In arranging the sites in this sequence, several factors were considered. First, the assumption was made that some sites were probably contemporary with others, some earlier in time, and others later. In relating one site to another, pottery was compared by classification, selected vessel shape, bottle type and shape, selected carinated bowl decorative motif, and selected design elements. Arrow point types were also used in the analysis. These characteristics are all listed in Fig. 33.

The pottery types are grouped by the foci with which they are primarily associated. Generally, at a given site, the presence of pottery types other than those which are major Titus Focus types, would indicate trade or contact between foci.

To establish which pottery types or vessel forms in Titus Focus were the most recent, Titus Focus vessels were compared with vessels from four historic and one proto-historic site. These sites are the top five in Fig. 33. The top four are sites which contained some artifacts of European manufacture in the graves. The fifth, the Hunt Site, contained no European artifacts, only those of Indian manufacture which were nearly identical to those from the Clements Site. These two sites are discussed by Suhm, *et al.* (1954: 225).

The Slade and Brown Sites (Webb, *et al.*, 1969: 8) are located in southern Harrison County and the Clements and Hunt sites in Cass County. These sites are all near the Titus Focus area in Northeast Texas. They are not part of the Titus Focus but are Indian cemeteries of a later period. No historic cemetery site or sites which contained artifacts of European manufacture have been reported within the Titus Focus area proper.

The earliest known sites which can be included in the Titus Focus are those of the Whelan Complex. These sites are near the bottom of the list in Fig. 33. In the two bottom positions are the Adkins #1 and W. O. Reed sites. These are Fulton Aspect cemetery sites which are located in the Titus Focus area (Fig. 2) but most likely precede or are contemporary with the Whelan Complex. They do not exhibit enough Titus Focus characteristics to be placed in the Focus.

In addition to establishing early and late pottery types to aid in determining the relative temporal position of the Titus Focus sites, a yardstick was needed to relate the arrow point types from the sites. For example, some Titus Focus sites contained only *Talco* points (triangular), some only stemmed points, and some (like Carpenter) a mixture of point types. If one of these styles (stemmed or triangular) is clearly older than the other in the Titus Focus, and if it can be established what the relative age is, then another means to place the sites in a temporal order would be available.

To establish this relative age, percentages of arrow points from graves, middens and other features of other caddo sites were calculated. Detailed data on these analyses and calculations could not be presented here, but are on file with the author and the Texas Archeological Research Laboratory, Austin. Those sites and foci studied include both the Gibson and Fulton Aspect periods. Fig. 15 shows the geographical location of the various foci with respect to the Titus. The data for arrow point analysis also includes materials from the Davis Site (Alto Focus); see Newell and Krieger (1949) and Story (1972). Information for Mound A at Gahagan was supplied by Dr. Clarence H. Webb.

The reader may be unfamiliar with several of the arrow point types from the Craig Mound of the Spiro Focus. All of these points are stemmed, or side or corner notched with the exception of one *Fresno* point.

At the opposite end of the time scale, during Caddo V or historic times, the triangular points were much in evidence. The *Turney* point was present in the Allen Focus and the *Fresno* point was by far the most popular form with the peoples who composed the Norteño Focus.

It is apparent from the analyses that in the Caddoan area the stemmed and notched points precede the triangular points in time. With this as a guide, it is then logical to assume that the Titus Focus sites where stemmed points are present and triangular points absent are older than those where the triangular point was the predominant type.

Thus, early and late arrow point styles have been established. The Whelan Complex and its pottery styles have been established as the lower boundary (or earliest sites) and nearby historic sites and their pottery as the upper boundary.

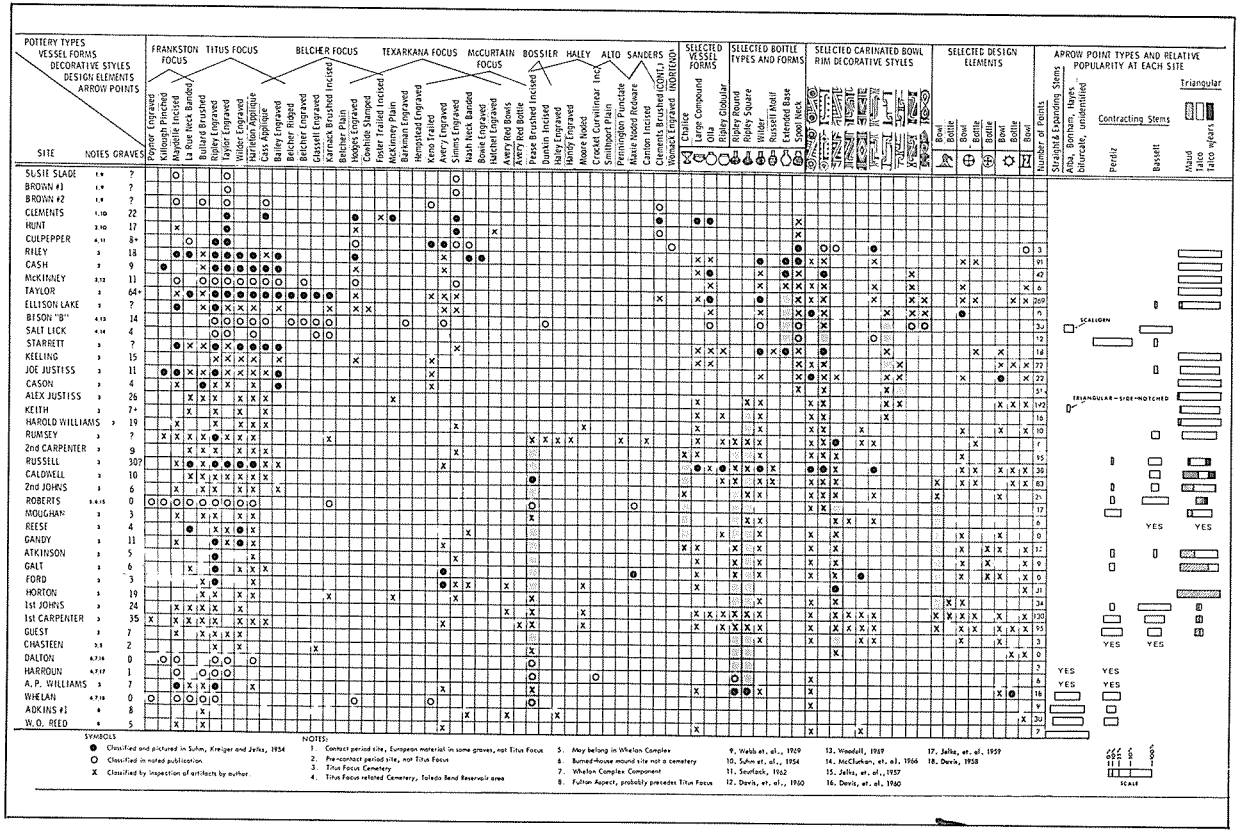


FIGURE 33. *A Proposed Temporal Arrangement of Titus Focus Sites.*

Therefore, the remaining task is to order the Titus Focus sites within this framework.

To start site ordering, pottery types and vessel forms from the historic sites were matched with similar types from Titus Focus sites. In particular, Titus sites containing spool-necked bottles and *Taylor Engraved, Hodges Engraved, Simms Engraved,* and *Clements Brushed* pottery were placed at the top of the list. This, then, established other similarities between these Titus sites such as the *Bailey Engraved* bottle and the bottle with extended base. The pendant triangle carinated bowl decorative motif, the scroll motif, and the two motifs at the far right of the "rim decorative style" section are other similarities. In addition, the arrow points from the graves were nearly completely of the *Talco* type except for the Bison "B" and Salt Lick sites which will be discussed later.

It is the author's belief that when an intricate design or unique artifact form from one site appears as a minor type or part of the assemblage of another, a close correlation in time between the two is implied. This is based on the assumption that the design or artifact actually had to be seen before it could be duplicated. Trade between groups of people would also account for its spread. In either case, contemporaneity may be assumed. Examples of this are: the four carinated bowl, decorative motifs at the right of the panel; the bird head; the completely encircled cross design elements; or the chalice vessel form.

In addition to working backward in time from the historic pottery types, sites were correlated forward in time from the Whelan Complex characteristics. Two main items used for correlation were *Pease Brushed Incised* pottery and the earlier arrow point types. This correlation then established the classic round and square *Ripley Engraved* bottles, the triangular design on carinated bowls, and *Perdiz* arrow points as continuing characteristics.

With the early Johns and Carpenter site components, *Bassett* and *Maud* points came into the picture with *Perdiz*. The Johns site was divided into early and late components as was the Carpenter Site. These components are noted on this chart (Fig. 33) as 1st and 2nd Johns or Carpenter.

The shaded strips are intended to emphasize the beginning and end of various traits and the grouping of sites where these traits were present (see Fig. 33).

In any comparison of this sort, it becomes apparent that certain decorative styles, pottery types, or design elements extend throughout the time span represented by these sites. Some were limited in popularity, evolved somewhere along the way, or were perhaps only regional in extent.

Examples of items other than pottery types that span most of the Titus Focus time period are: large compound bowls; bottles of *Wilder Engraved*; the scroll design on carinated bowls; the encircled cross element (where the cross touches the circle); the sun symbol element; and the "s" element.

The pendant triangle rim design on carinated bowls is an example of a style which evolved and became more popular with time. The encircled cross element where the cross does not touch the circle is an example of a regional characteristic. The sites where this element was present are on the western fringe of the Titus area.

The Bison "B" and Salt Lick sites are reported by Woodall (1969), and McClurkan, *et al.* (1966), respectively. These sites were located in the Toledo Bend Reservoir area on the Sabine River approximately 75-80 miles southeast of the Northeast Texas Titus Focus area. Fig. 15 shows this location. In the figure the encircled area is noted as Titus Related. In addition to these two sites that included graves, the Goode Site (Woodall 1969) in the same reservoir area produced over 8000 sherds but no graves. Pottery types identified by Woodall included *Ripley Engraved, Poynor Engraved, Hodges Engraved,* and *Belcher Ridged.* Three (possibly four) *Perdiz* points represented the total number of arrow points. Among the *Ripley Engraved* sherds from carinated bowls from the Goode Site are excellent examples of the pendant triangle, scroll, and triangular motifs common in the northeast Texas area.

Clearly, the Toledo Bend Reservoir sites are related to Titus, even though there are many differences. In addition to differences in grave direction, (feet to the notheast to north in Toledo Bend as opposed to westerly in northeast Texas), Toledo Bend ceramics exhibit a much higher percentage of bone temper than does the northeast Texas Titus Focus pottery (Woodall 1969: 11, 48). Still other differences include the cooking vessel types which are more closely allied to Belcher Focus that to Titus. The *Ripley Engraved* carinated bowls of the Bison "B" and Salt Lick sites are consistently smaller in size than those in northeast Texas

although they incorporate several of the carinated bowl design motifs. Both of these sites produced shallow burials with flexed skeletons and numerous offerings. Flexed skeletons are a feature held in common with several Angelina Focus sites (Jelks 1965). The *Wilder Engraved* bottles of the Bison "B" site, small *Taylor Engraved* bottles from the Salt Lick site, and one particular *Harleton Applique* vessel from the Bison "B" Site are all indistinguishable from their counterparts in northeast Texas.

In placing these sites in the temporal sequence, the pottery similarities were used and the arrow point types were ignored. Justification for this is based on the belief that the arrow point tradition in this area is akin to the Angelina and Belcher foci where the point types were stemmed rather than to Titus where a change to triangular occurred.

From inspection of Fig. 33, it may be noted that the Rumsey Site is characterized by both Titus Focus and Gibson Aspect pottery. In placing the site within the Titus Focus, only the Titus Focus pottery types were considered. This site is represented only with a collection of pottery, and no information rearding the graves is available. Obviously certain graves at the Rumsey Site represent an older time period than Titus.

In the site sequence it should be remembered that two different types of sites are included. The cemeteries provided complete vessels and arrow points in direct context. The Whelan Complex sites did not contain graves except for the Harroun Site where one was found. The artifacts, sherds and points, used in the ordering of this complex's sites were acquired from the general site excavations. The Roberts Site, which included a mound built over a burned structure, also produced *Pease Brushed Incised* sherds. Both traits are found in the Whelan, Harroun, and Dalton sites and characterize the Whelan Complex.

The artifacts from the Roberts Site were mostly surface finds from a nearby midden area. They included triangular arrow points and carinated bowl rims with pendant triangle design. These indicate a later time period than the Whelan Complex. The Roberts Site was placed in the sequence based on these artifacts.

If the artifacts and the mound at the Roberts Site were contemporary, this would imply that erecting mounds over burned structures existed later in the Titus sequence than

originally thought. On the other hand, the artifacts, or at least part of them, may represent a superposition of later artifacts over those coeval with the mound. Additional excavation will be needed to establish the real relation between mound and midden at the Roberts Site.

At several Titus Focus sites, there were graves present which differed in character from the norm. The Bison "B" and Salt Lick sites contained shallow, flexed burials with few or no grave offerings as well as the deeper graves with extended skeletons. At the Salt Lick Site, it was postulated by the excavators (McClurkan, *et al.*, 1966: 56) that these graves indicates a "difference of social status: either a caste system within the tribal unit or slavery."

At the Harold Williams Site, at least four shallow graves contained extended skeletons and no grave offerings. The skeletons were oriented one each with head to the east and west and two with head to the north. This is in contrast to the consistent head to east and feet to west of the nearby (30-40 feet) Titus Focus cemetery. As no artifacts were present in the shallow graves, there was no way of determining whether they preceded, were contemporary with, or followed the Titus Focus cemetery in time.

At the Ford Site, shallow graves which contained no vessels to three pottery vessels and/or crude stone work were at the same location as the Titus Focus graves. One Titus grave had cut through one of the shallow graves. These shallow graves were described as Farrar type burials by the site excavator (Goldschmidt 1935). The Farrar Site nearby (within a mile or so) yielded similar graves. Apparently, these graves predated the Titus Focus burials.

Also, the Rumsey Site included both Gibson Aspect and Titus Focus vessels. Based on this fact, it may be inferred that both Gibson Aspect and the later Titus Focus graves were present. It is interesting to note that Indians of different time periods chose identical locations for their graves.

A feature of the older sites in the arranged sequence concerns the infrequency of carinated bowls in the graves. The single grave at the Harroun Site contained but two vessels, one a bottle and one a compound bowl with peaked rim. At the A. P. Williams Site, there was less than one carinated bowl per grave. At the Chasteen Site, there was a total of only three carinated

bowls in two graves. In both the Adkins #1 and W. O. Reed sites, this form was represented by only a minor percent of the vessels. The popularity of this vessel form as an offering increased as time passed.

DATING THE CARPENTER SITE

Two sources provide information for dating the Carpenter Site late component graves. The first is a radiocarbon date of A.D. 1590 ± 60 years (Tx-666) which was provided by The University of Texas at Austin Radiocarbon Dating Laboratory. The date was obtained from the three small charred logs of Grave 10.

The second source of information is based on inference and concerns the "chalice"-like vessel of Indian manufacture of Grave 33, Fig. 34. Fig. 34 shows two additional stemmed vessels—one from the Johns Site and one from the Gandy Site. The vessel from the Gandy Site was first pictured in an article by A. T. Jackson (1938) entitled "Fire in East Texas Burial Rites". The spoon-like artifact of pottery shown in the figure came from the same grave at the Johns Site as the "chalice." This is the only artifact of this type known by the author to be associated with the Titus Focus.

A search in the published archeological literature concerning Texas and bordering states has failed to disclose vessels with true stems like those of Fig. 34. Inquiries concerning similar vessels in the collections of the Gilcrease Museum and the University of Arkansas have also failed to disclose duplicates. The vessel from the Gandy Site is the only vessel of this type in the collections of the Texas Archeological Research Laboratory.

Stemmed vessels can be accounted for as either a spontaneous development within the Titus Focus or a duplication of an existing form. The latter event is more likely since no other vessel shapes appear to be unique to Titus Focus. As this vessel form is apparently not a trait of contemporary or prior foci, the possibility exists that the vessel or vessels which engendered the idea were of European manufacture. It should be remembered, however, that no Titus Focus sites have contained artifacts of European manufacture.

After considering various possible contacts between the Indians of this region and Europeans, the De Soto expedition led by Moscoso into Texas appears the most likely contact. After

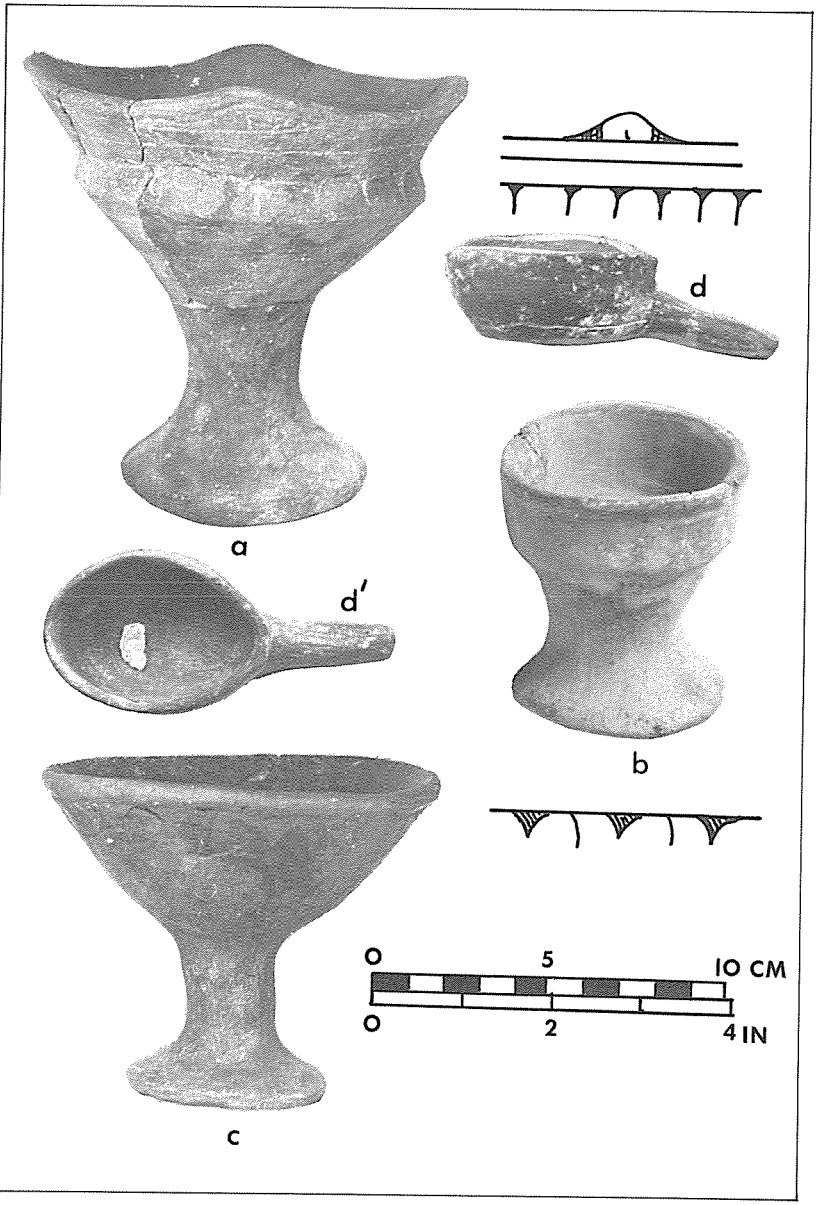


FIGURE 34. *Stemmed Vessels and "Spoon" From Titus Focus Sites.* a, d, d', Johns Site, Grave 18; c, Carpenter Site, Grave 33; b, Gandy Site.

landing in Florida in 1539, the expedition wandered through the present southeastern states. The group which entered Texas in 1542 consisted of approximately 350 Europeans (a decrease from the 600 who started the expedition) and 500 or more Indian slaves. Their entrada into Texas was an attempt by the surviving members of the expedition to reach present day Mexico. After penetrating deep into Texas, they gave up their plan to reach "New Spain" by land and retraced their path to the Mississippi River.

The stemmed vessel from the Carpenter Site has been called a chalice because of its close resemblance to the chalice as used in the Mass. However, it is unlikely the people of the Titus Focus would see this object. Both Swanton (1939) and Castaneda (1936: 121) report that in a battle with the Indians in October, 1540, at Mavilla (Mobile)

> they lost all their clothes they brought with them, the pearls they intended to send to Cuba, the bandages and appliances of their only surgeon, and, worst of all, the chalices, the altar decorations, the priest's robes, the wine, and the wheat flour reserved for the service of the Mass and all their powder.

Even if all the chalices of the Mass were lost, stemmed wine-glasses, stemmed cups, or stemmed goblets were probably still in the possession of individuals during their excursion into Texas and it is assumed that these vessels were seen by the Indians. Also, spoons belonging to the expedition members could have been seen by the Indians.

Historians differ on the route followed by the De Soto expedition in Texas as well as in other states. Fig. 35 shows the proposed routes in Texas as defined by Castaneda (1936) and Swanton (1939). The Castaneda route actually passed through present day Camp and Franklin counties where the Carpenter, Johns, and Gandy sites are located. Additional circumstantial evidence that the Castaneda route may be closer to the one actually followed than the route proposed by Swanton is provided by a major fragment of a chain mail gauntlet found near Dallas. It was exhibited and discussed by W. W. Crook at the annual meeting of the Texas Archeological Society in Fort Worth in 1957. Since 1957, an additional artifact of European manufacture and several Indian artifacts which could have been associated with this expedition have been found in Dallas.

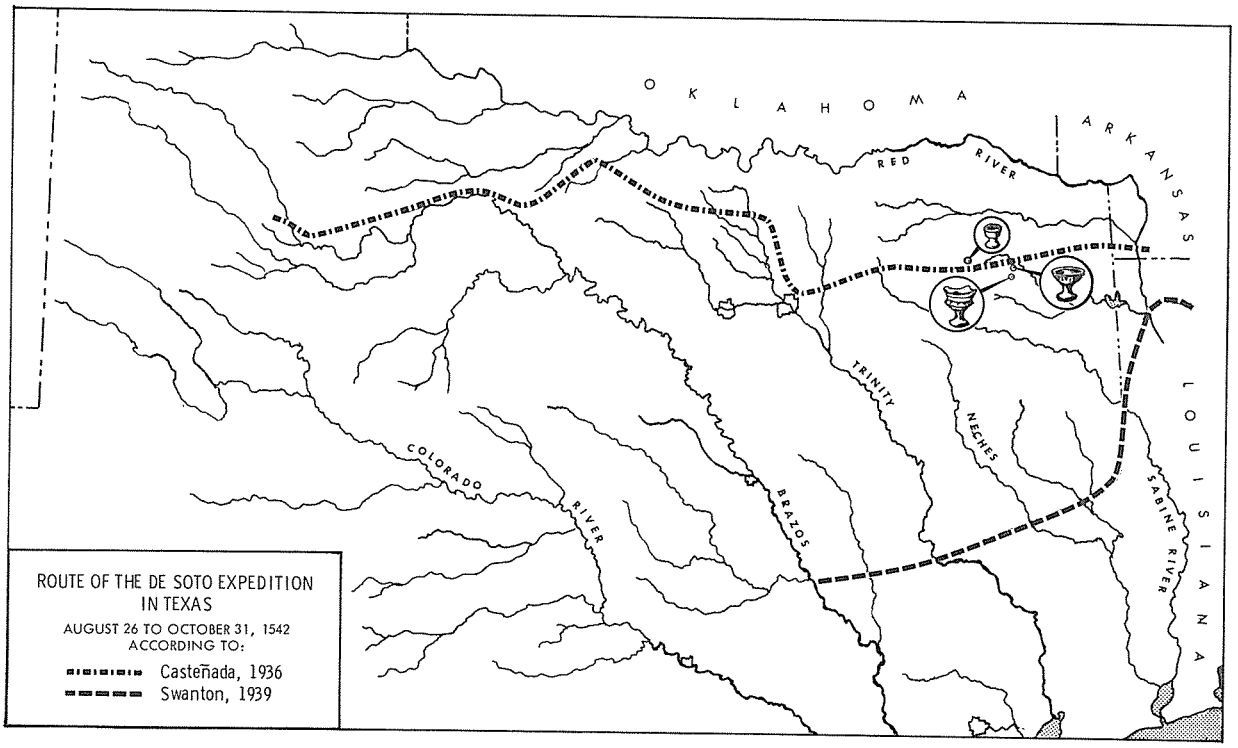


FIGURE 35. *Two Proposed Routes of the De Soto Expedition (Led by Moscoso) in Their Attempt to Reach New Spain by Land.*

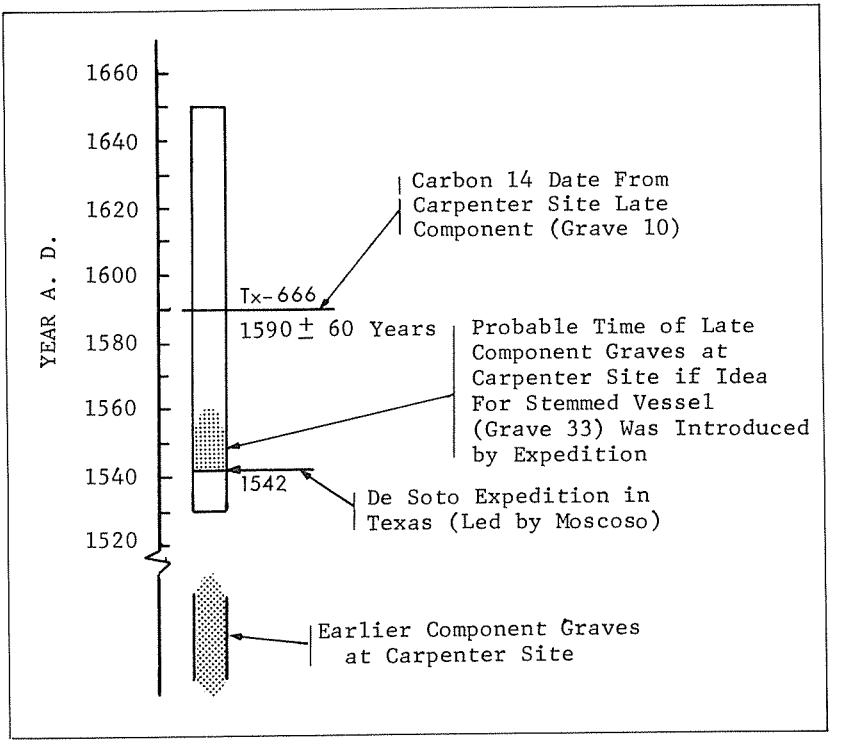


FIGURE 36. *Relation of Radiocarbon Date, De Soto Expedition Date, and Probable Date of the Carpenter Site Late Component Graves.*

If the expedition led by Moscoso (who became the leader after De Soto's death) did, in fact, pass through the region occuped by the Titus Focus people, and if the idea for the stemmed vessels did originate from vessels carried on this expedition, an additional time marker is available for the Carpenter Site late component graves.

Fig. 36 shows in graphical form the overlap of the radiocarbon date with the time of the expedition and the probable time period of the Carpenter Site late component graves. The earlier graves at the site are represented by a shaded region on the chart.

As the later component graves at Carpenter did not overlap or encroach on the earlier ones, the people who selected the locations of the late component graves must have been aware of the earlier

graves. Some form of marker must have been present such as depressions in the ground or small mounds marking their locations. Wooden markers or piles of brush may have been employed. No grave markers of any sort were found at the Carpenter Site. Therefore, markings, if present, must have been with material that eventually deteriorated. One grave at the Johns Site had a post mold near the right shoulder region of the person interred. Whether this represented a marker or part of a structure unrelated to the grave is unknown at this time.

The time period between the early and late components at the Carpenter Site had to be long enough for the popularity of the pendant triangle rim design to reach full flower and for the Talco arrow point to become the most popular type. Just how long this time period would be in years is impossible to say with any accuracy. Based on what few clues are available, it is estimated that the early graves preceded the late component graves by no more than 50 years, and probably less.

CONCLUSIONS

The Carpenter Site

1. The Carpenter cemetery is attributed to peoples of the Titus Focus.
2. The graves were placed during two different time periods with an unknown member of years separating these periods.
3. The individuals had been placed in the graves in a supine position with head to east and feet to west. The position of the setting sun may have been the determining factor in grave alignment.
4. If the "chalice"-like vessel of Grave 33 was engendered by stemmed vessels of the De Soto expedition, the late component graves would probably date from near A.D. 1542.
5. *Perdiz* and *Bassett* arrow points were placed in the earliest graves, with *Maud* points coming later in time, and *Talco* points last. The stemmed points were not abandoned but continued into the latest period.
6. Carinated bowls with a pendant triangle decorative motif were popular during the time period of the late component graves. This style had apparently not yet developed during the time period of the early graves.

7. Male and female graves both contained arrow points. Male graves usually contained larger quantities however.
8. *Wilder Engraved* bottles continued as a popular type from the early to the late component period.
9. Classic *Ripley Engraved* bottles were popular in the early period but were not present in late component graves.
10. Deer mandibles and potters clay were almost exclusively associated with female graves, pipes and evidence of fire with male burials.
11. Graves containing two individuals were present among the early component graves.
12. Ear ornaments, though not common, were present in male graves more frequently than in female burials. More were in the late component graves than in the earlier.
13. Copper was present in the form of a copper plate mounted on one face of a sandstone earspool. Traces of copper were present on fragments of wooden cymbal shaped ear or headdress pendants.
14. Trade vessels from the Texarkana and/or McCurtain foci were present in several graves. A single vessel of *Poynor Engraved*, or a replica thereof, indicates contact with Frankston Focus people.
15. Beamers of deer cannon bone, which have previously been considered a Plains Indian trait, were present in one grave in association with a gouge.

The Titus Focus

Conclusions concerning the Titus Focus are, for the Whelan Complex, based primarily on the Harroun Site report (Jelks and Tunnell 1959), the manuscript report on the Whelan Site (Davis 1958), and the summary of the Whelan Complex by Davis (1970). For the cemeteries: field notes, artifacts, or published reports concerning each site have been studied.

1. The time span of the Titus Focus encompassed at least part of both the Caddo III and IV periods.
2. The earliest presently known sites which may be included in the Titus Focus, or as directly ancestral to it, are those of the Whelan Complex of the Caddo III period.

3. Principal overlap of radiocarbon dates for the Whelan complex sites was between A.D. 1450 and 1550 and possibly 1650. Based on the probable date of the late component graves at the Carpenter Site (1540's), the author believes the Whelan Complex sites could not be as late as A.D. 1550.
4. Whelan Complex and other early Titus Focus sites contained sherds or vessels of *Pease Brushed Incised* pottery, a type associated with the Bossier and Haley foci. This vessel type disappeared as a recognizable type in later sites.
5. One or more of the Whelan Complex type sites contained sherds of Titus Focus pottery types: *Maydelle Incised, La Rue Neck Banded, Bullard Brushed, Ripley Engraved,* and *Taylor Engraved.* Titus Focus vessel types not identified in the Whelan Complex type sites which were present in later sites were *Wilder Engraved, Cass Applique,* and *Bailey Engraved.*
6. The trait of erecting mounds over burned structures, as in the Whelan Complex, may have persisted into later Titus Focus times; this has not yet been demonstrated by archeological evidence.
7. During the time span of the Titus Focus, arrow point types changed. During the Whelan Complex period, types included only stemmed forms: *Alba, Bonham, Hayes, Perdiz,* and a bifurcate-stem type. Following these came *Perdiz* and *Bassett* with occasional *Maud* points. Triangular point types, *Maud* and *Talco,* then increased in popularity as *Perdiz* disappeared. In the last period, *Bassett* and *Maud* decreased in popularity as *Talco* emerged as by far the predominant type.
8. Titus Focus burials in Northeast Texas were with the individual supine, head to east, and feet to west with most graves oriented south of west and within the range of seasonal variation in the point of sunset.
9. Graves usually contained only one person. At only two sites, Ford and Carpenter, were graves present with other than one person. Graves containing two individuals were present at these sites; two graves at Carpenter and one at Ford.
10. The Titus Focus people left northeast Texas before goods of European manufacture reached the area. Through native trade, easily carried material such as iron knives and glass beads could have been expected to reach the region by the early 1600's (Suhm, *et al.* 1954: 218).

11. The presence of Titus related people in the Toledo Bend area is the first archeological evidence of a dispersal pattern of those from northeast Texas.

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The property where the site was located was owned by the late Mrs. Tuck Carpenter and was administered by her niece, Mrs. Alice Parker. During the time of the excavations, the land was leased to Mr. Oren Reeves. Permission granted by these individuals to conduct these excavations is gratefully acknowledged.

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Radiocarbon Chronology of Sites in the Central Brazos Valley

FRANK H. WATT

ABSTRACT

Two sites in the Central Brazos Valley of Texas, Horn Rock Shelters nos. 1 and 2, provide a stratigraphic sequence of projectile point types and associated materials that is supported by radiocarbon dates. The earliest dated type is the *Brazos Fishtail* point, associated with crude scrapers, with uncorrected radiocarbon dates about 8000 B.C. *Plainview* points are higher, with uncorrected dates about 7000 B.C. The Brazos Fishtail and Plainview assemblages represent the first well-dated Paleo-Indian components in this area. There follows a gap in the sequence, *Pedernales* points being next with corrected dates about 2000 B.C. Above them are *Marcos* points, about 500 B.C., and finally *Perdiz* points about A.D. 1300.

INTRODUCTION

This paper reports radiocarbon dates from components ranging in age from earlier than 8000 B.C. to about A.D. 1400 in the Central Brazos river valley of Texas. It provides the first firm chronological evidence for Paleo-Indian occupation of the valley.

The Central Brazos is that portion of the valley between the junction of the Clear and Salt Forks near Graham, forming the main stream of the Brazos, and the mouth of the Little River below Waco (Fig. 1). The Little River carries also the discharge of the Leon River, in whose valley Paleo-Indian materials have been dated (Watt 1961). The Leon was the main stream of the Brazos in the Pleistocene Epoch, until the Clear Fork pirated its headwaters and the Leon became a tributary (Lewand 1969).

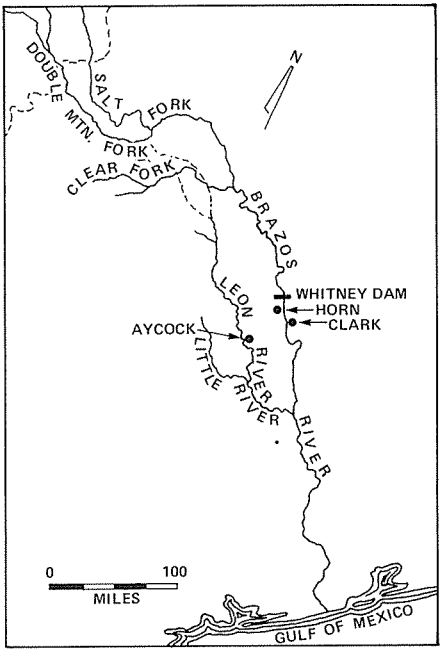


FIGURE 1. *The Brazos and Leon Rivers, with Locations of Sites Mentioned in the Text.*

THE SITES

Most of the dates reported here are from two sites, Horn Rock Shelters nos. 1 and 2, below Whitney Dam on the Brazos River. Two of the dates are from the Aycock Shelter and the Clark Midden, farther down the river. The stratigraphy of the sites is reviewed briefly here, with reference to the radiocarbon dates presented in a later section.

Horn Rock Shelter no. 1. This site is numbered 39B5-48 in the author's records and 41 BQ 47 in the files of the Texas Archeological Research Laboratory at the Balcones Research Center of The University of Texas at Austin. It is a recess in a bluff overlooking the Brazos, and is about 50 feet long and 20 feet deep. Excavations beginning in 1960 by the author and associates have explored 8 ft. of stratified fill but have not reached the floor of the shelter.

The top three feet of sediments in the shelter were sterile red alluvial sands. They lay on a surface, the top of a midden deposit,

In the lower part of the red alluvial sands was a lens of cemented red sandstone, adhering to the bottom of which were several *Plainview* points. Date #11 belongs stratigraphically to this level.

Under the red alluvial sands was a deposit up to five feet thick (and in places more), consisting mostly of gray roof spalls. Dividing this stratum into upper and lower parts was a layer of calcified limestone two inches thick. Dates #14 through #17 were from the upper part of the gray cave fill, in which occurred artifacts of the "Crude Scraper Culture" (described above in connection with Horn Shelter no. 1), *Brazos Fishtail* points, and a double burial in a rock-covered pit. *Brazos Fishtail* points (Fig. 7), a new form described here for the first time, have wide lanceolate blades and short expanding stems with small rounded ears. The bases are concave, and flakes have been removed upward from the base, producing a peculiar fluting, The range of dimensions is: length, 35 to 70 mm.; maximum width, 26 to 34 mm.; width of base, 22 to 26 mm.; maximum thickness, 6 to 7 mm.

In the lower part of the gray cave fill were several lenses of red sand, in one of which was a fragmentary *Folsom* point. In another such lens near the bottom of the unit (see Fig. 8) were charred bones, dart points of an unidentified fishtail form (Fig. 4, b) different from the *Brazos Fishtail,* and a stone discoidal of the same material, three inches in diameter.

At the bottom of the gray cave fill were the bones of a large testudinate turtle, probably *Geochelone* or *Gopherus*, from which Date #19 was determined (see Fig. 8).

Below the gray cave fill was a 6-inch layer of washed river gravels containing animal bone fragments and a human tooth. The gravels overlay four inches of heavy red clayey sand that rested on the floor of the shelter.

In terms of projectile point sequence, we can see five dated horizons in Horn Rock Shelter no. 2. From latest to earliest they are: (1) *Perdiz* points in the upper red alluvial sands; (2) *Marcos* points lower in the same sands; (3) *Pedernales* and *Gary* points in the lower part of the same sands; (4) *Plainview* points in a calcified red sand layer; (5) *Brazos Fishtail* points in the upper part of the gray spall stratum. As will be seen, the radiocarbon dates support this sequence. The points in the lower part of the gray spall stratum are not dated, although the bone date from

on which the sample for Date #1 (see "The Dates," below) lay.

At a depth of approximately five feet the deposits were uniform Archaic deposits. Dates #6 and #9 came from these deposits.

A stratum of calcified sand, in which two *Plainview* points were found, sloped southward from 50 to 90 inches below the surface over a distance of 35 feet. It varied in thickness from six to 15 inches. Dates #12 and #13 apply to this stratum.

Below the Plainview stratum was the earliest occupational stratum in the shelter, containing crude flake scrapers of blue-gray chert with a greenish undertone and a grainy patina. The scrapers varied in dimensions from about 4 x 6 cm. to 7.5 x 12.5 cm., the maximum thickness being about 1.3 cm. The author has called this scraper assemblage at Horn no. 1 the "Crude Scraper Culture" (Watt n.d.). Date #18 came from this stratum.

Horn Rock Shelter no. 2. This is site 39B5-55 in the author's records and 41 BQ 46 in the files of the Texas Archeological Research Laboratory. Like the near-by Horn Rock Shelter no. 1, it is a recess in a bluff overlooking the Brazos. It is about 150 feet long and 25 feet deep, with a ceiling about 13 feet high. Originally it contained more than 25 feet of sediments. It has been under investigation since 1960 by the author and his associates.

Some 90 inches of the highest sediments in the shelter had been removed during the past century in connection with the use of the shelter as a residence by an Anglo-American. At the back of the shelter a yellow clay deposit survived.

More than 48 inches of red alluvial sands made up the next lower unit. Lenses of gravel and cemented red sandstone occurred within this stratum. From near the top came Date #2, at a level also containing *Perdiz* points. Stratigraphically lower, under a large slab of roof fall, were Dates #4 and #5, associated with *Marcos* points. Still deeper were Dates #7 and #8, associated with *Gary* and *Pedernales* points and bone fishhooks.

In much of the shelter the division between Paleo-Indian and Archaic deposits was not sharp, but in one place there was an eroded remnant of Paleo-Indian deposits, from the surface of which came Date #10, representing the beginning of the Archaic occupation. There were no diagnostic materials in association. In terms of projectile point styles, there appears to be no Early Archaic occupation of the site.

the bottom of the stratum suggests they are not much older than those in the upper part.

Aycock Shelter. This site, now destroyed, is 39D4-12 in the author's records and 41 BI 28 at the Texas Archeological Research Laboratory. It was in the Leon River drainage north of Belton, about 50 miles south of the Horn Rock Shelters. It contained more than 40 unstratified burials of varying complexity and age, laid on ascending rock ledges and covered by earth. The author excavated many burials at this site in 1935 as part of the first project of the Central Texas Archeological Society (Watt 1936). Date #20 is from this site.

Clark Midden. This is site 39B5-25 in the author's records and 41 ML 39 at the Texas Archeological Research Laboratory. It was a midden stratum (now destroyed) about 1 ft. thick, below 16 to 20 inches of sterile alluvial sand, on a river terrace fragment in the Brazos Valley above Waco, some 20 miles below the Horn Rock Shelters. The author found large animal bones, *Perdiz* points, *Canton Incised* and *Sanders Engraved* sherds, and a fragment of a bone beamer, in a rock-lined hearth that was the only feature at the site (Watt 1965). Date #3 is from this site.

THE DATING LABORATORIES AND THEIR PROCEDURES

There are several methods by which radiocarbon assays are determined, the most common being by proportional counting of carbon dioxide or methane gas and by liquid scintillation counting of benzene. Once dates have been determined, the standard form for reporting them is to give (1) the sample number with a prefix indicating the laboratory; (2) the age of the sample in years before A.D. 1950 (this is the age B.P., i.e. Before the Present, and is calculated using a half-life of 5568 years); (3) a plus-or-minus figure representing one standard deviation (the one-sigma error) derived from the counting statistics.

This way of reporting dates is followed by all laboratories in publishing their dates in the international journal *Radiocarbon*. However, at the time many of the Central Brazos Valley dates were determined, a number of laboratories had not adopted this procedure, so that the dates given the author were not all in this form.

Three laboratories made the radiocarbon determinations that are reported in this paper: the Magnolia Petroleum Company laboratory, later called the Socony-Mobil Oil Company Laboratory; the Shell Development Company laboratory; and the laboratory of The University of Texas at Austin. Their procedures for dating and reporting varied, and are reviewed here.

The Magnolia Petroleum Company laboratory, which dated by proportional counting of methane gas, changed its name from Magnolia to Socony-Mobil in 1959 when the parent company changed its name. The laboratory is no longer active. Magnolia sample numbers have the prefix "FRL RC-"; Socony-Mobil samples have the prefix "SM-". The laboratory reported its dates to the author as years before the year of measurement. In the case of the Magnolia dates the year of measurement was 1956; with the Socony-Mobil dates it was 1964. Otherwise the dates were reported in the standard manner. They have not been published by the laboratory (H. F. Nelson, Mobil Research and Development Corporation, written communication to E. M. Davis, University of Texas at Austin; Bray and Burke 1960: 97).

The Shell Development Company laboratory, which also is no longer active, dated by proportional counting of carbon dioxide gas. The laboratory never published dates and has not used a prefix for its sample numbers; "Shell Devel." is used in this paper. This laboratory, in planning work on the Central Brazos Valley samples, considered the feasibility of three different counting times: 12, 24, and 48 hours. A 12-hour count was dismissed as resulting in too large a standard deviation, whereas a 48-hour count was rejected because, although it results in a small deviation and is thus more precise, it is prohibitively expensive. A 24-hour count was decided on as being satisfactory from the viewpoint of both deviation and expense (E. L. Martin, Shell Development Company, personal communication). This is the usual counting time in most laboratories. The Shell laboratory measurements were made in 1967, and were reported as years before 1945, using a half-life of 5760 years and with a plus-or-minus of two standard deviations (D. R. Lewis, Shell Development Company, written communication to E. M. Davis).

The University of Texas at Austin laboratory dates by liquid scintillation counting of benzene. The prefix for its sample numbers is "Tx-". The Central Brazos Valley samples dated by

this laboratory were dated in 1974, with one exception, and were reported to the author in the standard form. The exception was the turtle-bone sample of Date #19, which was dated in 1978 and received special treatment, as discussed later in connection with that date. The laboratory plans to publish these dates in a future date list in *Radiocarbon* (E. M. Davis and S. Valastro, Jr., University of Texas at Austin Radiocarbon Laboratory, personal communication; Valastro *et al.* 1970: 249).

Table 1 lists the Magnolia, Socony-Mobil, and Shell dates as reported by the laboratories, with their conversion to the standard form for use in this paper.

TABLE 1
CONVERSION TO STANDARD FORM OF DATES FROM MAGNOLIA, SOCONY-MOBIL, AND SHELL LABORATORIES

Sample no.	Age B.P. as reported by laboratory (see text)	Age corrected to standard form (B.P. 1950, half-life 5568 yr.) rounded to nearest 5 years
FRL RC-23	680 ± 150	675 ± 150
FRL RC-24	Greater than 10,000	Greater than 10,000
SM-689	9290 ± 360	9275 ± 360
SM-759	3830 ± 250	3815 ± 250
SM-761	9500 ± 300	9485 ± 300
SM-762	10,800 ± 500	10,785 ± 500
Shell Devel. 5210A-B	520 ± 60	510 ± 30
Shell Devel. 5210A-2	7330 ± 300	7090 ± 150
Shell Devel. 5210A-3	3000 ± 180	2905 ± 90

DATING ASSOCIATED SAMPLES OF SHELL AND CARBONIZED MATERIAL

It is possible to speak of two kinds of association of radiocarbon samples. In the case of *association in the broad sense*, different deposits in a site are associated in being parts of the contents of that site; they have their individual characteristics, and radiocarbon dates from different deposits in the site are compared with that in mind. By contrast, *association in the specific sense* refers to datable materials of different natures that are intermingled within the same deposit, and that are therefore demonstrably of the same age.

This second type of association was observed in four places in Horn Shelter no. 2, the associated materials being snail shells (*Bulimulis*) and carbonized material (woody charcoal and carbonized bone). Among the radiocarbon dates reported in this paper are measurements on these four cases of specifically associated materials, in order to see how their dates migh compare. These are Dates nos. 4-5, 7-8, 14-15, 16-17. To assure comparability in these cases, all the dating was done in one laboratory (the laboratory of The University of Texas at Austin) and within a relatively short time. In the field, the associated materials were collected at the same time.

As will be seen, the snail shells always gave older dates than the carbonized matter, although the differences are not striking when the plus-or-minus is taken into account. The greater age of the snail shell dates is due to the fact that in building the calcium carbonate of their shells the snails incorporated some environmental lime, which because of its great age has no radiocarbon left. Thus in the shell the contemporary carbon, which is derived from the organic materials eaten by the snail, has been diluted with the "dead" carbon from the lime in the soil, and the shells give falsely old dates. This is a situation which, in radiocarbon dating, must be checked anew for each kind of mollusc and for each type of environment (Tamers 1970).

The snail shell dates also have smaller standard deviations (the plus-or-minus) than the dates from carbonized material, but this results from the sample size, not from the nature of the material; the shell samples were larger than the carbonized samples. In a radiocarbon date, the main determinants of the "plus-or-minus" deviation are the age and size of the sample and

the length of the counting time. In these cases the ages of the shell and carbonized samples were the same, since they were associated in the specific sense. The counting times in the laboratory were the same. Only the sample sizes (and of course the nature of the material in the samples) differed.

THE RADIOCARBON DATES

Data on the radiocarbon dates for Paleo-Indian and later cultures in the Central Brazos River Valley are listed here in order from most recent to oldest (except for the last date, #21, which is a modern check sample). The information includes the site, sample number, material dated, date expressed in radiocarbon years B.P. (before 1950) and A.D.-B.C., the date corrected by dendrochronology (where possible) according to Damon *et al.* (1974) and rounded to the nearest five years, and a discussion of the archeological context.

Date #1
Horn Rock Shelter no. 1

Shell Devel. 5210A-B Carbonized onion seeds 510 ± 30 BP
AD 1440 ± 30
Corrected: AD 1410 ± 130

Carbonized wild onion seeds made up the sample (Fig. 2,a). Sixty-five of the onions were found in a rounded mound of charcoal and ashes resting on top of the midden deposit. They were covered with an overburden of 36 inches of sterile red river sands. No artifacts were associated. It may well be that a meal was being prepared when flood backwaters came in and covered the baking mound without disturbing it, but driving the people away. This date applies to the last occupation of the shelter, as the Brazos then built up the overlying 36-inch sterile sands that sealed off the shelter from further use. After this, only a narrow talus of red sand remained.

Date #2
Horn Rock Shelter no. 2

Tx-1723 Charcoal 590 ± 60 BP
AD 1360 ± 60
Corrected: AD 1340 ± 135

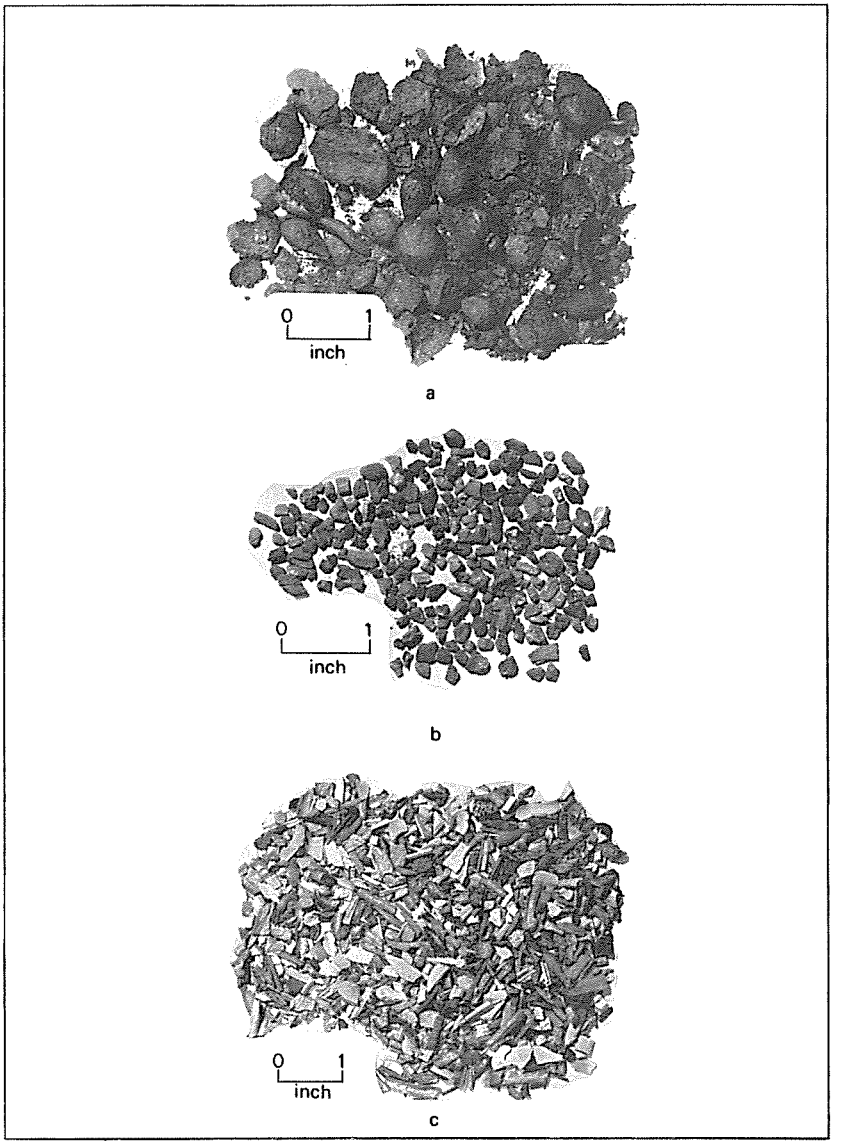


FIGURE 2. *Materials Used in Radiocarbon Dating at the Horn Rock Shelters, as Cleaned in the Laboratory.* a, Carbonized wild onion seeds (see Date #1); b, Woody charcoal; c, charred rodent and bird bones (see Date #10).

This sample came from red river sands lying mostly outside the overhang of Horn Rock Shelter no. 2. Stratification was clear. The sample came from the 58 to 60 inch level, and was associated with the earliest occurrence of *Perdiz* points at the site; it thus dates the latest of the five dated projectile point horizons in this shelter. This is the most recent date from the site.

Date #3
Clark Midden

FRL RC-23	Charcoal	675 ± 150 BP
		AD 1275 ± 150
		Corrected: AD 1265 ± 195

This sample was of charcoal from the only feature in the Clark Midden site, a rock-lined hearth containing a number of large animal bones including a bone beamer, *Perdiz* points, and *Sanders Engraved* and *Canton Incised* sherds (Watt 1965). The beamer is a trait that could represent Plains or Mississippian contact. This was the first radiocarbon date determined from the Central Brazos Valley and is the only date applying to a bone beamer. The author has published it previously (Watt 1961: 327-8; 1965: 103).

Dates #4 & #5
Horn Rock Shelter #2

Tx-1999	Charcoal	2330 ± 60 BP
		380 ± 60 BC
		Corrected: 455 ± 170 BC
Tx-2000	Snail shells (*Bulimulis*)	2510 ± 90 BP
		560 ± 90 BC
		Corrected: 685 ± 185 BC

The charcoal fragments and snail shells of these two samples (Figs. 3,a, 3,c) were intermingled in Square 17, 73 to 75 inches depth, in the top two inches of midden deposits in the red river sands, immediately underlying a large limestone slab that fell from the roof. Such slabs occurred throughout the Archaic deposits in this shelter (Fig. 4,a). *Marcos* points were in this part

of the red river sands; accordingly, these dates apply to the second dated projectile point horizon.

Date #6
Horn Rock Shelter #1

Shell Devel. 5210A-3	Charcoal	2905 ± 90 BP
		955 ± 90 BC
		Corrected: 1170 ± 155 BC

This sample was made up of charcoal fragments scattered in homogeneous Archaic deposits 56 to 64 inches below the surface, without associated artifacts. A burial was within 24 inches laterally, eight inches vertically, of the fill from which the charcoal fragments were recovered. The skeleton, tightly flexed, was oriented east by 5° south. It was lying on the left side facing south, the hands crossed in front of the face and the heels touching the pelvis. Ten large rock slabs covered parts of the burial (Fig. 5,a), the largest of which, weighing some 70 pounds, had crushed the lower part of the skull and all the bones of the torso. The hands and legs were in articulation. Measurement from hip to knee was 17.5 inches. There was an extreme arthritic condition present, especially in the lower lumbar region. The teeth were more worn and deteriorated than the author has seen in any other burial in Central Texas.

Dates #7 & #8
Horn Rock Shelter no. 2

Tx-1720	Charcoal	3470 ± 160 BP
		1520 ± 160 BC
		Corrected: 1905 ± 205 BC
Tx-1995	Snail shells (*Bulimulis*)	3690 ± 70 BP
		1740 ± 70 BC
		Corrected: 2195 ± 190 BC

These were associated samples, the charcoal coming from Square 52 at a depth of 102 to 114 inches and the snail shells from Square 47 at the same depth, in red alluvial sands that also contained bone fishhooks and *Pedernales* points. This is the third of the dated projectile point horizons in this shelter. The bone

fishhooks are found from 102 to 120 inches deep in an area 10 by 15 feet. Both here and in Horn Rock Shelters nos. 1 and 3 (Coleman) they are present in various stages of manufacture in the Archaic deposits. These fishhooks (Fig. 6) are of an eastern type; the same materials and processes of manufacture have been seen at Russell Cave in Alabama (Griffin 1974: 57) and elsewhere. This is their westernmost occurrence.

Date #9
Horn Rock Shelter no. 1

SM-759	Charcoal	3815 ± 250 BP
		1865 ± 250 BC
		Corrected: 2355 ± 295 BC

This sample was made up of charcoal fragments picked from fill overlying a burial. Within one foot of the skeletal material were three *Bulverde* points, one *Pedernales* point, two small scrapers, two partial fishhooks, one small anvil stone, one hammerstone, and an unusual number of small flint flakes. Despite these indicators of Archaic age, the blade of what appeared to be a finely chipped arrowpoint was in the abdominal area of the skeleton. It was 3.2 cm. long and 1 cm. in maximum width, with straight, finely serrated edges terminating in a needle-sharp tip. Lacking the stem, it is much the same as a *Perdiz* point, and suggests that the burial might be deeply intrusive. Still, there are no other evidences of intrusion, and the radiocarbon date together with the other artifacts clearly indicate an Archaic age. There was no visible indication of a burial pit, although charcoal fragments and mussel shells were more common than usual in this area.

The burial was partly covered with boulders. The largest boulder, weighing some 40 pounds, extended from over the left shoulder to over the mid-thorax. A thin triangular 15-pound rock lay across the lumber region. Four smaller rocks lay alongside the body and between the legs.

The skeleton lay on its right side, head northwest, facing southwest. The arms and legs were partially flexed, the forearms parallel to the vertebral column and the right hand tightly clenched. Much of the spine and ribs were disarticulated and crushed by the weight of the overlying rocks. Evidences of ar-

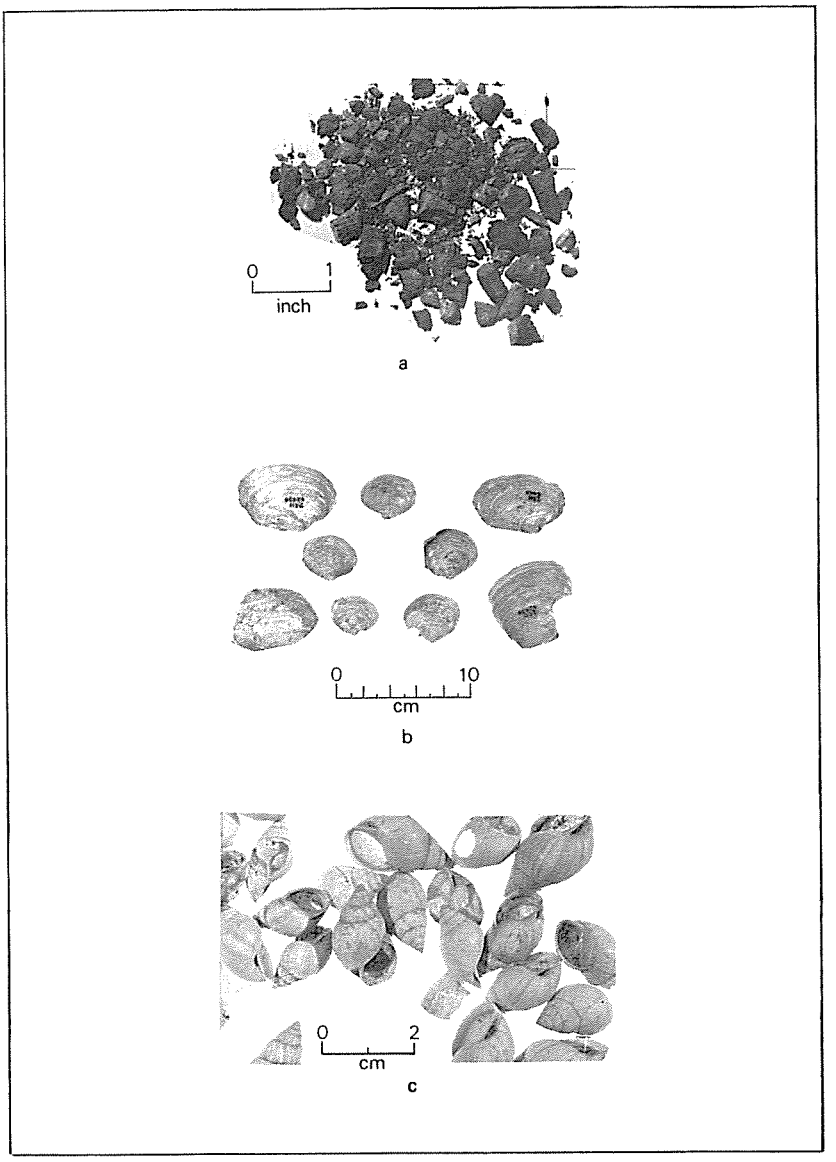


FIGURE 3. *Material From Horn Rock Shelters, Identical To Samples Sent to Laboratories for Dating.* a, Woody charcoal, from both shelters; b, mussel shells (*Proptera purpurata*) from Horn no. 1 (see date #13); c, snail shells (*Bulimulis*) from both shelters.

thritis were prevalent throughout the skeleton. The left little finger had been broken and the terminal phalange had overlapped the next phalange and had knit in that position.

Date #10
Horn Rock Shelter no. 2

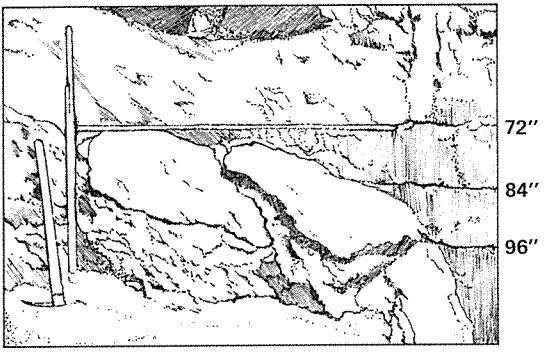
Shell Devel. 5210A-2	Charred bones	7090 ± 150 BP 5140 ± 150 BC Too old for correction

These burned animal and bird bone fragments (Fig. 2,c) were associated with a rock hearth lying on the eroded surface of a remnant of deposits of Paleo-Indian age. No artifacts were in immediate association, but the context is post-Paleo-Indian and represents the beginning of the Archaic occupation in the shelter. *Gary* and *Pedernales* points, bone fishhooks, and bone pieces from which fishhooks were cut, were in the overlying Archaic deposits.

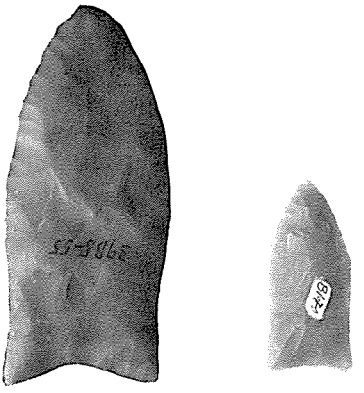
Earlier, the Brazos River had deposited several feet of sediments of Paleo-Indian, and probably earlier, age. These sediments were then eroded away until only a small fragment remained, cemented to the wall. A period of quiet ensued, before the Archaic deposits began to build up, and the dated material is from this time. Midway in the shelter, nine feet from the front at a depth of 108 inches, was a rock hearth around which were scattered numerous small fragments of animal bones, mostly charred. Immediately in front of the hearth was a mixture of limestone fragments, ashes, and bone fragments, in a lens six inches thick and three feet square. Within this lens were 1100 charred bone fragments, 187 uncharred bone fragments, 200 snail shells, 80 fish vertebrae, and 70 gar scales. There were no associated artifacts. The dated bones were from this concentration.

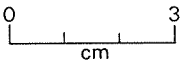
Date #11
Horn Rock Shelter no. 2

Tx-1996	Snail shells (*Bulimulis*)	8400 ± 110 BP 6450 ± 110 BC Too old for correction



a





b

FIGURE 4. *Horn Shelter No. 1 and No. 2.* a, Large limestone slab fallen from roof of Horn Shelter no. 1, similar to those mentioned in connection with dates #4 and #5, but of a different period; b, Two unidentified points of light brown chalcedony from the undated lower gray cave spall stratum in Horn no. 2 (see Fig. 8); The flake scars are worn, as if ground.

These snail shells were in the same stratigraphic position as two *Plainview* points; thus, this is the fourth dated projectile point horizon in the site. The points were cemented to the bottom of a calcified red sand stratum varying from one to three inches thick, the depth varying from 126 to 132 inches. There were fewer than six snail shells in direct association with the *Plainview* points, so that it was necessary to utilize shells in the same stratigraphic situation, as close as possible to the points. Since it was not everywhere possible to distinguish the Paleo-Indian from the Archaic deposits, only the shells nearest the *Plainview* points were taken. The date is 900 years later than the Plainview assemblage date from Horn Rock Shelter no. 1 (Date #12, below), but the points are different in form, and the variability inherent in snail shell dating (Tamers 1970) minimizes the significance of the difference.

Date #12
Horn Rock Shelter no. 1

SM-689 Snail shells (*Bulimulis*) 9275 ± 360 BP
7325 ± 360 BC
Too old for correction

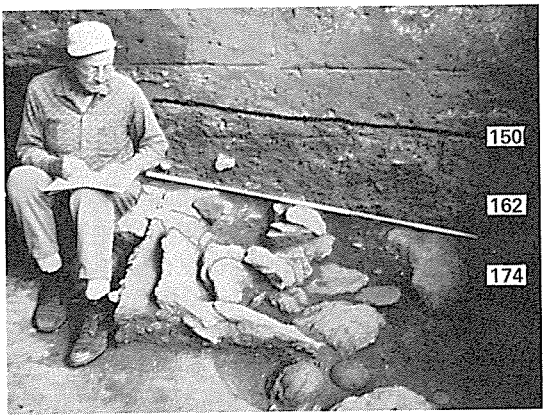
As in Horn Rock Shelter no. 2, the Plainview stratum in Horn no. 1 is a red calcified sand; it has been described in the section entitled "The Sites", earlier in this report. There were many charcoal flecks in the fill associated with a *Plainview* point at 82 inches depth in this sand, but they were too small and fragile to survive washing after collection. Accordingly, snail shells were taken from the back dirt that had been dug from the top 4 inches of the stratum; the distinctive red calcified sand adhering to the shells readily identified their provenience.

Date #13
Horn Rock Shelter no. 1
Mussel shells (*Proptera purpurata* Lam.)

SM-761 9485 ± 300 BP
7535 ± 300 BC
Too old for correction

These mussel shells (Fig. 3,b) were from the bottom deposits of the Plainview stratum in Horn no. 1. There were no snail

a



b

FIGURE 5. *Burials in the Horn Rock Shelters.* a, Rock-covered burial in Archaic deposits of Horn no. 1 (see Date #6); part of skull shows under large rock at right, and arm bones are beneath the two large rocks; b, the author sketching rocks covering double burial in upper gray cave spall stratum of Horn Shelter no. 2 (see Dates #14 and #15). Black line behind the author is the division between Plainview-age red sands above and gray cave spall stratum below.

shells in this part of the stratum. The shells were from a depth of 66 to 72 inches at the high end of the stratum, 12 ft. from the Zero datum line. A broken *Plainview* point was found about four feet away near the 16-foot line, half at 58 inches depth and half at 60 inches depth.

Dates #14 and #15
Horn Rock Shelter no. 2

Tx-1830	Charcoal	9500 ± 200 BP 7550 ± 200 BC Too old for correction
Tx-1998	Snail shells (*Bulimulis*)	10,030 ± 130 BP 8080 ± 130 BC Too old for correction

These specimens are from the upper part of the gray cave-spall stratum, which contained *Brazos Fishtail* points (Fig. 7) and scrapers of the "Crude Scraper Culture," as described earlier in the section entitled "The Sites." This is the fifth and lowest dated projectile point horizon in the site. The charcoal for Date #14 was picked from the fill in Square 46 at depths from 150 to 160 inches; the snail shells of Date #15 came from the same depth in Square 41.

Of particular interest in connection with these dates is a double burial (Fig. 5,b) at 174 inches depth, at the bottom of the stratum, resting on a thin layer of calcified limestone that divided the upper from the lower gray cave spall strata. The burial pit was 12 inches deep. This pit fill contained none of the red sands of the Plainview stratum that overlay the 28 inches of gray cave fill of the pit, and thus the pit must have originated in the upper 16 inches of the gray fill, from which the materials dated here were collected. The pit was covered with 19 limestone slabs of varying sizes.

Dates #16 & #17
Horn Rock Shelter no. 2

Tx-1722	Woody charcoal	9980 ± 370 BP 8030 ± 370 BC Too old for correction

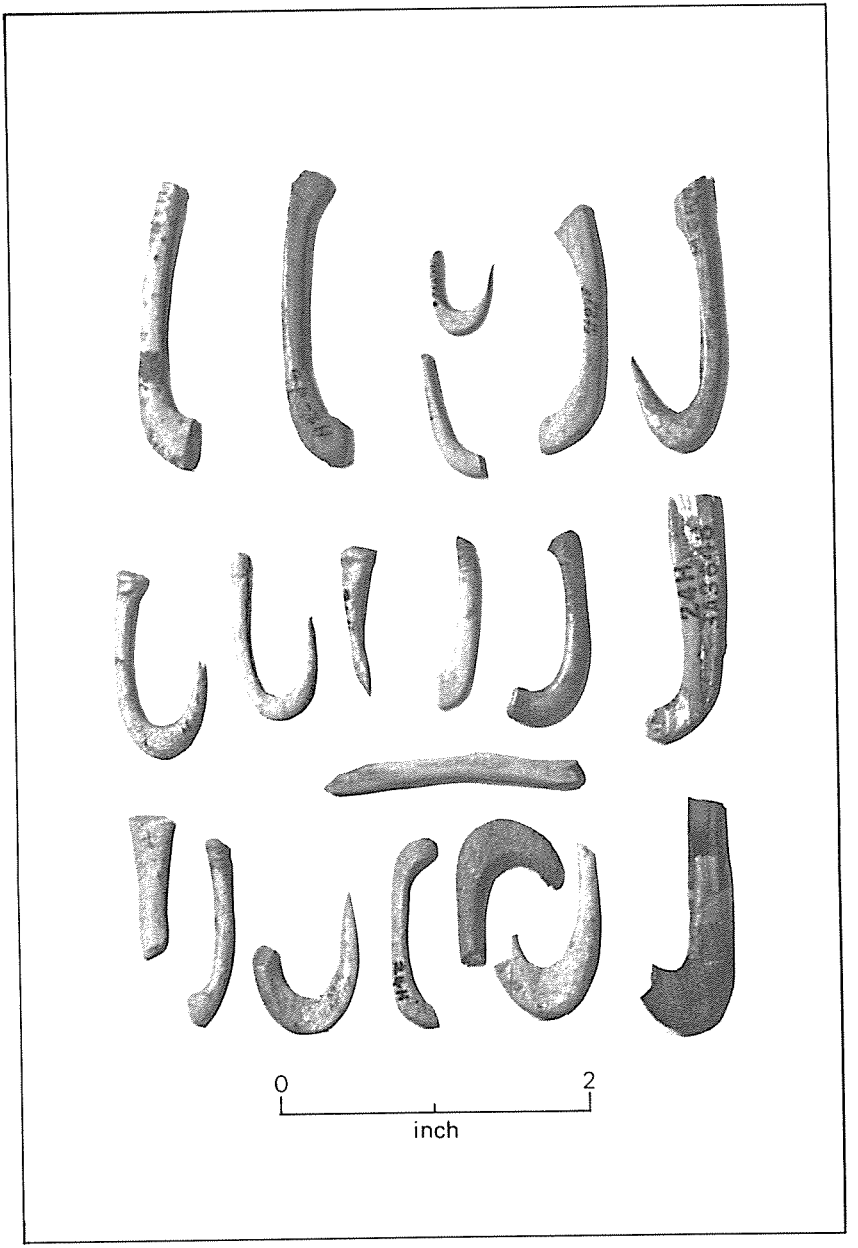


FIGURE 6. *Bone Fishhooks from Horn Shelter No. 2.* See also Fig. 8.

Tx-1997 Snail shells (*Bulimulis*) 10,310 ± 150 BP
8360 ± 150 BC
Too old for correction

These specimens are from the same upper part of the gray cave fill stratum as Dates #14 and #15, and were collected and dated to check those dates. The charcoal was picked out of the fill in Square 47 at depths of 156 to 162 inches, and the snail shells came from the same depth in Square 42. As can be seen, the dates agree well with Dates #14 and #15.

Date #18
Horn Rock Shelter no. 1

SM-762 Snail shells (*Bulimulis*) 10,785 ± 500 BC
8835 ± 500 BC
Too old for correction

These shells came from depths of 72 to 84 inches in Horn Rock Shelter no. 1, beneath the Plainview level that produced Date #13. The present date is appropriately older. The artifacts at this level were scrapers of the "Crude Scraper Culture," as described earlier. At Horn no. 2, these scrapers are associated with *Brazos Fishtail* points and with Dates #14 through #17, which agree with the present date. As noted in the site description, this is the oldest stratum at Horn no. 1, although at Horn no. 2 there are earlier deposits.

Date #19
Horn Rock Shelter no. 2

Turtle bones (*Geochelone* or *Gopherus*)
Tx-2189 10,150 ± 120 BP
8200 ± 120 BC
Too old for correction

These bones of an extinct form of large turtle were at the bottom of the gray cave spall stratum, resting on the surface of the underlying washed river gravels. Thus, they were earlier than the gray spall stratum, and were stratigraphically below dates #14 through #17, which are much the same as this date.

Judging from those dates and this one, the gray cave spall stratum as a whole is around 10,000 years old.

Bones present special problems in radiocarbon dating, and The University of Texas at Austin Radiocarbon Laboratory spent extra time on these specimens (S. Valastro, Jr., L. S. Land, and E. M. Davis, personal communication). The bones were inspected by X-ray diffraction to insure that the chemical pre-treatment was adequate and no contaminants (calcium carbonate in the form of caliche) remained that might affect the dating. In addition, this inspection seemed to indicate that there had been no recrystallization of the apatite fraction of the bone; recrystallization would make the date falsely young (however, apatite recrystallization is not well understood and is still being studied).

Mr. Valastro, who is in charge of technical operations at the laboratory, prefers to date both the collagen and the apatite fractions in bone, as checks on each other. In this sample, unfortunately, there was too little collagen (0.01 gm.) to date. The apatite fraction also was small, but the date was obtained by counting for three days. In addition a $^{13}C/^{12}C$ ratio was determined by mass spectrometry and a correction made for fractionation.

Dr. Ernest L. Lundelius, Jr., of the Laboratory of Vertebrate Paleontology, Balcones Research Center, University of Texas at Austin, identified the bones. He has been making a study of these extinct large turtles, and he notes (personal communication) that up to now the weight of evidence was that they became extinct long before 10,000 years ago. This suggests that the bones were actually considerably older than their radiocarbon age, a possibility also suggested by their stratigraphic relationship to dates #14 through #17. However, Dr. Lundelius also feels that because of this date and other recent evidence, there must be a reexamination of current ideas on the time of extinction of the large tortoises in this region. In other words, if this date is falsely young the error is not necessarily very great.

It is unfortunate that a larger sample, which would have permitted more definitive dating, was not available at this level in Horn Rock Shelter no. 2. Nevertheless, even as it stands this date is significant in supporting the 10,000-year age of the gray cave spall layer, and in presenting the possibility that large turtles became extinct in this area more recently than has previously been thought.

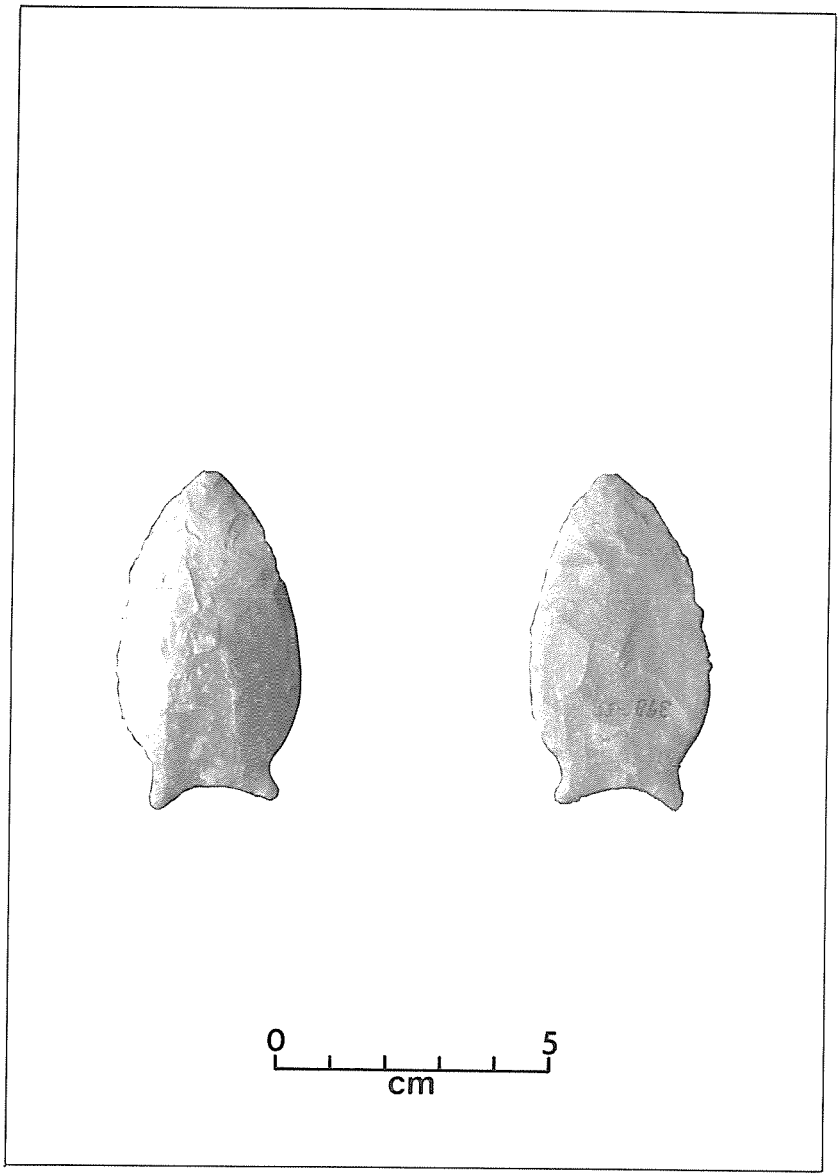


FIGURE 7. *Typical Brazos Fishtail Dart Point.* Both faces are shown. Points of this form were associated with Dates #14 through #17 in Horn Shelter no. 2, in the upper gray cave spall stratum.

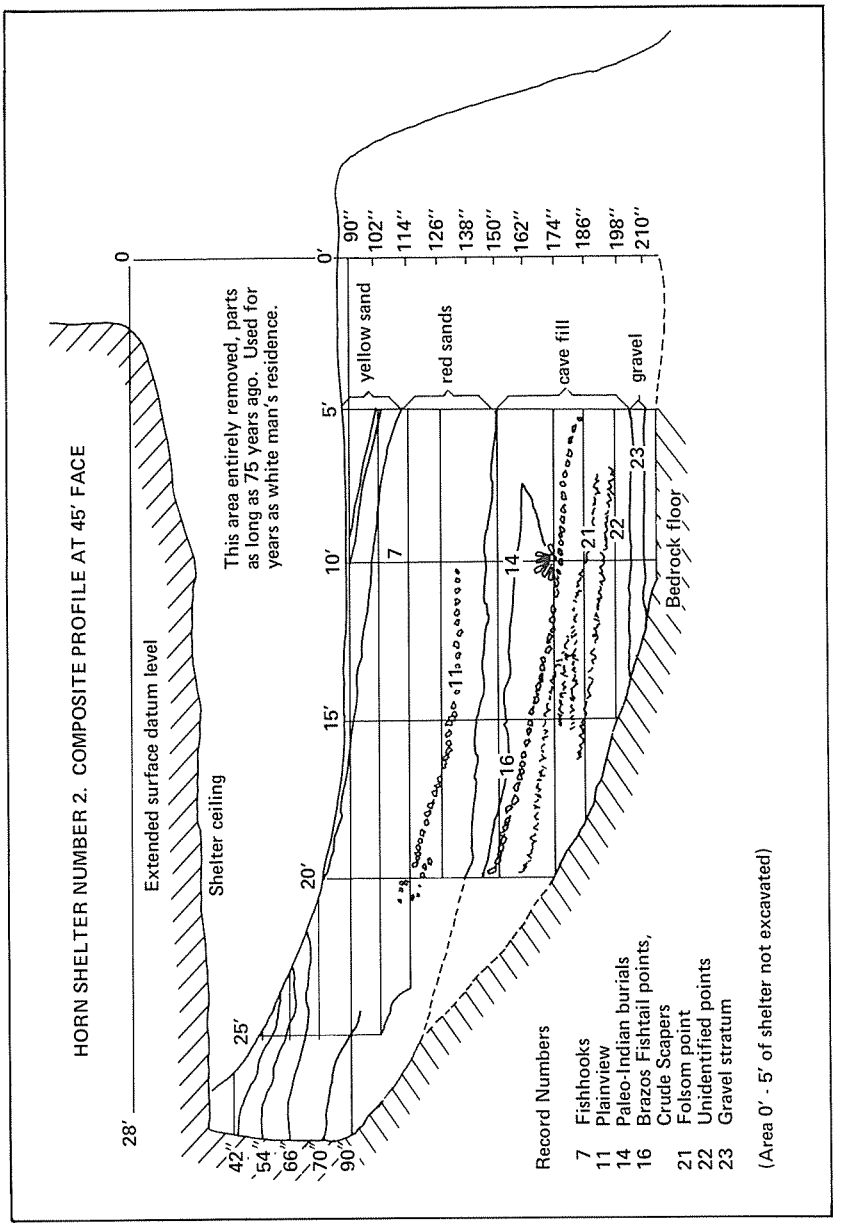


FIGURE 8. *Composite Section in Horn Rock Shelter No. 2, Based on Data At the 45-foot Grid Line.*

Date #20
Aycock Shelter

FRL RC-24	Charcoal	More than 10,000 years

This specimen was woody charcoal from burials excavated in 1935 at Aycock Shelter in the Leon River basin (Watt 1936; see the description in "The Sites" section of this paper.) The date has been published previously (Watt 1961: 327). The Magnolia Laboratory reported that this specimen contained too little carbon to give a reading, but this it appeared to be more than 10,000 years old. Based on this judgement and recent studies of the Leon River Basin (Lewand 1969), the author suggests a minimum age of approximately 11,000 years. Evidently the site was used as a burial ground for a very long time, as other burials in the shelter were more recent, as Suhm (1960: 90) has also noted.

Date #21
Vicinity of Horn Rock Shelter no. 2

Tx-2001	Modern snail shells (*Bulimulis*)	Ultra-modern

The author collected these live snails from fields in the vicinity of Horn Rock Shelter no. 2 in the summer of 1974. The snails were in a hot-weather inactive period and were on small semi-leafless bushes, six to 18 inches above the ground, exposed to sun and wind. The University of Texas at Austin laboratory found that the radiocarbon content of the shells was higher than the normal modern amount ($\delta^{14}C = +286.38 \pm 3.6‰$). This indicates that the carbon in the lime of the shells came mainly from organic food (and ultimately from the atmosphere) and not from environmental limestone, and reflects the fact that atomic and hydrogen bomb explosions have increased the normal atmospheric $^{14}C/^{12}C$ ratio. This evidence strengthens the validity of the snail shell dates from the archaeological components at Horn Rock Shelter no. 2, although the dated charcoal-shell pairs indicate that the shell dates are probably a little oder than the true ages, as already discussed.

SUMMARY

Horn Rock Shelters nos. 1 and 2 provide a stratigraphic squence (Fig. 8) of projectile point styles and associated materials as recent as *Perdiz* points and as old as the *Folsom* point and Brazos Fishtail points deep in Horn Shelter no. 2. The radiocarbon dates reported here verify this sequence.

The stratigraphically deepest date from the two shelters is the turtle bone date from Horn Shelter no. 2, Date #19, approximately 8200 B.C. This date does not apply directly to any projectile point type, being deeper than fishtail points that are different from *Brazos Fishtail* points, and than a fragmentary *Folsom* point. This date may be falsely young, since the specimen was stratigraphically below Dates #14 through #17, which are of approximately the same radiocarbon age.

The oldest dates that apply to artifacts are Dates #14 through #18, which are associated with *Brazos Fishtail* points and the "Crude Scraper Culture." Two of these dates are on charcoal and three on snail shells. The dates are too old for dendrochronological correction. Assuming the charcoal dates to be the more accurate, this context dates (in uncorrected radiocarbon years) about 7500-8000 B.C. The shell dates are a few hundred years older than the charcoal dates; this is to be expected in view of what we know about dates on snail shells in limestone environments. The shell dates, and their support by the check-date run on modern snail shells from the vicinity of Horn Shelter no. 2, reinforce the case for the antiquity of this horizon. These dates refer to Paleo-Indian times in this area, and for this reason the double burial in Horn Shelter no. 2 is of particular interest since documented human skeletal remains of this age are exceedingly rare in the Western Hemisphere. The tentative date of more than 10,000 years ago from burials in the Aycock Shelter may mean that some of those burials also date from Paleo-Indian times, although field evidence indicated that most of the burials in the site were later.

More recent in the Horn Shelters are *Plainview* points, associated in both sites with a layer of red calcified sand. The uncorrected dates (again, these dates are too old to be within the range of correction) are nearly as old as those for the *Brazos Fishtail* points—7500 B.C. on snail shells and mussel shells in Horn Shelter no. 1 (Dates #12 and #13) and 6500 B.C. on snail shells in Horn no. 2 (Date #11).

There is a gap in the sequence between the Plainview horizon and the next projectile point horizon above, indicated by three pieces of evidence: the absence of Early Archaic points in the sequence, a considerable gap in the radiocarbon dates, and the erosion seen in the vicinity of Date #10, about 5100 B.C. (uncorrected), which rests on an eroded surface.

The next higher dated point horizon is characterized by *Pedernales* points, and the dates (#7, #8, #9) are roughly from 1800 to 2500 B.C. These are dendrochronologically corrected dates.

Above this are *Marcos* points, in Horn no. 2, with corrected dates about 500 B.C. (Dates #4 and #5).

Last and most recent of the dated point associations are the *Perdiz* points in Horn no. 2, about A.D. 1300 (corrected; Date #2), agreeing with the date for Perdiz points in the Clark midden (Date #3).

The radiocarbon chronology presented here agrees with previously published chronologies from other sites in Central Texas (e.g., Sorrow *et al.* 1967: 142). Thus, we have established in the Central Brazos Valley a dated sequence of projectile point styles extending from Paleo-Indian times to the final stage of local prehistory.

ACKNOWLEDGMENTS

This paper has been written with a deep sense of appreciation for the help of friends who have made it possible to compile this chronology. Their assistance has enabled the author to crown many years of field work and research with a "breakthrough" in the form of finding the first well-dated Paleo-Indian occupation sites in Central Texas.

For special assistance I am indebted to the following: Bob E. Watt, Chief Scientist and Director of Research, Los Alamos, New Mexico; Dr. George A. Agogino, Director of the Paleo-Indian Institute, Eastern New Mexico University; John M. Payne, Field Research, Shell Development Company; Dr. Dee Ann Story, Director, Texas Archeological Research Laboratory, The University of Texas at Austin; and for special photographic work, Tommie Suits of Tom Padgett, Inc.

Those who contributed in the field work here: Sam N. Horne, James K. Mason, and John M. Payne at the Aycock Shelter in 1936; members of the Central Texas Archeological Society as a group at the Clark site in 1947; Albert J. Redder at Horn Rock Shelters nos. 1 and 2 from 1960 to the present; and Robert E. Forrester at Horn Rock Shelter no. 2 from 1972 to the present.

The assistance of Dr. E. Mott Davis of The University of Texas at Austin in putting this paper into its final form is acknowledged with gratitude.

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Archeological Investigations at Scorpion Cave (41 ME 7) Medina County, Texas

LYNN HIGHLEY, CAROL GRAVES, CAROL LAND AND GEORGE JUDSON

ABSTRACT

During the early summer of 1971, archeological investigations were conducted at the Scorpion Cave site in northeastern Medina County, Texas. The cave is located above the western floodplain of the Medina River in the lower level of 80-foot bluffs. Large amounts of occupational debris were recovered from cave deposits, indicating that the cave was occupied throughout the Archaic period and into Late Prehistoric times. Historic materials were also present in the cave. Studies of faunal remains from the site are provided.

INTRODUCTION

In June and July of 1971, excavations were carried out at the Scorpion Cave site (41 ME 7), which is located on the Medina River about .5 mile downstream from the Medina Lake Dam (Fig. 1.). Excavations at the site were carried out by a group of amateur archeologists, including co-authors Carol Benson Land and George Judson. The group worked to extensively excavate archeological deposits within the cave; they also investigated the area outside the cave mouth, but no occupational evidence was present.

Participants in the excavations at Scorpion Cave included co-authors Land and Judson, assisted by Perry Haass, the late Maxine Benson and Ruth Judson. Carol Land kept a diary of the proceedings, including excavation notes and maps. Site photographs were taken by Pete Farmer.

Co-authors Graves and Highley were not present during the excavation. Therefore, the discussion of excavation procedures, as well as many portions of the remainder of the paper, is based upon excavators' notes supplemented by input from George Judson.

The authors would like to acknowledge the advice and criticism of Thomas R. Hester. His help was invaluable and greatly appreciated. We would also like to thank Thomas C. Kelly for assistance with artifact photography and identification; Anne A. Fox for historic artifact identification and suggestions on various aspects of the paper; Richard McGeehee for information on the geological composition of various artifacts; Sam Nesmith for identification of cartridge cases; and John S. Graves, Jr. for assistance with site maps and photographs. We would also like to acknowledge those who participated in the 1971 excavations upon which this report is based.

ARCHEOLOGICAL BACKGROUND

Less than 30 prehistoric sites have been recorded in Medina County. Patterson (1975) has studied the blade technology at quarry site 41 ME 3, and has recorded sites 41 ME 9-17, all in northern Medina County (Hester and Kelly 1976). In 1976, the Center for Archaeological Research, The University of Texas at San Antonio, excavated four sites (41 ME 18-21) near Natalia, which is located in southeast Medina County (*ibid*). In 1975, the Texas Historical Commission carried out historic site excavations at the Landmark Inn in Castroville (see Hester 1975a). Little else is known about the archaeology of Medina County. Suhm (1960) should be consulted for a general overview of the archeology of the central Texas region.

Four major chronological periods can be discerned in central and south central Texas prehistory. The Paleo-Indian period (ca. 9200-6000 B.C.) is represented primarily by random finds of dart points such as *Clovis, Folsom, Plainview,* and *Golondrina* (see Sollberger and Hester 1972; Hester 1971). Five *Folsom* points were found in the backdirt left by looters at the Kincaid site in nearby Uvalde County (Suhm, Krieger, and Jelks 1954; Sellards 1952; Wormington 1957). A *Plainview* point was found eroding from a bluff upstream from Scorpion Cave (George Judson and Harvey Smith, Jr., personal communication). Several *Plainview* points were recovered during 1977 excavations at the St. Mary's Hall site

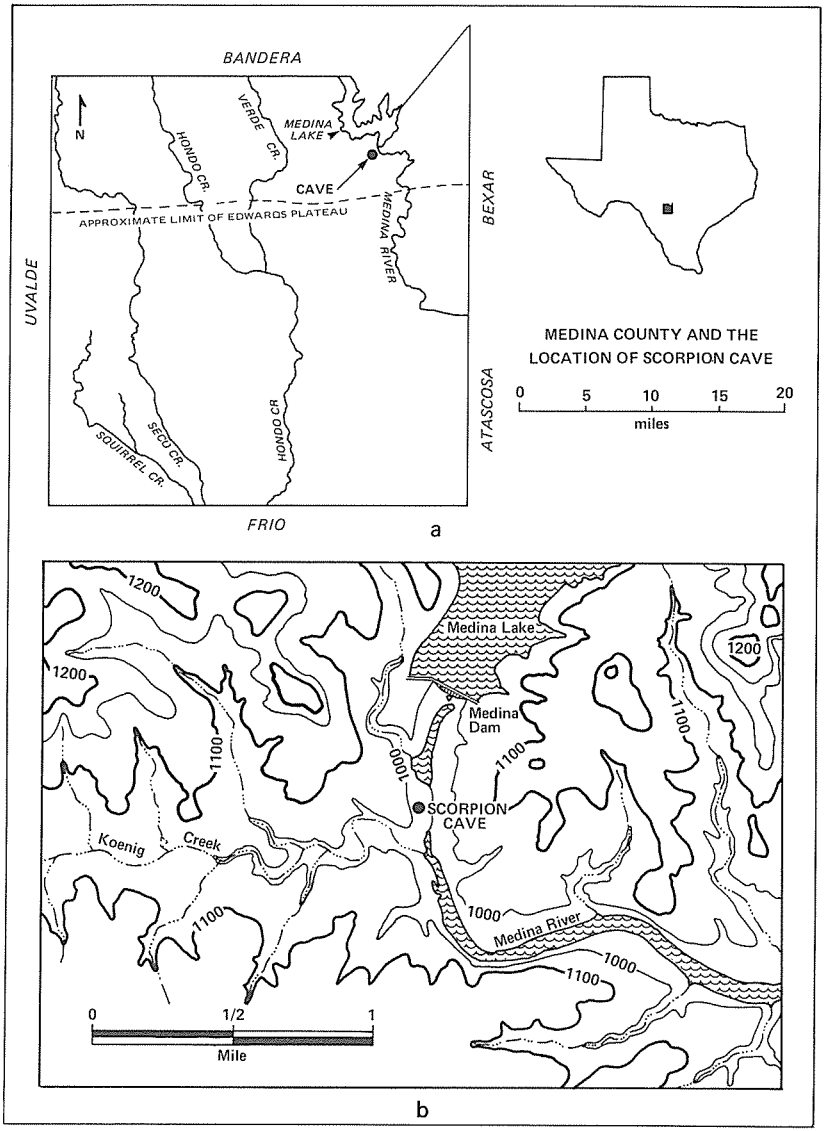

FIGURE 1. *Maps of Scorpion Cave Site.* a, Medina County and the location of Scorpion Cave. Inset shows the location of Medina County within the state; b, topographic map showing streams and uplands in the vicinity of Scorpion Cave (contour intervals are in feet).

(Hester 1978; see also Hester 1975b and Cantu, Lauderdale and Stoner 1976).

The Archaic period (ca. 6000 B.C.-A.D. 500/1000) is represented by numerous sites containing a great variety of dart points, bifaces and unifaces, and by the appearance of grinding stones. Burned rock middens are also characteristic of this time span. The current state of the Texas Archaic has been reviewed in a group of papers edited by Hester (1976). For information on internal divisions of the Archaic, Johnson, Suhm, and Tunnell (1962) should be consulted. Weir (1976) has synthesized recent data on the Central Texas Archaic and has proposed an alternative chronological sequence. Many of the projectile points from Scorpion Cave date to the Archaic period. Near the cave are several burned rock middens.

The Late Prehistoric period (A.D. 500/1000-historic contact) is characterized by the appearance of arrow points and pottery. Most of the projectile points from Scorpion Cave date to this period. No pottery was recovered, but the presence of clay nodules was noted; field records do not indicate whether or not these were baked.

The Historic period begins with the arrival of the Europeans. Sites dating from this period include missions, ranches, and structures built by the early settlers. Other than Spanish mission sites in which Indian quarters are found, very few sites representing historic Indian groups have been recorded (Hester 1975b).

An ethnographic summary of central Texas Indian groups has been prepared by Newcomb (1973). The culture of the Payaya, a Coahuilteco-speaking group of the south central Texas area, has been described by Campbell (1975). Included in this paper is information about the protohistoric lifeway of Payaya tribes along the Medina River, south of Scorpion Cave. Ethnohistoric accounts researched by Campbell refer to groups camping on the Medina River, near the present boundary between Medina and Bexar Counties. Pecan groves along the Medina River and the abundance of game, especially bison, seemed to account for Payaya encampments in this area.

THE SETTING

The site is situated 150 yards west of the present channel of the Medina River. The cave mouth faces east, with an old river channel situated halfway between the cave and the present river channel. The site is within the Medina Canyon, which is about 116 miles in length, extending from Bandera County southeast into Bexar County (Fig. 2, A).

The cave mouth sits about 20 feet above the present river level, with bluffs rising approximately 80 feet above the cave (Fig. 2, B). On the opposite bank of the river are gravel terraces and a lower river bluff.

The floodplain is characterized by a heavy vegetation cover. Trees are represented by many large elm, pecan, poplar, and live oak in the floodplain, with cypress and willow along the river. Also present are cedar, laurel, buckeye, walnut, persimmon, and hackberry. Plants include guajillo, agarita, yucca, kinikinik, numerous grape vines, and assorted weeds and flowers. There are also a variety of native grasses.

The cave is located in the northeast section of Medina County. The northern portion of the county is hilly and broken along the Balcones Escarpment. The site is on the southwestern edge of the Edwards Plateau, a rugged area of Comanchean Cretaceous limestone dissected by numerous rivers and stream beds of the area. The remainder of Medina County is rolling, partly brush-covered, with some fertile valleys. The site is also within the southern portion of the Balconian Biotic Province (Blair 1950: 112-115). The climate of the Balconian is semiarid and mesothermal, with rainfall decreasing from east to west. Average annual precipitation in Medina County varies from 28 to 30 inches (Carr 1967: 4). Mean temperature range is 42 to 96 degrees, with altitude varying from 600-1900 feet (Texas Almanac 1976-1977: 333).

The Medina River rises in northwestern Bandera County, flowing southeast to the San Antonio River, and having a length of 116 miles. It is a springfed stream (*ibid*: 117). According to Blair (1950), "The floodplains of the streams are occupied by a mesic forest of large live oaks, elms, hackberries and pecans. Along the Medina River, in the southeastern part of the province, large cypress trees (*Taxodium distichum*) fringe the

stream course." This description is characteristic of the Scorpion Cave environment.

THE CAVE

The mouth of Scorpion Cave faces east, toward the Medina River, which flows generally north to south. The floodplain slopes upward from the river to the cave mouth, which is located some 150 yards west of the river and approximately 20 feet above present water level. However, the old river channel is only 75 yards east of the cave.

The mouth of the cave measures 19 feet at maximum (Fig. 3, A). The cave interior consists of a roughly circular area extending 17 feet into the bluff; the maximum height of this room is approximately 6 feet. A shelf of about 1.5 feet in height extends along the south wall of the room. From this outermost room, a passageway of 7 feet maximum width runs 20 feet at a 30 degree angle to the opening (Fig. 3, B). The shelf continues along the south side of this passage, with another shelf along the opposite wall. At the end of the passage, a second passage 6 feet in width extends for another 19.5 feet at a 90° angle from the first. Then, a third passage, of 4 feet maximum width, continues for 17 feet at a 30° angle from the second. The cave ends at this point. Between the second and third passages is a larger area, 7 feet wide and 6 feet high; a chimney (with a slight updraft) found in the ceiling of this area extends upward into the bluff above. (See Fig. 4 for diagram of cave interior.)

EXCAVATION PROCEDURES

Excavations were carried out in the outermost circular area of the cave and in the first passageway (see Fig. 4), as well as outside the cave mouth. The basic excavation strategy was "vertically-oriented". Units were laid out in four-foot squares wherever feasible; contours of the cave necessitated differently-shaped units in some areas. Excavations were carried out in six-inch arbitrary levels. All excavated materials were passed through ¼" mesh and were bagged according to unit and level. Large amounts of charcoal, chert debris, bone, snail and mussel shell were saved along with all artifacts.

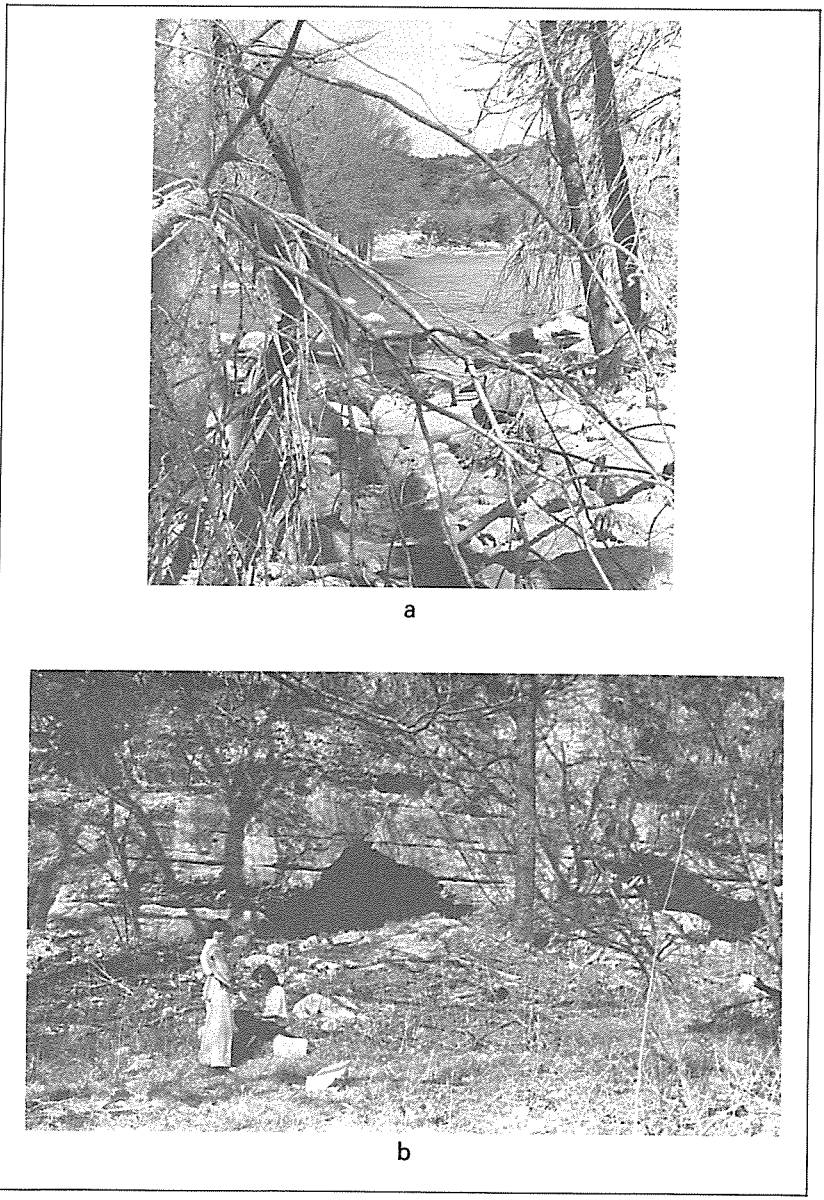

FIGURE 2. *Views of Scorpion Cave Area.* a, the Medina River near Scorpion Cave; b, the mouth of Scorpion Cave. Note the steep bluff in which the cave is situated.

Many large rocks in front of the cave mouth were removed to facilitate excavations. Portions of the deposit in units located across the mouth were derived from spalling of the cave ceiling; consistency was that of a fine powder and it was gray in color. Toward the front of these units the deposits were comprised of a dark humus soil and burned rock. Medium-sized land snails prevalent in the cave probably represent a food source for prehistoric inhabitants.

As excavations proceeded, large rock spalls from the cave ceiling were uncovered in the units. A red clay gravel was reached in some areas at the lower levels. Several hearths were uncovered in the outermost circular room at depths of approximately 36 inches; associated artifacts found nearby may be the result of knapping sessions around a fire, with heat-treatment of raw materials a part of the knapping process.

DESCRIPTION OF THE ARTIFACTS

The excavations at Scorpion Cave resulted in the recovery of 682 prehistoric artifacts. The following broad categories were established through the analysis of the specimens: Chipped Stone Artifacts (including Projectile Points, Other Bifaces and Unifaces), Painted Artifacts, Ground and Pecked Stone Artifacts, Bone Artifacts and Shell Artifacts. The various classes of artifacts in each of these categories will be described in the following section. Projectile points were generally sorted according to the typology of Suhm, Krieger and Jelks (1954). All measurements are in millimeters with incomplete measurements in parentheses. Dimensions are indicated by the following abbreviations: L: length; MW: maximum width; MT: maximum thickness; SL: stem length; SW: stem width; and NW: neck width. WT: weight, is in grams, and is given for complete specimens only. Vertical provenience data are provided in Table 3. Terminology used in the projectile point descriptions is defined by the sketch in Figure 5.

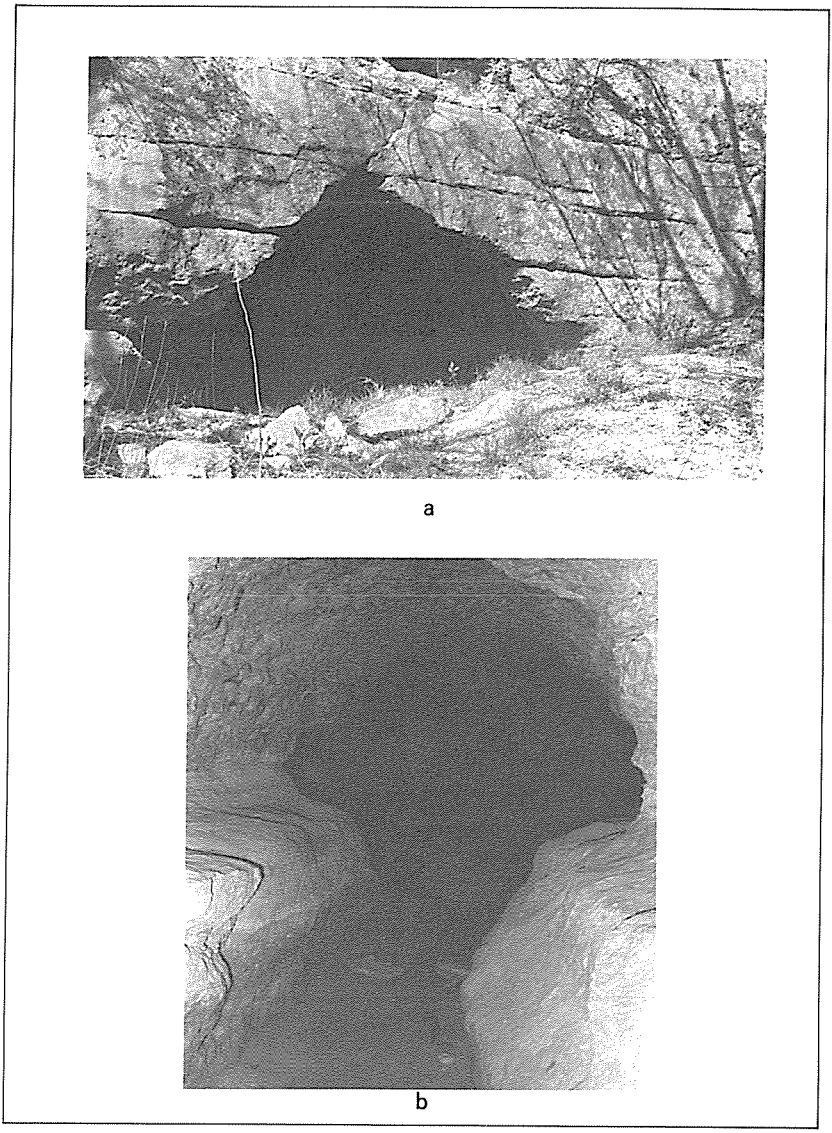

FIGURE 3. *Scorpion Cave.* a, the mouth of Scorpion Cave (note accumulation of screened backdirt in right foreground); b, passageway in the cave interior, with shelves along both walls; another passage extends to the left at a 90° angle from the above passage.

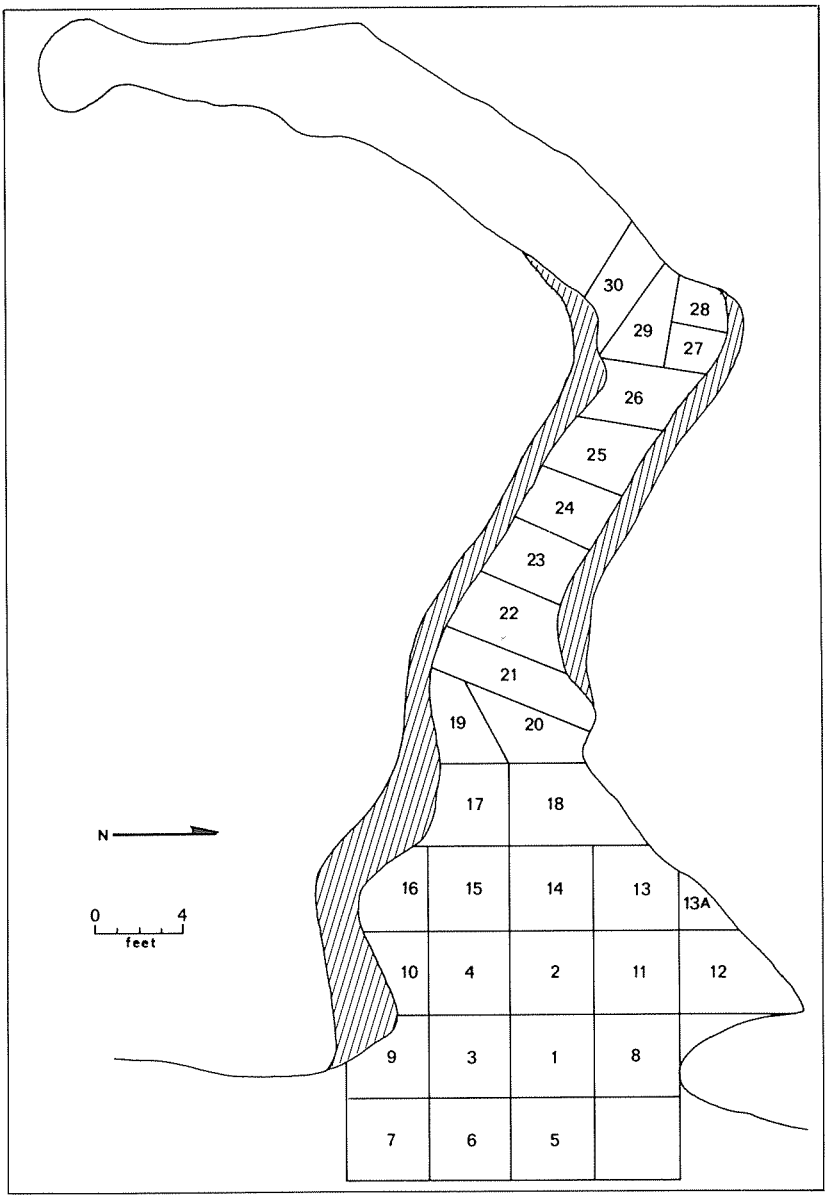

FIGURE 4. *Scorpion Cave.* Plan of the cave interior showing excavation units. Units 5, 6 and 7 are located just outside the cave mouth.

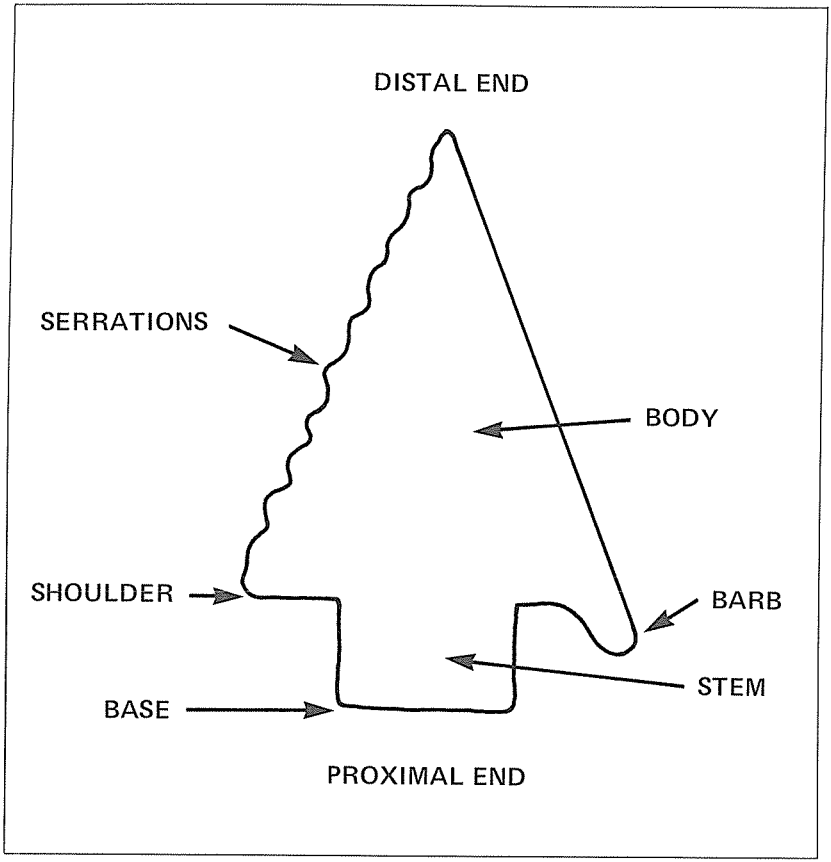

FIGURE 5. *Terminology Used in the Description of Projectile Points from Scorpion Cave.*

CHIPPED STONE ARTIFACTS
PROJECTILE POINTS

ARROW POINTS

A total of 117 arrow points was found, including the *Cuney, Edwards, Fresno, Perdiz* and *Scallorn* types. There are two unfinished specimens. An expanded discussion of the *Edwards*

type is included along with a table showing dimensions of each specimen (see Table 1). Also discussed are 112 specimens that were too fragmentary for identification.

CUNEY (1 specimen; Fig. 6, a). The body has straight, serrated edges. It is corner-notched and has barbs that are almost even with the stem's concave basal edge. L: 23.5; MW: 16; MT: 3; SL: 4; SW: 7; NW: 7; WT: .7.

EDWARDS (88 specimens; Figs. 7 & 8). The predominant point type at Scorpion Cave, these points are characterized by deep corner notches, a broad concave base, and a stem as wide or wider than the shoulders. The triangular blades are straight or slightly concave; many are serrated. *Edwards* points were first described by J. B. Sollberger (1967). He believes that the *Edwards* point was the first arrow point form in the Edwards Plateau region and was patterned after dart point forms, such as *Frio, Ensor, Fairland, Martindale, Pedernales,* and *Uvalde.* A discussion incorporating new data on the type followed a few years later (Hester 1970). In this paper and a subsequent site report (Hester 1971), *Edwards* points recovered at the La Jita site in northeastern Uvalde County were described. The 1977 UTSA Archaeological Field Course recovered a number of *Edwards* points at the St. Mary's Hall site, 41 BX 229 (Hester 1978), and they were also found during an extensive survey of the Camp Bullis area in northern Bexar County (Gerstle, Kelly and Assad 1978). Radiocarbon data for *Edwards* points have been obtained from two sites. A date of A.D. 1054 was assigned to a stratum containing *Edwards* points at a site on Camp Bullis (*ibid*); dates of A.D. 960 and A.D. 930 come from the La Jita site (Hester 1971). The *Edwards* type represents 75% of the arrow point total recovered from Scorpion Cave. Table 1 presents the measurements for the *Edwards* points from Scorpion Cave; weight is included for complete specimens only.

FRESNO (5 specimens; Fig. 6, b-d). Two specimens are basal fragments; the remainder are substantially complete. Bases range from slight convexity to slight concavity. The triangular points are very thin, well-made specimens. L: (18-29); MW: 15-21; MT: 3-4; WT: .7-1.2.

PERDIZ (5 specimens; Fig. 6, e-h). All of the specimens are fragmentary. Two are worked unifacially except for bifacial flaking on the stems. Two have serrated edges. L: (19-36.5); MW: 11.5-18.5; MT: 3-4; SL: 10-12; NW: 6.5-7.

SCALLORN (16 specimens; Fig. 6, i-v). Eight of these are essentially complete. Bodies vary from broad to slender with edges slightly concave to slightly convex. Stems are expanding, with bases varying from slight convexity to concavity. Body edges of several specimens are finely serrated. Workmanship is generally good. Measurements of essentialy complete specimens are: L: 23-27; MW: 13-31; MT: 2.5-5; SL: 4-6; SW: 10-17; NW: 6-11; WT: .7-2.2.

UNFINISHED (2 specimens; Fig. 9, a-b). One specimen appears complete but probably represents an unfinished point since only one side has been notched. L: 45; MW: 16; MT: 4.5; SL: 6; SW: 7.5; NW: 10. The other specimen is the basal fragment of a preform made on a flake. The preform has been side-notched; one lateral edge has been bifacially trimmed, the other edge has been trimmed unifacially. L: (27); MW: 18.5; MT: 3.5; SL: 7; SW: 12; NW: 9.

FRAGMENTS (116 specimens). Thirteen partial basal fragments are probably broken *Edwards* points. Another basal fragment is probably a broken *Scallorn*

point. Eleven other arrow point fragments could not be classified. Sixty-eight distal fragments and 23 medial fragments were also recovered. Most of these arrow point fragments were in the upper three levels. Not illustrated.

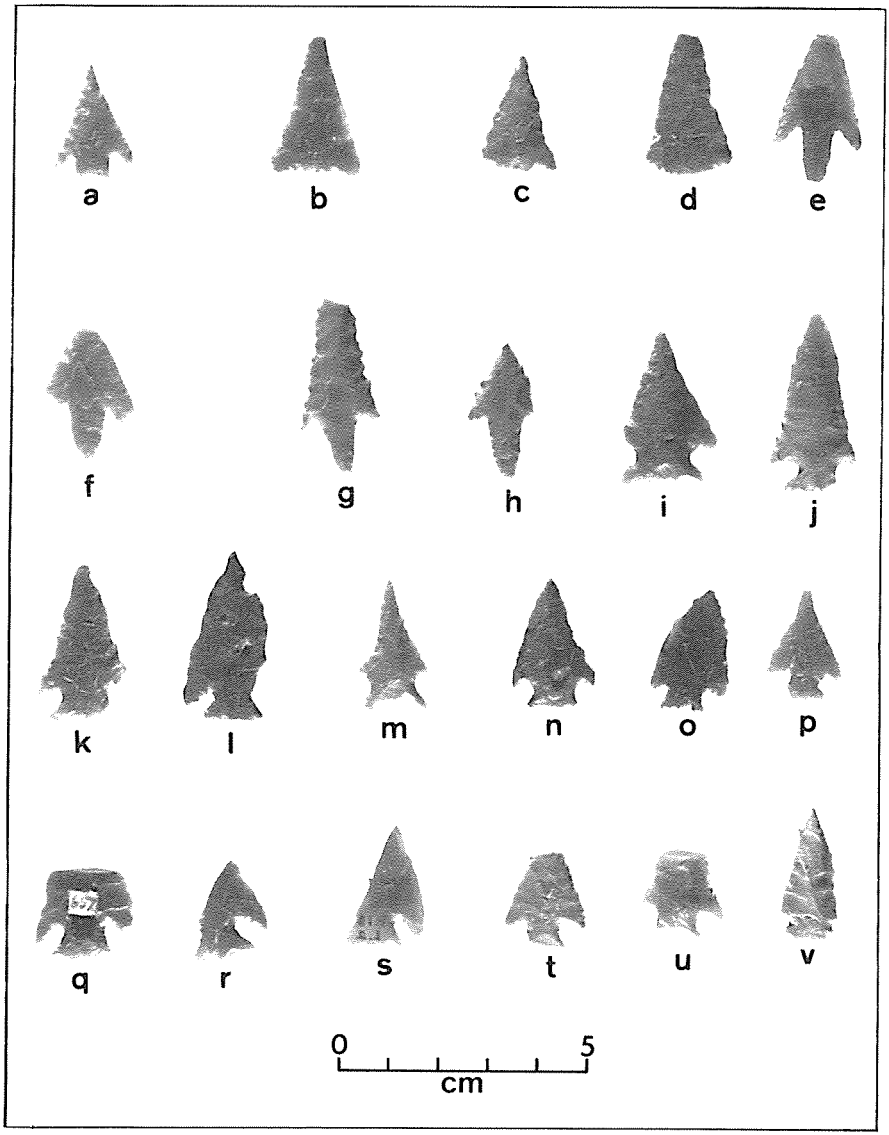

FIGURE 6. *Arrow Points.* a, *Cuney*; b-d, *Fresno*; e-h, *Perdiz*; i-v, *Scallorn.*

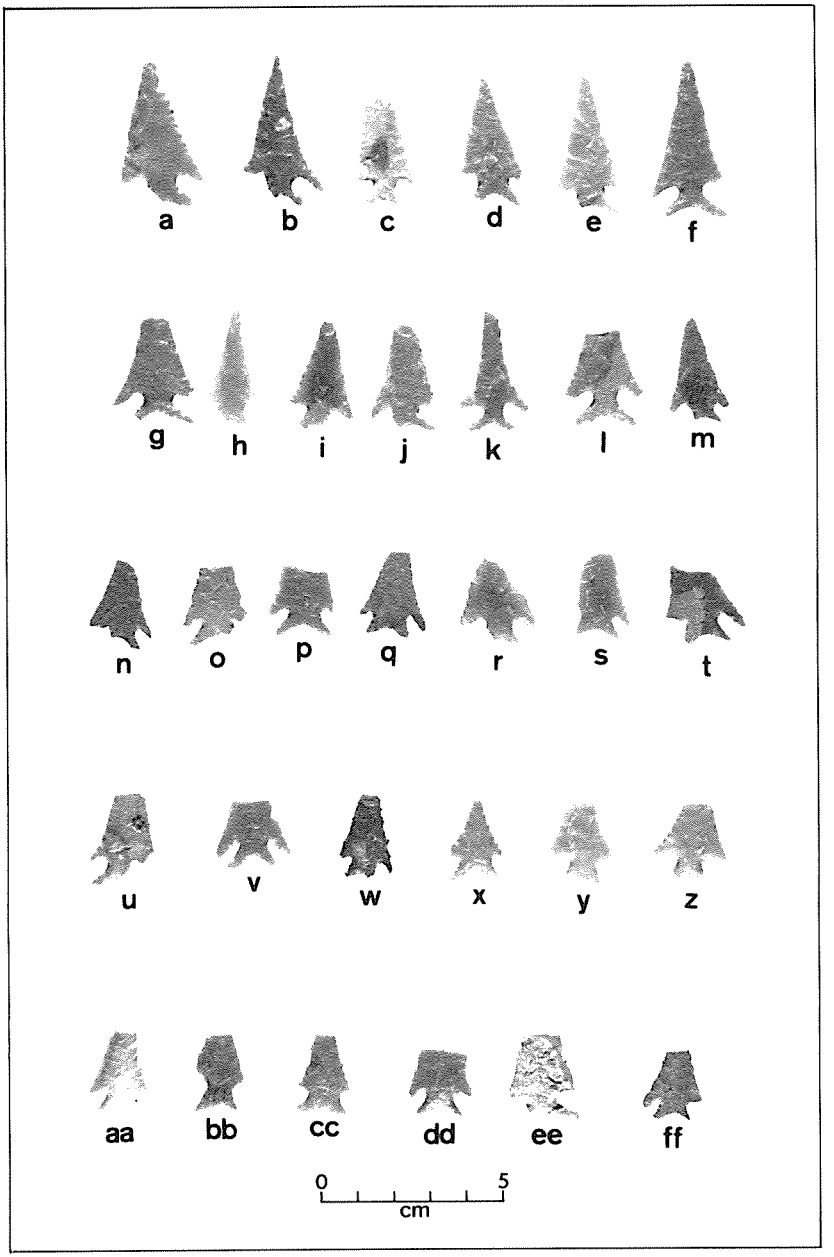

FIGURE 7. *Arrow Points.* All specimens are of the *Edwards* type.

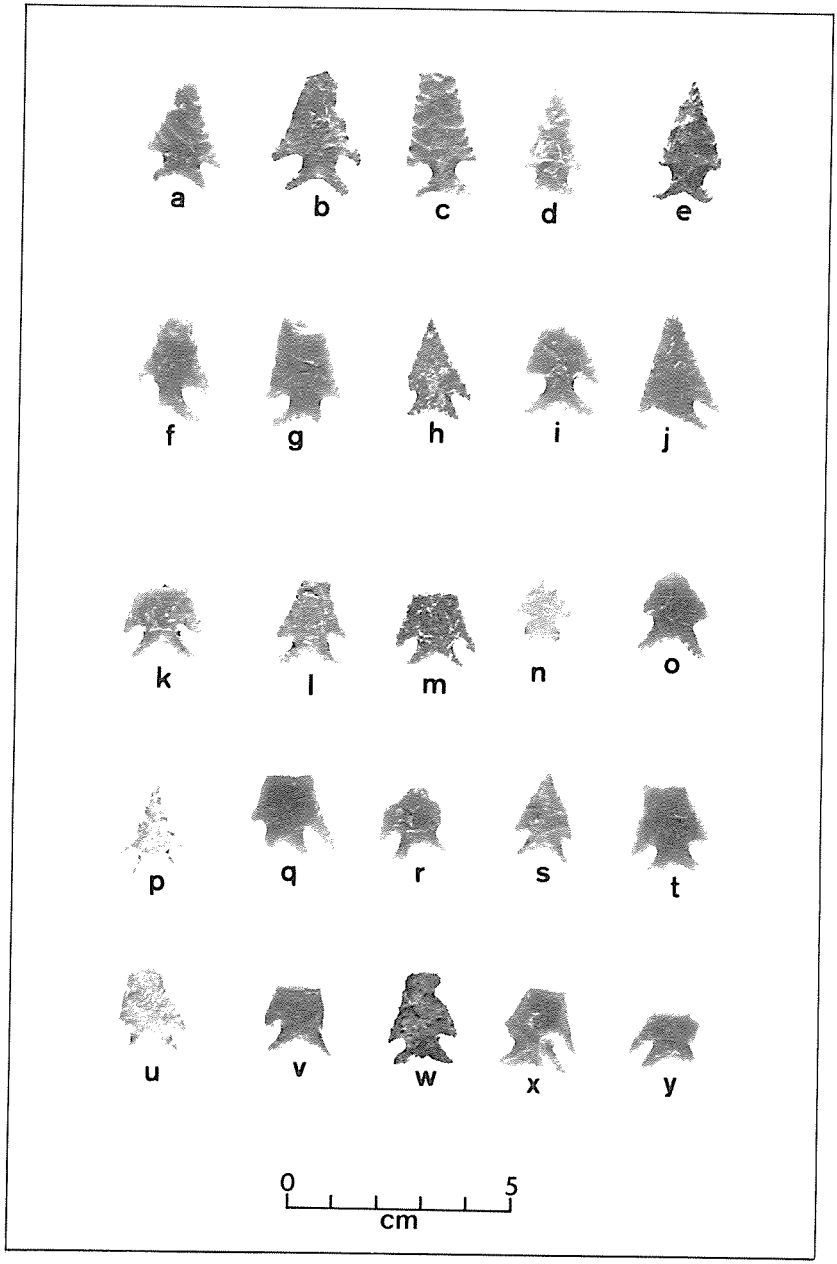

FIGURE 8. *Arrow Points.* All specimens are of the *Edwards* type.

TABLE 1
MEASUREMENTS OF EDWARDS ARROW POINTS*

Length	Maximum Width	Maximum Thickness	Stem Length	Stem Width	Neck Width	Weight**
(44)	20	4	7	(19)	7	2.6
43.5	(22)	4.5	7	(9)	7	2.4
41	19	4	7	(12)	8	2.3
(38)	(18)	4	8	(14)	9	1.7
37	17	4	5	(11)	8	2.0
(34)	20	4	5	16	5.5	1.5
33	(16)	3.5	5	(10)	8.5	1.5
30	17.5	3.5	4	(9)	7	1.4
29	(14)	3	4	(9)	6	1.6
(28)	21	5	6	15	8	1.9
28	14.5	4	5	(14)	13	1.5
27	(16)	3.5	4	(12)	7	1.3
26	14.5	4	5	14	9	1.1
(23.5)	(18)	4	5	13	9	1.4
23	(15)	3	5	14	9	1.2
(22)	(16)	3	5	(11)	7.5	1.1
21	(14)	3	4	12	8	.9
(20)	(15)	3	5	(12)	8	1.0
20	17	3	6	(7)	6	.9
19.5	14	4	4	10	7	.9
19	(18)	4	6	(15.5)	8	1.4
(30)	(22.5)	3.5	6	(13)	8	—
(32.5)	18	3	6	(14)	11.5	—
(27)	(22.5)	5	8	17	7	—
(29)	17	3	5	8	5	—
(23)	(22)	3	7	14	9	—
(31)	(19)	3	6	(7)	6	—
(22)	(18)	4	5	(11)	9	—
(25)	(20)	4	6	(13)	8	—
(23)	(16)	3	5	8	8.5	—
(20)	(17)	3	6	(13)	9	—
(21)	(13.5)	3	6	(13)	8.5	—
(28)	(14)	3	4	(7)	8	—
(27)	(18)	3	6	(8)	6	—
(24.5)	(19.5)	3	5	12	9	—
(19)	(20)	3	6	(12)	8	—
(25)	(19)	4	7	(14)	8	—
(24)	(16)	3	5	(13)	9	—
(22.5)	(15.5)	4	5	15	9	—
(19)	(15)	3	6	(9)	6	—
(31)	(18)	4	6	(12)	7.5	—
(27)	19	3	6	—	8	—
(22)	(23)	3.5	6	(9)	7	—

(22)	(19)	4	8	19	6.5	—
(19)	(18)	3	4	(7.5)	6	—
(26.5)	(15)	4	7	(11.5)	6	—
(23)	(14)	3	6	13.5	8	—
(29)	(23)	4	6	(16)	8	—
(26)	21	4	6	(8)	7.5	—
(20)	(19)	3	6	16	9	—
(17)	19	3	6	13	8	—
(19)	(16)	3	6.5	16	9	—
(17)	(19)	3	7	15	8	—
(20)	(20)	3	6	17	10	—
(20)	(15.5)	3	5	14	9	—
(18)	(16)	3	5	(8)	7.5	—
(20)	(14)	3	5	(12.5)	8	—
(24)	(18)	4	5	(12)	5	—
(19)	(21)	3	6	(14)	8	—
(22)	(15)	3	(4)	(6.5)	5	—
(26)	(18)	3	5	(8)	7	—
(16)	(15.5)	3	6	(10)	4	—
(20)	(17)	3	6	(9)	7	—
(24)	(19)	4	7	(10)	9	—
(25)	20	4	6	(13)	7	—
(21)	(17)	3	5	11	8	—
(21)	16	3	6	14	8	—
(21)	(15)	4	6	(7)	8	—
(20)	(18)	4	6	(14)	8	—
(20)	(19)	3.5	6	(12.5)	8	—
(18)	(16)	4	5	(15)	8	—
(19)	(18)	3	6	16	9	—
(17)	(15)	2.5	5	9	5	—
(20)	16	3	6	14	8	—
(24)	(17)	4	5	(10)	8	—
(24)	(15)	2.5	5	(9)	7	—
(19)	(15)	4	6	(11)	8	—
(17)	(14)	3	6	15	9	—
(16)	(20)	3.5	6	(11)	7	—
(13)	(17.5)	2.5	6	(14)	9	—
(13)	(12)	3	6	(16)	9	—
(17)	(15)	3	6	(15)	10	—
(18)	(13)	2	6	(14)	9	—
(17)	(14)	4	5	(10)	9	—
(20)	(13)	3	5	(10)	6	—
(12)	(18)	4	6	(15)	8	—
—	—	3	6	(13)	5	—
—	—	3	8	20	—	—

*Incomplete measurements are enclosed in parentheses.
**Substantially complete specimens only.

ARROW POINT PREFORMS

These thin, bifacially chipped artifacts are probably preforms for the manufacture of arrow points. Of these 40 specimens, 75% are basal fragments. Nine groups are described below.

GROUP 1 (2 specimens; Fig. 9, c). All are complete. Triangular with straight bases. Both have serrated edges. Workmanship is fair. L: 36-38; MW: 20-21; MT: 5-6.

GROUP 2 (3 specimens; Fig. 9, d). All complete. Triangular with markedly convex bases. Serrated edges; fair workmanship. L: 32-39; MW: 22-26; MT: 5-6.5.

GROUP 3 (2 specimens; Fig. 9, e). Triangular with concave bases. One is complete; the other specimen is composed of two halves broken across the lower body. Workmanship is fair to good. L: 31; MW: 21-22; MT: 3-4.

GROUP 4 (2 specimens; Fig. 9, f). Complete; generally triangular outline. Bases slightly convex. Fair workmanship. L: 29-31; MW: 21-23; MT: 4.5-6.

GROUP 5 (1 specimen). Medial section. Serrated edges; thin. MT: 3. Not illustrated.

The remaining four groups consist entirely of basal fragments.

GROUP 6 (2 specimens; Fig. 9, g). Straight base. Body expands above base. L: (13-20); MW: 2-22; MT: 3-4.

GROUP 7 (7 specimens; Fig. 9, h). Concave bases. Body narrows above base. L: (13-27); MW: 21-27; MT: 3-4.

GROUP 8 (11 specimens; Fig. 9, i-j). Convex bases. Body narrows above base. Platform remaining on the base of one specimen. L: (17-28); MW: 20-27; MT: 3-7.

GROUP 9 (10 specimens; Fig. 9, k-l). Relatively straight bases. Body narrows above base. L: (19-26); MW: 21-25; MT: 3.5-5.

DART POINTS

A total of 71 dart points was found; types included *Bulverde, Castroville, Early Triangular, Ensor, Frio, Kinney, Langtry, Marcos, Marshall, Martindale, Montell, Nolan, Palmillas, Pedernales, Travis and Wells,* as well as several specimens that do not fit within existing taxonomy. Unfinished dart points and dart point fragments are also described.

BULVERDE (1 specimen; Fig. 10, a). This incomplete specimen has only a partial body, probably broken in manufacture, which is slightly convex. The stem is contracting with a slightly convex base. L: (44); MW: 35; MT: 7; SL: 19; SW: 14; NW: 18.

CASTROVILLE (2 specimens; Fig. 10, b). Both basal fragments have convex bases. Only portions of the shoulders remain; one fragment is burned and potlidded. L: (24-38); MW: (29.5-37.5); MT: 5.5-6.5; SL: 10-15; SW: 21-27.5; NW: 18-24.5.

EARLY TRIANGULAR (1 specimen; Fig. 10, f). This triangular point has been alternately beveled along the right lateral edge. Similar points were found and given this tentative label at the La Jita site (Hester 1971). L: 33.5; MW: (28); MT: 5; WT: 4.8.

ENSOR (19 specimens; Fig. 11). This type has been divided into six varieties based on work by Johnson, Suhm, and Tunnell (1962) and Hester (1971).

Variety 1 (3 specimens; Fig. 11, a-c). Two specimens are complete; one is a

basal fragment. Of the complete specimens, one is very well made and the other is unfinished. All three have side notches and straight or slightly convex bases. L: (33.5)-38.5; MW: 19.5-26; MT: 5-9.5; SL: 8-15; SW: 19-24; NW: 13-21; WT: 2.8-8.8. (Johnson's Variety 1; Tunnell's Variety A; Hester's Variety 4).

Variety 2 (1 specimen; Fig. 11, d). This point resembles Variety 1 but the body is alternately beveled. The point has side notches; the base is straight to convex. L: 47.5; MW: 30; MT: 7; SL: 13.5; SW: 27.5; NW: 24; WT: 10.4. (Tunnell's Variety D; Hester's Variety 1).

Variety 3 (1 specimen; Fig. 11, e). The body has convex edges; the side notches are broad. The expanding stem is not as wide as the shoulders; the basal edge is concave. L: 36; MW: 23; MT: 6; SL: 8; SW: 17.5; NW: 15; WT: 4.2. (Tunnell's Variety F).

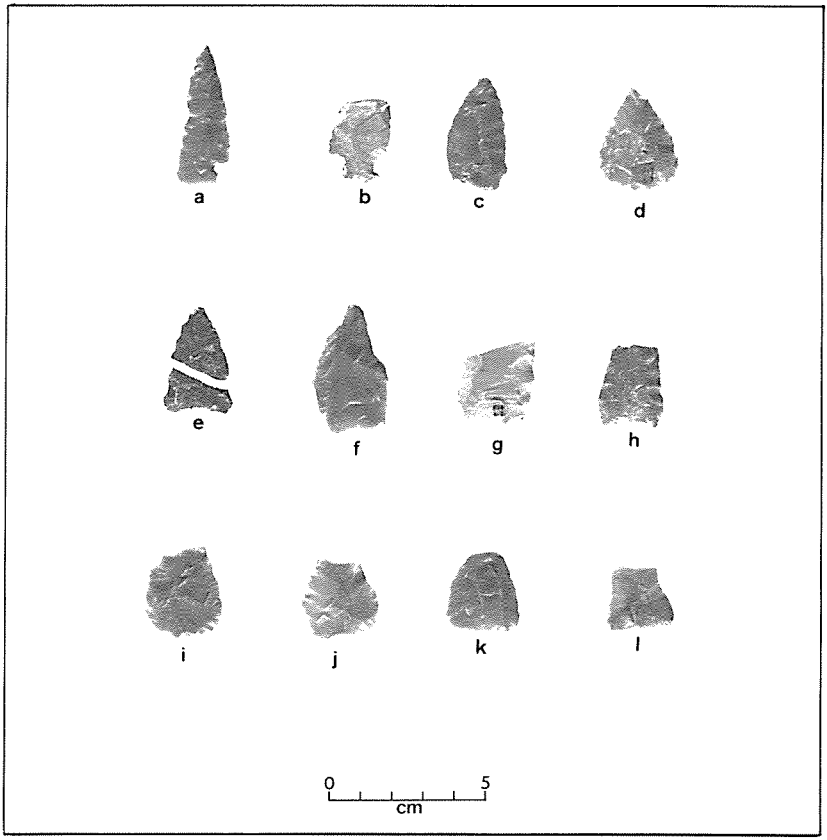

FIGURE 9. *Arrow Points and Arrow Point Preforms.* a-b, unfinished; c, preforms, Group 1; d, Group 2; e, Group 3; f, Group 4; g, Group 6; h, Group 7; i-j, Group 8; k-l, Group 9.

Variety 4 (8 specimens; Fig. 11, f-j). The bodies are triangular and have straight or slightly convex edges. The points are side-notched. Bases are as wide or slightly wider than the shoulders and have convex basal edges. Three of the specimens are barbed. Two points are complete; six are fragmentary. Two fragments are badly burned and potlidded. One specimen is finely serrated along the edges. L: (19)-54; MW: (21)-34.5; MT: (4.5)-8; SL: 8.5-11.5; SW: (19.5)-28.5; NW: (14.5)-22; WT: 6-6.8. (Tunnell's Variety E).

Variety 5 (3 specimens; Fig. 11, k-m). These points resemble *Frio* points, but their bases were straight before the removal of a central U-shaped notch ("Ensor-Frio"). Bodies are triangular with straight or slightly convex edges. One specimen has slight barbs. The stem is as wide, or slightly wider, than the shoulders. The side notches are broad. L: (38)-43; MW: 26-29.5; MT: 5-7; SL: 9.5-12.5; SW: (26.5)-28.5; NW: 17.5-18.5; WT: 6.8. (Tunnell's Variety C).

Variety 6 (3 specimens; Fig. 11, n-o). These specimens are similar to Variety 5. They also have a central U-shaped notch, but the bases were not straight before being notched. The specimens are fragmentary, but two have slight barbs. The stems are wider than the shoulders. One point is burned and potlidded. L: (44)-45.5; MW: (29.5)-33; MT: 5.5-8; SL: 9.5-12.5; SW: (24)-32; NW: 18.5-19.0; WT: 9.4. (Tunnell's Variety B).

FRIO (7 specimens; Fig. 10, c-e). Point tips are absent on three specimens; another two are the basal halves. Bodies are triangular and fairly straight, with shoulders average to strong, some with barbs. All bases are very concave, with four having a U-shape. One of the points is very large; another is thermally fractured. Workmanship is fair. L: (30)-69; MW: 22-42.5; MT: 5-7.5; SL: 8-12; SW: (17)-29; NW: 17-21; WT: 4.7.

KINNEY (1 specimen; Fig. 10, g). The badly burned, potlidded fragment has a deep concave base. L: (43); MW: 32; MT: (7.5).

LANGTRY (1 specimen; Fig. 10, h). The potlidded basal fragment is strongly barbed. The basal edge is slightly concave. L: (36.5); MW: (37.5); MT: (5); SL: 16; SW: 11.5; NW: 13.5

MARCOS (2 specimens; Fig. 10, i-j). These incomplete specimens have triangular bodies, one very broad, with straight edges. The stems are strongly expanding with a straight base on the broader specimen, a slightly concave base on the other. L: (36-37); MW: 30-35; MT: 7; SL: 8-9; SW: 13-26.5.

MARSHALL (2 specimens; Fig. 10, k-l). One specimen has no tip; the other lacks a shoulder. Both have thinned convex bases with expanding stems. Workmanship is fair. L: 37; MW: (30)-31; MT: 6-7; SW: 21-26; SL: 10-11; NW: 12.5-17.

MARTINDALE (2 specimens; Fig. 10, m). One specimen represents only the basal end and is very small. The second is absent the tip and one edge of the body. Both have expanding stems with a typical "fishtail" base. L: (12-32); MW: (18-27); MT: 5-7; SL: 11; SW: 17.5-21; NW: 13-16.

MONTELL (5 specimens; Fig. 10, n-o). All are basal fragments. One specimen is badly burned and potlidded; one shows patination. The bodies on the three more complete specimens have straight or concave edges. They are corner-notched and the stems have a V-shaped notch in the center of the base. All three are barbed. One point appears unfinished. L: (28.5-56); MW: (28-42); MT: 5.5-7.5; SL: (9.5)-14.5; SW: (18)-28; NW: (18.5)-27.5.

NOLAN (1 specimen; Fig. 10, p). The body is triangular, with the stem only slightly more narrow than shoulder width. The base is slightly convex. This highly

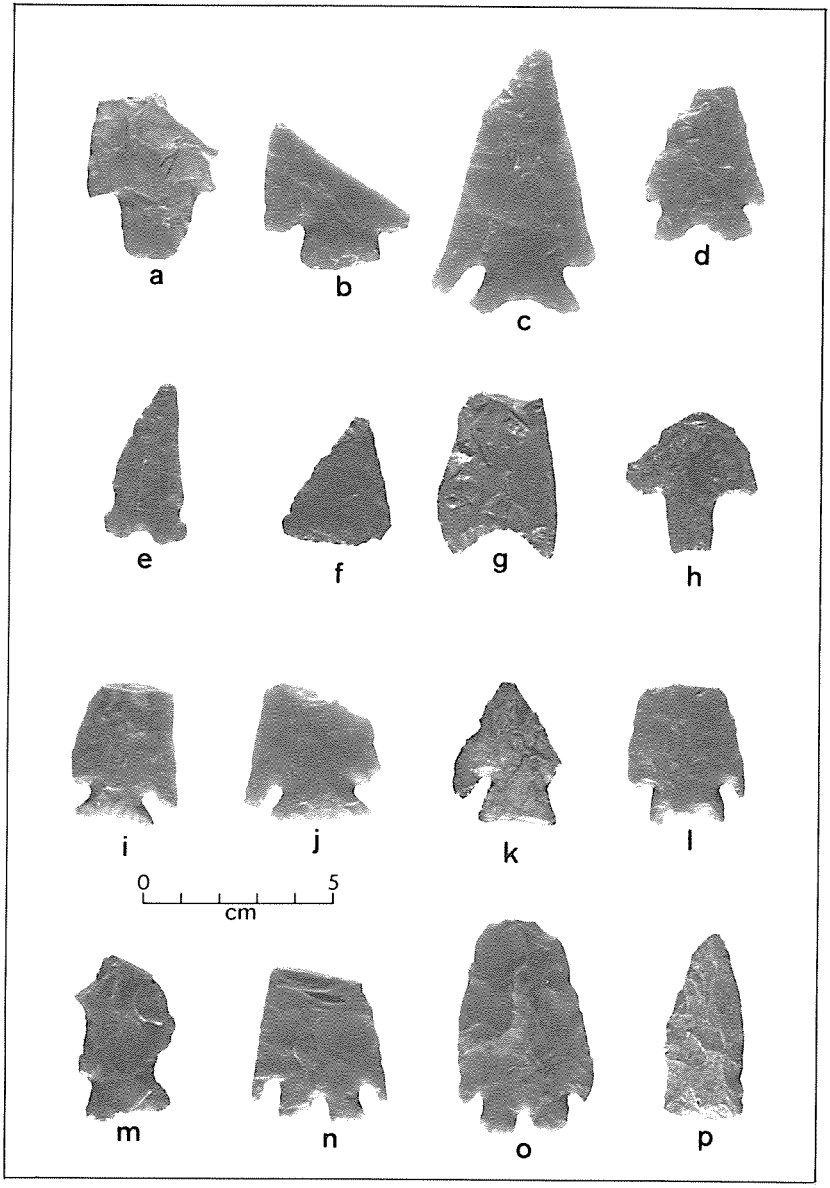

FIGURE 10. *Dart Points.* a, *Bulverde*; b, *Castroville*; c-e, *Frio*; f, *Early Triangular*; g, *Kinney*; h, *Langtry*; i-j, *Marcos*; k-l, *Marshall*; m, *Martindale*; n-o, *Montell*; p, *Nolan*.

patinated specimen exhibits crude workmanship. L: 49; MW: 22; MT: 8.5; SL: 21; SW: 18.5; WT: 9.4.

PALMILLAS (1 specimen; Fig. 12, a). This complete specimen has a narrow triangular body with slightly convex edges. The stem is expanding with a straight base. Body edges are serrated; workmanship is good. L: 42; MW: 17; MT: 5; SL: 6.5; NW: 11; WT: 2.9.

PEDERNALES (13 specimens; Fig. 12, b-j). The specimens are morphologically diverse. Only six are complete; several appear to be unfinished and were probably broken in manufacture. Bodies vary from triangular to leaf-shaped, with straight or convex edges. Barbs are present on three of the points. Stems are ¼-⅓ of total length. Variation from slight to deep concavity is present on the bases. Workmanship varies from very good to crude, the latter possibly reflecting the incomplete manufacturing stage of these points. Basal thinning frequently consists of a single channel flake removed from the center of the base on both faces of the stem. L: (36)-104; MW: 27-42.5; MT: 6-9; SL: 12-27; SW: 16-27; NW: 15-25; WT: 8.3-21.6.

TRAVIS (1 specimen; Fig. 12, k). This specimen has a triangular body with slight rounded shoulders. The base is slightly convex. L: (52); MW: 25; MT: 7; SL: 12; SW: 14; NW: 16.

WELLS (1 specimen; Fig. 12, l). This complete specimen has a slender triangular body, small shoulders, and a long stem with rounded base. It is heavily patinated. L: 61; MW: 21; MT: 8; SL: 24; SW: 15.5.

UNCLASSIFIED DART POINTS

The following dart points do not fit into any currently-defined type.

GROUP 1 (1 specimen; Fig. 13, a). This point cannot be placed within the existing taxonomy. The lateral edges are alternately beveled, resulting in a very sharp point. The specimen has a convex base and broad corner notches. L: 57; MW: 25; MT: 7; SL: 14; SW: 21; NW: 15; WT: 6.8.

GROUP 2 (2 specimens). This group consists of the stems of two dart points. They have concave bases, but are not identifiable. They are too fragmentary for measurement.

UNFINISHED DART POINTS

These eight points were abandoned at different stages in the manufacturing process. They are divided into six groups.

GROUP 1 (1 specimen, not illustrated). This specimen has corner notches. The body has pronounced convex edges. One side has traces of cortex on it. L: (35.5); MW: 31.5; MT: 15.5; SL: 9.5.; SW: 18; NW: 18; WT: 9.7.

GROUP 2 (1 specimen; Fig. 13, b). This specimen is missing the distal tip. The

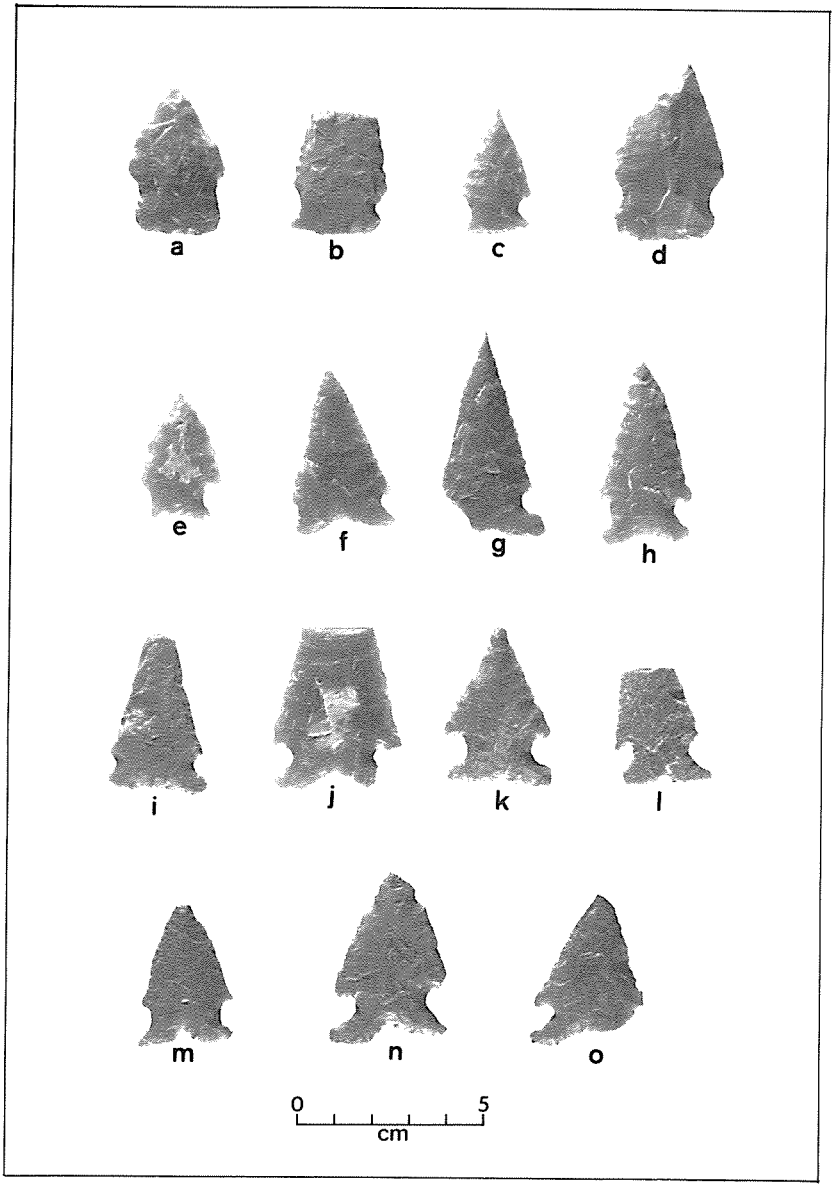

FIGURE 11. *Dart Points.* All of the *Ensor* type. a-c, Variety 1; d, Variety 2; e, Variety 3; f-j, Variety 4; k-m, Variety 5; n-o, Variety 6.

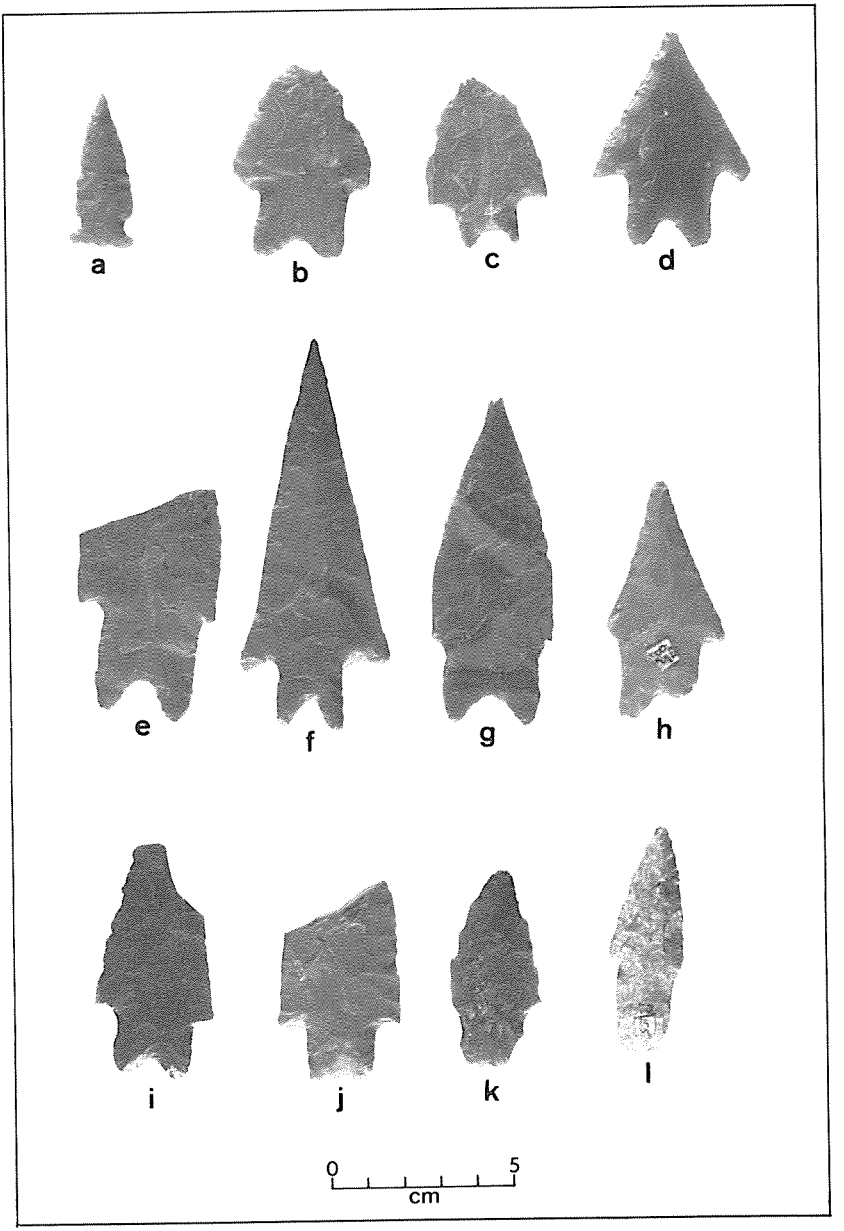

FIGURE 12. *Dart Points.* a, *Palmillas*; b-j, *Pedernales*; k, *Travis*; l, *Wells.*

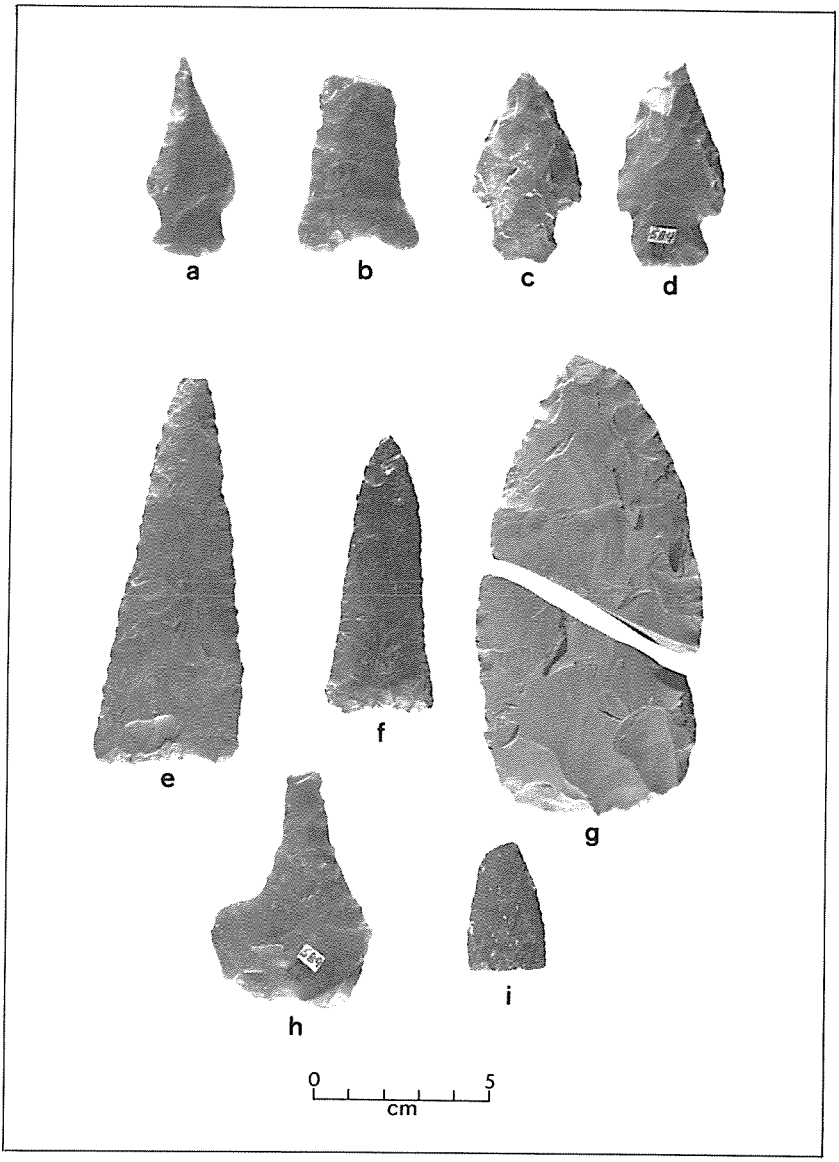

FIGURE 13. *Dart Points and Other Bifacial Artifacts.* a, Unclassified; b, Unfinished, Group 2; c-d, Unfinished, Group 6; e-f, Thinned Triangular Bifaces; g, Large Thinned Biface; h, Perforator; i, Beveled Knife.

body flares out to a concave base; there is no stem. L: (51.5); MW: 34.5; MT: 8.5.

GROUP 3 (1 specimen, not illustrated). One fragmentary specimen consists mainly of a base. One lateral edge has a side notch. The base is convex. L: (30); MW: 35.5; MT: 8; SL: (1.5); SW: 50.3; NW: 29.

GROUP 4 (1 specimen, not illustrated). This fragmentary specimen is absent the distal tip and part of the stem. It has a slight side notch on the intact side. The base is concave; the lateral edges of the body are slightly convex. L: (45.5); MW: (32.5); MT: 6; SL: (12); SW: (19.5); NW: (22).

GROUP 5 (1 specimen, not illustrated). This basal fragment has convex edges and a long contracting stem with a concave base. L: (38.5); MW: 26.5; MT: 7.6; SL: 16; SW: 16; NW: 18.

GROUP 6 (2 specimens; Fig. 13, c-d). These specimens have broad side notches and the body has straight to slightly convex lateral edges. One has a slightly convex basal edge; the other has a concave basal edge, with the tops of the stem broken off. It is patinated and has a beveled stem. L: (54.5-57); MW: 31-32; MT: 10-10.5; SL: 13.5-(14); SW: (20-23); NW: 19-19.5; WT: 15.4-17.0.

DART POINT OR LARGE BIFACE FRAGMENTS

The majority of these (84 specimens; not illustrated) seem to be dart point fragments. There are 27 distal fragments, 26 medial fragments, and 31 miscellaneous fragments that are too burned or broken to identify. Several medial fragments have part of a shoulder remaining. Several of the fragments are patinated.

DART POINT PREFORMS

This category includes 134 bifacially chipped artifacts, excluding projectile points, which are probably projectile point preforms. Of this number, only 36 are substantially complete specimens. On several of these cortex remains on one face which may have been impossible for the knapper to remove, resulting in their discard. A few of the basal fragments were complete enough to sort into groups 1-8 with the complete specimens, but most basal, medial, and distal sections were too fragmentary to divide morphologically. Eleven groups are described below.

GROUP 1 (2 specimens; Fig. 14, a, b). Narrow lanceolate outlines; the face of one specimen has a thick lateral ridge with parallel flaking to either side of this ridge. Fair workmanship. Straight to slightly convex bases. L: 65-69; MW: 21-24; MT: 10-11.

GROUP 2 (3 specimens; Fig. 14, c, d). Ovate with convex bases. One is made on a flake, with cortex covering the lower half of one face. L: 50-70; MW: 36.5-56; MT: 12-13.

GROUP 3 (8 specimens; Fig. 14, e, f). Asymmetrical but generally ovate

outline and convex bases. Crude; two are badly scarred and potlidded. L: 40-64; MW: 30.5-49; MT: 6-10.

GROUP 4 (11 specimens; Fig. 14, g, h). Triangular with straight to convex bases. Thick and crude with some cortex remaining on most. Distal tip absent on four specimens. L: 50-84; MW: 33-53; MT: 12-22.

GROUP 5 (7 specimens; Fig. 14, i, j). Triangular with straight edges and slightly convex bases. Two are basal fragments; two are badly potlidded. One specimen narrows sharply at the proximal end. Fair workmanship. L: 50-69; MW: 27.5-43; MT: 7-11.

GROUP 6 (12 specimens; Fig. 14, k, l). Triangular with convex bases and edges. Two have missing tips; another three are basal fragments. Fair workmanship. L: 47-81; MW: 32-46; MT: 7-11.

GROUP 7 (6 specimens; Fig. 15, a, b). Small triangular outline; bases straight to convex; crude workmanship. L: 41.5-53; MW: 27-30; MT: 7-10.

GROUP 8 (3 specimens; Fig. 15, c). Residual category. Very crude. One has mostly cortex on one face and is rectangular with perforator-like tip. Others are roughly triangular; one has cortex at the distal end; the other is badly potlidded.

The remaining three groups are bifacially worked artifacts too fragmentary to classify more definitively.

GROUP 9 (22 specimens). Basal fragments. Several specimens are thinned and exhibit fair workmanship. Others are crude and still have cortex remaining on one or both faces. One specimen was made on a biface thinning flake. Several specimens are potlidded; some are patinated. Not illustrated.

GROUP 10 (18 specimens). Medial fragments. Broken at various stages of manufacture. Most of the medial sections are small. Not illustrated.

GROUP 11 (42 specimens). Distal fragments. Wide range in size, workmanship and stage of manufacture. Some with cortex, patination, and/or potlidding. Not illustrated.

OTHER BIFACES

THINNED TRIANGULAR BIFACES (2 specimens; Fig. 13, e-f). Both are triangular in outline with moderately concave bases. Body edges are serrated; workmanship is fair to good. These bifaces, from levels 2 and 3, were probably utilized as knives. L: (79-110); MW: 31-41; MT: 6-10.

LARGE THINNED BIFACE (1 specimen; Fig. 13, g). This large but relatively thin specimen was apparently broken during manufacture. Both halves were found in Unit 1, the distal end in level 1 and the proximal end in level 2. Workmanship is good. L (combined halves): 121; MW: 60; MT: 12.

PERFORATOR (1 specimen; Fig. 13, h). This specimen has a rounded ovate base with a long shaft. The tip is absent. L: 66; MW: 44; MT: 11; L (of shaft): 35.

BEVELED KNIFE (1 specimen; Fig. 13, i). This medial fragment is alternately beveled along the right lateral edges. This type of knife dates to the Late Prehistoric (Hester and Parker 1970). A complete specimen was found on the natural shelf in the cave but was not available for analysis. L: (36.5); MW: (23.5); MT: (6).

CHOPPER (1 specimen; Fig.16, d). Several broad flakes have been removed bifacially from one end of the cobble, forming a convex edge. The proximal end is covered with cortex. L: 90; MW: 83.5; MT: 42.

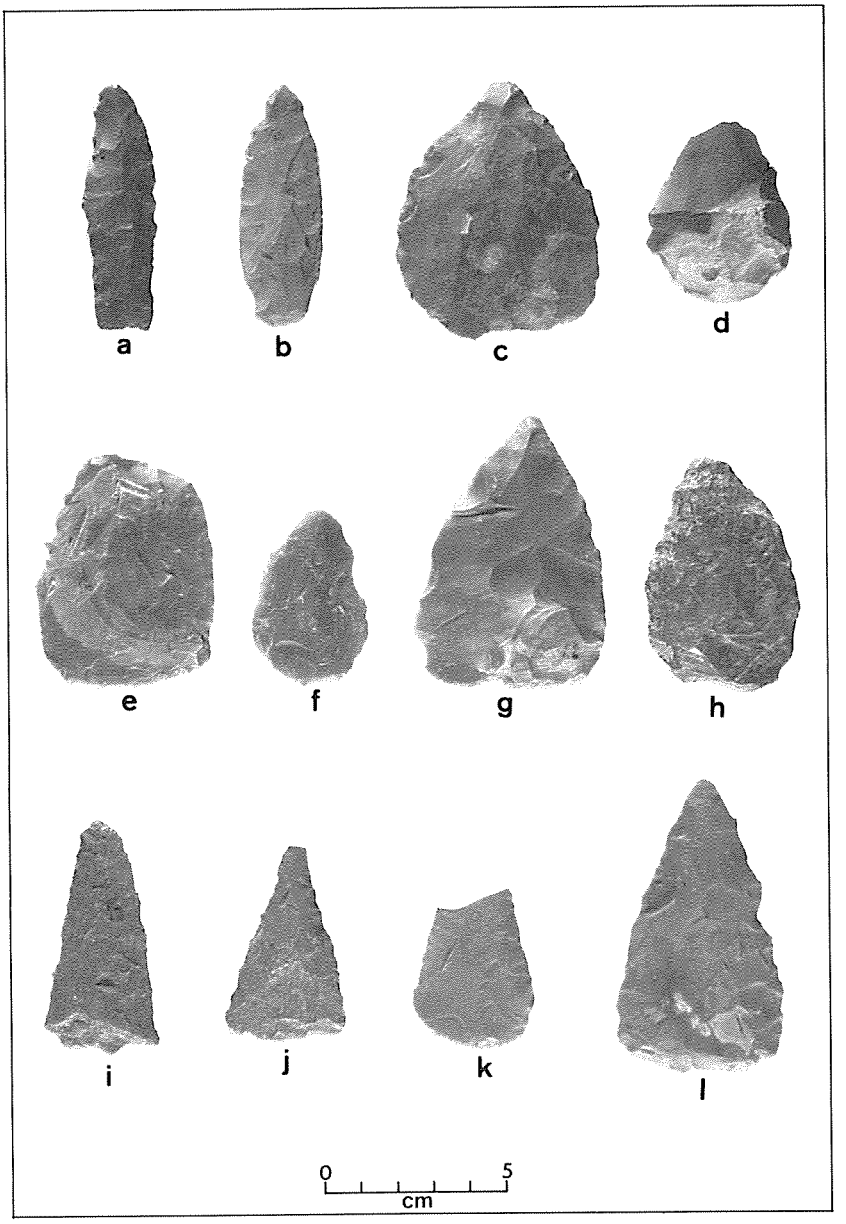

FIGURE 14. *Dart Point Preforms*. a-b, Group 1; c-d, Group 2; e-f, Group 3; g-h, Group 4; i-j, Group 5; k-l, Group 6.

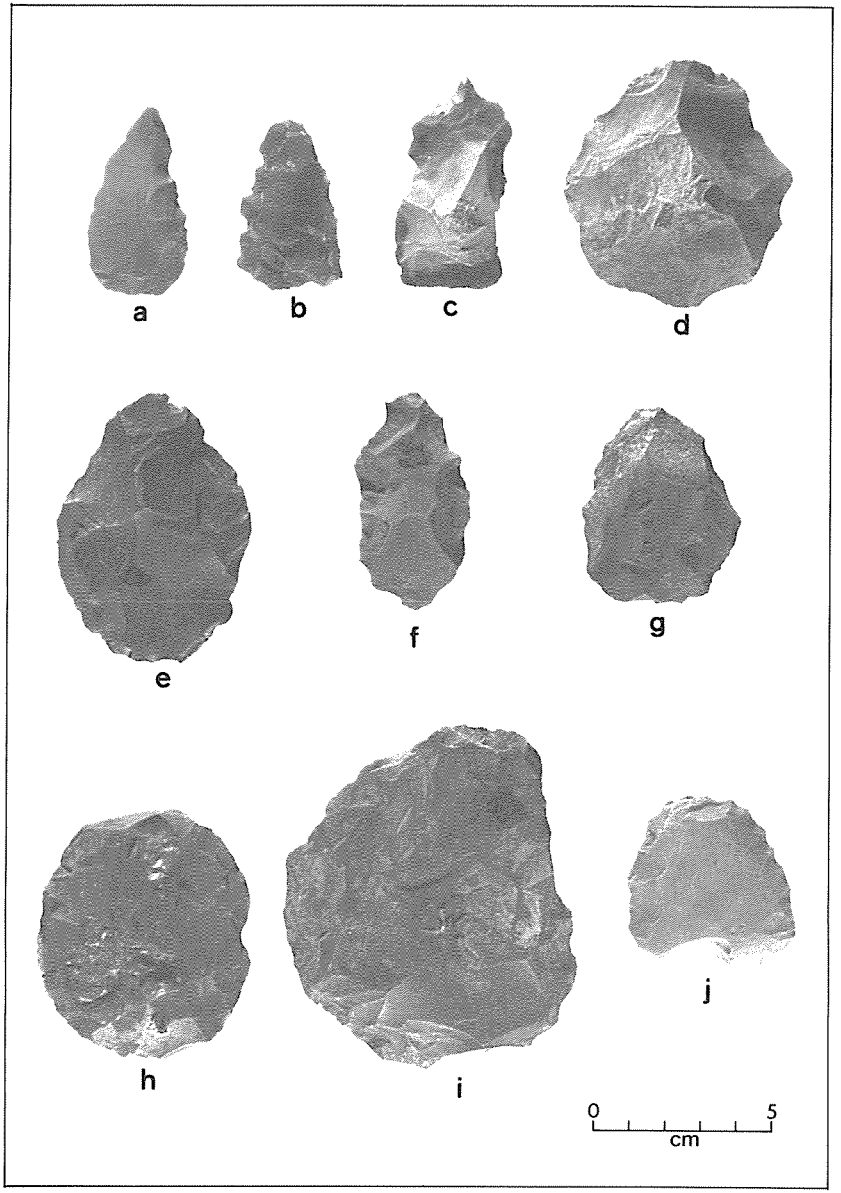

FIGURE 15. *Dart Point Preforms and Crude Bifaces.* a-b, Preforms, Group 7; c, Group 8; d, Crude Bifaces, Group 1; e-f, Group 2; g, Group 3; h, Group 4; i, Group 5; j, Group 6.

CRUDE BIFACES. These differ from those artifacts in the preform category in that the former represent crude percussion as opposed to controlled percussion and some pressure flaking on the latter. Seven groups of thick, percussion-chipped bifaces are described below.

GROUP 1 (6 specimens; Fig. 15, d). Ovate outlines. Thick, crude. Large flake scars. Cortex on one or both faces. L: 63-85; MW: 46-70; MT: 18-38.

GROUP 2 (7 specimens; Fig. 5, e-f). Ovate outlines. Thick, crude. Large flake scars. Cortex on one or both faces. L: 63-85; MW: 46-70; MT: 18-38.

GROUP 3 (2 specimens; Fig. 15, g). Small, ovate. Cortex on one face. L: 53-54; MW: 34-44; MT: 14-16.

GROUP 4 (2 specimens; Fig. 15, h). Thinner; ovate outline. Cortex on one or both faces. One is fire-fractured. L: 69-73; MW: 52-60; MT: 11-14.

GROUP 5 (1 specimen; Fig. 15, i). Very large ovate biface. No cortex remaining. L: 96; MW: 81; MT: 21.

GROUP 6 (1 specimen; Fig. 15, j). Asymmetrical. Made on a flake. Cortex remaining on each end. L: 51; MW: 46; MT: 13.

GROUP 7 (4 specimens). Fragmentary. Crude, some fire-fractured. Not illustrated.

CORES AND CORE FRAGMENTS (12 specimens). All have had flakes removed bifacially. All but two have cortex remaining. On one of these, blade-like flakes have been removed. Most of these specimens are natural platform cores. L: 55-81; MT: 23-40.

UNIFACES

RETOUCHED BLADES (5 specimens). By definition, a blade is a long, narrow flake, the length being at least twice the width. One or more lateral ridges occur on the dorsal surface. These five specimens show a series of patterned flake scars along one or both edges. Two of the blades show only slight modification. One blade has been retouched bifacially along one edge and unifacially on the other edge. This blade is sharply pointed and twisted. Two blades are retouched unifacially along both lateral edges. Use-wear analysis of blades from the central and southern coast has shown that retouched blades were most often used as cutting tools or knives, rather than as scrapers (Hester and Shafer 1975). L: 5-10.5; MW: 1-5; MT: .5-1.

UTILIZED BLADES (4 specimens). The edges of these blades have been slightly modified by use-wear.

RETOUCHED FLAKES (29 specimens). These flakes have been finely retouched along one or several edges. They have been divided into the following categories.

FORM 1 (1 specimen). This secondary flake has been alternately retouched along the lateral edges. L: 7; MW: 4; MT: 1.5.

FORM 2 (2 specimens). These two secondary flakes have been trimmed along the lateral edges producing a pointed flake. L: 7-7.5; MW: 5-7.5; MT: 2-2.5.

FORM 3 (7 specimens). These have been retouched along most of the flake perimeter. Three interior flakes have been trimmed unifacially; the four secondary flakes have been trimmed bifacially. L: 4.5-9.5; MW: 2-5; MT: .5-2.

FORM 4 (6 specimens). These flakes have been trimmed unifacially along both lateral edges. Three of the flakes are interior; three are secondary. L: 5-10.5; MW: 3-6.5; MT: 1-2.

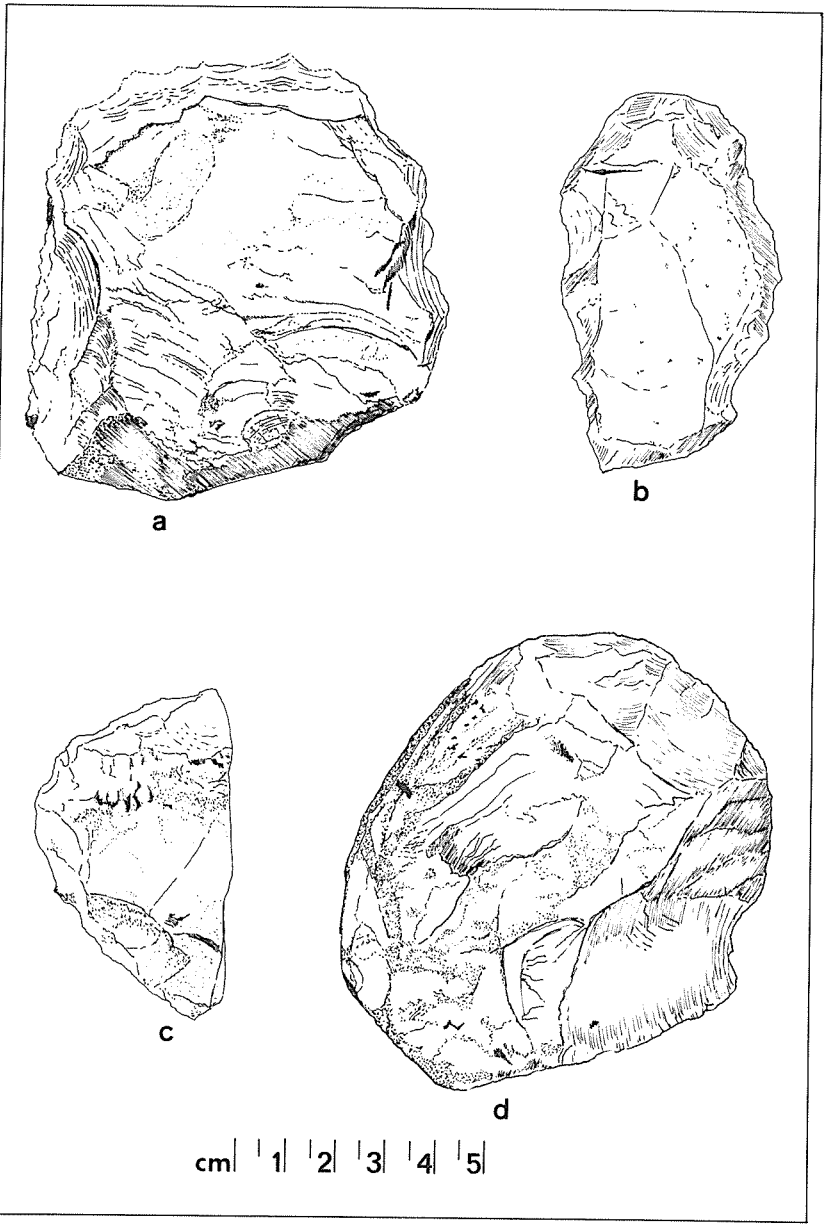

FIGURE 16. *Other Bifaces and Unifaces.* a, c, end and side scrapers; b, double end and side scraper; d, chopper.

FORM 5 (3 specimens). These secondary flakes have been retouched along the lateral edges as well as along the end opposite the bulb of percussion. L: 4.5-5.5; MW: 3-6.5; MT: 1-1.5.

FORM 6 (8 specimens). These flakes have been retouched unilaterally. Six are secondary flakes; two are primary flakes. L: 3.5-12; MW: 2.5-6.5; MT: 1-2.

FORM 7 (2 specimens). One secondary flake has been trimmed unilaterally; the opposite edge is cortex. The platform end has also been trimmed. The other flake has cortex along the platform end and along one lateral edge. The opposite edge and the end opposite the platform end have been retouched. L: 6.5-20.5; MW: 3-5.5; MT: 1-1.5.

SCRAPERS (7 specimens). These artifacts represent tools which have a steep bit edge or edges. Five are unifacial; one is bifacial.

side scraper (1 specimen). This specimen has been retouched unilaterally. L: 74; MW: 33; MT: 12.

end and side scrapers (3 specimens; Fig. 16, a, c). One specimen is complete; two are broken. On each specimen, one lateral edge has been retouched as well as the end opposite the bulb of percussion. L: 62-97.5; MW: 37-88; MT: 12-27.5. 27.5.

double end and side scraper (1 specimen; Fig. 16, b). This specimen has been flaked along both lateral edges as well as the end opposite the bulb of percussion. L: 76; MW: 43; MT: 12.5.

irregular scrapers (2 specimens). These specimens are irregularly shaped. The fragmentary unifacial scraper is trimmed along the perimeter. The bifacial flake is alternately trimmed along the lateral edges, one of which is concave. The end opposite the bulb of percussion has the steep-bit edge. L: 40.5-94; MW: 37-62; MT: 8-16.

PAINTED ARTIFACTS

PAINTED PEBBLES (3 specimens; Fig. 17, a-c). These pebbles show evidence of black linear decoration. One oblong pebble has several intersecting black lines painted on it; the design is very dim (L: 57; MW: 33; MT: 10). A second oblong specimen has three black parallel lines running lengthwise down the center of one face (L: 53; MW: 32; MT: 19). A third light brown oblong pebble has two black parallel lines running the width of one face, slightly off-center; there are also patches of red paint on this face (L: 63; MW: 35; MT: 20). The occurrence of painted pebbles in central Texas is very rare. A painted pebble was recovered from Classen Rockshelter, 41 BX 23 (Fox and Fox, unpublished manuscript on file at the Center for Archaeological Research, The University of Texas at San Antonio). This specimen had black paint on one end; a design was not distinguishable. At the Goodrich Site, a waterworn limestone slab had red parallel lines painted on both faces (Suhm 1960). Hester (1977) recently reported a painted pebble with red linear decorations from Zavala County in south Texas.

STAINED STONES (3 specmens; Fig. 17, d). One oblong specimen, as well as an ovate and a broken specimen, has reddish colorations on one or both faces. They were probably used to grind hematite. A conglomeration of a reddish material identified by Dr. Richard V. McGehee as hematite was also found in the deposits. This material is not native to the immediate area. (oblong specimen, L: 83; MW: 40; MT: 18; ovate specimen, L: 75; MW: 69; MT: 13).

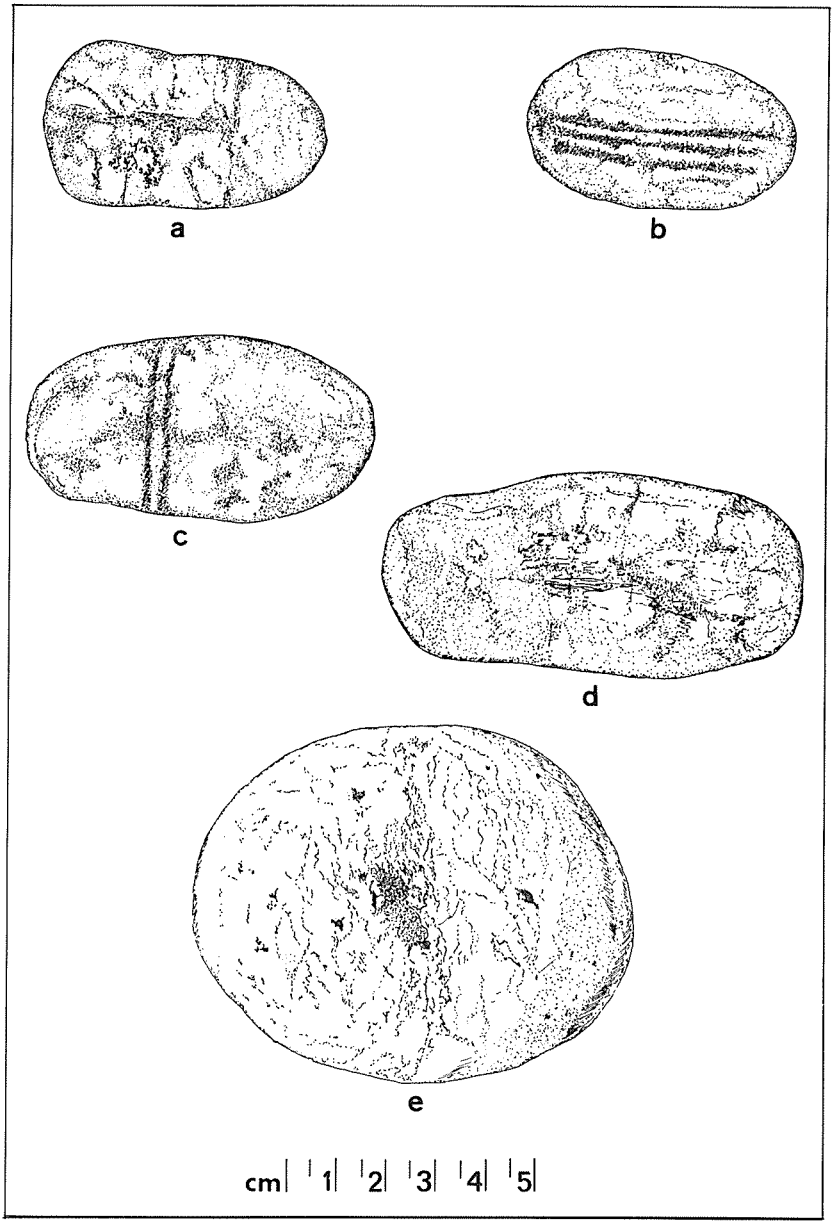

FIGURE 17. *Painted Artifacts and Ground and Pecked Stone Artifacts.* a-c, painted pebbles; d, stained stone; e, pitted stone.

GROUND AND PECKED STONE ARTIFACTS

PITTED STONES (3 specimens; Fig. 17, e). All three specimens are limestone and have a circular pitted area centrally located on both faces. Two stones are ovate, while the larger stone is rectangular. Similar artifacts have been described by Skinner (1971) and Word (1971). L: 85-138; MW: 68-91; MT: 43-60.5.

HAMMERSTONES (2 specimens). The smaller chert hammerstone evidences battering on both ends. The larger hammerstone, made of limestone, shows battering on only one side. L: 67-97; MW: 45-82.5; MT: 40-66. Not illustrated.

MANOS (2 specimens). Both are fragmentary and are made of limestone. The larger mano is ovate with wear facets on only one face. The other is fragmentary but appears to have been ovate in outline. It has wear facets on both faces. L: 35.5-79.5; MW: 75-80.5; MT: 38.5-48.5. Not illustrated.

BONE ARTIFACTS

BONE AWLS (8 specimens; Fig. 18, a-f). Four awls have been manufactured from the split bones of a deer. Similar awls have been recovered from Baker Cave and Red Mill Shelter (Word 1971). Word states that they do not need to be altered to be useful as a tool. Three of the specimens show no alteration; one has been sharply pointed (L: 44-54). Four broken awl tips were also recovered. Two are burned; all evidence polishing. The top of one appears to be fire-hardened. L: 20-56; MW: 5.5-12; MT: 2.5-4.5

DEER ULNA FLAKING TOOL (1 specimen; Fig. 18, g). The distal end has been broken off. Well-defined scratches are visible along the sides of the specimen, apparently used as a flaking tool. L: 77; MW: 30; MT: 13.5.

BONE BEADS (4 specimens; Fig. 18, h-i). One polished bone bead, made from the radius-ulna of a hawk-sized bird, is incised. Three grooves are cut around the bone and are filled with asphaltum. A fourth groove was started (L: 35; MW: 5.5). A similar polished bone bead was also recovered. It is not incised and was made from the radius of a vulture (L: 35; MW: 7.5). Two smaller, thicker beads were made from the bones of a raccoon-sized animal. These beads are not as highly polished; one is rodent-gnawed (L: 11.5-14; MW: 11-12.5). Two other bone specimens might represent beads but are in such poor condition that identification is not possible.

POLISHED BONE FRAGMENTS (9 specimens). All fragments show a high degree of polishing. Several are burned.

SHELL ARTIFACTS

NOTCHED SHELL (1 specimen; Fig. 18, j). This *Rabdotus* land snail has a rectangular slit cut in it. Clark (1969) reviews many of the archeological sites in Texas that have yielded shell ornaments. Most recorded examples are of snails that were strung as beads, and this modified land snail might have been utilized in that manner (L of snail: 22.5; L of notch: 10.5).

FLAKE ANALYSIS

The total amount of flakes that came out of the excavations conducted at Scorpion Cave was not available for analysis. From the flakes that were studied, it appears that the final stages of biface reduction were carried out within the cave. The majority of flakes are interior; comparatively, very few primary or secondary flakes were present. Many of the flakes can be classified as bifacial thinning flakes. Only 12 cores were found in the cave; 135 preforms and 23 crude bifaces were recovered. Units 13, 14, 15, 17 and 19 (see Fig. 4) contained large numbers of flakes.

Many blades were also recovered from the deposits. Blades are representative of a specialized flint-knapping technique that produces a long, narrow flake, which even unmodified has an excellent cutting edge. The length of a blade is at least twice the width and exhibits one or more lateral ridges on the dorsal face. Retouched blades and arrow points made on blades were analyzed and described earlier in the text. According to Green and Hester (1973) blades are characteristic of the Late Prehistoric period. Patterson (1973, 1976) has carried out extensive studies of blade technology in Texas.

HISTORIC ARTIFACTS

The Historic period is represented by a wide variety of artifacts. Specimens of pottery, glass, metal, leather, and plastic were recovered from Scorpion Cave. None of these can be attributed to a historic Indian occupation of the cave. Other than several majolica fragments, the earliest items are American-manufactured and can be dated to the late 19th and early 20th centuries. Other specimens date up to the present time. Presumably the historic items were randomly carried into the cave by campers, hunters or other transients. Due to the relatively small number of specimens it is doubtful that they represent any sort of long-term historic utilization of the cave. A State Historical Commission marker at the site of the Medina Dam indicates that 16 Mormon families under the leadership of Lyman Wright settled there in 1854; the site was abandoned in 1858 due to Indian depredation. Present-day owners do not know of any other settlements or structural remains in the immediate

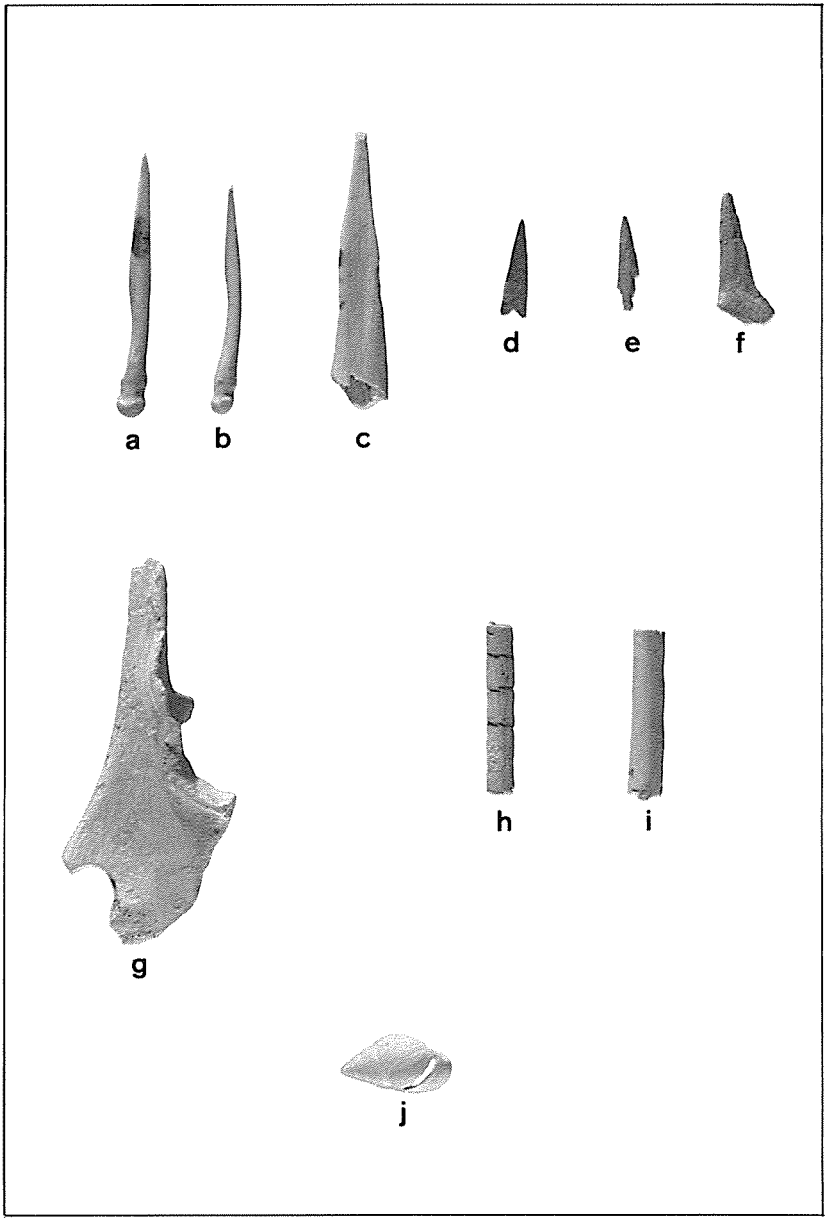

FIGURE 18. *Bone Artifacts and Shell Artifact.* a-f, bone awls; g, deer ulna flaking tool; h-i, bone beads; j, notched shell.

area that date to the late 1800s and early 1900s which might explain the presence of the older specimens.

Other caves and rockshelters in central Texas have also contained historic artifacts as well as a prehistoric assemblage. Kincaid Rockshelter in Uvalde County (Glen Evans, personal communication), Oblate Rockshelter in Comal County (Johnson, Suhm and Tunnell 1962), and Classen Rockshelter in Bexar County (unpublished manuscript on file at the Center for Archaeological Research, The University of Texas at San Antonio) contained historic metal and glass artifacts overlying prehistoric occupational debris.

The specimens from Scorpion Cave were scattered throughout the upper levels of most excavated units. The majority of these items extended from the outermost units of the cave to Units 19 and 20 (see Fig. 4); fewer specimens were found in the rear passageway.

The following is a general discussion of the historic specimens from Scorpion Cave:

CERAMICS

MAJOLICA (Fig. 19, a, b). Four fragments of European majolica probably date to the late 19th century (Anne Fox, personal communication). The three body sherds and one rim sherd have a green and yellow floral design on an off-white background. There is a green band along the exterior rim.

MEYER'S POTTERY (Fig. 19, f). Twenty-eight fragments of Meyer's pottery, probably from the same vessel, date to the late 1800s and early 1900s (Anne Fox, personal communication). Founded in 1887, the Meyer Kiln was located in Atascosa near San Antonio. It continued in operation until 1937. Meyer's pottery is distinguished by a red slip which results in mottled golds, browns, and greens (Schuetz 1969).

CRUCIBLE (Fig. 19, g). This fired clay fragment probably represents the lining of a still (Anne Fox, personal communication). The owners of the property report that they have located the remains of a still near the cave.

MARBLE. This fired clay specimen was found in the rear of the cave.

GLASS

BOTTLE GLASS. 189 fragments of aqua, clear, amber, and green bottle glass were found scattered throughout the upper levels of the cave deposits. "GEBHARDT EAGLE" was imprinted on one of the clear bottle glass fragments.

GLASS STOPPER. One clear bottle glass stopper was recovered.

METAL

CARTRIDGE CASES (Fig. 19, d, e). Two of the cartridge cases found in Scorpion Cave were manufactured in the latter half of the 19th century. One is a

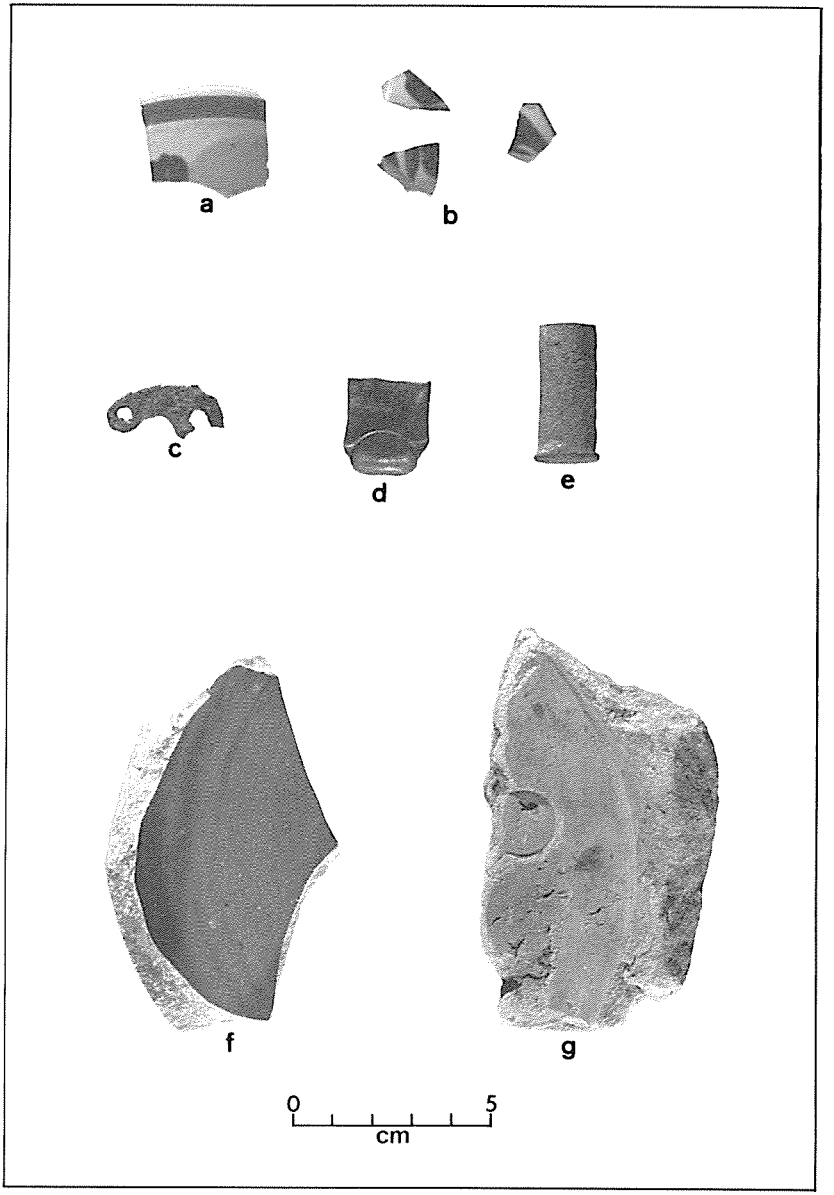

FIGURE 19. *Historic Artifacts.* a-b, majolica ceramic fragments; c, bridle for a gun lock; d-e, cartridge cases; f, Meyer's pottery; g, crucible.

Spencer rim-fire cartridge case which was manufactured during the Civil War and into the early 1870s. This type cartridge case was the standard cavalry carbine issued by the United States government after the Civil War. The other cartridge case is tentatively identified as a .50-.55 Springfield carbine, dated to ca. 1870 (Sam Nesmith, personal communication). Both of these specimens were found in Unit 7, level 3 (see Fig. 4). Other specimens include .22 caliber, .30 caliber, .32 caliber, .38 caliber, and Colt .45 caliber cartridge cases.

BRIDLE FOR A GUN LOCK (Fig. 19, c). This specimen was found in Unit 7, level 3 along with the aforementioned Spencer and Springfield cartridge cases and can probably be attributed to the same time period (Sam Nesmith, personal communication).

NAILS. Sixteen square nails and 16 round nails were found in the deposits. The presence of the square nails is puzzling since there are no known early structures in the immediate area.

MISCELLANEOUS METAL ITEMS. Other metal specimens include a square nut, a fishing weight, bottle caps, wire fragments, staples, and several unidentifiable metal fragments.

MISCELLANEOUS ITEMS

A triangular leather fragment with a series of holes along one side is probably part of a shoe or boot. Five plastic buttons and one cork were also recovered.

COMMENTS ON THE MOLLUSCAN REMAINS

The following is a description of molluscan remains recovered from Scorpion Cave.

RIVER MUSSEL. Several small fragments of unidentified species were found in the excavations, as well as two almost complete shells. No modification was noted on any of the specimens.

LAND SNAILS. Large quantities of land snails were recovered. According to the field notes, they were found in almost every unit. Information providing exact quantities and provenience was not available. Identification of the species and information on habitat are based on Allen and Cheatum (1961: 291-361).

FAMILY RABDOTUS

Rabdotus sp.

Comments: Present in large quantities at Scorpion Cave, these snails are commonly found in semi-arid south central, southwest, and west Texas. They probably represent a food source utilized by the prehistoric occupants of the cave (Allen and Cheatum 1961; Hester 1971). As described earlier in the text, one shell had been modified.

FAMILY OLIACINIDAE

Euglandina texasiana

Comments: Only four of these snails were found. Their habitat is well-protected areas with the presence of abundant moisture.

FAMILY HELICINIDAE

Helicina sp.

Comments: These snails occurred in small quantities. Their habitat is open wooded areas and unprotected fields. Because of their small size, they obviously do not represent a food source.

FAMILY POLYGYRIDAE

Polygyra texasiana

Comments: Very few of these snails were recovered. They occur in both woodlands and open fields. They do not represent a food source.

DISCUSSION

Very few mussel shell fragments were found in the materials available for analysis from Scorpion Cave. Perhaps they were not collected by the excavators. With the close proximity of the Medina River, it would be expected that this food source might have been heavily exploited.

It is generally assumed that the *Rabdotus* species was collected as a food item. Clark (1969, 1973) has reviewed the data published by many archeologists in Texas and the general opinion is that the snails were part of the aboriginal diet. Ethnohistoric accounts tend to support this assumption (T. N. Campbell, personal communication to T. R. Hester) and analysis of human coprolites fron archeological sites is providing new data. Bryant and Williams-Dean (1975: 107) have found the shells of land snails in human coprolites from rockshelter sites in Texas.

Land snails recovered from the St. Mary's Hall site (41 BX 229) were analyzed by Guntharp (1978, unpublished manuscript, on file at the Center for Archaeological Research, the University of Texas at San Antonio). To determine a possible correlation between the presence of land snails and human occupation, a study was made of distribution, density, and size of the *Rabdotus* species for a selected sample from the site. The data suggests that the *Rabdotus* were of such large size and found in such large concentrations that natural distribution seems improbable. Immature snails were noticeably absent from the site. Guntharp concludes that the *Rabdotus* species had been seasonally gathered by the prehistoric occupants of the site.

Studies have also shown that certain snails may be attracted to midden debris. Some species of land snails are often

found today around debris where there is abundant moisture; *Rabdotus* species have been found to accumulate near dryer deposits of organic material (Clark 1969). However, present research seems to support the assumption that large concentrations of land snails are directly related to the gathering activities of prehistoric peoples.

FAUNAL ANALYSIS

The faunal remains from Scorpion Cave were numerous and widely varied. A total of 8718 bone fragments was submitted to Billy Davidson for analysis; 285 fragments (3%) were identified according to species and genus. The faunal remains were analyzed according to unit and level; this data is on file at the Center for Archaeological Research, The University of Texas at San Antonio. The following is a taxonomically arranged list of identified faunal remains:

		Total Individuals per Species
FISH		
	unidentified fish	6
Aplodinotus grunnies	freshwater drum	1
Pylodicris olivaris	yellow catfish	1
AMPHIBIANS		
Rana sp.	unidentified frog	2
Rana pipens	leopard frog	5
REPTILES		
	unidentified turtle	5
Kinosternon flavescens	yellow mud turtle	5
Terrapene ornata	Western box turtle	7
Pseudemys sp.	slider turtle	5
Trionyx sp.	softshell turtle	2
Elaphe sp.	rat snake	2
Pituophis sp.	bull snake	1
Coluber sp.	racer snake	1
Crotalus atrox	diamondback rattlesnake	5
BIRDS		
	unidentified bird	6
Anas sp.	mallard-size duck	4
Anas carolinensis	green-wing teal	1
Brant canadensis	Canada goose	2
Bunto sp.	broad-wing hawk	2

Meleagris gallopavo	turkey	20
Mimus polyglottis	mockingbird	2
Dendroica sp.	warbler	1
Passerella cf. *iliaca*	fox sparrow	1
Gallus gallus	domestic chicken	4
MAMMALS		
Didelphis marsupialis	opossum	1
Myotis sp.	bat	2
Myotis velifer	cave bat	1
Ursus americanus	black bear	3
Procyon lotor	raccoon	3
Bassariscus astutus	ringtail	7
Mephitis mephitis	striped skunk	1
Geomys sp.	Plains pocket gopher	4
Sciurus niger	fox squirrel	2
Citellus mexicanus	Mexican ground squirrel	2
Sigmodon hispidus	cotton rat	6
Neotoma sp.	pack rat	36
Castor canadensis	beaver	4
Sylvilagus sp.	cottontail rabbit	43
Sus scrofa	domestic pig	3
Capra sp.	domestic goat	3
Odocoileus virginianus	whitetail deer	56
Bovid	cow or bison	16
Canis sp.	dog or coyote	1

Several armadillo fragments were among the faunal remains, but according to Billy Davidson the preservation of the bone indicates the animals have only recently died and this species should not be included in the faunal list. A recent invader from Mexico, the armadillo did not occur in south central Texas prior to the 1900s.

The faunal remains suggest that the prehistoric inhabitants of Scorpion Cave relied on hunting wild game and small mammals and supplemented their diet with avifauna, reptiles, and riverine resources. According to Newcomb (1973) prehistoric hunters and gatherers in this area of Texas overlooked very few animals as a potential food source. Many hypotheses could be offered regarding aboriginal hunting activities as suggested by the faunal remains. However, many of the bone fragments might represent recent intrusions. The majority of fragments occur in levels 1 and 2. A great quantity of bone found in the rear of the cave might indicate the presence of a carnivore lair. Most of these fragments are of large mammals and turtles, snakes, and

turkey. A large concentration of bone was also found in the first three levels of the units near the mouth of the cave.

Whitetail deer and cottontail rabbit were the most numerous of the identified species. Fragments were found in almost every excavated unit. Deer remains extended as deep as level 8 in Unit 3 (see Fig. 4) but were mainly concentrated in levels 1 through 3 of most units. Cottontail rabbit was encountered as deep as level 5 in Unit 20, but was concentrated in levels 1 and 2 of most units.

Pack rat remains were also numerous. Though found in most units, a great number of pack rat remains were found towards the rear of the cave. The field notes do not mention the presence of pack rat nests; however, the great quantity of fragmented bone in the rear of the cave might conceivably be attributable to pack rat activities.

The bovid remains could not be specifically identified as either cow or bison, but several specimens found in the lower levels are undoubtedly bison. According to ethnographic accounts, bison-hunting was common in this area of central Texas (Dillehay 1974; Campbell 1975).

The occurrence of black bear is notable. According to Davis (1974) the species was once widespread throughout the state. However, the only other reported occurrences in the south Texas faunal record are at the Kirchmeyer site in Nueces County (Hester 1975c) and at Mission San Bernardo near Guerrero, Coahuila, Mexico (Davidson and Valdez 1976). According to Olsen (1971) bears were occasionally killed for purposes other than food since they were competitors for both food and shelter, especially caves.

The smaller mammals found in the deposits probably represent food items. However, the occurrence of bat probably indicates a recent intrusion. Caves and rockshelters are used as roosting sites, and according to Olsen (1971), there is no evidence that bats were ever used as a food item in this hemisphere. Because of burrowing activities, the presence of pocket gopher in lower levels probably represents natural intrusions.

Four species of turtle, three of which are aquatic, were identified and are considered part of the aboriginal diet. Turtle remains were found in almost all units. Other riverine resources include freshwater drum and yellow catfish.

Birds, especially turkey, were apparently an abundant and

preferred source of food. Turkey fragments were found in most areas of the cave and occurred as deep as level 7 in Unit 2. The presence of two migratory water fowl, Canada goose and greenwing teal, suggests seasonal occupation of the cave. According to Baird (1974), Pettingill (1970), and the Texas Parks and Wildlife Commission (personal communication), these birds usually occur in the southern regions of the United States from November to April. Only two fragments were identified as Canada goose and one of these was found in association with domestic goat and pig. This might indicate a more recent occurrence of the fowl.

The variety of fauna suggests that the prehistoric inhabitants of Scorpion Cave exploited a wide variety of animals available as food. Wild game and smaller mammals, as well as birds, reptiles, and fish were apparently abundant in the area. The large quantity of fragmented bone might be due to the aboriginal practice of eating bone marrow. The abundance of such a great variety of animals, coupled with the available vegetal resources, would have made Scorpion Cave and the surrounding area a favored camping site for prehistoric hunters and gatherers.

OTHER SITES

The Medina River is an area from which no previous archeological work has been published. However, it appears to be an area that was extensively occupied for many thousands of years. Approximately 300 yards to the north of the cave at 41 ME 8, a portion of the bank bordering the river has been washed out during periods of heavy flooding, exposing burned rock to a depth of approximately three feet in the upper portion of the bank. From the lower portion of this burned rock, a *Plainview* point was recovered (Harvey Smith, Jr., personal communication). Below the Medina Dam is the original channel to the east, with a creek merging from the west. Between the confluence of these bodies of water is a strip of land from which large numbers of artifacts of Archaic and Late Prehistoric age have been obtained. Just below the dam, Perry Haass (personal communication) reports a site at which an obsidian point has been found.

To the south of the cave, along the base of the cliff, are several overhangs of various sizes, but no archeological materials have been found in these areas. About 300 yards south

of the site is another burned rock midden from which many Archaic and Late Prehistoric materials have been obtained, among these a corner-tang knife. Many crude bifaces were also recovered. Artifacts from this midden as well as many from a five-mile stretch of the Medina River floodplain are among those found on the surface over a period of several years by George and Ruth Judson.

SUMMARY AND CONCLUSION

During June and July of 1971 archeological investigations were conducted at Scorpion Cave in northwestern Medina County, Texas. Prehistoric occupations from the Pre-Archaic through the Late Prehistoric periods are represented by extensive cultural remains. Historic materials were also recovered. Suhm (1960) has been used as the main reference to incorporate Scorpion Cave into the known archeology of central Texas and should be consulted for further information on other cave and rockshelter sites.

The determination of occupational sequences at Scorpion Cave was necessarily based on temporally diagnostic artifacts (i.e., arrow and dart points) which could be related via cross-dating to similar artifacts at other central Texas sites. A careful record of artifact provenience kept by the excavators revealed that archeological deposits within the cave were heavily mixed (see Table 3). This does not seem untenable given the powdery composition of the cave deposits which could have been easily displaced by successive groups of inhabitants.

The Pre-Archaic is represented by two *Martindale* points. Early Archaic specimens include *Bulverde, Early Triangular, Nolan, Travis* and *Wells* points. *Castroville, Langtry, Marcos, Marshall,* and *Pedernales* points are representative of the Middle Archaic, with *Pedernales* apparently continuing into the Late Archaic at Scorpion Cave (cf. Hester 1971). Occupational evidence of the Late Archaic is dominated by *Ensor* points (30% of recovered dart points); *Frio, Kinney, Montell,* and *Palmillas* points are also representative of the Late Archaic.

The Late Prehistoric periods is dominated by the presence of 88 *Edwards* points (75% of recovered arrow points). They represent the earliest arrow point form found in central Texas, and this is one of the largest collections of *Edwards* points yet documented. Radiocarbon dates from the La Jita site in north-

western Uvalde County (Hester 1971) indicate that this type appeared between A.D. 900 and 1000 in the southwestern Edwards Plateau region. A radiocarbon date of A.D. 1054 was obtained from excavations in the Camp Bullis area near San Antonio (Gerstle, Kelly, and Assad 1978). Other arrow points include those of the *Cuney, Fresno, Perdiz,* and *Scallorn* varieties. Provenience of arrow point specimens (see Table 3) shows *Edwards* as the only arrow point type present below level 4. However, the majority of the specimens were in levels 1 and 2, as were several Early Archaic specimens.

The beveled knife fragment and bone artifacts also date to the Late Prehistoric period. No pottery was recovered. However, 26 nodules of clay were recovered from level 3 of Unit 36 (see Fig. 4). Ranging in size from ½" to 1½" in diameter, most of the nodules were of fine yellow clay; others were of red clay which was slightly coarser and harder. Since the nodules are fairly uniform in size and occur in an isolated part of the cave, they probably do not represent a natural occurrence.

Historic specimens include ceramic, glass, metal, leather, and plastic items. Several date to the late 18th and early 19th centuries; others date up to the present time. These items were probably left behind by hunters or campers and do not represent a long-term historic utilization of the cave.

Based on the percentage of projectile points, the Late Prehistoric, with representative arrow points comprising 62% of the total, would appear to be the heaviest occupational period at Scorpion Cave. However, if preforms are taken into consideration, dart point preforms representative of the Archaic period comprise 77% of the preform total (see Table 2). Since the preforms are not temporally diagnostic and provenience of all specimens is mixed, the occupational periods represented by them cannot be assigned more definitely than as "Archaic". A reasonable assumption based on consideration of both diagnostic points and preforms would be that the cave provided intermittent shelter to numerous inhabitants from the Middle Archaic through the Late Prehistoric periods.

TABLE 2

	Points	**Preforms**	**Total**
Arrow Point Category	117	40	157
Dart Point Category	71	134	205
Total	188	174	362

Lithic debris representative of the initial stages of artifact manufacturing is not well represented at Scorpion Cave. Only 12 cores and 23 crude bifaces were recovered from the cave; primary and secondary flakes were infrequent. Interior flakes, many classifiable as bifacial thinning flakes, comprised the greatest quantity of lithic debris. Horizontally, recovery of several thousand flakes and flake fragments from Units 13, 14, 15, 17 and 19 (see Fig. 4) is indicative of an area where final flint-knapping stages and/or point resharpening were carried out. Quarry sites such as the one recorded by Patterson (1975) in northern Medina County were probably utilized by the cave's inhabitants for early phases of core reduction and initial phases of biface manufacture.

Of 134 dart point preforms recovered during excavation, 82 of these (61%) were proximal, medial, and distal fragments. Within the arrow point preform category, 75% are basal fragments. Apparently the cave's inhabitants were attempting, at times unsuccessfully, the latter stages of biface reduction within the cave. Only two hammerstones were recovered from cave deposits; one broken deer ulna flaking tool was also recovered.

Of special interest are the painted pebbles and stained stones. The pebbles all have black linear decoration; one specimen also has red patches on one face. These specimens are very rare for this part of Texas, although a painted pebble with red linear decoration has been reported from Zavala County (Hester 1977). The stained stones, possibly used for grinding pigment, have reddish colorations. A hematite concretion, not native to the immediate area, may be the color source.

Charcoal and burned limestone were found scattered throughout the deposits. According to the field notes, Units 9-12 (see Fig. 4) contained hearths. One hearth contained a large concentration of *Rabdotus* snails. At 36 inches in Units 2 and 4 a large hearth was exposed and was surrounded by tools and chert debitage, probably an indication of heat treatment of raw materials as part of the knapping procedure.

Faunal remains, along with the analysis of cultural remains, indicate that the prehistoric inhabitants of Scorpion Cave were seasonal hunters and gatherers who utilized a wide variety of resources found in the local environment. Whitetail deer and cottontail rabbit were most numerous in the faunal materials; a variety of smaller mammals were also apparently utilized as food items. The presence of bison and black bear is significant.

According to Campbell (1975), bison-hunting was common along the Medina River. Black bear has been recorded at only two other sites in south Texas. Turtle and turkey were a preferred food source. Seasonality is suggested by the occurrence of Canada goose and green-wing teal, present in the area only during winter migrations. Riverine resources were exploited as indicated by the presence of several species of fish and mussel shell fragments. Found throughout the deposits were great quantities of land snails. Mostly of the *Rabdotus* species, they represent a significant food source.

Plant remains have not been preserved, but a great variety of edible plants are available in the wooded area surrounding the site. The recovery of several manos and pitted stones certainly suggests the processing of vegetal materials. Newcomb (1973) provides a general description of the subsistence and material culture of the aboriginal inhabitants of this area. He reports that the grinding process was used for almost every edible item, including dried fish, agave, peyote, and prickly pear. Though most creatures were considerd as a possible food source, plants were the mainstay of their diet (*ibid*). Campbell (1975) has reviewed ethnohistoric accounts of the Payaya Indians who inhabited this region of south central Texas. A very important part of their gathering activities was the harvesting of pecans in autumn. The Payaya reportedly were able to remove the nut shell without breaking the nut meats (*ibid*). Perhaps this was the function of the pitted stones found within the cave. They have been described as "nutting" stones at other archeological sites (Johnson, Suhm, and Tunnell 1962).

The occurrence of bone beads and tools provides further insights into the culture of the prehistoric inhabitants of Scorpion Cave. The incised bone bead, its grooves filled with asphaltum, is probably indicative of trade with coastal peoples. At the Floyd Morris site in Cameron County, several bone beads with traces of asphaltum were recovered (Collins, Hester and Weir 1969).

Comparison of Scorpion Cave to similar sites is difficult because so little professional archeology has thus far been done in the southwestern Edwards Plateau. Both rockshelters and burned rock middens are frequently reported by area residents and ranchers, but detailed information is unavailable. The following is a review of several recorded sites in central Texas

whose artifact assemblages are comparable to specimens from Scorpion Cave.

La Jita, a terrace site with several burned rock middens is located on the Sabinal River in northwestern Uvalde County (approximately 35 miles west of Scorpion Cave). It is an important comparative source for the Edwards Plateau area (Hester 1971). Cultural remains at La Jita are attributable to Archaic and Late Prehistoric occupation. The Middle Archaic is dominated by the presence of numerous *Pedernales* points. Nineteen *Edwards* points were recovered. Bone-tempered potsherds were also present.

Classen Rockshelter in northern Bexar County has an artifact assemblage similar to that of Scorpion Cave (Fox and Fox, unpublished manuscript, Center for Archaeological Research, The University of Texas at San Antonio). Located on Cibolo Creek, the rockshelter contained ceramic, metal, and glass artifacts overlying prehistoric assemblages. The prehistoric cultural remains include *Castroville, Ensor, Darl, Langtry, Montell, Pedernales,* and *Shumla* points. A possible *Edwards* point was also recovered. Other artifacts include a deer ulna awl and a painted limestone pebble. The pebble was painted on one end; the design motif could not be determined.

Timmeron Rockshelter in Hays County was excavated in 1975 by the Southern Texas Archaeological Association (manuscript in progress). Several dart point types were recovered, but the Late Prehistoric components, with *Edwards, Scallorn,* and *Perdiz* arrow points, were most numerous. Several burned rock middens were located in the immediate vicinity of the rockshelter.

The Wolf Site in Blanco County consists of a rockshelter and a nearby burned rock midden (Highley and Lengefeld 1977). Several ring middens have also been recorded just west of the site (Carolyn Spock, personal communication). Preliminary testing at the rockshelter, located on the Pedernales River, has resulted in the recovery of several *Perdiz* points, many flakes and blades, and one bone tool. Several ovate unifacial scrapers were surface-collected near the rockshelter; these specimens can be attributed to the Late Prehistoric period (Green and Hester 1973).

Salvage archeological efforts prior to construction of Canyon Reservoir in Comal County (Johnson, Suhm and Tunnell

1962) revealed three important sites, a burned rock midden site, a terrace site, and a rockshelter. Oblate Rockshelter contained remains of the Archaic and Late Prehistoric periods, with *Ensor, Frio, Marcos, Perdiz,* and *Scallorn* points present in large numbers.

As with most caves and rockshelters, the Late Prehistoric cultural assemblage at Scorpion Cave is more prolific than the Archaic components. A gradual increase in occupational debris begins in the Middle Archaic period. The presence of a nearby burned rock midden also seems to be characteristic of most cave and rockshelter sites. Burned rock middens are attributable to the Archaic period. Their occurrence near a natural shelter suggests multi-component utilization of the general area surrounding the site. The Late Prehistoric, represented by a greater number of diagnostic artifacts, might indicate longer periods of occupation of natural shelters and/or utilization by larger groups of peoples. Further research is needed to incorporate the data from central Texas rockshelters and determine their relevance in overall settlement patterns of prehistoric hunters and gatherers.

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TABLE 3
PROVENIENCE OF SPECIMENS

LEVELS (6″)	1	2	3	4	5	6	7	8	9	10	none	Totals
PROJECTILE POINTS												
Arrow Points												
Cuney			1									1
Edwards	29	29	10	3	3	4					10	85
Fresno	3	1	1									5
Perdiz	3		2									5
Scallorn	4	7	2	3								16
Unfinished	2											2
Total												117
Arrow Point Preforms												
Group 1	2											2
Group 2	1		2									3
Group 3			1								1	2
Group 4	1	1										2
Group 5					1							1
Group 6		2										2
Group 7	2	1	3		1							7
Group 8	2	3	3	1	1							10
Group 9	1	2	6	2								11
Total												40
Dart Points												
Bulverde		1										1
Castroville							1				1	2
Early Triangular		1										1
Ensor		6	5	3	3	1					1	19
Frio				1	2	1	1			2		7
Kinney	1											1
Langtry		1										1
Marcos							1		1			2
Marshall	1		1									2
Martindale	1				1							2
Montell				1				1	1	2		5
Nolan				1								1
Palmillas											1	1
Pedernales	2	3	3	1						2	2	13
Travis		1										1

Levels(6″)	1	2	3	4	5	6	7	8	9	10	none	Totals
Wells				1								1
Unclassified												
Group 1		1										1
Group 2	2											2
Unfinished	1	3	2	1			1					8
Total												71
Dart Point Preforms												
Group 1		2										2
Group 2		1		1							1	3
Group 3	4		1			1					2	8
Group 4	2	2		2	2	3						11
Group 5	1	4	2									7
Group 6*	1	1	2	1		2	2		1		1	12
Group 7		3		1							2	6
Group 8		3										3
Group 9	9	4	3	1	2	2					1	22
Group 10	3	6	2	2	3	1					1	18
Group 11	10	11	3		4	1	1	4	1		7	42
Total												134
OTHER BIFACIAL ARTIFACTS												
Thinned Triangular Biface		1	1									2
Large Thinned Biface (2 halves)	1	1										2
Perforator		1										1
Beveled Knife		1										1
Chopper				1								1
Crude Bifaces												
Group 1		3	2	1								6
Group 2	2	1		1	2	1						7
Group 3	1		1									2
Group 4	1				1							2
Group 5	1											1
Group 6	1											1
Group 7	2				2							4
Total												23
Cores and Core Fragments				3	3	3			3			12

Levels(6")	1	2	3	4	5	6	7	8	9	10	none	Totals
UNIFACIAL ARTIFACTS												
Retouched Blades		1	3			1						5
Utilized Blades*				1	1		1					4
Retouched Flakes												
Form 1		1										1
Form 2	1		1									2
Form 3	3	2			1	1						7
Form 4	2	2	1	1								6
Form 5		2		1								3
Form 6	1	3	1	1		1	1					8
Form 7	1	1										2
Scrapers												
Side				1								1
End & Side			1		1				1			3
Double End & Side					1							1
Irregular**	1											2
PAINTED ARTIFACTS												
Painted Pebbles	2	1										3
Stained Stones		2				1						3
GROUND AND PECKED STONE ARTIFACTS												
Pitted Stones					1						2	3
Hammerstones	1				1							3
Manos	1	1										2
BONE ARTIFACTS												
Bone Awls												
Complete	4											4
Fragments		1			1	1					1	4
Deer Ulna Flaking Tool											1	1
Bone Beads		1	1								2	4
Polished Bone Fragments	3	5	1									9
SHELL ARTIFACT												
Notched Shell								1				1

*1 specimen at level 12

**1 specimen on surface

A Survey and Assessment of the Archeological Resources of Fort Hood, Texas

GEORGE B. THOMAS

ABSTRACT

The results of six years of amateur archeological survey on the Fort Hood military reservation are discussed in detail. Acting under an archeological survey permit authorized by the Department of the Interior for two of those six years, the Fort Hood Archeological Society successfully surveyed portions of the 217,000 acres (339 square miles) of the installation. While survey method — or lack of method — and collection practices certainly biased the sample, it was felt that tentative settlement patterns could be determined by correlating chronologically diagnostic artifacts with topographic variables. Discernible patterns appear similar to those elsewhere in central Texas. We await future work, using adequate sampling techniques, to test the results and tentative conclusions of this able amateur survey.

INTRODUCTION

The Fort Hood Archeological Society (FHAS) conducted a site distribution survey on the Fort Hood Military Reservation (Fig. 1,a) from December, 1971 until the late months of 1977. For two years of that period, August 27, 1974 to August 26, 1976, the FHAS operated under Department of the Interior Survey Permit No. 74-TX-053. Fort Hood land is subject to numerous U. S. Army regulations governing the treatment and preservation of "archeological resources," (PL #209, June 8, 1906; PL #93-291, May 24, 1974; AR 200-1; AR 405-80), as well as to Executive Order (EO) 11593 — Federal legislation requiring the survey and assessment of archeological and historic resources on Federal lands by July 1, 1973. In spite of the evident impracticability of the Executive Order, prevailing legal opinion seems to indicate that it is still in effect, and

that EO 11593 forms part of the basis for the Post Archeologist position, currently under the Master Planning Department of the Fort Hood Directorate of Facilities Engineering.

This report will concentrate upon the results of the FHAS survey until shortly after the termination of Permit No. 74-TX-053. It will also consider the results of a tentative settlement pattern study on the basis of surface evidence and projectile point chronologies, to be compared with regional syntheses published by others (Shafer 1971; and Weir 1976). Finally, we will discuss special problems inherent in archeology on military land.

Of the approximately 217,000 acres (339 square miles) of Fort Hood land, investigators from 1971 to 1973 limited themselves mostly to the easily accessible North Nolan Creek and Owl Creek drainages. Later investigators extended the survey, most notably to the Cowhouse Creek drainage, as Society members decided to broaden the scope of areas and ecozones considered.

Further limitations to the survey were imposed by the Impact Area, an area of approximately 56,000 acres (87 square miles), which is usually inaccessible for reasons which are self-explanatory. The remaining 160,000 acres (approximately 250 square miles) are open post area during most of the year. Antiquities preservation is the subject of little to no enforcement on post, having proven "impossible" in the absence of survey.

In spite of these problems, survey has been scheduled judiciously by non-professionals, working when military occupations permit, and motivated by professional goals. Fort Hood Archeological Society members, who at one time had four individuals among them with academic backgrounds in archeology, managed to gain sponsorship of the Recreation Services Library as a Private Organization. By late 1977, the FHAS still existed on paper, and the newly-hired post archeologist was hopeful of rejuvenating the organization.

ENVIRONMENT

Geology

Fort Hood is located in portions of Bell and Coryell Counties, central Texas, in a region traversed by the Balcones Escarpment and Balcones Fault. The fault zone is part of a major geologic feature extending from the Red River valley, through Dallas, Waco, Austin, San Antonio, and curving westward across the

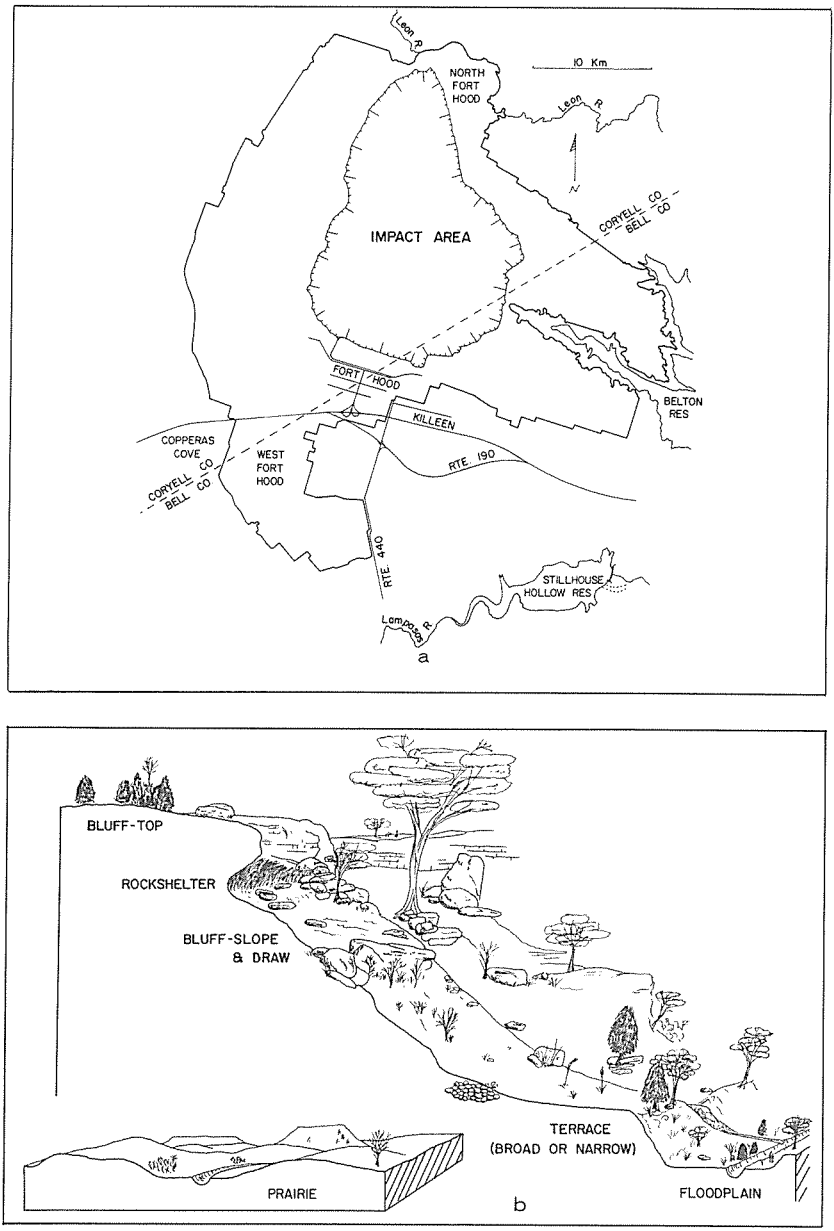

FIGURE 1. *The Fort Hood Area.* a, the survey region; b, major terrain zones.

Rio Grande into Coahuila. In the Fort Hood region, the Balcones Fault System is indistinct, having been described as a 7-mile wide graben zone passing through the town of Belton, the Bell County seat. Small, discontinuous faults in this zone line up "*en echelon*" (Adkins and Arick 1930: 74), just below the Edwards Plateau, the southernmost region of the southern Plains. Throughout the fault region is the Balcones tableland, or Lampasas Cut Plain, a dissected plain from which rise fossiliferous limestone hills. These limestone caprock hills are flat-topped remnants of the Edwards formation of the Cretaceous Fredericksburg group (Sellards, Adkins and Plummer 1958: 332-340; and Jelks 1962: 1). Resistant Fredericksburg limestone is underlain by softer Comanche Peak limestone, causing undermining, steep slopes, and rockshelters. Predominant geological composition of the eroded terraces and floodplains is Walnut clay (Adkins and Arick 1930: 29). The tableland yields farther southeast to the Blackland Prairie, a region of dark, fertile soil, rolling southeastward to the Gulf coastal plain.

While Fort Hood land lies entirely within the Cut Plain region, the southern portion of the post is more extensively eroded, with fewer flat-topped hills (Edwards outliers) (Adkins and Arick 1930: 29), and with rounded, rolling, broad alluvial land among them, resembling prairie. This relatively flat terrain is of generally higher elevation than the valleys of the dissected hilly region to the north, and the occasional flat-topped hills to the south are correspondingly higher than the limestone plateaus to the north.

Fort Hood is situated within the Brazos River drainage between the Leon and Lampasas Rivers. Drainage in both regions is dendritic, tending to be more angular in the north than in the south. The urbanized, main "cantonment area" of Fort Hood is located in the southern region, immediately south of the southernmost Cretaceous hills. Creeks and rivers trend from west-northwest to east-southeast. Major drainages of the dissected hill and plateau region are the Leon River, forming a portion of the north boundary of Fort Hood; Owl Creek, which was the location of most FHAS survey before 1974; and Cowhouse Creek, the large, central drainage, having steep sides and wide floodplains. Stampede Creek flows southward into Cowhouse Creek through a broad, rolling valley.

In the southern portion of Fort Hood, Clear Creek flows

northward as part of the Table Rock Creek/House Creek/Cottonwood Creek drainage pattern flowing northward into Cowhouse Creek. Other streams in the southern region include North Nolan Creek, again flowing west-northwest to east-southeast; and Reese Creek, which flows southward toward the Lampasas River. Other major tributaries of Cowhouse and Owl Creeks, and of the Leon River, are located in the Impact Area.

Climate

Fort Hood receives an annual rainfall of 33.4 inches, with most of it concentrated during the months of September and May. July is the month with least rainfall. The area is near the boundary of two climatic zones: the semi-arid steppe climate to the west, and the warm, temperate, rainy climate with hot summers to the east. The average temperature is 68.1°F, with a range of 94°F to 38°F as the mean summer-winter temperatures. The frequency of frontal conditions means that abrupt changes in weather conditions are frequent (U. S. Army 1971).

Fauna

White tail deer, bison, mountain lion, bobcat, wolf, coyote, cottontail and jackrabbits, skunk, opossum, raccoon, fox, rodents, turkey, dove, owl, hawk, fish, mollusks, snails, and various species of snake, turtle, and lizard were among the animal resources available to prehistoric inhabitants of the Fort Hood region. Armadillo and ringtail cat are recent faunal additions derived from Mexico. All of these except bison are present in modern times.

Flora

Vegetation on Fort Hood consists of the familiar combination of central Texas grassland, shrubs, and trees. Upland trees include live oak, Spanish oak, post oak, and juniper ("cedar"), while pecan, willow, sycamore, bur oak, and cottonwood trees occur in the lowlands. The growth of juniper (*juniperus mexicana*) has increased since early historic times. Rounding out the flora are grasses and various plant species associated with grassland, dense stands of brush, and vines. Trees tend to cluster densely along the stream beds and on steep bluff slopes of the limestone hills. Trees also cluster in linear patterns following historic fence lines (which appear prominently on orthopicto

maps and aerial photographs). "Roots, pecans, walnuts, acorns, mesquite beans, plums, prickly pear fruit [*Opuntia engelmannii*], mulberries, grapes, and other edible vegetal foods are found in abundance in central Texas, and it is likely that many of them were eaten" (Jelks 1962: 93).

ARCHEOLOGICAL BACKGROUND OF FORT HOOD AND VICINITY

Archeological surveys in the region have included the studies at Belton (Miller and Jelks 1952; and Shafer, Suhm and Scurlock 1964) and Stillhouse Hollow Reservoirs (Sorrow, Shafer and Ross 1967). Among other regional archeological work, notable publications have concerned the Youngsport Site on the Lampasas River, Bell County (Shafer 1963); the Finis Frost Site, on Richland Springs Creek, San Saba County (Green and Hester 1973); the Kyle Site, Hill County (Jelks 1962); the Loeve-Fox site, Williamson County (Prewitt 1974); and a survey of the Leon River (Shafer 1971; Watt 1936: 5-27).

Most Fort Hood sites are typical of the Central Texas Archaic; rock and shell middens are numerous, with large limestone-derived sedimentary flint (chert) sources utilized extensively. Scrapers (if we can accept this functionally descriptive label) are apparently most numerous on the surface of most sites, with flake knives, choppers, engraving tools and burins, drills, and an occasional gouge also occurring. Cores, some of them quite large, can sometimes include biface chopper-like implements. Bifaces are abundant at some sites. they range from blanks or preforms, through finely-shaped knives or scrapers, to projectile points. As the projectile point illustrations indicate (Figs. 2-12), the surface-collected specimens are usually in a fragmentary state.

Equally prominent in the Central Texas Archaic sites of Fort Hood are implements probably related to plant food collecting and processing. Milling stones, whole and fragmentary, have been located in all microenvironmental or terrain contexts.

The sites themselves range from small-area surface scatters or burned rock middens, to large flake and biface scatters covering one, two, or more square kilometers. Some large site complexes extend for as many as three or four km^2 on or near the flat limestone hilltops, and may be associated with flint sources.

METHODOLOGY OF SURVEY

The informal nature of Fort Hood Archeological Society membership meant that survey and laboratory analysis did not take place regularly, or follow a consistent research design. Usually working on weekends, field crews drove to one or more selected areas, where they engaged in walking, non-random site location survey. It could be said that a "drainage corridor" technique was used. From one to approximately 10 individuals participated. U. S. Department of Defense maps were plentiful, including maps discarded by various military units to which Society members belonged, and others that were provided by the post engineers. These military maps were of excellent quality, and were available in 1:25,000; 1:50,000; 1:75,000; and smaler scales. Orthopicto maps, which combine an aerial photographic mosaic background with standard mapping symbols, were available at 1:25,000. These maps enabled extremely accurate plotting of site locations.

Artifact, shell, bone, and burned rock samples were collected from virtually all Fort Hood sites. Most of these were uncontrolled "grab" samples, and were justified on two grounds: (1) Time limited FHAS members to rapid site location activities, while members felt the need to famliarize themselves with the nature of artifacts, their sorting, cataloguing, and storage; (2) extensive looting on the post convinced members that collections, if only partially controlled, kept some of the artifact inventory away from those of less than professional bent. Controlled collection would have been possible under current conditions of full-time, professional supervision. Under the conditions imposed on Society members in previous years, however, a "no-collection" policy might have been more desirable and, in spite of the looting, such policy would have enabled more accuracy in future controlled sampling.

With no coherent teaching organization, no accreditation, and no obvious avenue for FHAS members to add to their own credentials, later, more scientific phases of the survey project left many individuals lost and disinterested. A "90% labwork/10% fieldwork" policy served to make the lab a quiet and peaceful place to work, but there was little assistance. Fieldwork also took its toll on membership, as we left the idle streams of the drainage corridors, plunged into the thick underbrush, and

climbed to the bluff-tops and plateaus in 110°F weather.

To facilitate site differentiation, and to create a problem formulation and hypothesis testing framework, we divided Fort Hood land into seven terrain zones (Fig. 1,b). These appear to correspond with "microenvironments" or biological ecozones:

Bluff-Top	Narrow Terrace
Bluff-Slope and Draw	Floodplain
Rockshelter	Prairie
Broad Terrace	

We also divided Fort Hood into drainage zones, taking into account creek size in order to include smaller creeks within larger watersheds or creek systems. Thus Bull Run Creek, Stampede Creek, Cottonwood Creek, and Two Year Old Creek are part of the Cowhouse Creek system, Preacher's Creek is part of the Owl Creek system, and Henson Creek and Shoal Creek are part of the Leon River system. Some of these smaller drainages are treated separately, however, for finer differentiation.

Earlier surveyors, relying solely upon the drainage zones technique, limited the survey to corridors which followed creek valleys and immediately adjacent bluffs. Later survey results have come from semi-systematic, problem-oriented efforts, while most recent survey has begun to extend to all terrain contexts. Standard sampling techniques may show site distribution concentrated in or near the valley areas, where ecozonal boundaries, flint sources, creeks and springs could be exploited. No systematic study has confirmed this. A more comprehensive, full-time survey project is needed, perhaps beginning with the hypothetical assumption that no sites have been located. Fortunately, the recently-hired post archeologist has also proposed this strategy (Briuer 1977: personal communication). This strategy should provide the most reliable test of the results presented here.

For present purposes, we can assume that the Fort Hood Archeological Survey site distribution results are reasonably accurate, given the personnel and part-time conditions under which the survey was made. The following terrain summaries are presented as an overview of the archeological setting as conceived at present.

Bluff-Top: These sites line the bluff-tops of the Cretaceous hills, sometimes extending in massive, multi-occupational surface scatters from the bluff edges to the

opposite side of a plateau. Bluff-top sites may have been seasonal occupation sites, hunting camps, stone chipping stations (or combinations of these) and are characterized by light to dense surface scatters, very likely without notable depth. Usually eroding from highly deflated soil cover, burned rock middens may be numerous here. Vegetation cover can be grasses, with vegetation usually associated with grassland; along with upland trees. Inhabitants of bluff-top sites may have utilized bluff slopes and rockshelters extensively.

Bluff Slope and Draw: These sites are often closely associated with bluff-top sites and rockshelters. As the terrain type suggests, there may be much erosional wash here, with many artifacts secondarily deposited from rockshelters or from on top of the escarpment. However, the frequent incidence of burned rock middens eroding from bluff slopes, and washing down steep draws, lends substance to this terrain type as a primary site location. Artifacts may be concentrated in light to dense scatters. Test excavations in 1972 at 41 BL 138, the observation of fresh pot-holes dug by collectors on Fort Hood, and WPA work reported by Collins (1972) at the Devil's Hollow Site, all took place in bluff slope areas. Vegetation is these zones is likely to consist of heavy tree cover, with upland varieties predominating.

Rockshelter: These sites, as noted above, will be closely associated with bluff-top, and bluff slope and draw sites in many cases. Many Leon River rockshelters contained post-Archaic burials (Shafer 1971: 3); however these had almost all been vandalized at the time of the survey. Whether Fort Hood rockshelters contain burials of the Austin and Toyah Foci remains to be seen. Rockshelters may have provided shelter, as indicated by minor midden activity observable in front of some. Often springs are conveniently located. Because rockshelters are geologically associated with bluff-top edges and bluff-slopes, vegetation will be of the same configuration as in bluff-slope areas without rockshelters.

Broad Terrace: These sites are on wide, rolling terraces, situated above floodplains. They contain moderate to dense lithic surface scatters, and are usually sites of intensive or extensive occupation. Most of these sites have been plowed, and are old agricultural fields with historic fence lines marked by straight lines of trees. One natural profile cut into a terrace site indicates shallow cultural deposition. The great extent of horizontal distribution at such sites, however, suggests the possibility of controlled surface studies of intra-site activity variability. A grid system was established at 41 CV 73 with this in mind; but few controlled sampling collections were attempted. Burned rock middens can be discerned on broad terraces, scattered by plowing. Vegetation here is usually grassland, with lowland trees growing in clumps, or along historic fence lines.

Narrow Terrace: These sites are geologically similar to broad terrace sites; however, they occur in restricted areas between bluffs and floodplains. Usually there is little or no evidence of historic plowing, and burned rock midden activity here can be undisturbed. Narrow terraces may or may not be culturally distinct from broad terraces, but the arbitrary distinction may be useful. Burned rock

middens may be most dense here, under alluvial overburden from the nearby slopes. These areas are also most susceptible to looting, probably because of the proximity of bluff slope trees, dirt roads, and the furtive nature of looting activities. Concealment and evasion opportunities are close-by.

Floodplain: These sites may also be washouts from bluff slopes; however, there are indisputable sites in this terrain type. Floodplain sites may be characterized by burned rock middens, sometimes disturbed by historic plowing. Artifacts often indicate occupational activity. Vegetation on the floodplains is usually grassland, with clumps of lowland trees. Dense stands of lowland trees often line the stream banks.

Prairie: These sites are located in the Edwards Outlier areas, south and southeast of the main land area of Fort Hood. The rolling to flat terrain suggests transition to the Blackland Prairie farther to the southeast. Archeological sites here are often near stream confluences. Prairie sites may utilize relatively high ground, and may be similar to terrace sites except for their smaller size, and the absence of plowing in rocky, marly soil. While most of the old Edwards formation has eroded away here, the soil is extremely rocky, with many Cretaceous fossils among the breccia. Sites in the prairie region may also cluster on or near the slopes of the isolated Cretaceous hills, especially if streams are conveniently located. Although little survey has taken place in this southern portion of Fort Hood, we may conjecture that site distribution and settlement pattern may be affected by the different arrangement and fewer varieties of biotic zones for subsistence exploitation by hunting-collecting societies.

As of early 1977, 81 prehistoric sites on Fort Hood were registered with the Texas Archeological Research Laboratory, Austin. Five additional registration numbers, not included here, represent four historic sites and one off-post site (41 CV 51) improperly investigated in 1973, on the private land of one FHAS member. Site 41 BL 155 and 156 are considered together, having been found upon later survey to be one massive surface scatter, as described earlier in our section on bluff-top sites. To these 87 sites we may add 18 additional sites not yet registered. Nine of these were located as a result of the joint survey efforts of the North Texas State University crew, and individuals from the FHAS. The North Texas State University Institute of Applied Sciences was contracted by the City of Copperas Cove to assess the archeological resources along the proposed route of a wastewater pipeline (McCormick and Filson 1976). As of early 1977 a total of 105 archeological and historic sites was on record at the Fort Hood Archeological Society.

Notable sites include 41 BL 146, 41 BL 154/160 and 41 CV 73. BL 146 is a petroglyph locus on the northern edge of a low

bluff, at the head of a draw. A flowing spring rises at the draw head, just below the petroglyph outcrop. The site is surrounded by a massive scatter of burned-rock middens and lithics, including an unusually ample representation of projectile points. Investigators have been unable to discern limits, other than natural ones, to the site, which extends southward to the opposite edge of the plateau, and northward across the floodplain to the creek. The petroglyphs include intriguing figures of historical, post-European-contact origin, including the letters "AD." Others are of uncertain significance.

BL 154/160 is a complex of middens and lithic scatters occupying a relatively limited area, yet occupying four of the possible six terrain types or ecozones. A burned rock midden is surrounded by lithic scatter on the bluff-top; two rockshelters are just under the escarpment, with lithic and shell midden material eroding down the slope and the associated draw. A spring at the base of the slope is in close proximity to burned rock middens and lithic scatter on the floodplain.

CV 73 is a broad terrace site located on both sides of an Owl Creek tributary stream which cuts deeply into the terrace. The surface has been extensively plowed and deflated, and currently carries a heavy load of off-road military traffic. The distinctive features of this site are its broad expanse and dense lithic deposition, inviting easy gridding and on-site control. Gridding and controlled collection were attempted here in 1975 and 1976, until extensive military traffic obliterated artillery firing point #131, which we were using for a bench-mark-like reference point. (FP 131 was replaced by late 1977, apparently at the same spot, although we have not been able to check it for accuracy). The north base line, extending 250m. from FP 131, was laid out in a 338° 30′ direction, ending at a deep natural soil profile cut by the tributary. Observation of these profiles show the site to have shallow cultural depth at these locations; however, testing could determine areas of little or no plowing, and if significant stratigraphy is present.

TENTATIVE SETTLEMENT PATTERN ANALYSIS

Of the 81 sites included in this analysis, 41 produced chronologically diagnostic artifacts (projectile points), and are included in the following settlement pattern analysis. Nineteen of

the 31 Bell County sites are included; with 22 of the 50 Coryell County sites. It remains to be seen whether the remaining 40 non-diagnostic sites can be tested to discern chronological patterning by tool type frequencies and lithic manufacture variability in the collected samples. Chronology is not the only interest. Predominant flake size, lithic material, the presence and frequency of utilized and debitage flakes, cores, blanks, and bifacial tools should indicate industrial activity patterning in Archaic society. It is doubtful that either of these can be discerned from the FHAS collections. 41 CV 73 is the only site at which controlled surface sampling has been attempted, and we were unable to complete it.

What could be tested were the hypotheses generated about chronological settlement changes, using the projectile point-producing sites only. With such a small sample, and relying on surface data for the most part (data from 41 BL 138 must be considered uncontrolled excavational), one must keep in mind the tentative nature of the settlement pattern study.

Diagnostic artifacts

For future reference, and to convey an accurate impression of the nature and condition of the diagnostic artifactual data referred to here, it is appropriate to present the following illustrations (Figs. 2-17):

(Fig. 2) (a) *Scallorn*, 41 BL 137; (b and c) *Ensor*, 41 BL 138 and 146 respectively; (d) *Ensor*-like base, 41 BL 146; (e) *Darl*, 41 BL 146; (f) *Darl*-like, 41 BL 142; (g-j) *ELlis*, 41 BL 146; (k and n) *Castroville*, 41 BL 146; (1) *Castroville*, 41 BL 138; (m) *Castroville*-like, 41 BL 139; (o and p) Corner-notched, possibly *Castroville*, 41 BL 138 and 146 respectively; (q) *Marshall*-like, 41 BL 146; (r) *Williams*-like, 41 BL 138; (s) expanding stem basal fragment, 41 BL 138; (t) *Marshall*, 41 BL 139; (u) *Williams*, 41 BL 146.

(Fig. 3) (a-d) *Ensor*, 41 BL 160, 154, 152, and 161 respectively; (e) *Ensor* base, 41 BL 159; (f) *Darl*-like, 41 BL 152; (g) *Castroville*-like, 41 BL 148; (h) *Frio*-like fragment, 41 BL 161; (i) may be a *Castroville* variant, 41 BL 161; (j) *Palmillas*-like, 41 BL 154; (k) *Castroville*-like fragment, 41 BL 153; (l-n) *Castroville*, 41 BL 148, 152, and 164 respectively.

(Fig. 4) *Pedernales*: (a-e), 41 BL 138; (f-g), 41 BL 146; (h), 41 BL 148; (i-j), 41 BL 152; (k), located approximately 1 km southeast of 41 BL 165.

(Fig. 5) (a) Biface, probably an unfinished dart point, plano-convex in cross-section, 41 BL 146; (b) *Marshall*, with scraper retouch on the blunted tip, 41 BL 138; (c) *Bulverde*, 41 BL 138; (d-e) *Travis*, 41 BL 138; (f and h) *Travis*, 41 BL 136; (g) *Travis*, 41 BL 153; (i-k) *Travis*, 41 BL 153; (l-n) *Nolan*, 41 BL 146; (o) Unidentified fragment, possibly *Nolan* or *Bulverde*, 41 BL 146; (p-s) *Bulverde*, 41 BL 146, 150, 147, and 153 respectively.

(Fig. 6) (a-d) *Travis*, 41 BL 178, 170, 154, and 154 respectively; (e) *Bulverde*, 41 BL 162; (f) *Gower*, 41 BL 138; (g) Small preform, possibly a biface knife, 41 BL 155/156; (h) Knife fragment, 41 BL 154; (i) "Waco Net Sinker (Type 5)," 41 BL 154 (Watt 1938: 28); (j) Knife, basal fragment, 41 BL 138.

(Fig. 7) (a-b) *Perdiz*, 41 CV 47; (c) *Scallorn*, 41 CF 79; (d) *Catan*-like biface with bulb, 41 CV 47; (e) *Matamoros*-like bifacial knife or blank, 41 CV 73; (f) *Ensor*-like fragment, 41 CV 44; (g) Miscellaneous, 41 CV 49; (h) *Bulverde*-like, 41 CV 49; (i) Miscellaneous, 41 CV 49; (j) *Bulverde*-like, 41 CV 48; (k) Possible "Early Barbed" stem fragment, marginally identifiable by its ground edge, 41 CV 49; (l) Miscellaneous, 41 CV 49; (m) possible *Travis*, 41 CV 49; (n) Miscellaneous, 41 CV 49; (o) Miscellaneous, 41 CV 46; (p) *Castroville* or *Williams*, 41 CV 47.

(Fig. 8) *Castroville*: (a-b) 41 CV 41; (c) 41 CV 42; (d) (severely heat-altered), 41 CV 45; (e) 41 CV 101; (f) 41 CV 48; (g) 41 CV 104. (h) A *Frio*-like fragment, 41 CV 54.

(Fig. 9) (a) *Montell*-like, or *Pedernales*-like, 41 CV 49; (b) Large stemmed biface, resembling a *Gary* form, 41 CV 90; (c) *Martindale*-like, 41 CV 54; (d-l) *Pedernales*; 41 CV 41, 41 CV 45, 41 CV 101, 41 CV 50, 51 CV 55 (longitudinal fracture), and 41 CV 84 respectively. [Note: In a re-evaluation of the specimens after completion of the manuscript, it appears that Fig. 9,h may be *Darl* and Fig. 9,f,g are possibly *Darl* bases; they are from 41 CV 48 and 41 CV 49].

(Fig. 10) (a-h) *Nolan*, 41 CV 49; (i-j) *Nolan*, 41 CV 54; (k-l) *Travis*, 41 CV 92 and 54 respectively; (m) *Travis*-like, 41 CV 88; (n) large, split-stemmed biface, resembling the *Pogo* or *Nolan* form, 41 CV 49.

(Fig. 11) (a) *Nolan*, 41 CV 47W; (b-c) *Travis*, 41 CV 76 and 73 respectively; (d-e) 41 CV 73 and 45 respectively; (f) knife tip, 41 CV 87; (g-h) *Gower* variants, 41 CV 87; (i) scraper exhibiting hinged flute (Cambron and Hulse 1973: 389), 41 CV 87; (j) bifacial base fragment with possible flute, 41 CV 83.

(Fig. 12) (a) *Bulverde*, 41 BL 170; (b) *Castroville*, 41 CV 98; (c) *Ensor*, elongated and serrated, 41 CV 98; (d) knife or point midsection, 41 BL 161; (e) biface scraper, 41 CV 98; (f-g) specimens resembling blades. Both are from the Fort Hood cantonment area, the location of g being designated 41 CV 75; (h) Limestone pebble with engraved cross-hatchings, 41 CV 98.

(Fig. 13) (a) flake knife, 41 BL 138; (b) limestone slab with scratched design, 41 BL 154.

(Fig. 14) (a and d) manos, 41 CV 53 and 41 BL 138 respectively; (b) metate fragment, 41 BL 138; (c) metate, 41 CV 53.

(Fig. 15) (a) large bifacial core resembling a preform or blank, and probably representative of an early stage in the lithic manufacture process; (a') obverse side of a; (b-c) biface knives or preforms, 41 BL 138 and 41 BL 164 respectively.

(Fig. 16) (a) untyped biface, incomplete manufacture, 41 BL 152; (b) blank or biface chopper, 41 BL 155/156.

(Fig. 17) This brown, tradeware sherd has an incised design and smudged and polished interior. It was located by Charles Collins, formerly of Belton, Texas. The sherd was excavated from the bluff-slope approximately 2 km NW of the known extent of 41 CV 92, near the south bank of the Leon River. A second sherd, located in November, 1977, was from the rockshelter site 41 BL 181. While it would be productive to include ceramics in any future analysis, none have been included here.

Chronological Considerations

Of the various chronological schemes applicable to central Texas, and presented in Fig. 18 (Suhm and Jelks 1962; Shafer 1963; Willey 1966; 329-337, Sorrow, Shafer and Ross 1967; Johnson 1967; 23-24; and Weir 1976), Weir's five-phase system for the Archaic lends itself most readily to projectile point chronological analysis. Morphological distinctions can be discerned: stemmed (Clear Fork); basal notching (Round Rock); broad points with corner notching (San Marcos); and side notched (Twin Sisters). Weir's early phase (San Geronimo) is tentatively represented by one *Gower* point from uncontrolled excavational context (Fig. 6,f); while one possible "Early Barbed" stem base (Fig. 7,k) was not included in the San Geronimo phase for the settlement pattern study. Two additional *Gower* variants are worthy of mention (Fig. 11,g,h); although they are from an off-post site, and were not included in the analysis.

Weir's sytem was constructed with the assumption that phases overlap. This is likely to be an accurate reflectin of stylistic and typological change in cultural processes. All cultures arrive at stylistic modes, but are never static: rather they are in a state of continual transition. Perhaps significantly, Weir (1976 makes no mention of the Transitional Archaic (ca. 500 B.C.-ca. A.D. 1800). The use of the term "transitional" implies that transition is something new and unusual, rather than

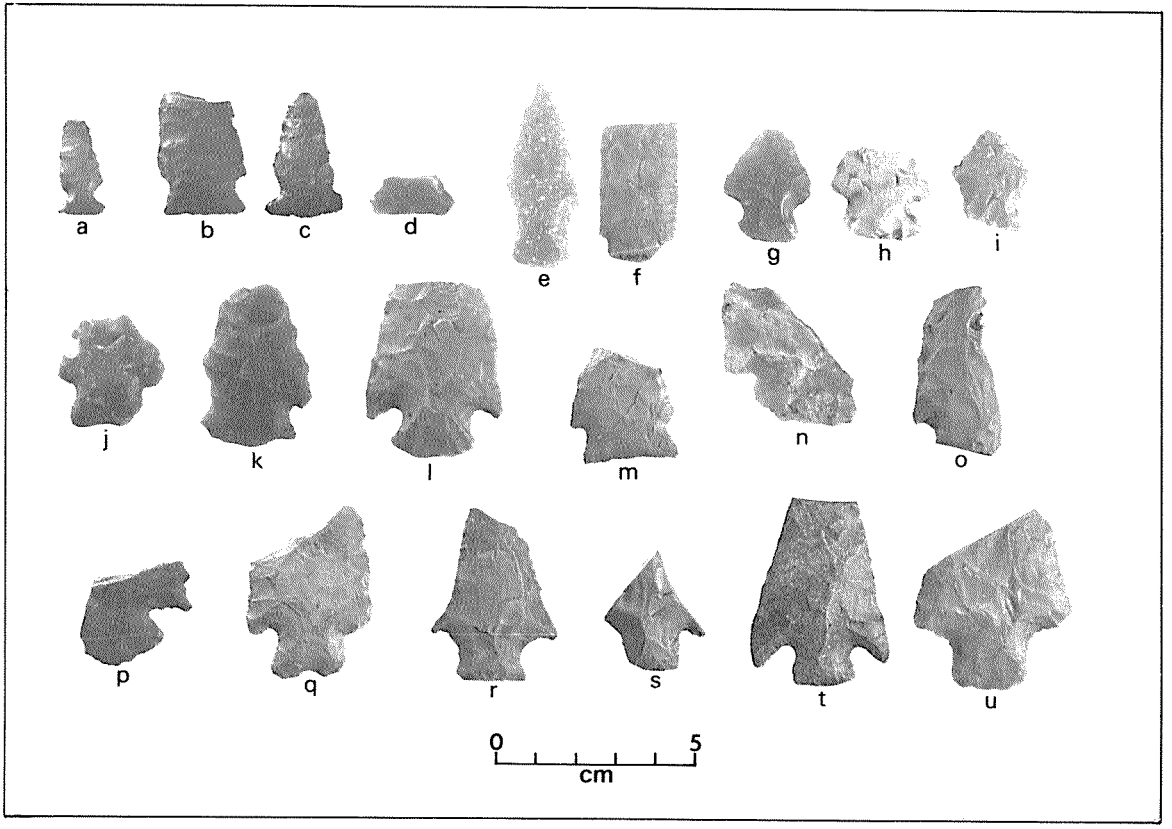

FIGURE 2. *Projectile Points*. a, *Scallorn*; b,c, *Ensor*; d, Ensor-like; e, *Darl*; f, *Darl*-like; g-j, *Ellis*; k-l, *Castroville*; m-p, *Castroville*-like; q. *Marshall*-like; r. *Williams*-like, s. expanding stem; t, *Marshall*; u, *Williams*.

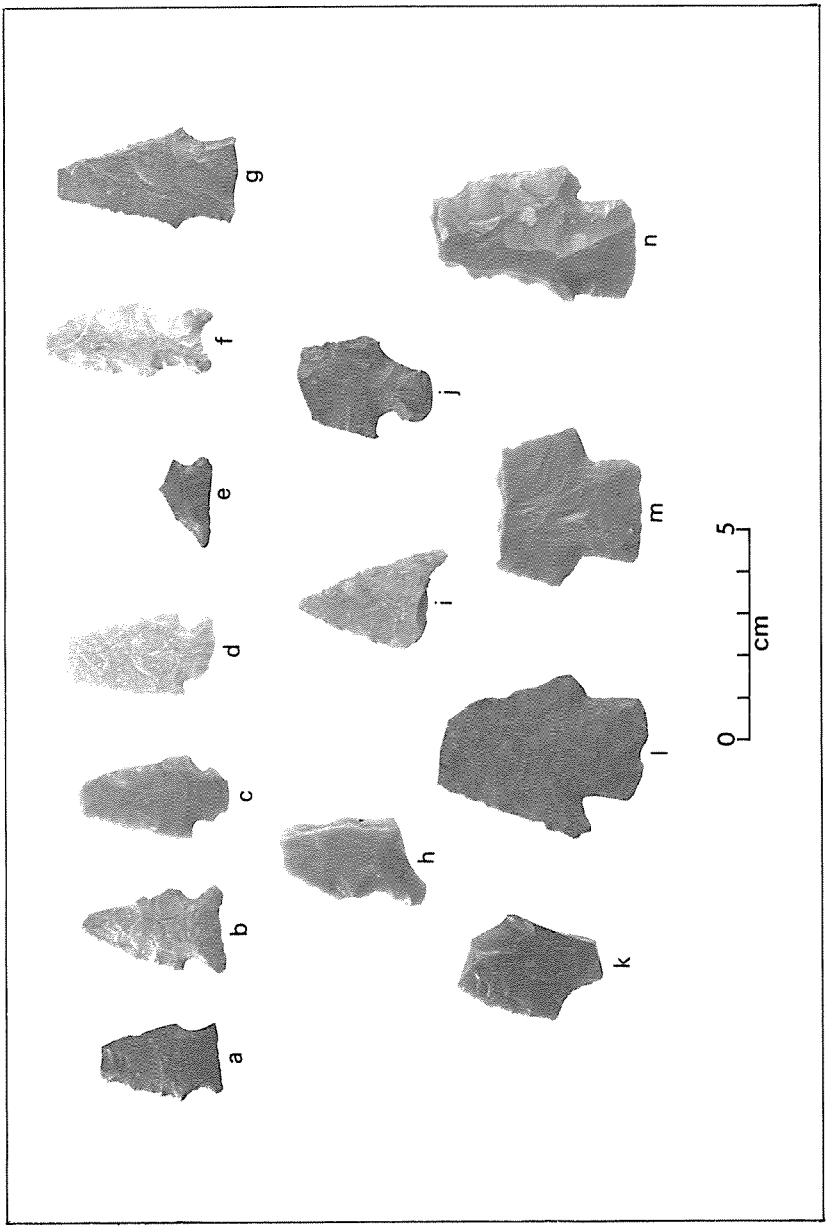

FIGURE 3. Projectile Points. a-e, *Ensor*; f, *Darl*-like; g,i,k, *Castroville*-like; h, *Frio*-like; j, *Palmillas*-like; l-n, *Castroville*.

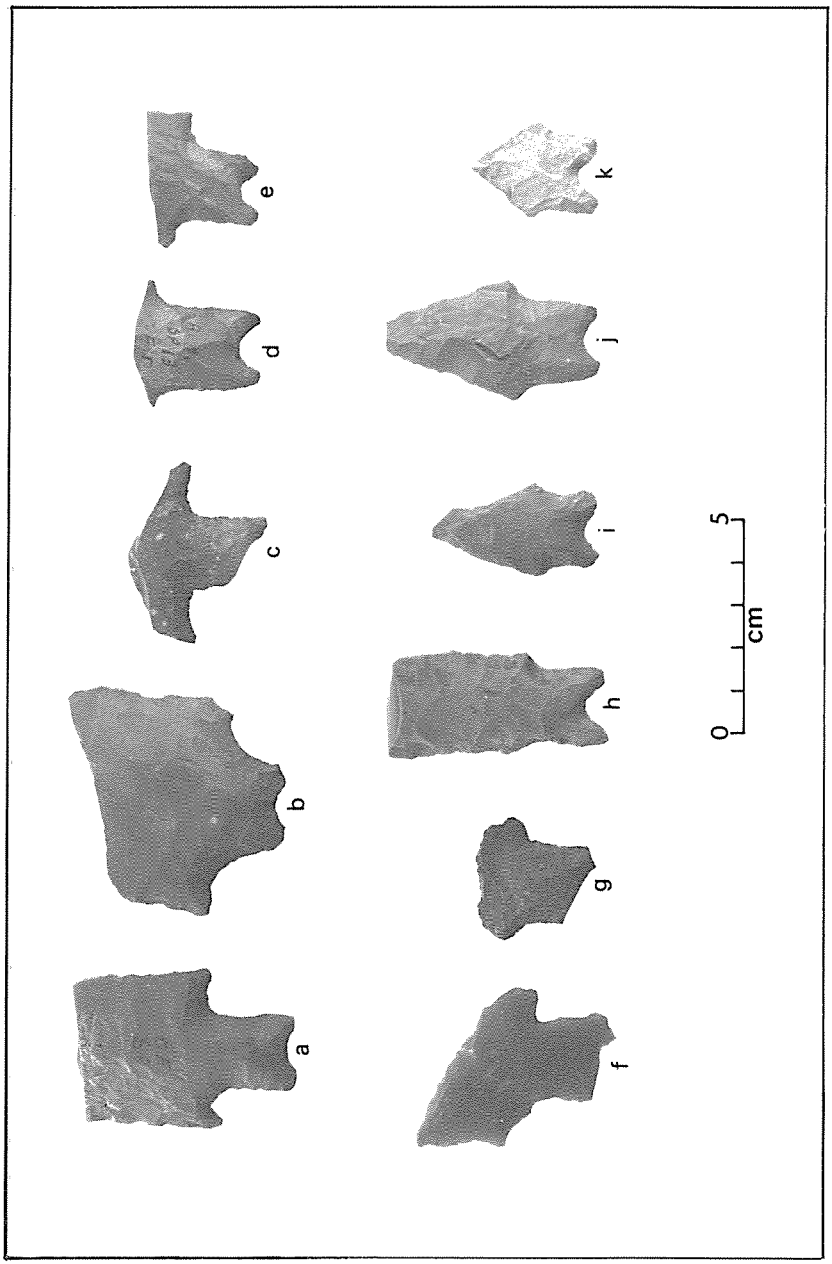

FIGURE 4. *Projectile Points.* a-k, *Pedernales.*

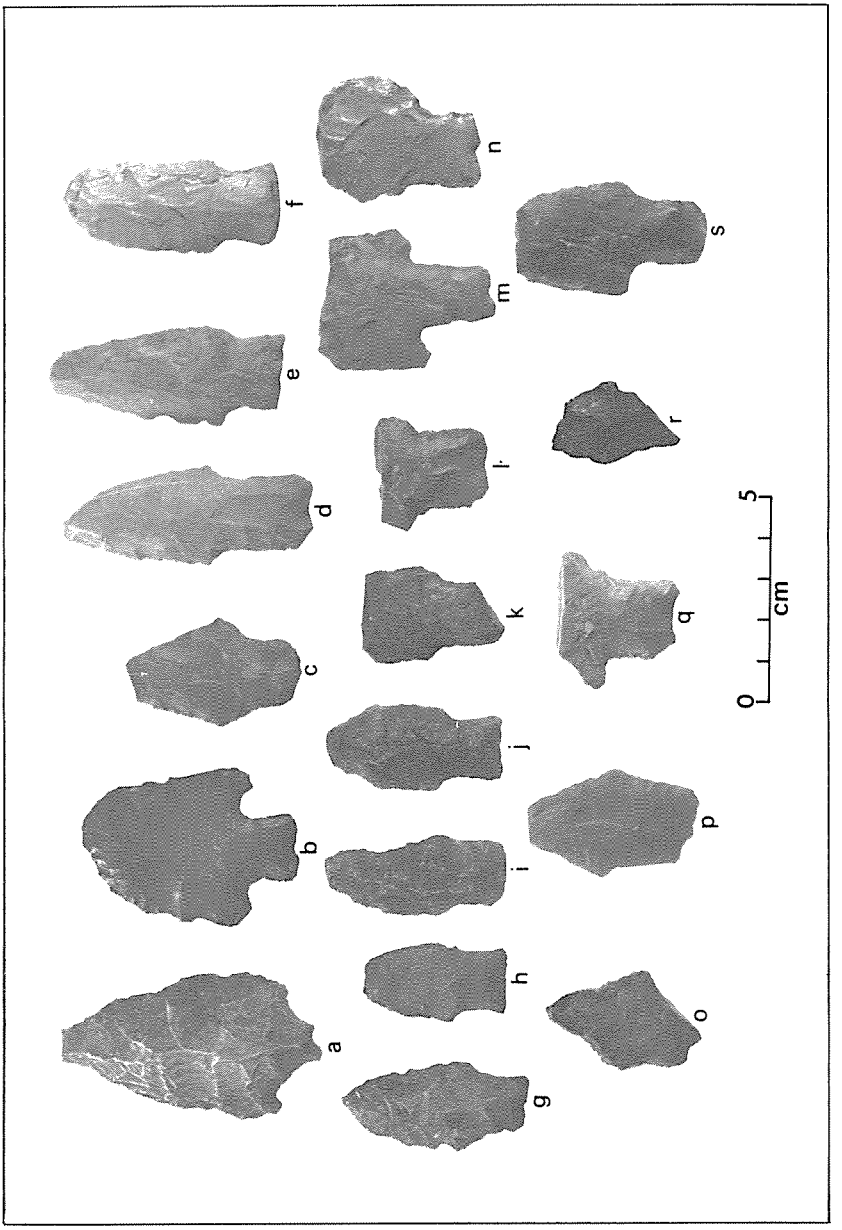

FIGURE 5. *Projectile Points.* a, unfinished dart point; b, *Marshall*; c, p-s, *Bulverde*; d-k, *Travis*; l-n, *Nolan*; o, unidentified fragment.

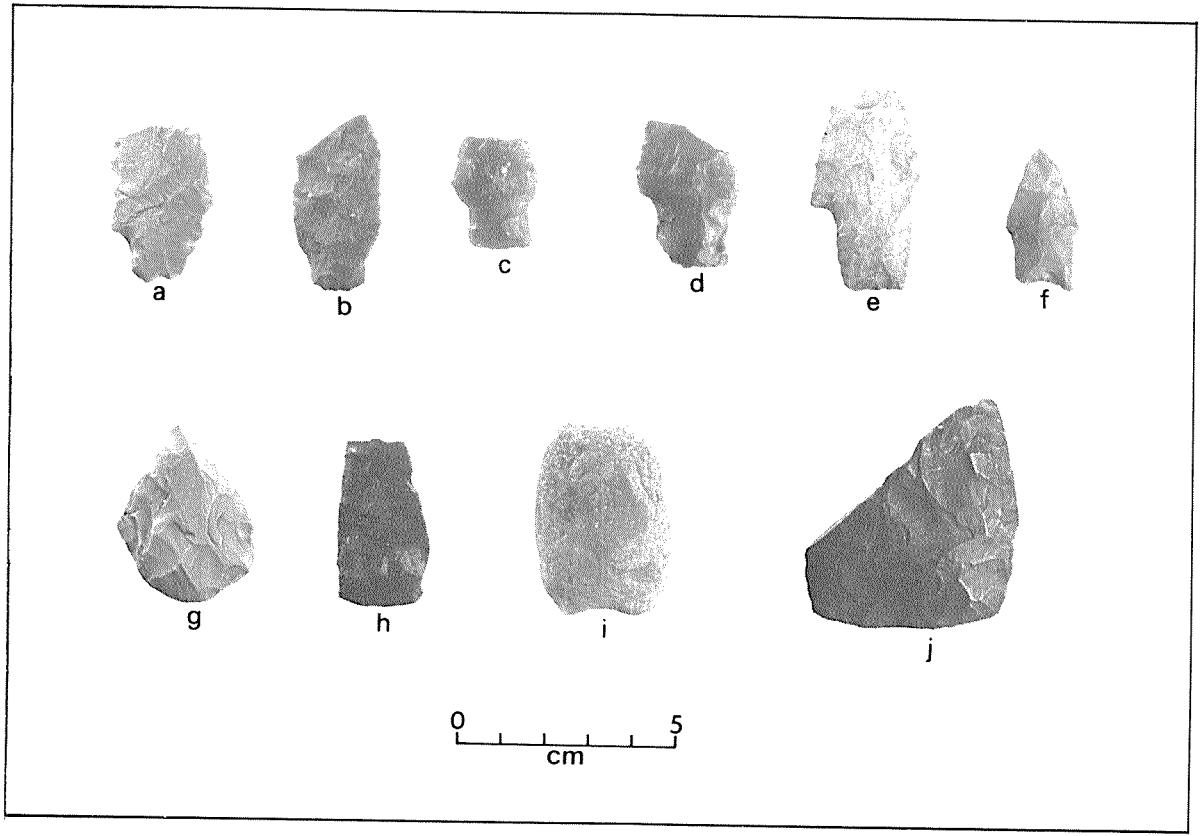

FIGURE 6. *Lithic Artifacts*. a-d, *Travis* points; e, *Bulverde* point; f, *Gower* point; g, preform; h, knife fragment; i, *Waco* sinker; j, knife fragment.

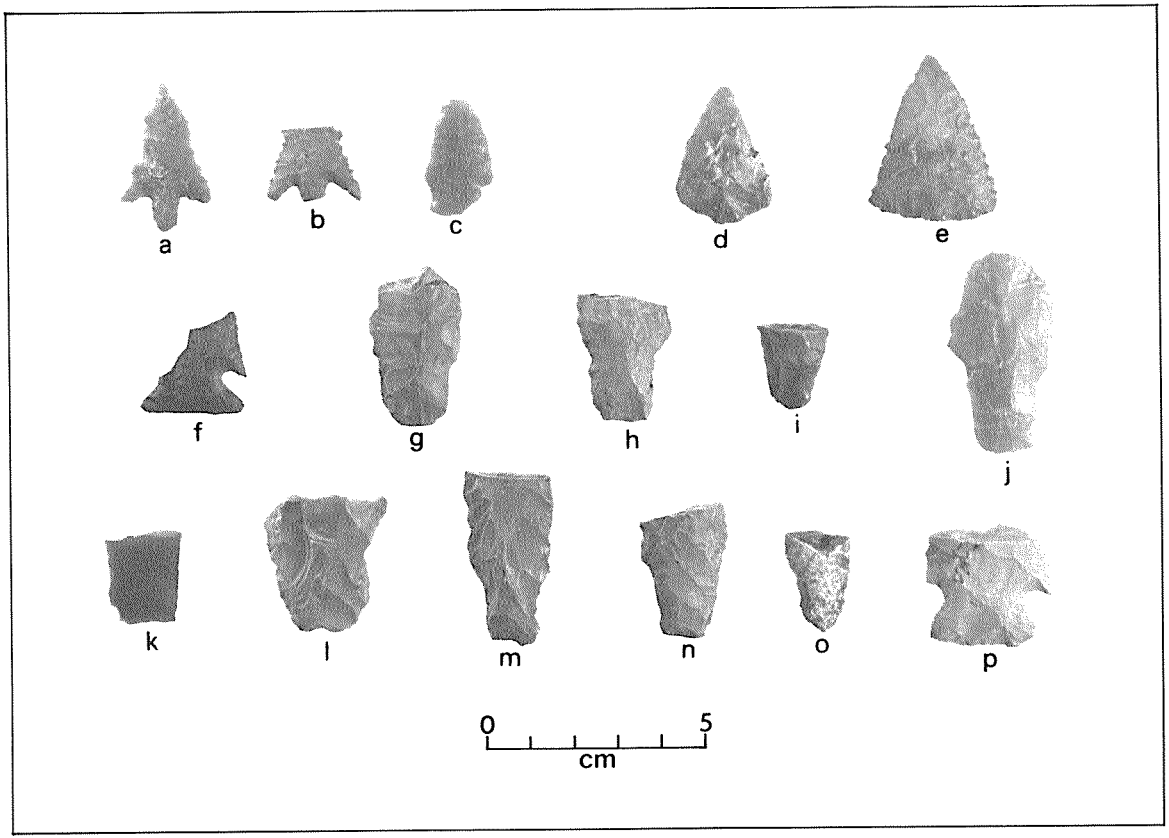

FIGURE 7. *Projectile Points*. a,b, *Perdiz*; c, *Scallorn*; d, *Catan*-like; e, *Matamoros*-like; f, *Ensor*-like; g,i,n,o, miscellaneous; j, *Bulverde*-like; k, possible "Early Barbed" fragment; m, possible *Travis*; p, *Castroville* or *Williams*.

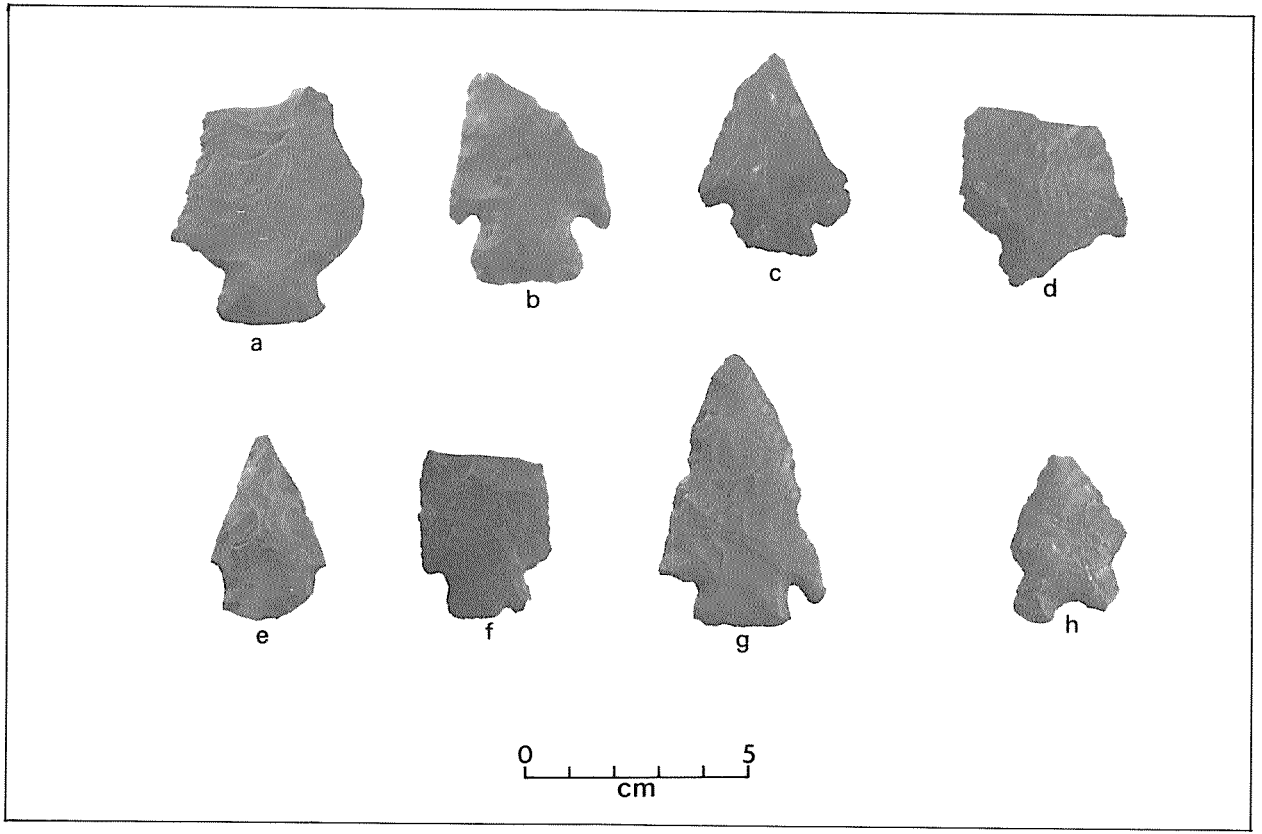

FIGURE 8. *Projectile Points*. a-g, *Castroville*; h, *Frio*-like.

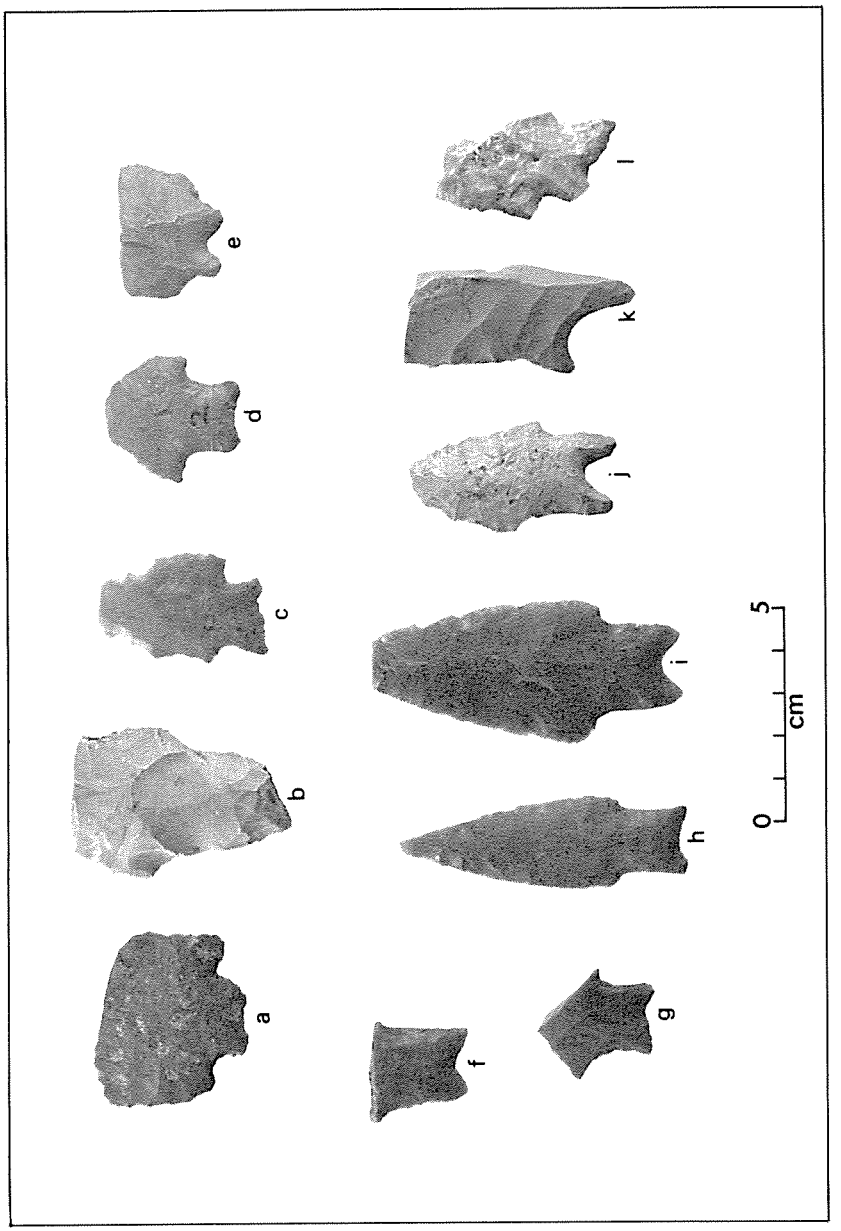

FIGURE 9. *Projectile Points*. a, unidentified point; b, Gary-like; c, Martindale-like; d-l, Pedernales.

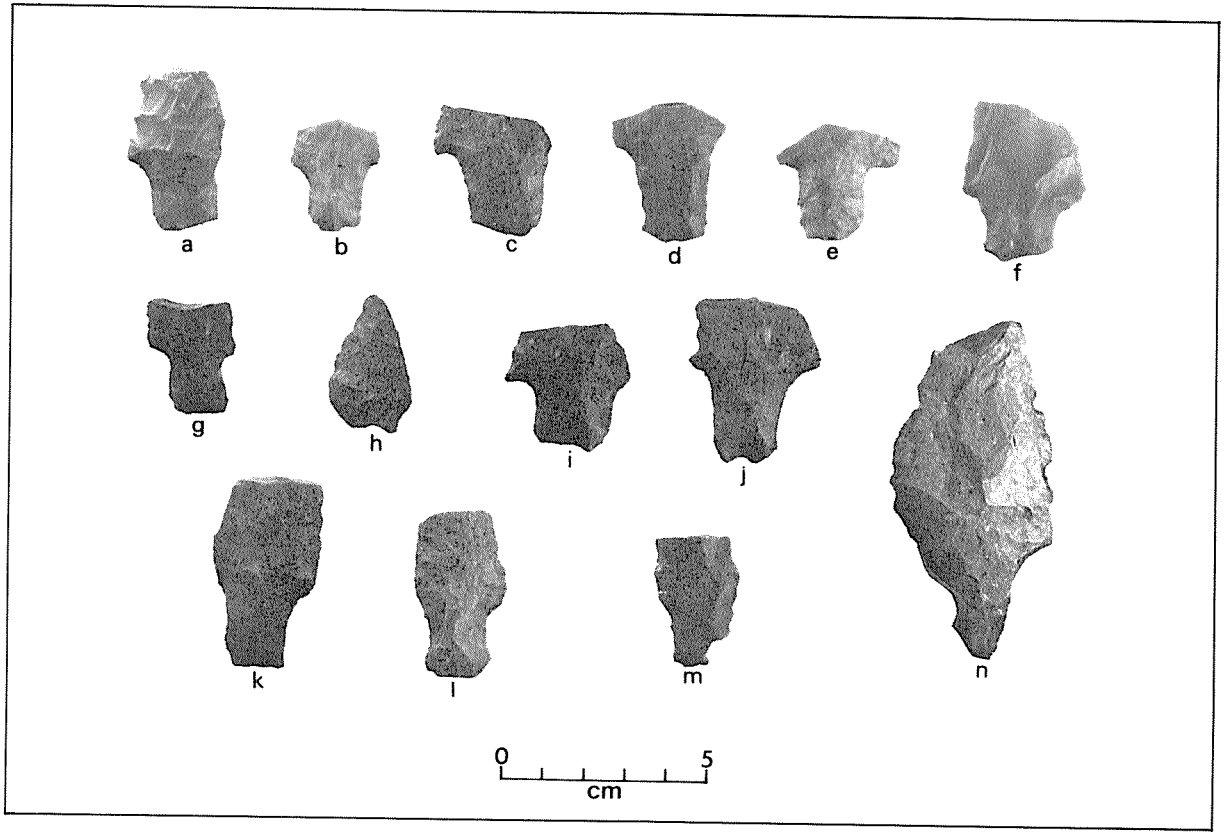

FIGURE 10. *Projectile Points*. a-j, *Nolan*; k-l, *Travis*; m, *Travis*-like; n, large unidentified point.

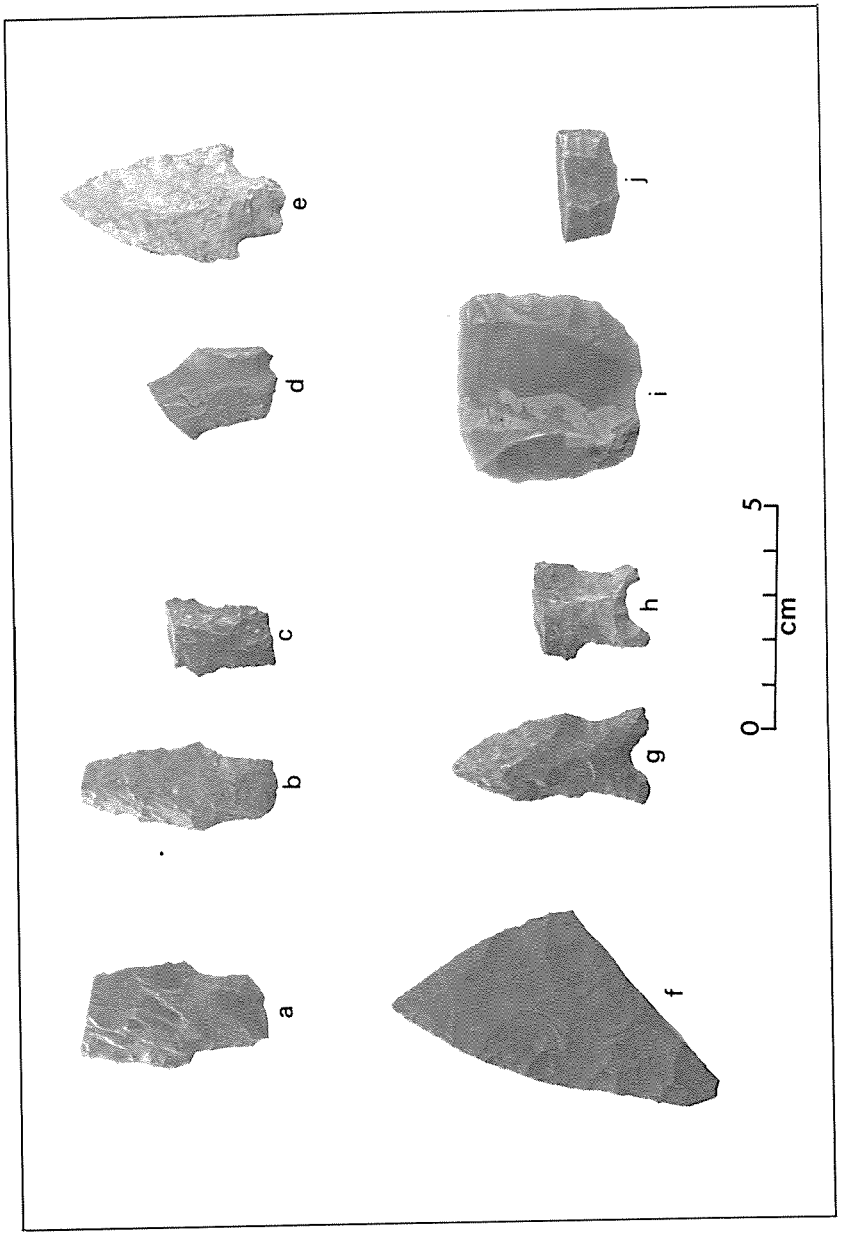

FIGURE 11. *Lithic Artifacts.* a, *Nolan* point; b-e, *Travis* points; f, knife tip; g-h, *Gower* points; i, scraper; j, biface fragment.

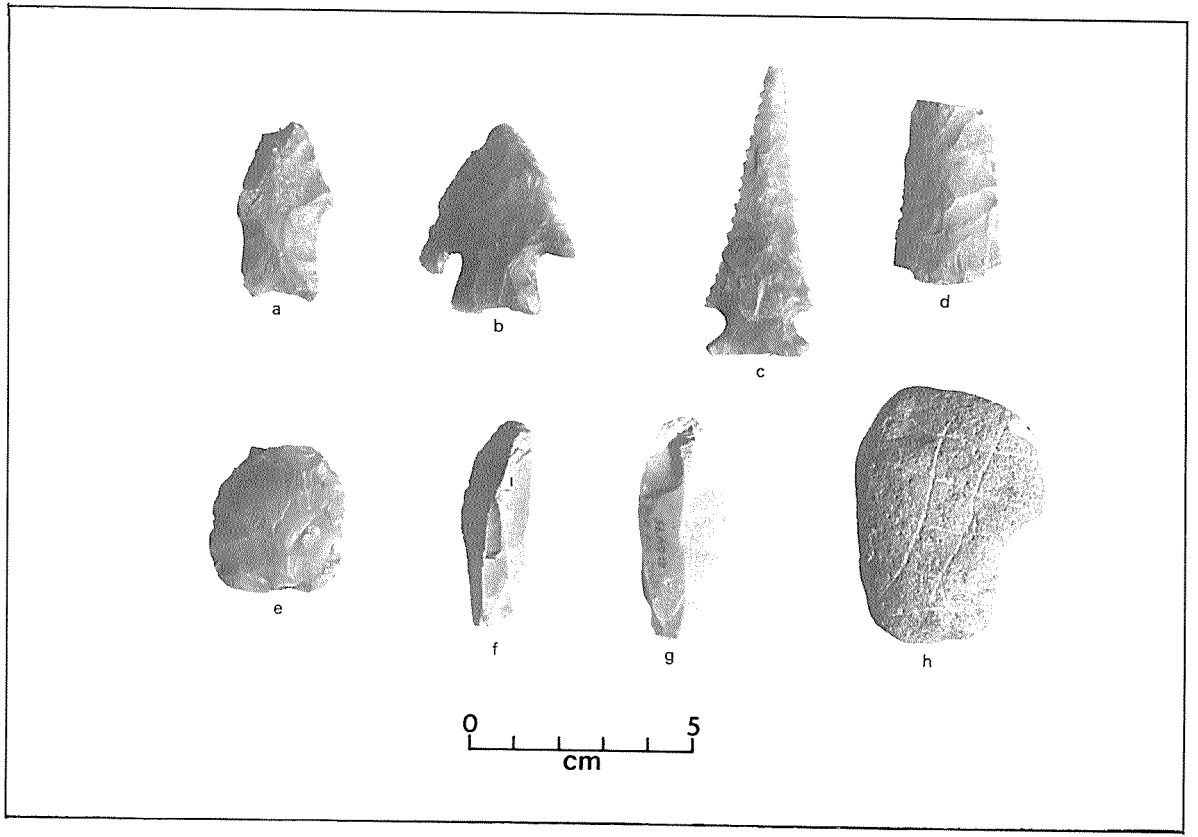

FIGURE 12. *Lithics and Engraved Stone.* a, *Bulverde* point; b, *Castroville* point; c, *Ensor* point; d, knife or point midsection; e, biface scraper; f-g, blades; h, engraved pebble.

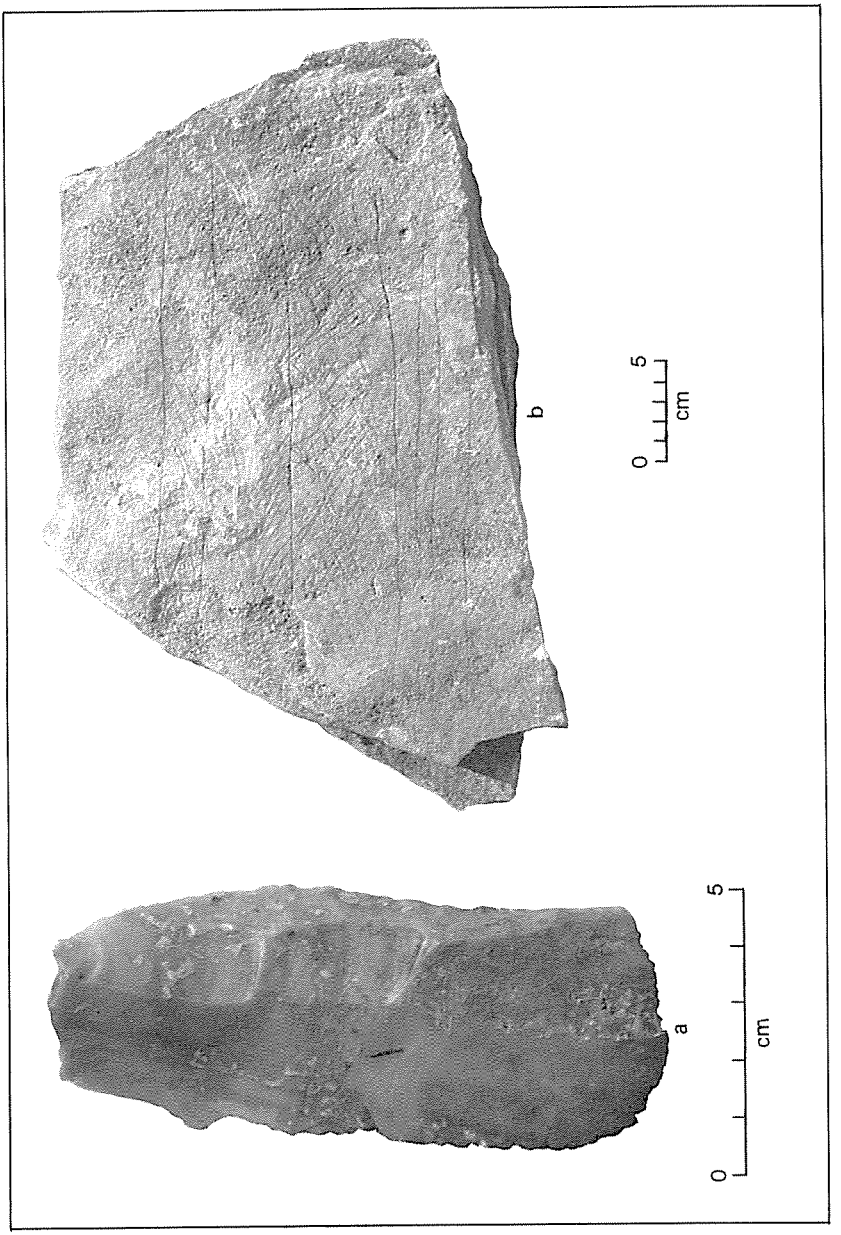

FIGURE 13. *Artifacts.* a, flake knife; b, limestone slab with engraved designs.

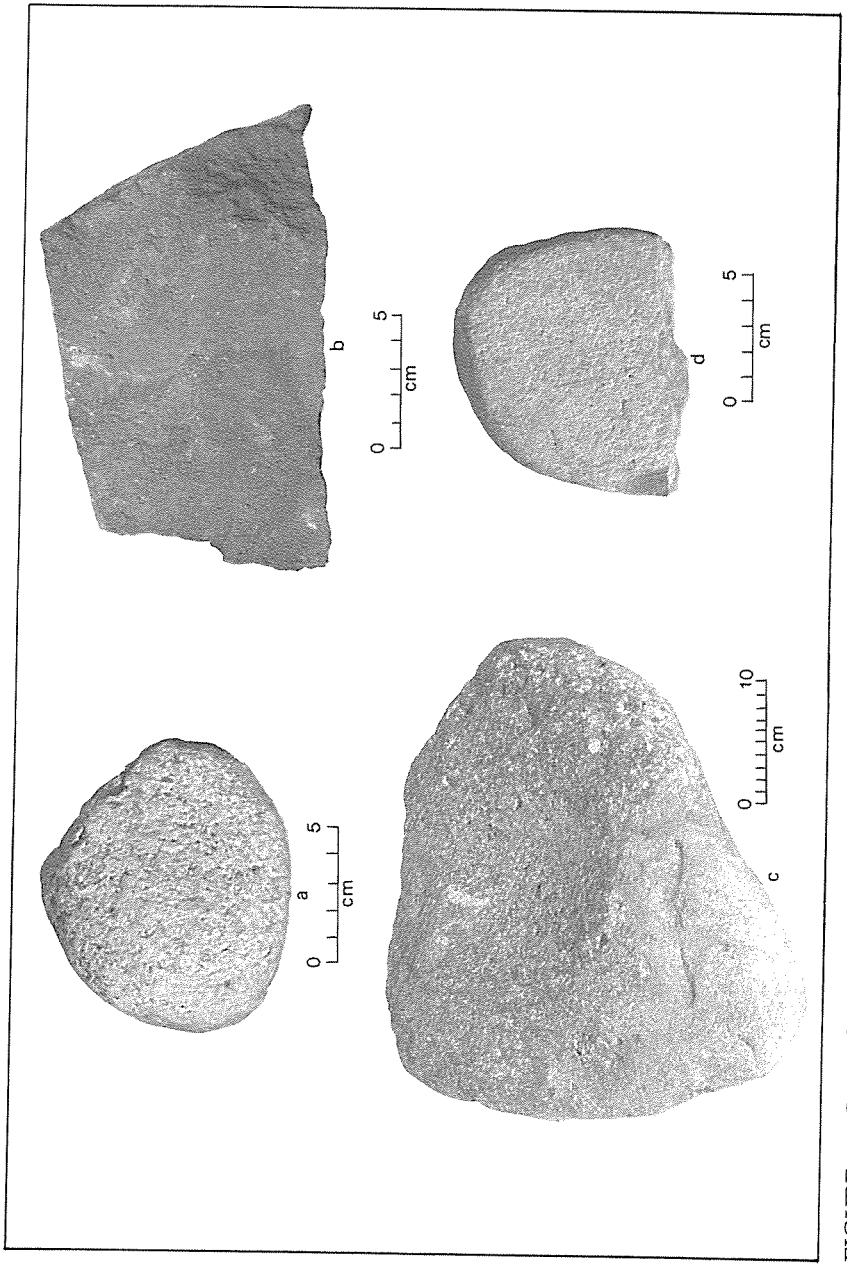

FIGURE 14. *Ground Stone Artifacts*. a,d, manos; b,c, metates.

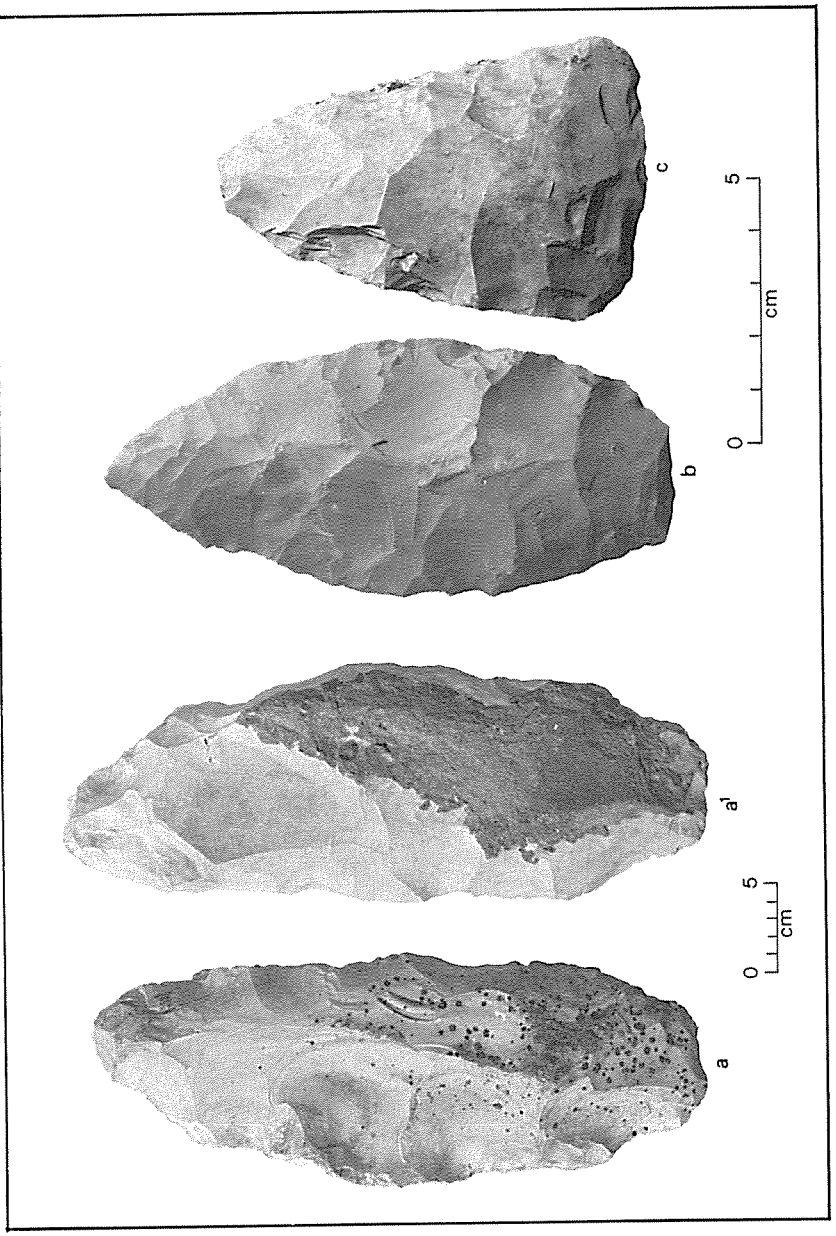

FIGURE 15. *Lithic Artifacts.* a,a', both sides of a large biface; b,c, bifaces.

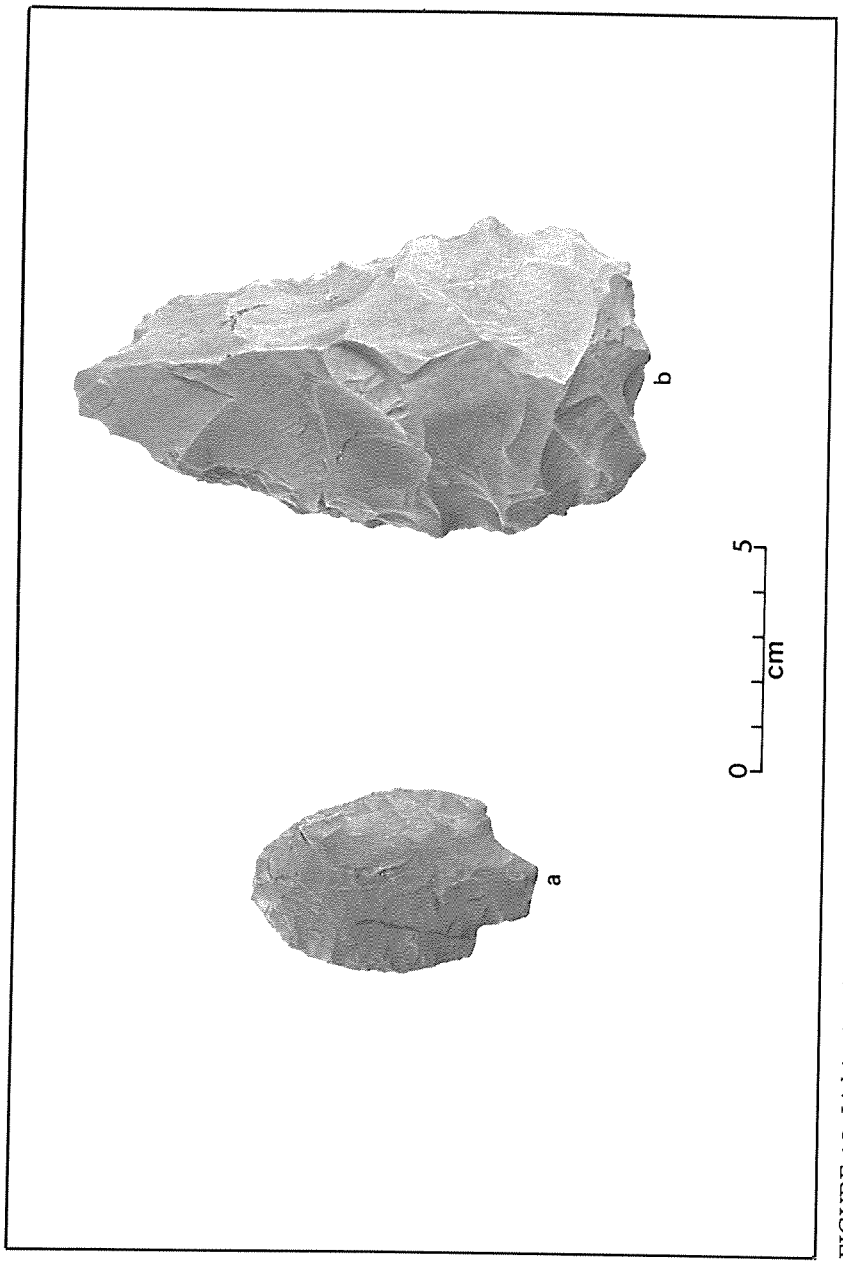

FIGURE 16. *Lithic Artifacts.* a,b, bifaces.

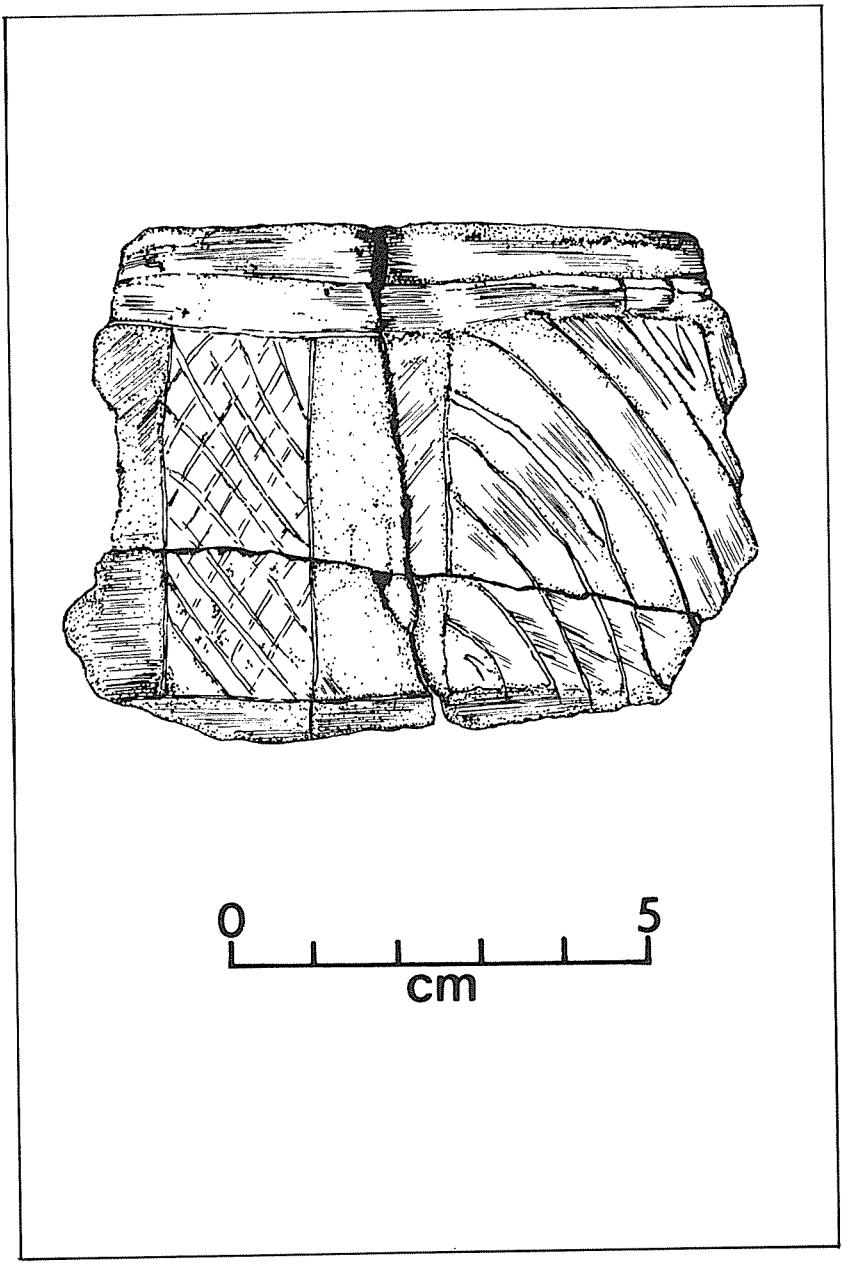

FIGURE 17. *Ceramic Artifact*. Artist's sketch of a brown potsherd.

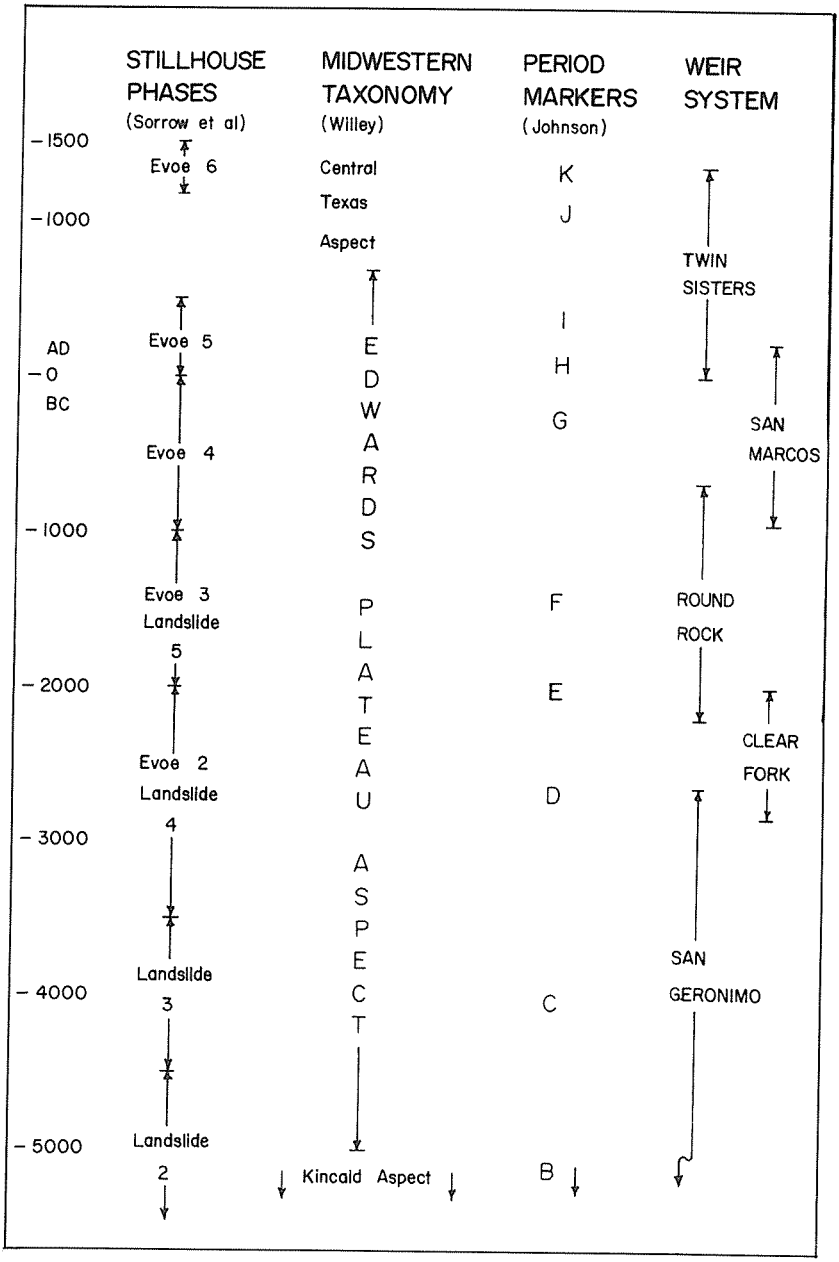

FIGURE 18. *Chronological Schemes for the Central Texas Area.*

the normal situation. Other researchers have found no evidence of overlap (Prewitt 1974; and personal communication 1977).

Be that as it may, the Fort Hood data grouped easily into artificially-conceived "components," each of which clustered into what might be called "chronological modes," for the sake of tentative analysis. Site distribution maps (on file, Texas Archeological Research Laboratory, Austin) indicate the probable settlement pattern changes through time; while in Figs. 19 and 20, projectile point-producing sites are represented by schematic battleship curves. Both Bell and Coryell County sites are arranged chronologically by mean site date, weighted according to the number of chronological indicators (points) in each chronological mode component. Longer battleship curves indicate more chronological mode components — hence, according to surface evidence, longer site use. A glance at the battleship curve for site 41 BL 138 may indicate the effects of excavational data upon a surface sample from numerous sites. The overall impression from these initial charts, however, indicates the possibility of nonrandom changes in settlement patterning through time.

Terrain types, as represented in Fig. 1,b, add another dimension to the analysis. The question was, how much of this nonrandom settlement patterning change was according to terrain, and how could this be correlated with other central Texas archeological data and conclusions in the form of functional hypotheses? When terrain type and chronology were correlated, we could produce settlement frequency graphs (Figs. 21, 22).

To arrive at the interpretations in Fig. 21, the mean date was determined for each site as in Fig. 19 and 20. Chronological mode components with more projectile points represented, were weighted more than those with fewer points, thus giving us mean site dates which may be more accurate. Sites were then segregated according to primary terrain type or microenvironment, and the percentages of dated sites at each terrain type determined. These results were more striking than those represented in Fig. 22.

To arrive at the interpretations in Fig. 22, sites were ignored, and all projectile points totalled in each artificially-determined chronological mode component. These totals were then segregated as in Fig. 21, according to terrain type. The advantage of this second procedure was in its representation of

the separate chronological mode components, and the multiple terrain types represented at many of the larger sites. Results, while not as striking, may have been more specifically accurate. The advantage of the first procedure (Fig. 21) may be in its reflection of possible general tendencies in settlement patterning. As we can see from the graphs, and for the figures presented in Fig. 23, Neo-American (post-Archaic) manifestations are not well-represented from Fort Hood surface data. Two *Scallorn* points (Austin Phase) and two *Perdiz* points (Toyah Phase), from three separate sites, round out the diagnostic lithic inventory; while the few known ceramics (one represented in Fig. 17) complete the total Neo-American sample. While most of these data were being processed, there was no choice but to concentrate upon the Archaic.

Hypotheses

Because of the preliminary nature of any survey, hypotheses must derive from preliminary observations and from the local archeological literature. Thus we might state two hypotheses. (1) Rockshelters came into use starting in the late Archaic (Shafer 1971: 2); and (2) bison hunting increased during the same period (Weir 1976). A third hypothesis, which we shall discuss first, derives from preliminary observation, supported by implications in Bryant (1969) that the water-table was higher, and the central Texas climate was wetter before the late Middle Archaic (Weir's San Marcos Phase) ca. 1,000 B.C. (Shafer 1971: 2). During the earlier phases, then, rockshelters would be too wet for habitation, and floodplain areas would be swampland. This would channel habitation to the bluff-tops, terraces, and prairie highlands. Preliminary observations of a portion of the broad Cowhouse Creek floodplain showed the area to lack sites, while sites (41 CV 57, 79, 80, 81 82, 83, 95, 96, and 97) line the bluff-tops in the immediate vicinity.

Later observations of the same floodplain at a stream confluence ca. 3 km to the northwest, cast the first doubts upon the "absence from floodplains" hypothesis (41 CV 88 and 89). Finally we can see from both Figures 21 and 22, that there was never any such absence. The general trend was no significant change in percentage of floodplain habitation from early Middle Archaic (Clear Fork Phase) times to the end of the Archaic.

Checking the first two hypotheses against the data, we find that they can be tentatively confirmed. Both interpretations show rockshelter occupation to be either central or late in the Archaic sequence. Fig. 22, based upon individual chronological modes, places rockshelter occupation in Weir's San Marcos and Twin Sisters Phases, clearly supporting Hypothesis 1. Bluff-top occupation appears to have undergone significant changes according to both Figs. 21 and 22. In both graphs rockshelter occupation is represented as coinciding with the later of the two upsurges of bluff-top occupation; with bluff-slope and draw occupation showing the most significant increase in Fig. 21, during the Twin Sisters Phase, Late Archaic. Correspondingly, broad terrace occupation shows a brief burst in the Round Rock Phase, Middle Archaic, during one of the lulls in bluff-top occupation. It would seem also that there was positive population movement toward the bluff-tops, rather than movement away from lowland swamps. Superimposing a proposed schedule of bison absence from the southern Plains upon Figs. 21 and 22 (Dillehay 1974), we are able to further correlate Fort Hood data with that from elsewhere in central Texas. If we may connect bluff-top, rockshelter, and bluff-slope occupation with bison hunting, we may confirm Hypothesis 2: tentative Fort Hood evidence would support conclusions that bison hunting increased during the Late Archaic, until the bison population declined.

While this correlation may be tenuous, it enables us to define further problems: will excavation or more systematic site sampling confirm or deny a correlation between population use of the high ground and bison hunting on Fort Hood? The presence of high-ground flint sources does not account for population flunctuation.

FUTURE PROBLEMS

As archeological investigations continue on Fort Hood, we might expect further progression away from the original "babes-in-the-woods," favorite spot techniques of the early FHAS. Before the much-delayed institution of an archeologist's position at Fort Hood, I was formulating program stages characterized by increased problem orientation, and culminating in selected excavation only in the later stages. Post archeologist F.L. Briuer has commenced upon a uniquely flexible program, in which inter-

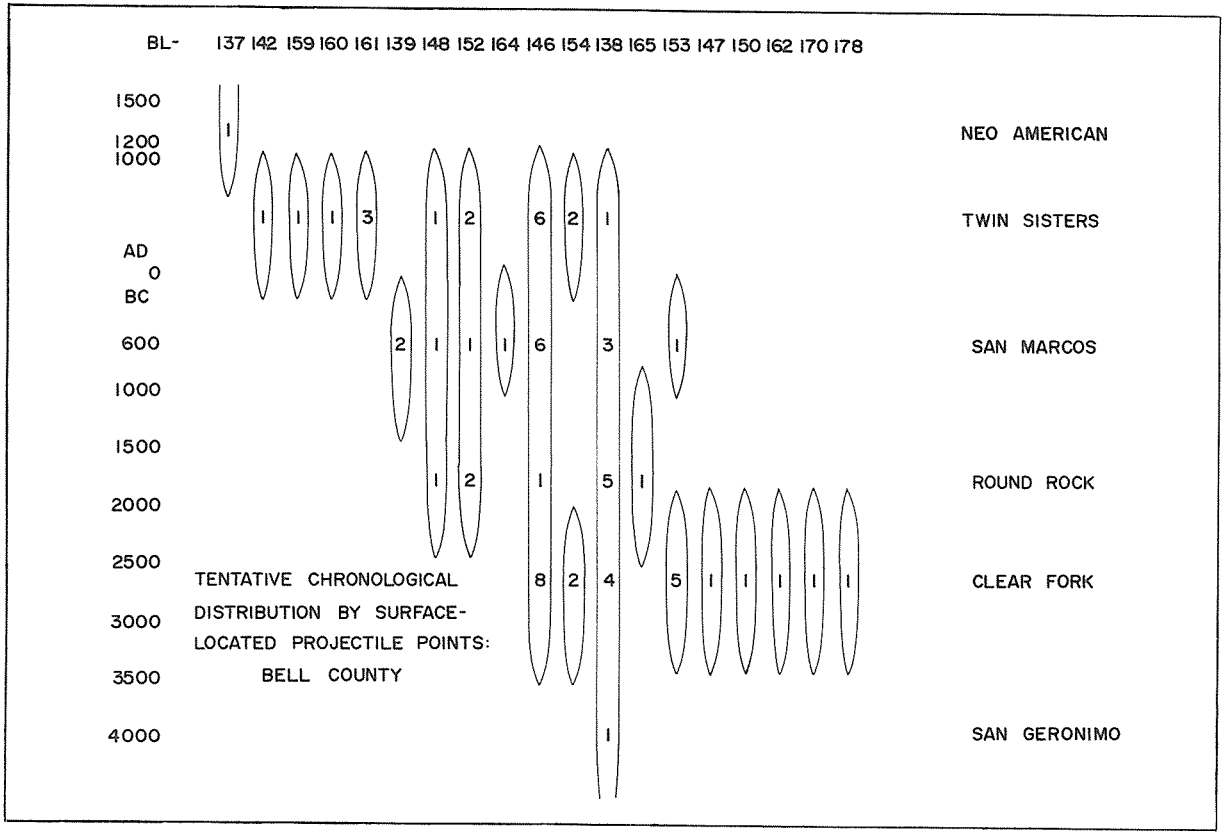

FIGURE 19. *Tentative Chronological Distribution by Surface-Located Projectile Points, Bell County.*

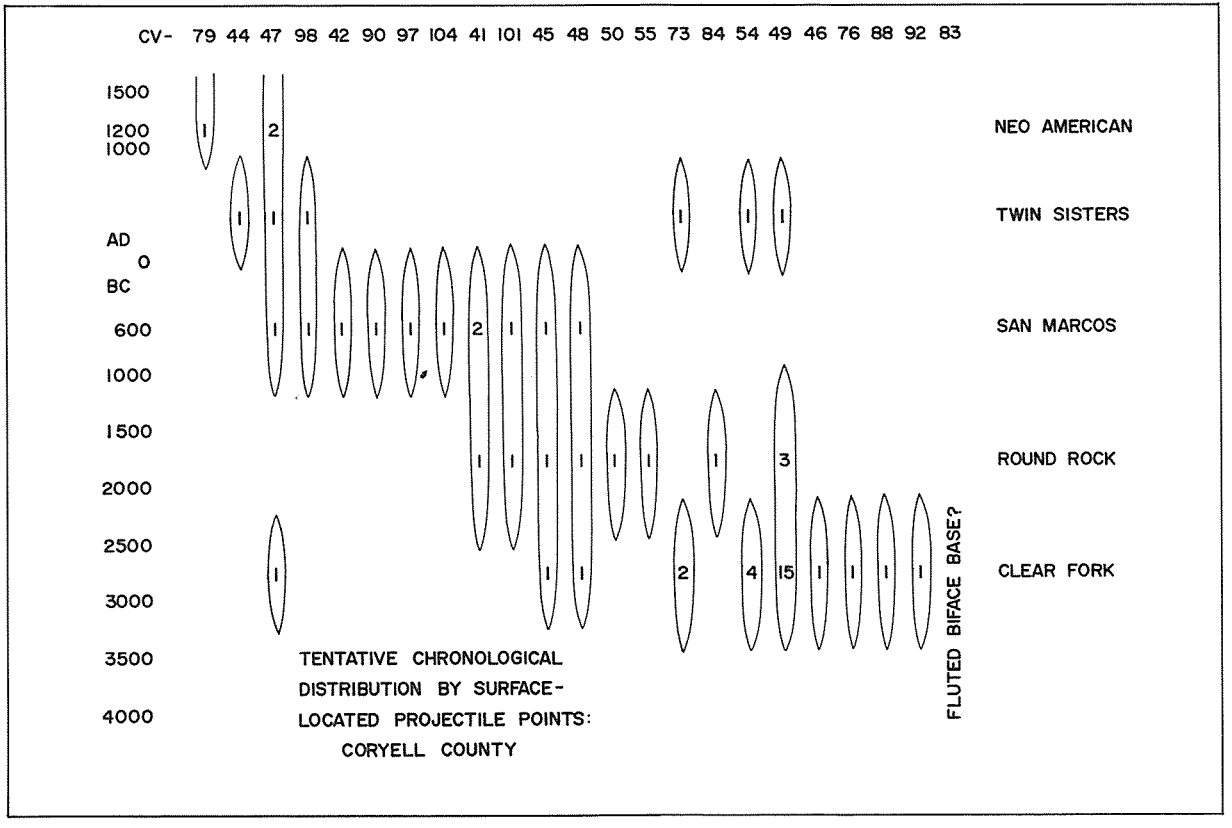

FIGURE 20. *Tentative Chronological Distribution by Surface-Located Projectile Points, Coryell County.*

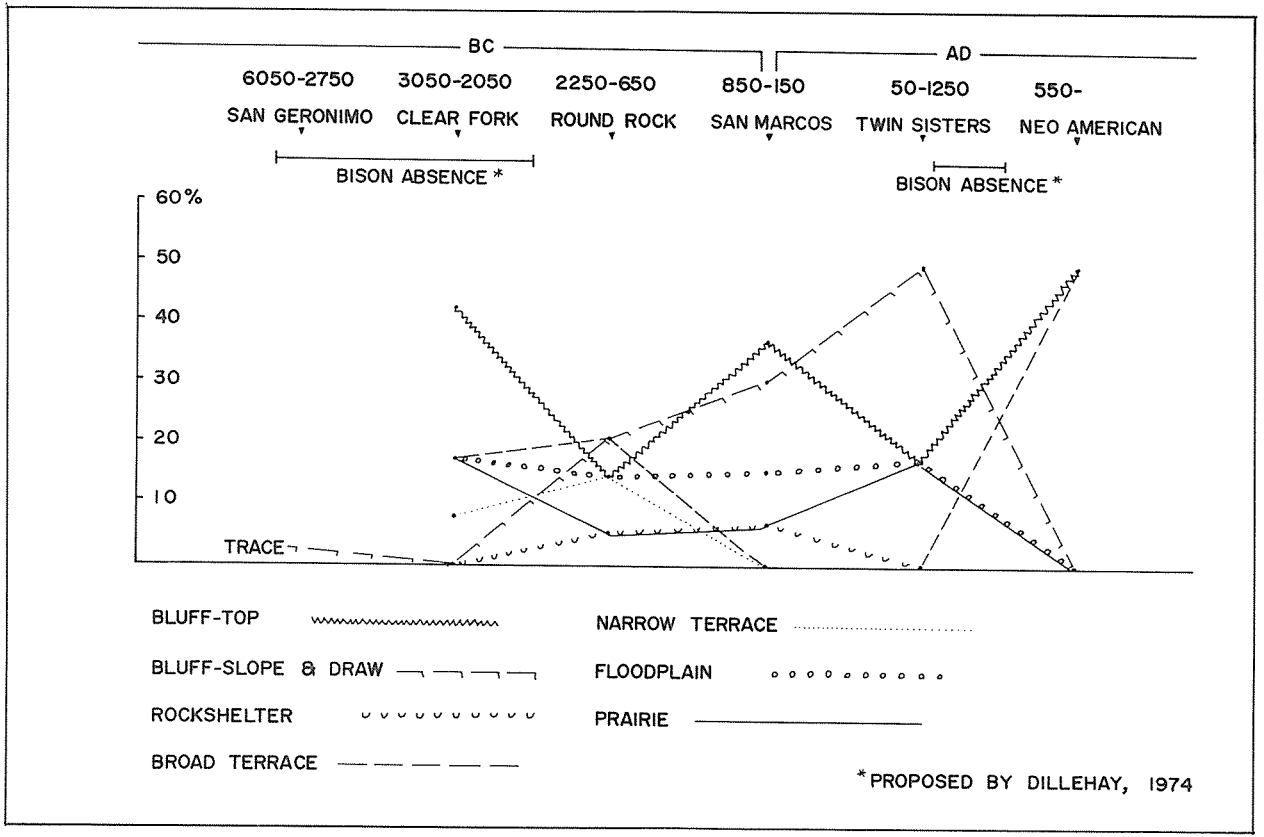

FIGURE 21. *Settlement Frequency Graph.*

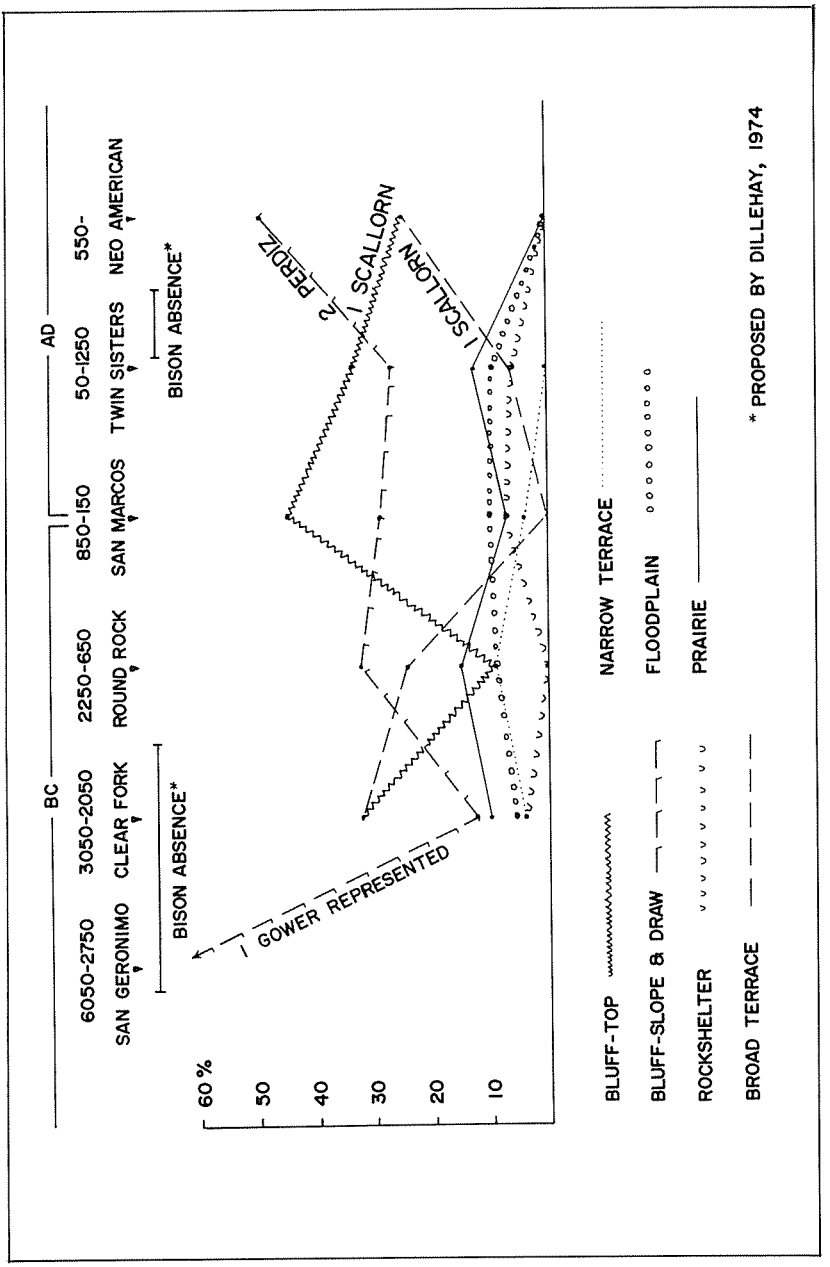

FIGURE 22. *Settlement Frequency Graph.*

	BLUFF-TOP	B-S & D	B. TER	N. TER	RKSHLTR	FLDPLN	PRAIRIE	TOTAL
NEO-AMERICAN	1-50%	-	1-50%	-	-	-	-	2
TWIN SISTERS	1-17%	3-50%	-	-	-	1-17%	1-17%	6
SAN MARCOS	5-38%	4-31%	-	-	1-8%	2-15%	1-8%	13
ROUND ROCK	2-14%	3-21%	3-21%	2-14%	1-7%	2-14%	1-7%	14
CLEAR FORK	5-42%	-	2-17%	1-8%	-	2-17%	2-17%	12
SAN GERONIMO	-	TRACE	-	-	-	-	-	TRACE

(Corresponds with Fig. 21).

41 sites occupying ca. 47 terrain zones.

NEO-AMERICAN	1-25%	2-50%	1-25%	-	-	-	-	4
TWIN SISTERS	10-33%	8-27%	2-6%	-	2-6%	3-10%	5-17%	30
SAN MARCOS	12-43%	8-29%	-	1-4%	2-7%	3-11%	2-7%	28
ROUND ROCK	2-10%	7-33%	5-24%	2-10%	-	2-10%	3-14%	21
CLEAR FORK	18-32%	8-14%	18-32%	2-4%	2-4%	3-5%	6-11%	57
SAN GERONIMO	-	1-100%	-	-	-	-	-	1

(Corresponds with Fig. 22).

141 possible loci for 127 projectile points.

FIGURE 23. *Distribution of Sites by Terrain Zones Through Time.*

disciplinary archeology and salvage "mitigation" are well-balanced. Briuer's interest in botanical and zoological aspects of human behavior, along with an eagerness to try innovative sampling techniques, should be a major contribution toward solving basic problems of regional archeology.

The prevailing practice in earlier years of collecting large, uncontrolled samples, has caused minor disruption of artifact patterning on the surface at a time when controlled surface sampling methods are coming more and more into style (Davis 1975: 39-53; and Dancey 1976). This in addition to the extensive vandalism in the more accessible areas of Fort Hood, may present obstacles to both surface and sub-surface sampling.

Chronological data could become more completely representative following stratigraphic testing. Excavation projects might assist in refinement of local Archaic chronologies. At Evoe Terrace (41 BL 104), two *Angostura* points are evidence of terminal Paleo-Indian occupation in the local vicinity (ca. 6,000-7,000 B.C.); while 17 *Perdiz*, 7 *Cliffton*, and 10 *Scallorn* points are evidence that Neo-American components (A.D. 500-1500) are present (Sorrow, Shafer and Ross 1967: 123-135, and 142).

Other efforts might be directed toward an assessment of the Fort Hood lands for archeological burial populations. Watt (1936: 5-27) and Shafer (1971: 3) cite rockshelters in the bluffs along the Leon River as late prehistoric burial grounds. This pattern continues along the Leon and other sub-drainages, to the Brazos River bluffs. Open burial sites on the terraces and floodplains are generally placed in the late periods of incipient village agriculture, with the westward spread of marginal Caddoan influences (Shafer 1971: 3). Little evidence is available on burial populations from Archaic or earlier stages in the Fort Hood region. Comprehensive inventories of skeletal remains in central Texas are presented by Prewitt (1974: 51-67).

Definitive studies of burial populations are well-represented in the literature, notably from the North American Southwest (Longacre 1975: 71-74). Here again, however, extensive looting in the Fort Hood area prevented extensive studies of rockshelter burial populations (Shafer 1971: 3). It is reasonable to expect, however, that most open-site burials — if any — on Fort Hood would be intact, and available for sampling, such as at the Frisch Auf! site (41 FY 42) (Hester and Collins 1969).

Dwelling, or discrete occupational/activity areas, might become evident by means of controlled surface sampling, but is more likely to appear through excavation. Shafer (1971: 3) notes evidence of wattle and daub structural material in association with round ceramic, shell and bone concentrations at a site on a narrow terrace of Elm Creek near Troy. These hint of late prehistoric (Caddoan-like) dwellings; however no evidence of thatching or other roof structure has been located. Archaic dwellings pose a problem. In the absence of evidence, one may resort to shaky ethnographic analogy to assist with hypothesis-formulation, even though ethnographic connection between the Archaic and the Neo-American is unknown. Newcomb (1961: 140) offers "the bisonhide tepee" of the Tonkawas, "small, squat, and crude, never the tall, imposing, and beautiful lodges typical of northern Plains tribes." Coahuiltecans placed "reed mats and hides over bent saplings to form low, circular huts" (Newcomb 1961: 43). Ethnographic descriptions from little or no data leave us primarily with conjecture, and with the knowledge that "more work needs to be done."

ARCHEOLOGY ON MILITARY LANDS

Attempts are becoming more frequent to do archeological research on military lands. Field school and club-like activities, some of them attaining professional or near-professional standards, are known from West Point, New York; and Fort Belvoir, Virginia. Other posts, like Fort Sill, Oklahoma, have extensive archeological and historical programs and museum systems. Army and Air Force personnel on their way to Fort Irwin, California for a field exercise in 1976, were briefed on preservation of archeological fragile patterning in the Mojave Desert. There is an Army publication detailing some of the procedures for archeological and historical preservation programs on military lands (U.S. Army 1975). Finally, both Fort Bliss and Fort Hood hired archeologists in 1977.

What should be most notable to those interested in research potentials on military lands is the restricted or semi-restricted nature of most such areas. Fort Hood itself is officially regarded as "unrestricted," except in the impact area, where danger to life and limb should be obvious; and except in certain restricted security areas. During some military maneuvers, selected areas

of Fort Hood are off-limits to "non-combatant" individuals. Areas of post usually open to the general public are closed to all non-hunters on holidays and weekends, during a short winter hunting season, except between 10 a.m. and 2 p.m.

Security and impact areas may thus be the only areas relatively untouched by looters and vandals: the 57,000 acres (87 square miles) of Fort Hood's impact area have remained almost untouched by the present survey. If this area has remained free of vandalism as well, it could provide the opportunity for conventional or innovative controlled sampling, and perhaps modified versions of what Davis (1975) calls "exposed archaeology," coordinating with Fort Hood Range Control to undertake survey in areas which are periodically cleared and made safe for entry. Davis, working in the Mojave Desert, California, has taken advantage of a segment of the China Lake Naval Gunnery Range, no longer in use, and thus an area which long remained practically inaccessible. This area provides relatively undisturbed archeological surface patterns for Davis' project. Decades of Naval bombardment of selected target areas has produced negligible damage when compared with damage by collectors.

Good coverage by aerial remote sensing is usually available on military posts. On Fort Hood, aerial photographs processed by a military intelligence detachment were available for this report. A map of 41 CV 73 was traced directly from one frame of negative transparency, taken at an altitude of 4,000 feet. If aerial imagery does not prove useful in individual site location, it can be used for mapping, augmenting the 1:25,000 scale Department of Defense Orthopicto maps already available.

Another advantage to archeology on military lands is homogeneity of ownership: it is all Federal land, and one need only clear research with Federal authorities. A disadvantage on military lands, however, is the delay inherent in operating through two echelons of Federal authority, and two separate legal systems.

SUMMARY AND CONCLUSIONS

As of early 1977, the archeological survey of Fort Hood located 105 sites, both registered and unregistered according to the TARL system, and mostly within the boundaries of the

military reservation. Using surface data, it was possible to run a tentative settlement pattern analysis, which tends to confirm the results of investigations in other areas in central Texas. While the immediate purpose of the survey — to locate, describe, register, and publish preliminary survey results — was achieved, Fort Hood investigators also tentatively confirmed central Texas Archaic patterns of late period rockshelter occupation and increased bison resource exploitation. It is hoped that future, more extensive research on Fort Hood will enable intensified dialogue among central Texas archeologists.

ACKNOWLEDGMENTS

A latecomer to the Fort Hood Archeological Society (FHAS), I must extend gratitude to many former Society members whom I have not met. James Rodgers, at this writing pursuing graduate studies in archeology at Arizona State University, cropped up most prominently within the early half of the FHAS site survey folders. His perseverence in early administrative as well as research efforts is to be admired. Much gratitude goes to Les Dix, Camille Avery, and Sid Lyons, plus other individuals too numerous to mention.

Of the individuals with whom I was fortunate to associate, James Shirah, Les Herring, and James Baskin stand out as Society members capable of the most Herculean efforts. Baskin returned to Tennessee following his departure from the Army, and later moved to Florida. In both places he became deeply involved with amateur archeological societies, while pursuing the field academically. While at Fort Hood, Jim assisted with (41 CV 73) and initiated (41 CV 87) much field investigation. In his own reports, and when helping to put together some of the prolific writings of Jim Shirah, he produced excellent scientific illustrations. Without the labors of Les Herring, the FHAS correspondence and source files would now be in chaos.

With contagious enthusiasm, Craig McKee carried the Society through a trying period of membership turnover until late 1975. Following Craig's departure, several individuals helped to develop this paper: Michelle Pemberton and John Tyler assisted with the photography, while Barbara Taylor drafted most of the illustrations. In the field, Rudy Purificato showed enthusiastic interest, while Pat Tucker and Mark Rittenaur embarked on site-location surveys of their own.

"Outsiders" who provided the most encouragement have been Olin McCormick, Institute of Applied Sciences, North Texas State University, Denton; and Bob Burleson, former President of the Texas Archeological Society.

Dr. Frederick L. Briuer, who assumed the position of Post Archeologist in October, 1977, expressed much gratitude for our shaky start in the archeology of Fort Hood. I especially thank him for his much-needed intellectual stimulation in the last month and a half of my sojourn in the Army.

I apologize to those many former, and few current members of FHAS I failed to mention.

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An Archeological Survey in the South Concho River Area, West Central Texas

DARRELL CREEL

ABSTRACT

A small area along the South Concho River in west central Texas was surveyed in an effort to correlate different archeological remains with microenvironmental zones. The recovered data suggest a subsistence-settlement pattern in which occupation and most of the food procurement occurred in the riparian zone. Exploitation of the flatlands or outwash plains probably was restricted to procurement of animal foods, while the most apparent use of upland areas was procurement of lithic raw materials

INTRODUCTION

West Central Texas is rich in cultural remains, though poorly understood archeologically. In an effort to learn more about prehistoric resource use in the region, a small area along the South Concho River (Tom Green County) was systematically surveyed by the author for archeological sites on several occasions in 1975 and 1976. To protect these sites, all locational references herein are nonspecific; persons should contact the author for more detailed information.

Prior to this study, it was known that the study area contained abundant archeological remains, including most notably, burned rock middens. The area was also known to have been essentially a prairie until perhaps 75-100 years ago when widespread expansion of mesquite, juniper, and oak began (Figs. 1-3). This naturally

raised the question of what resource(s) had been exploited that resulted in the large accumulations of burned rock and other cultural debris. None of the plants whose processing produced the burned rock middens of west and southwest Texas presently occur in the region (Greer 1965: Shafer 1970). Were the oaks and pecan now found near the streams present in prehistoric times and were these the resources that were utilized? These questions led to further speculation concerning the overall nature of prehistoric resource use, and this speculation in turn led to the investigation reported here. With the abovementioned questions as stimuli, a general objective was set forth for the study.

The objective of the investigation was to determine the relationships between the distribution of resources and the distribution of the various types of archeological remains. As a primary objective, this aim is founded on the concept that ". . . the determination of resource use tends to precede and condition the site placements and demographic arrangements of a hunter-gatherer group" (Jochim 1976: 12). Assuming that all archeological remains are those of hunting and gathering populations, the focus of the investigation can be directed toward the general resource exploitation patterns characteristic of aboriginal populations in the area.

This objective required a standard survey of the archeological remains to determine the number of sites present and the nature of their content. From the survey, preliminary concepts of site type, size, condition, and, whenever possible, age were to be developed as necessary antecedants to further investigation. These kinds of information certainly must be gathered as a broad data base before specific questions can be answered or hypotheses tested.

Perhaps appropriately mentioned at this early point is the particularly flexible nature of the investigation, in as much as it has influenced the appraisal of the archeological remains. The relative lack of time restraints on the survey is the most significant aspect of the flexibility, for it made possible at least two visits to nearly every site, each during a different time of the year. In many cases, the overall appearance of sites changed considerably from one visit to the next and often influenced the determination of site structure and content. Not only were the archeological remains seen in differing conditions, but their environmental situations were observed as they varied with seasonal change. As will be explained later, these observations on environmental changes

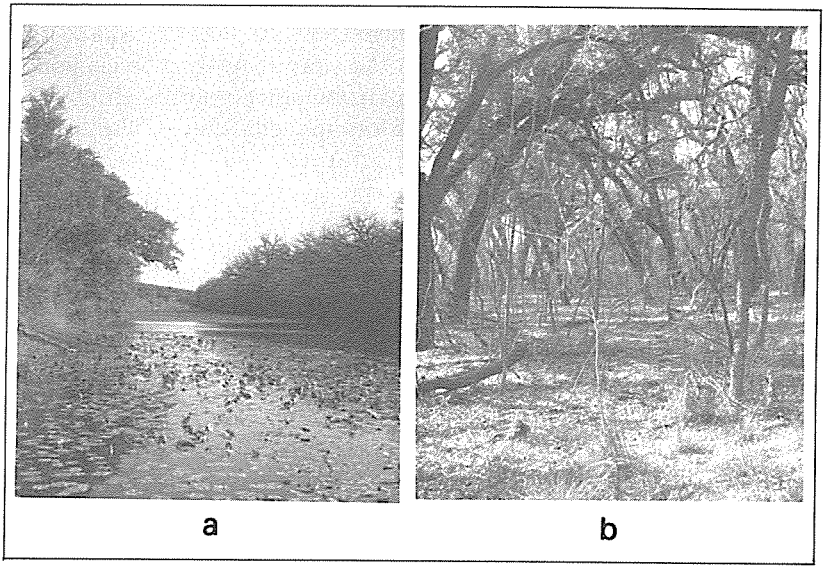

FIGURE 1. *Riparian Microenvironment.* a, view of partially-dammed South Concho River; bottom, wooded area.

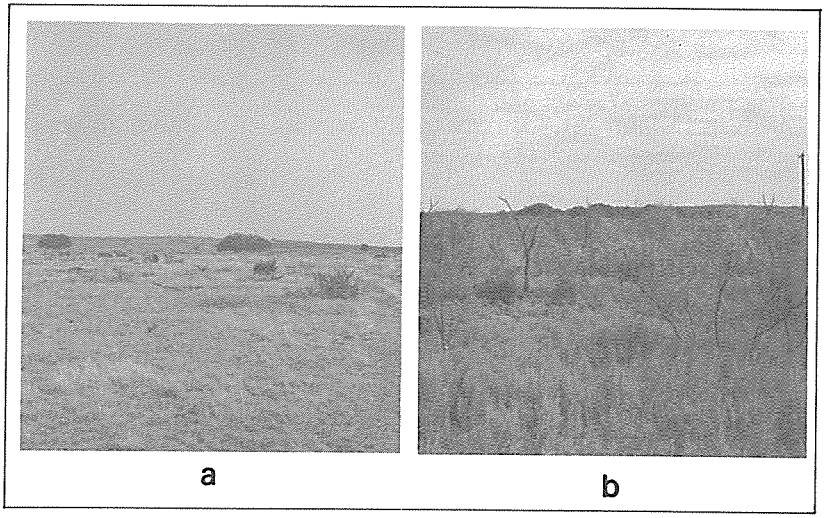

FIGURE 2. *Flatlands Microenvironment.* a, area cleared of mesquite; b, uncleared mesquite brush ara.

frequently provided important bits of data for understanding the differential availability of certain resources. Repeated visits to any research area during all seasons of the year appear to be essential for adequate investigation into environmental relationships; the investigator in effect gains a greater appreciation of the subtle peculiarities of his research area.

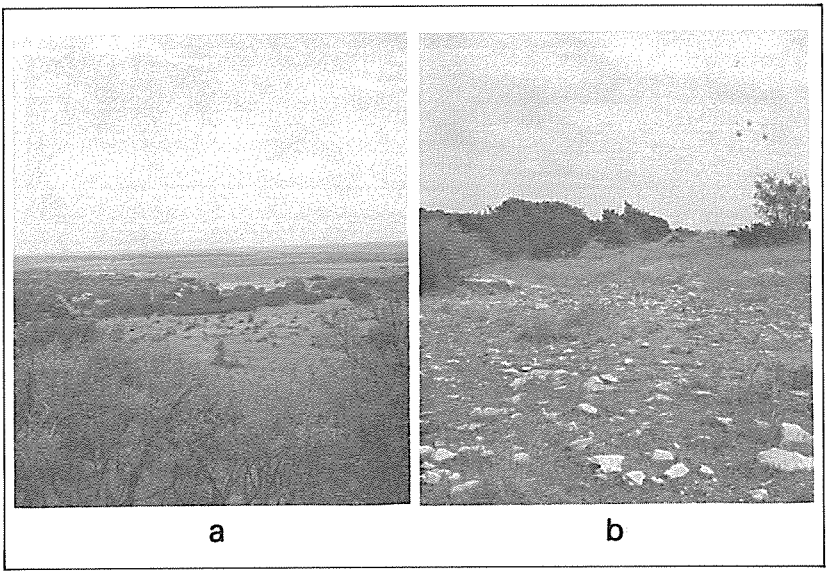

FIGURE 3. *Upland Microenvironment.* a, view of uplands in study area; b, closer view of typical upland are.

RESEARCH DESIGN

A research design that would fulfill the previously mentioned objective, had to be based on two assumptions. Foremost, is the already noted assumption that the population(s), whose relationships with the environment are the subject of the investigation, were hunters and gatherers. The second assumption, as implied, is that patterned relationships between the environment and culture as an adaptive system do in fact exist and are amenable to observation and analysis.

Assumption I

All available evidence indicates that the prehistoric and historic aboriginal groups who inhabited the region surrounding the research area were hunters and gatherers (Suhm 1960: 73; Shafer 1971: 131; Weir 1976). The archeological remains investigated in west central Texas clearly are similar to those of adjacent regions where the peoples were hunters and gatherers (Shafer 1969: 95; Green 1961: 194-196). Similarly, groups known to have been in the area during historic times—Jumano, Lipan Apache, Comanche, and perhaps the Tonkawa—were also hunting and gathering peoples, although some of the Lipan Apache occasionally gardened (Newcomb 1961: 113).

Assumption II

According to Struever (1968: 136), a population's articulation with its environment through patterned relationships occurs within two milieus, one biophysical, the other social. Archeological investigation generally is restricted to evidence from the biophysical realm. In this respect,

> The most accessible and direct relationship between a culture and its environment is expressed in its technological and economic adaptations, and those cultural forms most closely related with these pursuits (Fitzhugh 1972: 7).

Expressions of these relationships are most evident in a population's subsistence-settlement pattern.

Subsistence can be defined as the extraction of biological energy from the environment and in hunting-gathering societies is basically determined by technology and resource potential. Given that a population's environment contains sufficient exploitable resources, extraction of biological energy at predetermined levels requires an adequate technology. Thus, a population must not only possess the techniques for procuring energy, it must also be capable of processing the energy into a consumable form.

With an adequate technology, extraction of energy (in contrast with production) is largely dependent on resource potential, which is itself a function of distribution in both time and space. Energy harvest at predefined levels is necessarily adapted to temporal and geographical variation in potential; therefore, evidence of this adaptation in terms of procurement, processing,

and consumption should be reflected in the patterned remains of the archeological record. Similar extractive activities can be expected to produce patterned remains indicative of those activities. Essentially then, a correlation must exist between the archeological remains and the patterned structure of the biophysical environment as influenced to a varying extent by the social environment. This configuration is observable as a population's subsistence-settlement pattern, with the different settlement types exhibiting different material remains.

RESEARCH STRATEGY

Predicated on the objective of this investigation and the two assumptions discussed above, the research strategy and the presentation in this report logically involve four phases.

I. A brief review of general patterns in hunter-gatherer subsistence-settlement systems is presented. The focus is on those patterned relationships between populations and their environment that lend themselves to archeological investigation.

II. With the background data and expectations derived from the first phase of research, the strategy shifts to actual investigation of the study area. Phase II, then, is the investigation of the biophysical environment of both the research area and the surrounding region. Intensive analysis of the survey area must necessarily be complemented by a more general regional analysis since the ecosystem of which it is part is certainly not delimited by the arbitrary survey boundaries. Investigation includes past and present environments, as well as the nature of their differences.

III. Phase III is the archeological investigation and analysis of the recovered data. Consideration is given the nature of the data, including the sites, features, artifacts, and other remains. From the analysis, hopefully, qualitative and quantitative differences among site types can be demonstrated.

IV. The final phase synthesizes the information gathered during the preceding phases and essentially is an attempt at correlation of the environmental and archeological data in terms of resource exploitation. In addition, Phase IV, as an overall synthesis, will be a measure of this investiga-

tion's contribution toward an understanding of prehistoric resource utilization systems in Texas and adjoining areas.

HUNTER-GATHERER SUBSISTENCE AND SETTLEMENT

Making the assumption that the archeological remains in the reserach area are those of hunting and gathering peoples, certain generalizations on subsistence-settlement patterns of such populations must be borne in mind in an investigation of resource utilization. Several such regularities have been ethnographically observed in many hunting-gathering societies and are generally assumed to apply as well to societies known only through archeological remains. Recognizing, of course, that the arbitrarily delineated research area cannot be expected to correspond to any prehistoric group's concept of "its territory," the focus of this review is necessarily directed away from comments on territoriality and toward characteristics of group composition, subsistence, and settlement.

Typical of all known hunting and gathering societies is a social unit composed of those individuals, generally related, who interact with one another on a day-to-day basis (Murdock 1949: 79). Known by several names, in this report, such a group is termed a band. It is the basic exploitation unit whose flexibility in composition allows for variable response to environmental conditions, both social and biophysical.

> . . . the fluid organization of recent hunters has certain adaptive advantages, including the adjustment of group size to resources, the leveling out of demographic variance, and the resolution of conflict by fission (Lee and DeVore 1968: 8).

When resources permit, two or more bands frequently congregate to take advantage of the surplus as well as the opportunity for social interaction. Coahuiltecan bands, for example, came together for "tuna fests" in areas where prickly pear (*Opuntia* sp.) fruit was especially abundant (Hodge 1907).

Another social unit characteristic of hunting and gathering peoples is that known as the "dialectal tribe"; it is the largest group having face-to-face contact at some point in the yearly round. "In short, the dialectal tribe can be defined as a collection of interacting groups . . . sharing a linguistic dialect and forming a

territory-specific cultural and genetic unit" (Nunley 1973: 25).

When studying the archeological record of hunter-gatherers for information about social organization, one should keep in mind certain concepts set forth by Jochim (1976). He found five objectives that guide decisions about population aggregation:

1. Provision of food for the population.
2. Resource procurement in the predetermined proportions at low cost.
3. Resource procurement in the predetermined proportions with high security.
4. Insurance of reproductive viability.
5. Provision of social interaction (Jochim 1976: 70).

The first three, perhaps, lend themselves most directly to observation and interpretation in archeological research, for they are often discernible from intra- and extrasite evidence. Intrasite evidence can consist of faunal and floral remains as well as artifacts. Extrasite evidence is derived from environmental studies, both qualitative and quantitative, and can be most useful in studying resource procurement at low cost and with high security. Inferences may then be possible about potential and probable group size.

Jochim has proposed that two major goals guide resource use decisions among hunter-gatherer groups:

1. The attainment of a secure level of food and manufacturing needs.
2. The maintenance of energy expenditure within a predefined range, determined partly by the need for population aggregation (1976: 19).

Certainly, cultural definition of what constitutes a "secure level" and the acceptable range of energy expenditure must be conditioned by resource availability or potential. Fortunately, availability can be studied in modern environments and frequently can be estimated to varying degrees for paleoenvironments. Resources commonly considered include water, food, fuel, and raw materials for manufacture of tools and other needed or desired items.

Although procurement of food at a secure level is clearly a primary concern, the desire and perhaps nutritional necessity for variety in the diet is also a strong influence.

> Whenever two or more kinds of natural foods are available, one would predict that the population exploiting them would emphasize the more reliable source. We would also expect, however, that the

> people would not neglect the alternative means of subsistence (Lee 1968: 41).

In this respect, gathering generally functions as the economic backbone of hunting and gathering societies, even though it may be considered by them to supply supplementary foods and is avoided when possible (Nunley 1973: 23-240. Conversely, while hunting and/or fishing may provide only a fraction of the diet, they tend to be held more important.

The more secure a resource, the greater is its attraction for settlement. Typically, settlements are located nearer denser and less mobile resources. Food, fuel, water, view, and provision for shelter appear to determine immediate location of camp sites. Again following Jochim (1976: 50),

> The primary goals which operate in settlement placement among hunter-gatherers, then, may be summarized as follows:
> 1. Proximity of economic resources
> 2. Shelter and protection from the elements.
> 3. View for observation of game and strangers.

With the seasonal and geographic variation in resource availability characteristic of most areas, occupation of a particular location usually can be expected to coincide with the availability of the economically important resources. Degree of permanency of a settlement is partly a function of this restricted availability; thus, hunter-gatherer groups typically change location in order to take advantage of the variation.

ENVIRONMENTAL CONSIDERATIONS

An ecologically oriented archeological investigation must of necessity include analysis of the structure of the biophysical environment and should consider both temporal and spatial variation not only of the study area itself but of the surrounding region as well. For this project, environmental data were gathered in two ways: field investigation and literature research. Only through a combination of the two was it possible to prepare a data set for correlation with the archeological findings.

The actual field investigation was carried out by the author while surveying for archeological remains. The data gathered are

primarily spatial in nature although important information on seasonal change was also obtained. Significantly, the numerous trips to the research area during all seasons of the year are felt to have provided a more nearly complete assessment of the present environment.

The data gleaned from the literature supplement that from the field investigation and represent the major present source of information on the paleoenvironment. As a result of having to rely primarily on tentative paleoenvironmental reconstructions of somewhat distant regions, the temporal data are necessarily generalized. It should be noted however, that the research area is centrally located among three regions whose environmental histories are better known though based in part on relatively limited data, and therefore, generalizations derived from them are considered reasonably applicable.

The following discussion of the environment will begin with consideration of the analytical unit used in describing the ecological history of the research area and surrounding regions. With the least known environments first, the discussion proceeds from the end of the most recent glacial period to the better known present, attention being focused on resource potential (insofar as the data permit).

Because of its arbitrary boundaries and small size, the research area in all probability does not correspond as a whole to any aboriginally conceived cultural-spatial unit such as a band territory. Therfore, in this study, the only spatial unit employed, the microenvironment, is defined primarily, but not solely, on ecological terms. The working definition used herein is taken from Fitzhugh (1972: 138):

> A minimal ecological unit of the environment usually with a distinct faunal and floral signature. When defined in terms of culture it may be a small portion of a local environment. Cultural adaptations are generally geared to exploit the microenvironment including its varied resources, rather than individual resource areas since in the microenvironment there are several resources available.

Given the gradient nature of the environment, it is clearly recognized that actual boundaries separating microenvironments are often difficult to delineate, if in fact they do exist as such; characteristically, microenvironments interdigitate with one another in a transitional zone known as an "ecotone" (Odum 1959:

278). Thus, the boundaries shown in Fig. 4 are approximate only and in general reflect solely the linear extent of ecotones.

ECOLOGICAL HISTORY

Before describing in detail the recognized research area microenvironments, it is necessary to consider the proposed development since 10,000 B.P. of the regional environment. As noted previously, no study has yet been made of the paleoenvironment of the research area itself, yet hypothesized reconstructions are available for the LLano Estacado (north and northwest), the Lower Pecos region (south and southwest), and the eastern part of central Texas (southeast). These reconstructions are based on pollen records from both archeological and non-archeological sties and have synthesized the bulk of the available data.

Widespread climatic and vegetational transition in all three regions is implied for the time following the end of the last glacial (Bryant 1969: 145; Oldfield and Schoenwetter 1975: 167-168; Bryant and Shafer 1977). Mesophytic parklands predominated over the whole area before the shift toward savanna-like vegetation. On the Llano Estacado, the pollen record for the Yellow House Interval from 10,000-9000 B.P. suggests a gradual decrease in pine frequency; that is, herb and scrub communities were replacing the pinyon pine parkland, probably through declining effective moisture. Pinyon was still common in the San Jon Subpluvial, 9000-7000 B.P., with no really drastic shift in vegetation zones; "... mixed prairie communities are indicated over most of the LLano between scattered stands of pinyon parkland in the most favorable area" (Oldfield and Schoenwetter 1975: 168). As a whole, the trend was generally toward a less mesic environment.

A similar progression is suggested by the pollen evidence for the same time periods in both central Texas and the Lower Pecos region. Bryant (1969: 118, 120) proposes that in the Lower Pecos, the predominantly pinyon parklands of 10,000-7000 B.P. remained relatively stable, though the climate was tending toward increasing aridity and the vegetation toward savanna-like conditions. Similarly, the mixed deciduous parklands of central Texas were gradually being replaced by savanna vegetations of grasses, oak, and hickory (Bryant 1969: 130).

Apparently inhabiting during this time both central and west Texsa, as well as the Llano Estacado, were now-extinct species of

bison; this is implied by the presence of their bones in several archeological sites dated between 12,000 and 8000-7000 B.P. (Dillehay 1974: 181-182).

The trend toward less mesic conditions continues from 7000-4500 B.P. in all three regions. On the Llano Estacado, the vegetation had by about 7000 B.P. already approximated that of the present as indicated by the pollen record; Oldfield and Schoenwetter (1975: 169) suggest that the region was an essentially treeless prairie. With minor differences, a similar situation is thought to have prevailed in central Texas. According to Bryant (1969: 130-131), grasses increase, while the percentage of arboreal vegetation is, with the exception of oak, generally low. Significantly, Bryant further proposes that, in at least one locality (South Soefje Bog), a relatively high availability of water may have supported a restricted oak-ash-hickory parkland.

In the Lower Pecos region, the period from 7000-4500 B.P. is characterized by erosional contacts in the alluvial sediments. Analysis of pollen from pre- and post-erosional deposits indicates a general trend toward less mesic conditions, with mesquite, acacia, and agave first appearing in the pollen record in the post-erosional deposits (Bryant 1969: 119-120). This observed or suggested trend toward a less mesic environment in the Lower Pecos, as well as central Texas and the Llano Estacado, may perhaps partially explain the general absence of bison remains in archeological sites in these regions (Dillehay 1974: 185). It is at least arguable that the bison inhabiting the woodlands and parklands of the Southern Plains prior to about 7000 B.P. became extinct possibly as a result of their inability to adapt to the changing environment.

The bones of modern bison occur widely in components from about 4500 to 1500 B.P., but are not found from 1500 to 700-800 B.P. (Dillehay 1974: 182, 184). Their presence after 700-800 B.P. is noted both by the occurrence of bone in archeological sites and later by firsthand observation; they were documented as far south as the Texas coastal plain by Cabeza de Vaca in 1533 (Hodge 1907: 68). The bison inhabiting these regions was clearly a creature adapted to a prairie environment.

Such prairie conditions are clearly indicated by the pollen record from about 4500 B.P. until the present in both the Llano Estacado and the Lower Pecos region, less clearly in central Texas (Oldfield and Schoenwetter 1975: 169; Bryant 1969: 145-

146). The general trend toward less mesic environments was interrupted by a short period of more mesic conditions around 2500 B.P., but all regions are considered to have remained essentially prairies and/or savannas composed primarily of oaks, hickories, and grasses.

An incomplete survey of the literature suggests that since perhaps as early as 4500 B.P., the faunal composition of these regions—mammals at least—was remarkably similar to that reported in historic times (Davis 1974). This similarity is, as a result of the inherent biases of the data, observable on a qualitative basis only. More specifically, faunal lists from central Texas archeological sites reveal that modern deer, bison, and smaller mammals, reptiles, birds, mussels, and snails have all been present during this period (Tunnell 1962; Sorrow *et al.* 1967). Likewise, the data from the Lower Pecos region indicate a relatively unchanged species configuration in the last 7000-8000 years (Ruben 1968; Raun and Eck 1967; Word and Douglas 1970; Prewitt 1970; Ken Lord, personal communication 1977). In general, much the same can be said for the Llano Estacado (Johnson 1976).

Summarizing then, the pollen records from the Llano Estacado, the Lower Pecos region, and central Texas indicate a general trend toward increased aridity after 10,000 B.P. By about 7000 B.P., the vegetation was approximating that existent 100-200 years ago; as will be discussed subsequently, changes since then appear to be more of degree than of kind. Because of its intimate systemic relationships with the vegetation, the fauna predictably appear to have concurrently developed a configuration similar to that of 100-200 years ago. Given, (1) the relatively minor overall differences in physiography between these three regions, (2) their rather similar ecological histories, and (3) the gradient nature of environmental conditions, it seems reasonable to infer that the centrally located research area experienced an environmental evolution generally paralleling that of adjacent regions. Therefore, it is *suggested* that the microenvironmental structure of west central Texas since about 7000-8000 B.P. probably did not differ appreciably from that observable a century or two ago, or, with certain modifications, that observable at the present time.

The Modern Environment

In addition to providing general information on the region, this section deals primarily with the microenvironmental configuration in the research area over the past 200-300 years. To a large extent, the microenvironments defined in this study are detectable in descriptions written before changes were brought about by Anglo-American land-use practices; observed differences are discussed more fully below.

Climate

Climatically, the region is classified as semi-arid, that is, predominantly warm and dry (Wiedenfeld and Flores 1976: 55). Precipitation, mainly in the form of rainshowers and thunderstorms, averages about 18-19 inches per year, most of it from April through October (Mount *et al.* 1967: 12); documented variation in annual total ranges from 7.41 to 40.40 inches. The average number of days between the last freeze of the spring and the first in the fall is 232, the mean dates being March 24 and November 13, respectively. Freezes have, however, occurred as late as April 18 and as early as October 16 (Wiedenfeld and Flores 1976: 55).

Physiography

The regional context of the research area has been described in several ways. Fenneman (1931) places the region in the Edwards Plateau Section of the Great Plains Province; in southern Tom Green County, it is characterized by rolling hills formed by erosion of the once-flat plateau surface. Elevation differences between the river bottoms and the hilltops often are as much as 100-125 meters. Along some stretches of the streams, steep bluffs are common and occasionally contain small rockshelters.

Biota

In terms of now present flora and fauna, Blair (1950) includes the research area in the Balconian Biotic Province. It is characterized by an intermixture of plants and animals from adjacent provinces, though, as a whole, the biotic composition is rather distinctive. In similarly broad terms, Thomas (1975) considers the locality to be part of the Edwards Plateau Vegetational Area, which is largely grassland or open savanna. More specifically, Eckhardt (1975) has defined for southern Tom

Green County two contrasting vegetation types: juniper and oak savannas and stream riparian. While the species list has remained the same, the change in relative abundance of several plants and animals over the past century has appreciably altered the environmental appearance. Of particular concern are certain species known through ethnographic documentation to have been economically important to aboriginal groups inhabiting the area. Thus, it seems appropriate at this point to use early observations of the region as a beginning of the description of that microenvironmental configuration proposed to be characteristic of the past 7000-8000 years.

Historical Descriptions of the Region

If the route proposed by Williams (1962; see also Connor 1969) is accepted, then Mendoza in 1684 travelled south from about present San Angelo to the headwaters of the Llano River, possibly up the South Concho itself. Mendoza noted several times the lush vegetation along the streams, particularly the pecans; he also mentioned the abundance of bison, fish, "wild hens," mussels, and good pasturage (Bolton 1908: 336-337). Similarly, in 1808, the Spaniard Amangual described sparsely wooded uplands and plains, with woods (pecans and others) along the streams (Haggard 1939: 9-12).

About 40 years later, John Russell Bartlett passed near the research area. The streams were said to contain an abundance of fish, with large oak and pecan trees growing along the banks (Bartlett 1854). Looking in the general direction of the research area, he noted, "To the south were hills within a few miles, quite barren in appearance" (Bartlett 1854: 73-74). The prairies, described as deficient in wood except for oaks and mesquites kept few and small by frequent grassfires, were inhabited by large numbers of prairie dogs, as well as "jackass-rabbits."

One of the more explicit accounts is that of Lloyd (1887), whose descriptions were introductory to his bird list. He noted that the hills were not timbered though they often were covered with "shin-oak," and that the head draws of the creeks were full of cedar groves. In addition, he wrote that:

> The creeks are well timbered with pecan, elm, hackberry, a species of walnut, and willow, etc., and have well defined bottoms of an average width of about fifty yards, but frequently are half a mile wide, densely grown with scrub mesquite, small groves of hackberry, wild china, and other small trees, overrun with poison ivy, and laden with parasitic mistletoe (Lloyd 1887: 182).

Thus, a synthesis of these early descriptions suggests a general configuration of three microenvironments in the region: the hills, the more nearly level flatlands, and the riparian zone. All three are presently recognizable in the research area, though certainly somewhat changed. Most noticeable is the tremendous increase in brushy plants, cedar and mesquite in particular, and, to a lesser extent perhaps, the live oak. A hypothesized elimination of bison, priarie dogs, and possibly antelope is based on faunal remains from archeological sites. Thus, to varying degrees, the horizontal distribution of the microenvironments illustrated in Fig. 4, while considered to be a relatively accurate representation of that existent 100 years ago, is only that recognized during this research.

The Research Area

As noted, the three microenvironments observable on a regional basis are present within the research area (Fig. 4). For convenience, the riprian, flatland, and upland microenvironments are designated I, II, and III respectively. In approximate terms, of the 20.0 square kilometer study area, the riparian zone occupies 23% (4.7 km^2), the flatlands 43% (8.7 km^2), and the uplands 34% (6.3 km^2). This coverage results from the fact that the survey more or less transected the South Concho valley and adjacent uplands. It is important to note here, though, that the microenvironmental configuration of the research area, viewed in terms of proportional size, is not necessarily representative of the surrounding region, however delineated.

I. *Riparian Microenvironment.* As implied by the name, this zone encompasses the streams and their alluvial floodplains. In general, the extent is defined by interrelated physical characteristics and is reflected—in some areas, less clearly than others—by the presence or absence of certain plants and animals. The most important factor is the greater amount of moisture, either in the form of surface water or available soil moisture.

The floodplain deposits of Quaternary alluvium are classed in the Rio-concho-Spur association of deep, nearly level, calcareous soils with high available water capacity (Wiedenfeld and Flores 1976: 38, 18). Where not cultivated, these fertile soils with their greater moisture availability support a vegetation dominated, in appearance at least, by huge live oaks (*Quercus virginianus* var. *fusiformis*), bur oaks (*Quercus macrocarpa*),

and pecan (*Carya illinoensis*) (see Figure 1). Also common are hackberry (*Celtis* sp.), persimmon (*Diospyros texana*), mesquite (*Prosopsis glandulosa*), and numerous other edible or useful plants. In many places, almost impenetrable thickets of trees, shrubs, and green briar (*Smilax bona-nox*) occur, making survey somewhat difficult. Along the intermittent streams, this dense vegetation begins to thin until, generally restricted to a narrow strip along the stream banks, it too becomes intermittent.

In the riparian microenvironment, floral resources are particularly abundant, especially in terms of fuel and edible plants. Fruits, berries, and forbs occur widely but are perhaps overshadowed by the tremendous amounts of acorns and pecans. Some of the berries and forbs are available in the spring; yet, as a rule, the vegetal foods are most abundant in late summer and fall. This is most notably true of the acorns and pecans, though there is a great deal of variation in annual yield resulting from the interplay of species differences, insect damage, precipitation, temperature, and wind. A particular bur oak, for example, may bear acorns every other year but often it bears only once in four, five, or more years. Thus, in a certain year in any one area, these resources might be scarce, when other years they might be unusually bountiful.

The fauna of the riparian microenvironment (determined by personal observation and by faunal remains) is readily separable into two groups: those species spending most or all of their time in the water and the terrestrial species which generally restrict themselves to the floodplain. Included in the former group are the fishes, turtles, mussels, muskrat, and numerous species of waterfowl. In the second group are deer, turkey, squirrels, cottontail rabbits, skunks, raccoons, and a variety of other small animals; occasionally, animals such as bison which generally occupied the other microenvironments probably came to this zone to get water.

Flint is available in certain parts of this zone but is not abundant in any one place. In and along the streams, good quality cobbles of varying sizes occasionally occur; other sources generally are at the periphery of this zone and may extend into adjoining microenvironments. Much the same can be said of the distribution of limestone, although it certainly is more common than flint in all areas.

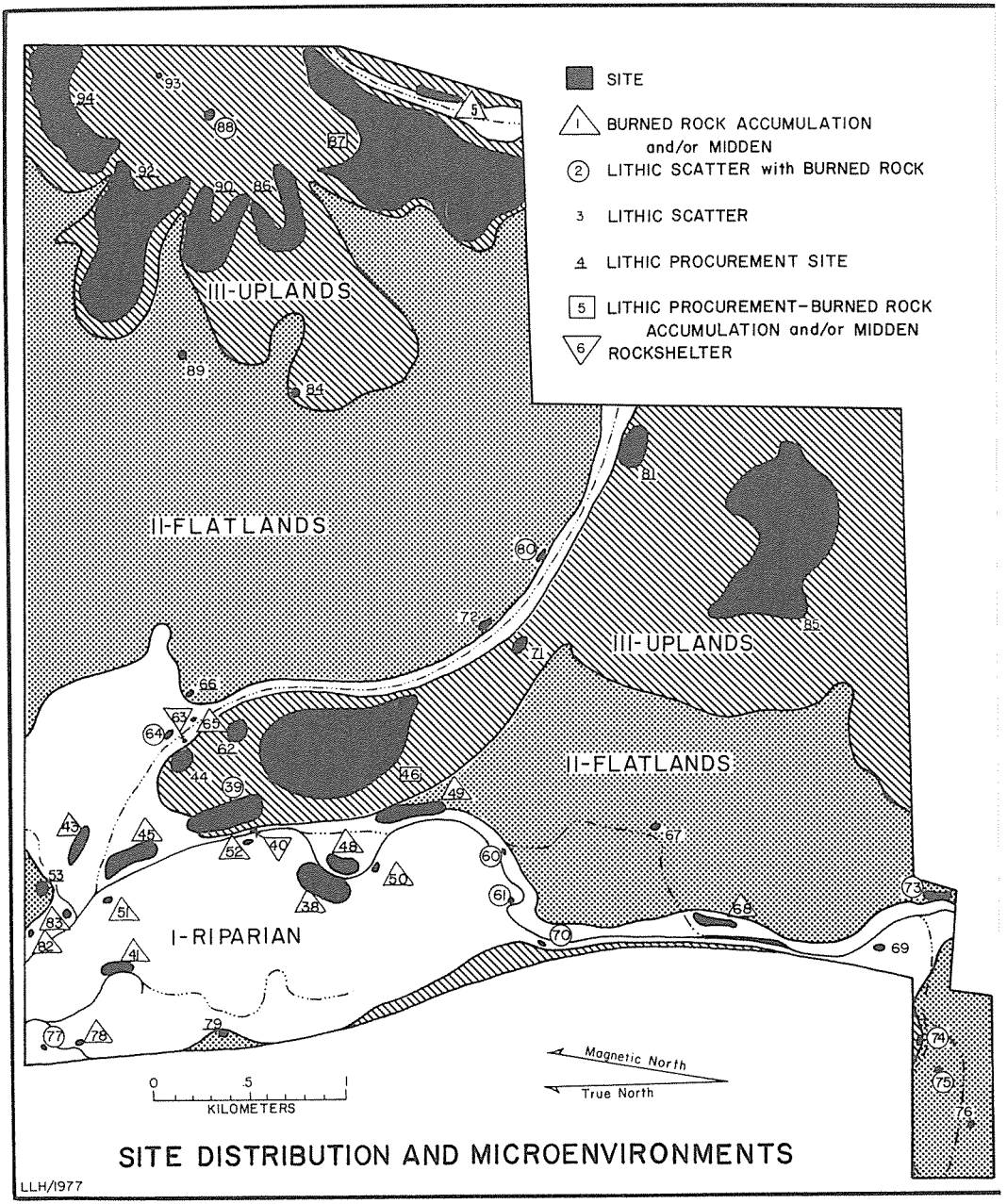

FIGURE 4. *Site Distribution and Microenvironments.*

II. *Flatlands Microenvironment.* Generally speaking, this microenvironment is defined by the extent of the Angelo association of deep, nearly level, calcareous soils on outwash plains (Wiedenfeld and Flores 1976: 3). In present appearance, it is distinguishable mainly by its relatively heavy grass cover and in certain areas by an abundance of mesquite (Figure 2). Prickly pear (*Opuntia* sp.) and small "mottes" of live oak also occasionally occur, but like the mesquite, were probably not as widespread 100-200 years ago.

The fauna, as well, appears to have changed in the last century. While not visually observed, the past presence of badger, prairie dog, bison, and possibly antelope is suggested by the occurrence of their bones in archeological sites (TG 40 and TG 41). Assuming that these animals did inhabit the survey area, they most likely were to be found in the flatlands and/or the uplands. The prairie dog, at least, probably was restricted to the flatlands because it could not burrow in the uplands nor would it live in the riparian zone where the vegetation limits visibility. This requirement of visibility probably made the prairie dog an agent in maintaining the integrity of the flatlands microenvironment. Prior to its extermination and modern land-use practices, the prairie dog, fire, and bison all contributed to a check on the growth and spread of brush plants such as mesquite and live oak (Maxwell n.d.; Davis 1974; Smith 1967). They, in effect, maintained the prairie conditions.

As a microenvironment then, the flatlands are differentiated from the riparian by the drier soils, their resultant prairie flora, and fauna. Lithic resources are less abundant and tend to be localized in light concentrations on low rises.

III. *Upland Microenvironment.* In some ways, the uplands resemble the flatlands, though their respective resource arrays provide the nonphysiographic criteria for separating them. The rolling limestone hills typically have a very rocky surface and are in the Tarrant-Ector association of very shallow, well drained, calcareous soils (Wiedenfeld and Flores 1976: 3). Throughout the uplands at a certain elevation is a continuous outcropping of flint of varying quality in both ledge and nodule form; this and other outcroppings contain large amounts of eroded flint.

Like the flatlands, the upland flora is dominated by grasses, although trees and shrubs are common (Figure 3). In some parts,

cedar (*Juniprus pinchotii*) has over the last 100-200 years expanded considerably from the steeper slopes. Live oak, mesquite, hackberry, and prickly pear also are widespread now but probably were less so in the past; persimmon and beargrass (*Nolina texana*) are less abundant and tend to be more localized. While found throughout this microenvironment, persimmon is especially common on the steeper slopes. Beargrass, today, is almost completely restricted to the hills in the eastern portion of the survey area.

Animals observed by the author to be presently inhabiting the uplands include the whitetail deer, turkey, cottontail rabbit, jackrabbit, rock squirrel, and various other small mammals, reptiles, and birds. When present in the region, bison probably were frequent on the more gentle slopes as well as in the flatlands; the same may also be true of the antelope.

The previously mentioned historical descriptions of the area indicate that the uplands, in general, were predominantly grassland with restricted growths of woody plants. This condition appears to be a function of several factors including physical conditions, herbivore control, and fire.

In terms of resource potential, then, the three research area microenvironments appears to differ qualitatively and quantitatively, especially as they are hypothetically reconstructed (see Table I). Each offers a unique set of resources. The riparian zone is the only one where surface water is available. It also has by far the greatest amount of plant foods, particularly the easily procurable and storable acorns and pecans, though they are generally only seasonally available. The vegetation, in addition, provides a large fuel supply as well as protection from the elements. Its faunal resources as a whole probably offer a year-round contribution to human diet. In one respect, the riparian zone is relatively deficient; that is, it has no large, concentrated sources of good quality lithic (flint) raw material.

Generally speaking, this scarcity of flint raw material is also characteristic of the flatlands. This microenvironment is, however, mostly lacking in plant foods that are procurable in large amounts with low cost. On the other hand, the hypothesized fauna could provide significant amounts of meat and nonfood materials such as bone and hides, depending though on temporal availability.

TABLE 1
HYPOTHESIZED RESOURCE AVAILABILITY

Resource	Zone I	Zone II	Zone III	Use	Availability
Water	VA,L			Drinking, cooking	Year-round
Wood	VA	O	A,L	Fuel, shelter, implements	"
Flint	S,L	O,L	VA,L	Tools	"
Fish	A,L			Food	"
Turtles	O,L			"	"
Waterfowl	O-A,L			"	Mostly winter
Mussels	A,L			"	Year-round
Cottontail	A	O	A	Food, raw materials	"
Jackrabbit	S	A	A	"	"
Squirrels	A		S	"	"
Prairie Dog		A		"	"
Other small mammals	A	O	A	"	"
Antelope		A	O-A	"	"
Deer	VA		O	"	"
Bison		A	A	"	Mostly winter
Turkey	A		O	"	Year-round
Acorns	VA	S	A,L	Food	Fall
Pecans	VA			"	"
Mesquite	O	S	S	"	Late summer, fall
Persimmon	O	S	O,L	"	"
Prickly Pear	S	O	O	"	Summer
Berries	O			"	Spring
Beargrass			A,L	Basketmaking	Year-round

VA — Very Abundant
A — Abundant
O — Occasional
S — Scarce
L — Localized

With the exception of the prairie dog, the uplands likely shared many of the animal populations (for example, bison and perhaps antelope) found in the adjacent flatlands. In contrast, they offer, in localized situations, relatively substantial sources of

easily gathered plant foods (acorns and persimmons), as well as manufacturing raw materials (the leaves of beargrass for use in construction of baskets). The uplands, moreover, contain what the other microenvironments lack: extensive and heavy concentrations of readily usable flint.

Thus, it is apparent that economic resources are differentially available in the research area; their distribution probably strongly influenced subsistence-settlement patterns. Movement between microenvironments is easy and the resources of each are readily accessible from the others.

ARCHEOLOGICAL DATA

Survey Methodology

As previously noted, the survey area comprises approximately 20 square kilometers in the drainage of the South Concho River. No special significance is attached to this size; it merely represents the area that had been covered when the decision was made to terminate the field work. The boundaries, however, are almost exclusively delimited by private property lines, with the exceptions being determined primarily by the extent of survey coverage at the cut-off date. Although these limits are indeed rather arbitrary, they are not considered to have restrictively biased the data.

In terms of logistics, the primary objective of the survey was to completely cover a large block of land that reflected the environmental variation of the vicinity. Through such a 100% coverage procedure, it was expected that a representative sample of site types from the region would be observed. Total coverage was accomplished with a maximum of consistency by the author personally walking over the entire area. This survey, being basically documentary, was to be supplemented by subsequent controlled surface collections. It was felt that such a procedure should produce data that would allow for projections over a much larger region. In actual fact though, circumstances of site discovery suggest that as yet undetected archeological remains may lie buried in the alluvium of the riparian microenvironment; this, however, is not felt to affect significantly the overall results of the project.

Procedure in the field consisted of systematically covering

the area in order to locate and assess any archeological remains. When evidence was discovered, its surface extent was determined; as a rule, a site designation was given only to locations subjectively perceived as exhibiting an aggregation of artifacts or other evidence of human activity. To explain further, it is important to note that large areas, particularly along the streams, contain cultural debris throughout, but with certain spots having a higher frequency. While these spots received site designations, the more or less isolated artifacts are not represented in the inventory, though their distribution has been noted. Because of factors such as heavy ground vegetation or thick mantles of fallen leaves, the observed frequencies are in many instances perhaps more apparent than real; therefore, partly in order to compensate for these limitations, nearly every site was visited at least twice during different seasons of the year. The uplands in the eastern portion of the survey area presented a somewhat different problem. They are "belted" by a continuous flint outcropping which exhibits abundant evidence of aboriginal use; in these cases, drainages were employed as arbitrary site boundaries.

Designated sites were numbered according to the University of Texas system: 41, for Texas; TG, for Tom Green County; and a number for that specific site. When a site was found, it was thoroughly and carefully examined to define its extent and content, at least so far as could be determined from surface evidence. Sketch maps were made for most sites. However, all were plotted on USGS 7.5 minute topographical maps in such a manner as to reflect their horizontal extent. Notes taken at each site included information on features, numbers and kinds of artifacts, site size, environment, condition, and other factors affecting assessment.

Consistent with the plans of possible controlled collection, the practice was merely to observe the archeological remains at each site, thereby preserving the integrity of provenience and context. In some cases where part of a site had been disturbed and/or displaced material was clearly in danger of damage or loss, collections of artifacts were made. This is most notably true of 41 TG 41, where erosion is causing material to slip down the steep stream bank. In a very few instances, individual artifacts were taken from apparently undisturbed contexts.

Appropriately mentioned here are the first four sites in

Table II; these had been known to the author for several years prior to the survey. Uncontrolled collections of varying size had been made from each, three (41 TG 38, 39, and 41) by surface collection and the other (41 TG 40) by excavation. These early collections from 41 TG 38 and 41 TG 39 consist almost entirely of projectile points, while that from 41 TG 41 contains all bone and lithics observed in the eroded context described above.

Of special concern is 41 TG 40, a small cave containing dry fill. The front part, approximately 4 x 2 meters, was essentially completely excavated, with all of the fill put through a ¼-inch mesh screen. All flint, nearly all of the faunal remains, and certain other material were saved. Since all flint from within the excavated portion was collected, the lithic assemblage as a whole has some utility for comparative purposes. The value of the recovered faunal remains, as well as of the observed and noted botanical remains, lies in making one acutely aware of the interpretive limitations of data from open sites, especially those known only from their surface manifestations.

Table II presents an inventory of sites located during the survey with brief descriptions of each and with comments on factors that are felt to have affected assessment of the archeological remains. In addition, the microenvironmental location and a descriptive site type are noted for each site; these site types are defined in the final part of this section.

In the brief description of each site, the amount and diversity of observed and/or collected cultural material is noted. An assemblage described as "diverse" is one observed to contain a variety of artifacts of different kinds, i.e. projectile points, bifaces, unifaces, cores, flakes, etc.; one of medium diversity, on the other hand, contains only a few kinds, while an assemblage of little diversity contains only one or two kinds. These distinctions certainly are subjective, yet in many cases, this is perhaps partly a function of conditions, such as heavy ground cover, which limited assessment.

These data on the observed assemblages are presented in qualitative terms in Table IV; it should be made explicit, however, that the categories represent a condensed version of the more detailed classification that was employed only for the collected artifacts (see Tables V, VI, and VII). In other words, the categories in Table IV are those which, as a general rule, were used in the field notes. Of primary concern are the

TABLE 2
SITE INVENTORY

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 38	I	Group of five burned rock middens and accumulations. Cultural debris very abundant and diverse. Bedrock mortar holes. Pottery found at this site. Bone and mussel shell. Controlled and random collections.	Limited plant cover	Burned rock accumulation and/or midden
41 TG 39	III	Extensive lithic concentration with hearths. Bedrock mortar holes. Cultural debris abundant and diverse. Random collection.	Localized heavy vegetation	Lithic scatter concentration, with hearths
41 TG 40	I	Small cave containing dry fill. Pictographs. Diverse assemblage, including faunal remains. Bone and mussel shell. Random collection.		Rock shelter
41 TG 41	I	Two burned rock middens and adjacent debris. Diverse assemblage; material abundant. Bone and mussel shell. Random collection.	Heavy leaf cover	Burned rock accumulation and/or midden
41 TG 43	I	Partially buried burned rock accumulation (midden?) with adjacent debris. Artifacts not frequently observed. Mussel shell noted.	Appears to be mostly buried	Burned rock accumulation and/or midden
41 TG 44	III	Light scatter of diverse types of lithic artifacts. Random collection.		Lithic scatter

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 45	III	Group of three partially buried burned rock middens with adjacent debris. Diverse assemblages; material common. Bone and mussel shell present. Random collection.	Heavy vegetation. Road cut through two of the middens.	Burned rock accumulation and/or midden
41 TG 46	III	Very large site with internal concentrations of material; artifacts and other debris abundant over entire hill. Diverse assemblage, including mussel shell. One burned rock midden and several accumulations. Mortar holes. Burial excavated in past—bones and antler artifact(s) reported. Ledge flint common in localized areas. Two controlled and a random collection.		Lithic procurement—burned rock accumulation and/or midden
41 TG 48	I	Partially buried burned rock accumulation with surrounding scatter of hearths and artifacts. Artifacts abundant; assemblage diverse, bone and mussel shell observed.	Heavy plant and leaf cover	Burned rock accumulation and/or midden
41 TG 49	I	Much disturbed burned rock accumulation with scattered hearths and other debris. Assemblage of medium diversity; artifacts common. Mussel shell noted.	Disturbance	Burned rock accumulation and/or midden
41 TG 50	I	Burned rock midden with surrounding light scatter of debris. Artifacts not observed as being common; little diversity. Mussel shell noted.	Midden and part of adjacent area covered by vegetation; plowed	Burned rock accumulation and/or midden

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 51	I	Buried burned rock accumulation (midden?) exposed in road cut. Only mussel shell and a few flakes observed. Scattered burned rocks on surrounding surface.	Buried condition; ground cover.	Burned rock accumulation and/or midden
41 TG 52	I	Two small accumulations of burned rock; one partly disturbed. Very little other material observed.	Heavy leaf and plant cover	Burned rock accumulation and/or midden
41 TG 53	II	Light lithic scatter on low rise. Little diversity in observed material. Some flint naturally occurring.		Lithic procurement site
41 TG 60	I	Light scatter of burned rock and other lithics. Medium assemblage diversity; low frequency.		Lithic scatter with burned rock
41 TG 61	I	Light scatter of burned rock and other lithics. Assemblage of medium diversity; frequency low.		Lithic scatter with burned rock
41 TG 62	III	Small concentration of ledge flint, chipping debris, and a few artifacts. Diverse assemblage.		Lithic procurement site
41 TG 63	I	Small cave. Bone common; lithics very infrequently observed.	Observation limited to very small surface area	Rockshelter
41 TG 64	I	Light scatter of burned rock and other lithics. Assemblage of medium diversity; frequency low.	Heavy ground cover in some places	Lithic scatter with burned rock

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 65	I	Small burned rock midden with light scatter of lithics in surrounding area. Little diversity; low frequency.		Burned rock accumulation and/or midden
41 TG 66	II	Low rise with natural flint cobbles. Small amounts of chipping debris; artifacts infrequent.		Lithic procurement site (?)
41 TG 67	II	Very light scatter of lithics. Little diversity; frequency very low.	Brush clearing exposed some material	Lithic scatter
41 TG 68	I	A much disturbed site, probably originally a buried burned rock accumulation and/or midden. Artifacts and debris very abundant; diverse assemblage, including mussel shell.	Disturbance	Burned rock accumulation and/or midden
41 TG 69	I	Light lithic scatter partially exposed in a road cut. Artifacts infrequent; little diversity in observed assemblage.	Disturbance exposed some material	Lithic scatter
41 TG 70	I	Light scatter of burned rock and other lithics. Medium assemblage diversity; low frequency.		Lithic scatter with burned rock
41 TG 71	III	Area of large amounts of ledge flint with abundant chipping debris. A few artifacts observed; little diversity		Lithic procurement site

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 72	II	Very light lithic scatter. Material observed in low frequency; little diversity.		Lithic scatter
41 TG 73	II	Scatter of burned rock and other lithics, none frequent. Medium assemblage diversity.	Brush clearing has exposed some material	Lithic scatter with burned rock
41 TG 74	III	Light scatter of burned rock and other lithics. Low frequency; medium assemblage diversty.	Heavy ground cover in placed	Lithic scatter with burned rock
41 TG 75	II	Very small, light scatter of burned rock and other lithics. Very low frequency; little diversity.	Heavy ground cover	Lithic scatter with burned rock
41 TG 76	II	Very light scatter of lithic material. Little diversity.	Brush clearing has exposed some material	Lithic scatter
41 TG 77	I	Scatter of burned rock, other lithics, and mussel shell. Low frequency; little diversity.	Heavy ground cover almost completely obscures soil	Lithic scatter with burned rock
41 TG 78	I	Small burned rock accumulation, mostly buried, but exposed by erosion. Artifacts infrequent; little diversity.	Heavy ground cover	Burned rock accumulation and/or midden

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 79	III	Light lithic scatter on a low rise having a moderate amount of natural flint. Low artifact frequency; little diversity.		Lithic procurement site (?)
41 TG 80	II	Scatter of burned rock and other lithics. Low artifact frequency; medium assemblage diversity.		Lithic scatter with burned rock
41 TG 81	III	Area of abundant ledge flint. Chipping debris common, artifacts less so. Little diversity.		Lithic procurement site
41 TG 82	I	Small burned rock accumulation with heavy ground cover. No artifacts observed.	Heavy ground cover	Burned rock accumulation and/or midden
41 TG 83	I	A very large and deep burned rock accumulation with heavy ground cover. Several potholes. Material mostly observed in these holes; assemblage of medium diversity. Low observed frequency.	Heavy ground cover restricted observation except in potholes	Burned rock accumulation and/or midden
41 TG 84	III	Small area where ledge flint is common; small amounts of chipping debris only.		Lithic procurement site
41 TG 85	III	A very large site on a hill where tremendous amounts of flint are available. Chipping debris very abundant; other material rare. Little diversity.		Lithic procurement site

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 86	III	Large site, mostly conforming to the extensive outcropping of flint belting the ridge. Chipping debris frequent; other material less so. Little diversity. Controlled collections.		Lithic procurement site
41 TG 87	III	A very large site, mostly conforming to the flint outcropping belting the ridge. Chipping debris common; other material less so. More diverse assemblage in this area. Four burned rock middens and/or accumulations in one area.		Lithic procurement—burned rock accumulation and/or midden
41 TG 88	III	Lithic scatter on the flat top of high hill with small amounts of burned rock. A 4-meter diameter pile of small unburned boulders with a 2-meter diameter pit in the center is centrally located. Chipping debris fairly common, artifacts less so. Little diversity.		Lithic scatter with burned rock
41 TG 89	II	Very light scatter of chipping debris; no flint naturally occurring. Little diversity in observed material.	Heavy grass cover	Lithic scatter
41 TG 90	III	A large site basically conforming to the flint outcrop belting the hill. Chipping debris common; other material not abundant, but does occur consistently. Little diversity in assemblage.		Lithic procurement site

Site	Microenvironment	Description	Factors Adversely Affecting Assessment	Type
41 TG 92	III	A large site mostly conforming to the flint outcrop belting the ridge. Chipping debris common; other artifacts consistently occur but are not abundant. Little diversity.		Lithic procurement site
41 TG 93	III	Light lithic scatter on the upper part of a hill. Cultural material very scarce; little diversity.		Lithic scatter
41 TG 94	III	Large site conforming mostly to flint outcrop belting ridge. Chipping debris common; other material infrequent. Little diversity.		Lithic procurement site
41 TG 95	I	Two burned rock midens, one mostly buried, with adjacent artifact scatter. Diverse assemblage. Remains of Anglo house and associated artifacts also present.	Heavy brush cover	Burned rock accumulation and/or midden

groupings of bifaces and unifaces. In general, "thin bifaces" in Table IV correspond to the Group I bifaces and the "thick bifaces" to Groups II and III. The group of "side scrapers and other unifaces" merely includes all unifaces that are not end scrapers (the end scraper group is the same in both versions). Similarly, all observed utilized flakes are grouped together in Table IV, while those that were collected are put into two separate categories. These additional data biases further make the assemblage diversity designations in Table II subjective.

ARCHEOLOGICAL REMAINS

The Features

Several kinds of features were observed during the course of the survey: hearths, burned rock middens, burned rock accumulations, bedrock mortar holes, pictographs, and a pile of boulders with a central pit. In addition, the landowners report the excavation and removal of bones and antler artifacts from a burial situated on the top of the hill at 41 TG 46.

HEARTHS. Hearths consisted of small, typically circular concentrations of burned limestone rocks, generally no more than a meter or two in diameter. Cultural material was rather common around some hearths, especially if a burned rock midden or accumulation was associated, while at others, material was quite infrequent. At several sites, small numbers of these burned rocks are distributed in such a way as to suggest that they are scattered remnants of once intact hearths.

BURNED ROCK MIDDENS. These are generally circular, mounded accumulations of burned limestone rocks, ranging in diameter from 5 or 6 meters to as much as 10. Only the midden at 41 TG 87 was observed as having a central depression; the remainder do not exhibit such a characteristic, though it is certainly possible that some may in fact possess one. This group includes Type 1 and Type 2 burned rock middens as described by Weir (1976: 34-40). When ground cover conditions were favorable, an abundant and diverse assemblage of cultural material was typically observed in, on, and surrounding these features. However, at least one midden was almost devoid of associated debris.

BURNED ROCK ACCUMULATIONS. This is somewhat of a catchall group and includes those accumulations whose con-

ditions at the time of the survey prevented more specific descriptions, including unmounded surface concentrations of burned rock, Weir's Type 4 burned rock midden (1976: 40). Perhaps as a function of the buried nature of some remains and/or heavy ground cover, associated material was observed to vary considerably in both abundance and diversity.

BEDROCK MORTAR HOLES. These occur singly and in groups of as many as six, but were not commonly observed in the survey area. Diameter ranges from about 10 to 20 centimeters, and maximum depths were noted to as much as 20 or 30 centimeters.

PICTOGRAPHS. Red monochrome pictographs are present on the cave walls at 41 TG 40. Most are linear designs and are rather faded; however, the one handprint is in good condition.

MISCELLANEOUS. Centrally located on the flat top of a high hill (41 TG 88), is a 30-40 centimeter high, 4 meter diameter pile of small, unburned limestone boulders with a pit in the center; its cultural affinity and function are unknown.

The Artifacts: Chipped Stone

In this group are all objects of chipped stone as well as the byproduct material resulting from their manufacture; with the exception of six quart items, all are of flint material. Unless otherwise noted, the projectile point classification generally follows that in the *Handbook of Texas Archeology: Type Descriptions* (Suhm and Jelks: 1962), as well as utilizing subsequent individual type descriptions. The other artifacts are classified into broad categories used by Sorrow *et al.* (1967) and Shafer (1967, 1969, 1971). It should be emphasized that the following descriptions are based on collected artifacts as well as those observed but not collected. Provenience of collected specimens is presented in Tables V, VI, and VII.

Arrow Points

Washita (1 specimen, Fig. 5, d). The single specimen has shallow side notches and concave base.

Perdiz (3 specimens, Fig. 5 a-c). Small specimens with contracting stems. Two specimens are strongly barbed.

Unclassified I (1 specimen, Fig. 5, e). The single specimen is triangular with a very slightly concave base. Blade edges are slightly recurved.

Unclassified II (1 specimen, Fig. 5, f). This unstemmed specimen has essen-

tially parallel edges for about two-thirds of the blade; the edges converge rather abruptly on the distal one-third. Base concave.

Fragments (2 specimens). One bifacially flaked distal fragment and one strongly barbed point with the stem broken off.

Dart Points

Angostura (1 specimen, Fig. 5, g). One basal fragment with straight to slightly concave edges; base also concave. Edges not ground.

Bulverde (17 specimens; Fig. 5, h-l). Two subgroups are recognized: I. (8 specimens, Fig. 5, h-j). Stem edges parallel; base straight. Shoulders squared, blades triangular. II. (9 specimens, Fig. 5, k, l). Similar to others except for slightly concave base.

Castroville (7 specimens, Fig. 5, m-n). Triangular blade with strong to weak barbs. Expanding stem, edges straight, base straight to slightly convex.

Conejo (Johnson 1964: 37; specimens, Fig. 6, a, b). All specimens fragmentary, but characterized by a short, broad, straight to slightly expanding stem with a concave base. Shoulders prominent.

Ensor (3 specimens, Fig. 6, c, d). Basically triangular points with side notches, bases straight or convex.

Fairland (2 specimens, Fig. 6, e, f). These points have long shallow side notches and strongly flaring stems with concave bases.

Frio (15 specimens, Fig. 6, g-j). Corner-notched stems, with notched base. Have either prominent shoulders or strong barbs.

Martindale (2 specimens, Fig. 6, k, l). These two specimens are distinguished by an expanding stem with the double-convex "fishtail" base. One has strong barbs; the other is too fragmentary to determine further characteristics.

Montell (4 specimens, Fig. 6, m, n). Characterized by an expanding stem with a V-notched bifurcated base; complete specimens are barbed. One specimen has been reworked, possibly into an awl (Fig. 6, m). Another is an unfinished specimen (Fig. 6, n).

Nolan (4 specimens, Fig. 7, a-c). This group includes specimens with beveled stem edges. One is beveled along both edges on one face (Fig. 7, c); the others are bifacially beveled. One is made of quartz, the others of flint.

Pedernales (3 specimens, Fig. 7, d). All are fragmentary specimens having straight stems with indented bases. Slightly barbed. The blades on two are rather broad.

Plainview (1 specimen, Fig. 7, e). A single fragmentary specimen with a concave base. At least one of the basal edges is ground. This artifact was an isolated find near 41 TG 86.

Val Verde (Ross 1965: 37; 2 specimens, Fig. 7, f, g). Both specimens have slightly concave blade edges and prominent shoulders. Stem is expanding, base slightly concave.

Williams (1 specimen, Fig. 7, h). The single specimen has prominent barbs and an expanding, somewhat bulbous stem with a convex base.

Miscellaneous A (1 specimen, Fig. 7, i). This group of fragmentary dart points is characterized by a contracting stem with bases straight or slightly convex. Shoulders are weak to prominent. Similar to *Langtry* points.

Miscellaneous B (3 specimens, Fig. 7, j, k). These specimens have expanding

stems with slightly concave bases. Have prominent shoulders or may be barbed.

Miscellaneous C (3 specimens, Fig. 7, l). This group has straight stems with rounded bases; shoulders are prominent.

Miscellaneous D (2 specimens, Fig. 8, a). These fragmentary points have expanding stems with slightly convex bases. On the more nearly complete specimen, barbs appear to have been rather strong. Those are in many respects similar to *Marcos* points, but are so fragmentary that they could not confidently be so classified.

Miscellaneous E (2 specimens, Fig. 8, b). These very fragmentary specimens have straight stems with very slightly concave bases. Barbed.

Miscellaneous F (2 specimens, Fig. 8, c). Short, broad points with very short but wide stems. Stem edges parallel, base straight. Prominent shoulders.

Miscellaneous G (1 specimen, Fig. 8, d). The single specimen is basically triangular with two basal notches which create strong barbs and a very short rounded stem.

Miscellaneous H (1 specimen, Fig. 8, e). The single specimen is short with prominent shoulders and an expanding stem with a straight base.

Miscellaneous I (1 specimen, Fig. 8, f). The single specimen has weak shoulders with a contracting stem; the base is notched similar to a *Montell* point.

Miscellaneous J (1 specimen, Fig. 8, g). These long slender specimens have almost non-existent shoulders and a weakly defined stem with a rounded base.

Miscellaneous K (1 specimen, 8, h). This specimen is basically lanceolate in form with a deeply indented base. It is not fluted, though two narrow longitudinal flakes have been removed to thin the base.

Dart point fragments. Fifty-five specimens are so fragmentary that they are unidentifiable.

Remarks: Taking into consideration the typological limitations resulting from the surface provenience, it appears that, on a qualitative basis only, the projectile points suggest occasional occupation of the survey area from about 9000-10000 B.P. to historic times. This is suggested by the chronological positions of similar types in both central Texas and the Lower Pecos region.

Bifaces

As distinguished from the projectile points, the artifacts in this broad grouping are those bifacially chipped artifacts without stems. Three categories are recognized:

Group I (16): These bifaces have been thinned presumably by soft hammer retouch and, in the majority of cases, they exhibit pressure retouch along the edges. Three subgroups are recognized.

IA (11 specimens, Fig. 9, a, b). These well-made specimens typically have triangular shapes with straight to convex bases.

IB (4 specimens, Fig. 9, c). This group is distinguished by alternate beveling of the edges, giving them a twisted appearance. Also known as 4-edged beveled knives.

IC (1 specimen, Fig. 9, d). The single specimen is significantly smaller than any other Group I bifaces and may be a finished or unfinished projectile point. The base is rounded, edges convex.

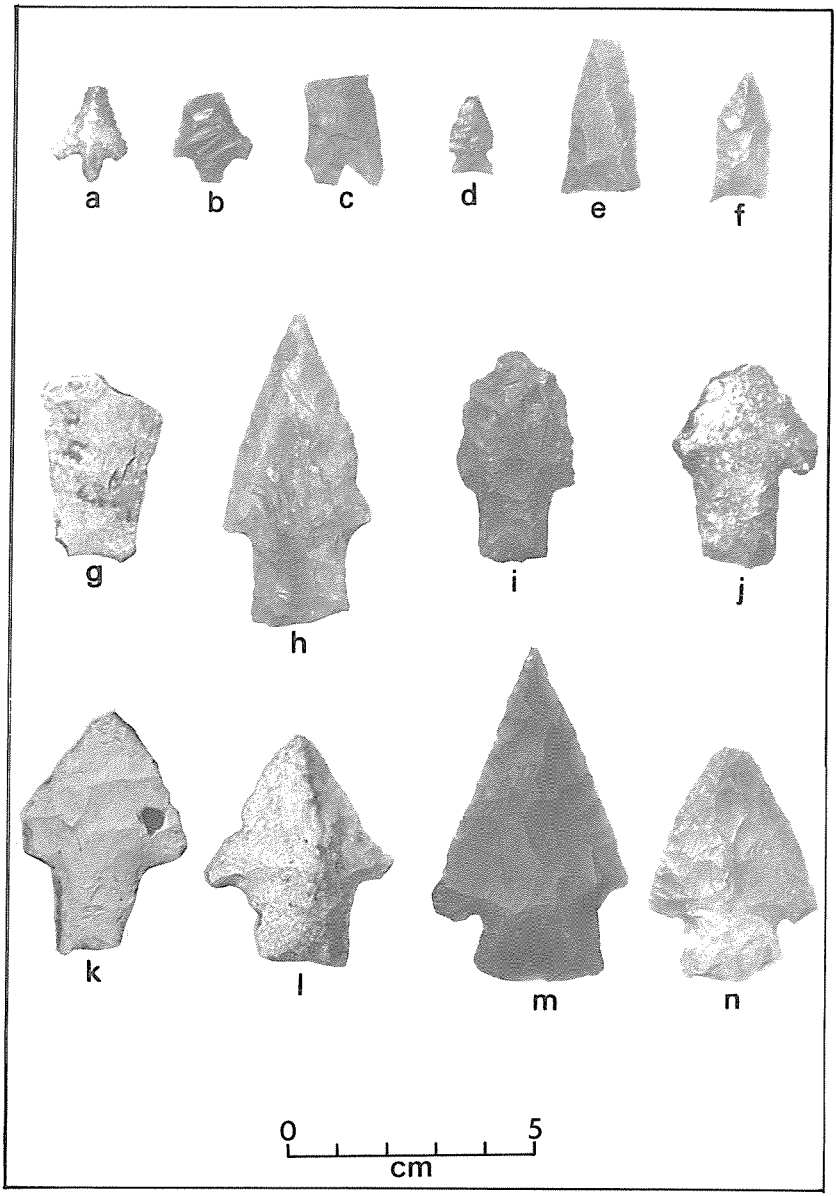

FIGURE 5. *Projectile Points.* Arrow points: a-c, *Perdiz*; d, *Washita*; e, Unclassified I; f, Unclassified II; Dart points: g, *Angostura*; h-j, *Bulverde I*; k,l, *Bulverde II*; m,n, *Castroville.*

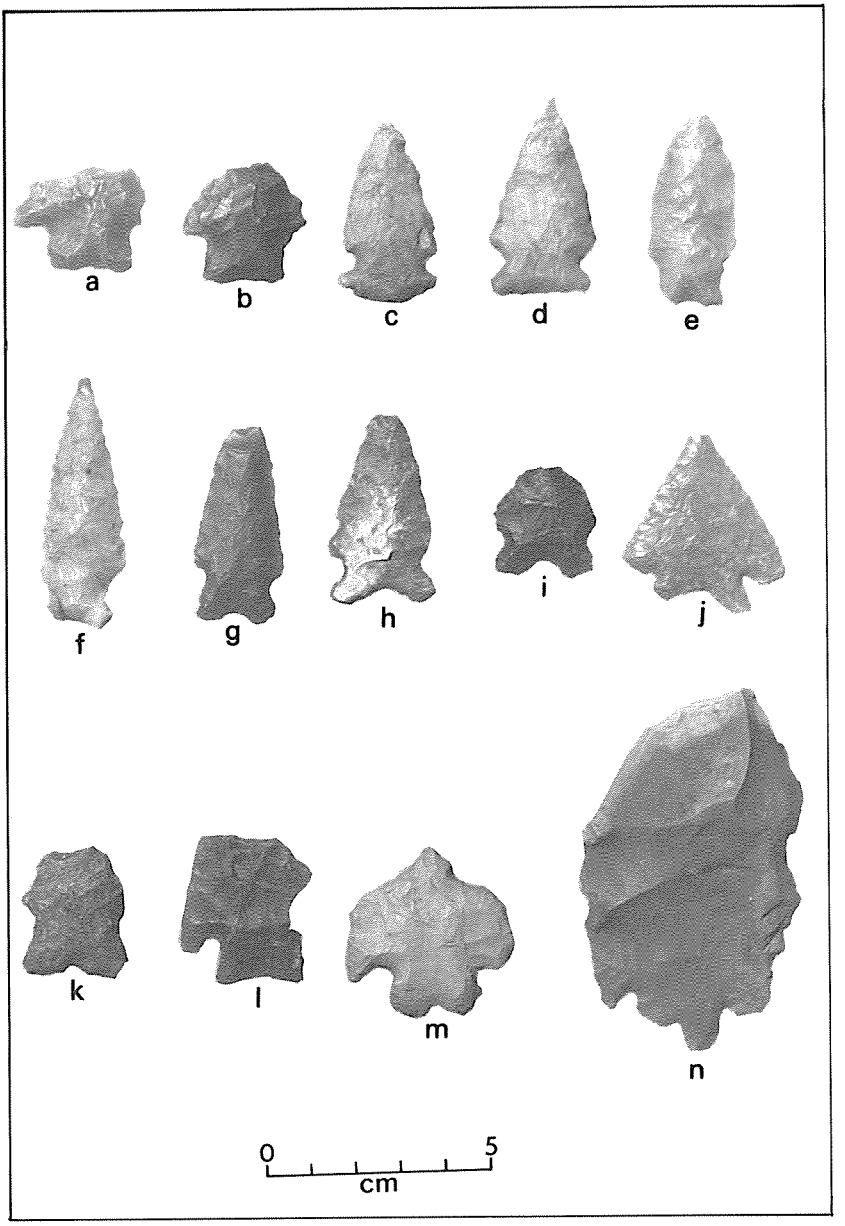

FIGURE 6. *Dart Points.* a,b, *Conejo*; c,d, *Ensor*; e,f, *Fairland*; g-j, *Frio*; k,l, *Martindale*; m,n, *Montell.*

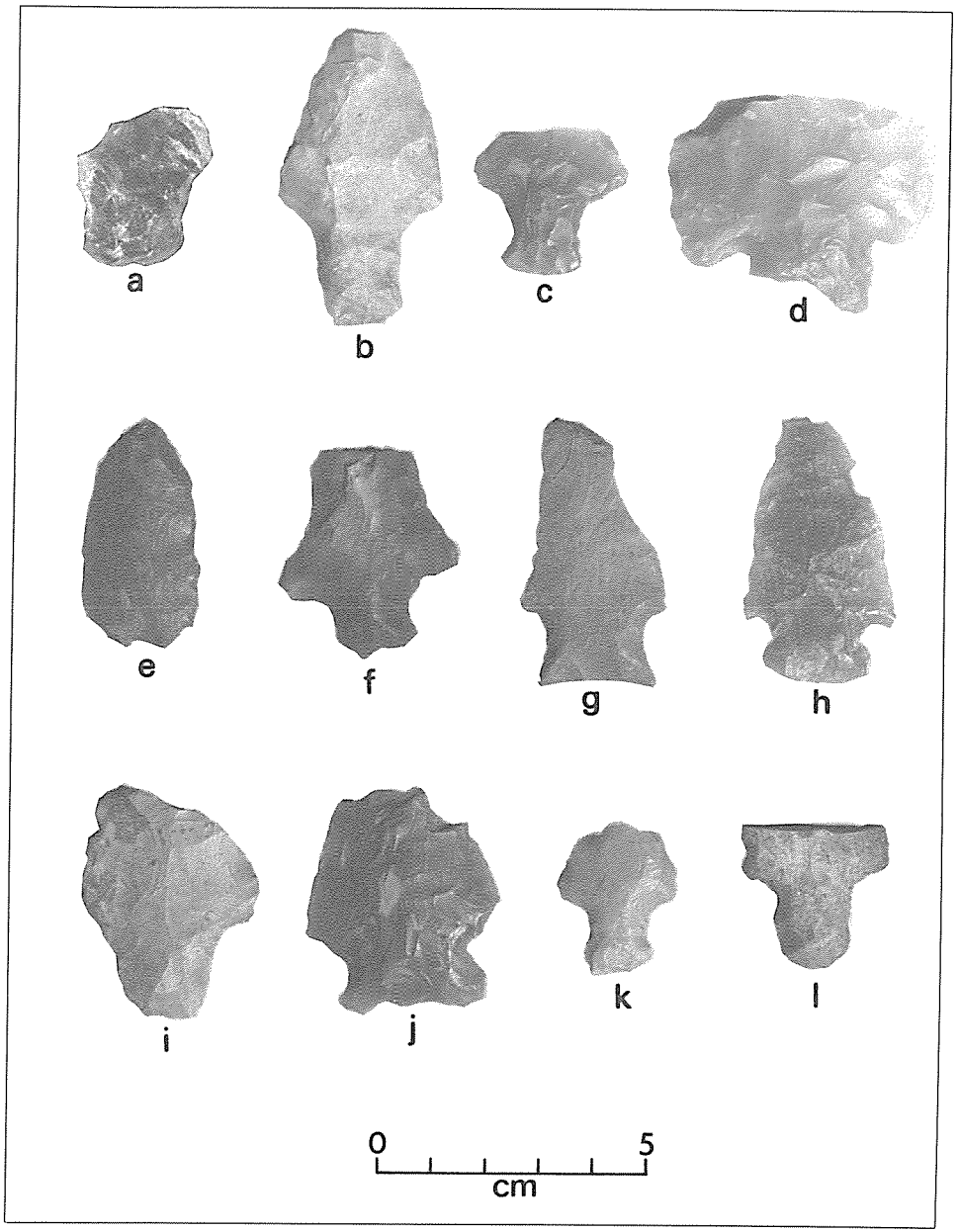

FIGURE 7. *Dart Points*. a-c, *Nolan*; d, *Pedernales*; e, *Plainview*; f,g, *Val Verde*; h, *Williams*; i, Misc. A; j,k, Misc. B; 1, Misc. C.

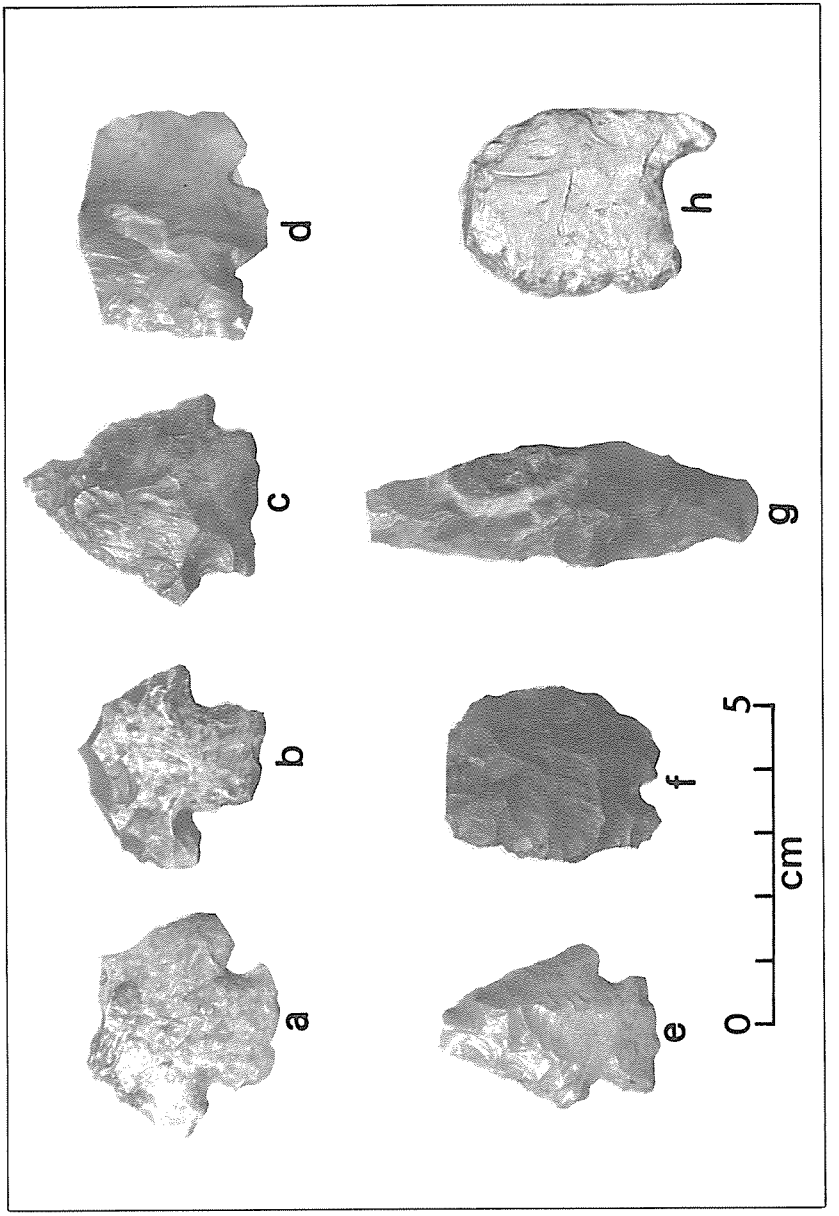

FIGURE 8. *Dart Points.* a, Misc. D; B, Misc, E.; c, Misc. F; d, Misc. G; e, Misc. H; f, Misc. I; g, Misc. J; H, Misc. K.

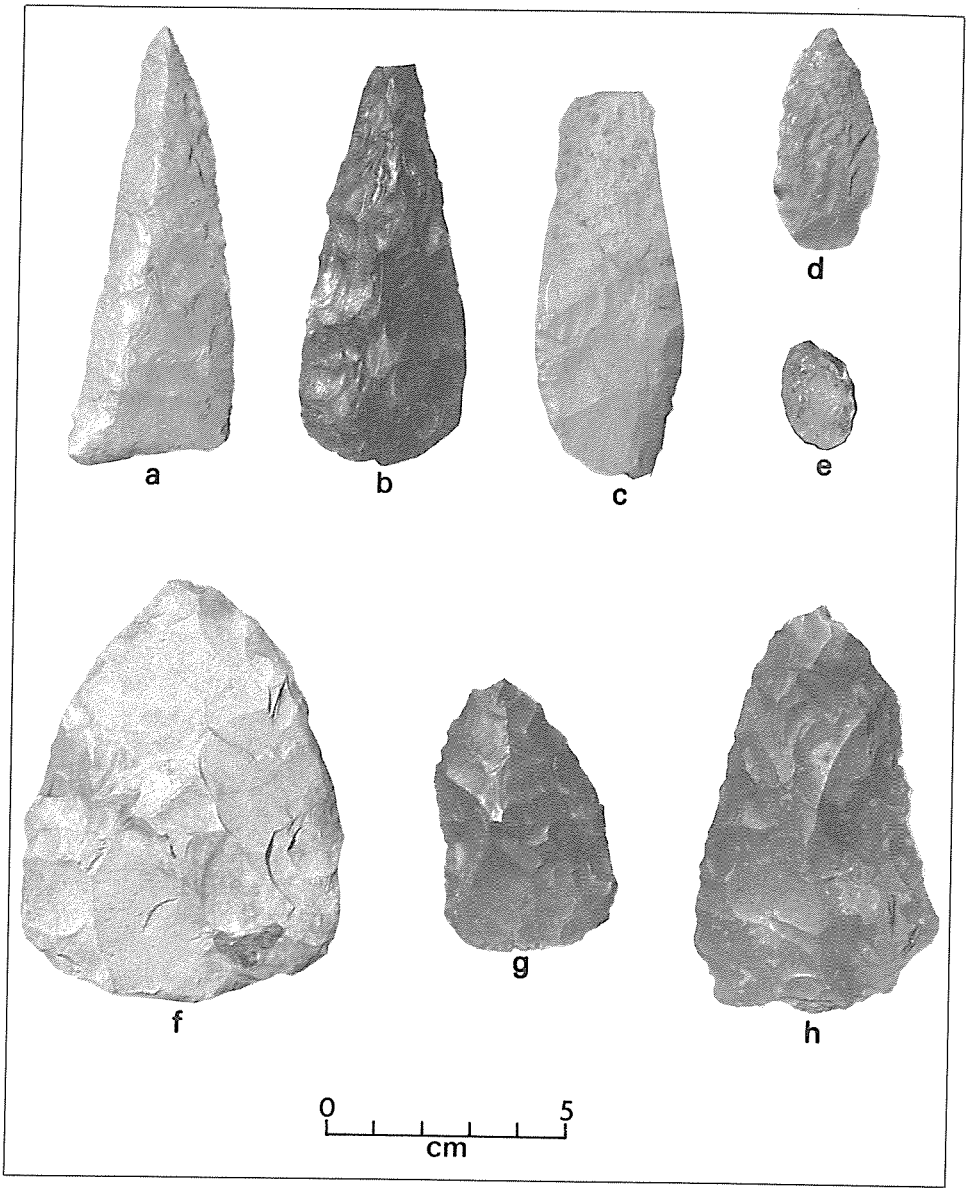

FIGURE 9. *Bifaces*. a,b, Group IA; c, Group IB; d, Group IC; e, Group III; f-h; Group II.

Group I Fragments (48 specimens). These specimens are grouped together as a result of their having the general Group I technological characteristics; that is, they have been thinned by presumed soft hammer flaking and often exhibit pressure retouch.

Group II (17 specimens, Fig. 9, f-h). These bifaces generally are more or less triangular and are relatively thick; many show some flake scars presumably indicating soft hammer percussion. None exhibits pressure retouch.

Group III (42 specimens, Figs 9, e and 10, g, h). The specimens in this group are rather heterogeneous in form and in extent of reduction, though all flaking is restricted to hard hammer percussion. In addition, these bifaces, are, as a rule, rather thick and have sinuous edges. Many of these appear to be failures in the biface reduction process (Shafer and Baxter 1975: 50). One specimen (Fig. 9, e) is of quartz.

Groups II-III Fragments (169 specimens). This group contains those fragments possessing the flaking attributes and thickness characteristic of Groups II and III.

Unifaces

This broad category contains all those unifacially chipped artifacts, with the exception of uniface retouch flakes which are described in the section on burin spalls.

End scrapers (Fig. 10, a-c). On these artifacts, the chipped edge is the dorsal surface on the end of the flake opposite the bulb of percussion; this edge typically is steeply beveled and convex. In cross-section, these are plano-convex. Cortex may or may not be present on the dorsal surface.

Side scrapers (Fig. 10, d-f). Chipping on these specimens is on one or both edges lateral to the axis of flake removal and is also on the dorsal flake surface. The straight to convex edges generally are not steeply beveled. Cortex may or may not be present.

Concave Edge Unifaces (Fig. 11, a, b). These specimens have one or more concave edges formed by removal of a few flakes; the edges, furthermore, are characteristically rather steep.

Miscellaneous Unifaces. These unifacially flaked artifacts do not fall within the range of variation of any of the other groups. One specimen (Fig. 11, c) has a serrated edge.

Utilized Flakes

Group I (33 specimens, Fig. 11, d, e). This group contains those flakes having one or more edges very lightly pressure retouched, almost always unifacially.

Group II (34 specimens, Fig. 11, f, g). These specimens exhibit nicking or nibbling along one or more edges; none has retouched edges. Edge modification on these artifacts appears to result from use only.

Drill

The single specimen (Fig. 10, i) has an unmodified flake base with a bifacially flaked bit. It is possible that one of the *Montell* dart points (Fig. 6, m) is a drill refashioned from a projectile point.

Burin-faceted Bifaces

This group of eight specimens (Fig. 11, n, o) contains biface fragments that exhibit one or more burin facets.

Burin Spalls

Group I (3 specimens, Fig. 11, j, k). These spalls originated from bifacially flaked artifacts.

Group II (3 specimens, Fig. 11, h, i). These spalls originated from unifacially flaked artifacts.

Group III (25 specimens, Fig. 11, l, m). These are spalls showing no evidence of originating from previously retouched artifacts.

Hammerstone

A single specimen is here designated a hammerstone. It is a thick bifacially flaked artifact, probably an exhausted core, which exhibits battering on the two ends.

Ground Stone

Manos (2 specimens, Fig. 12, e). These two specimens are circular to oval sandstone cobbles, shaped by pecking, with one well defined grinding facet.

Ceramics

The seven undecorated potsherds (Fig. 12, a-c) collected from 41 TG 38 represent all that are presently known from the research area. The paste of each contains much crushed bone, some of which is burned. Exterior surfaces are all buff colored and range from smoothed to rough; interior surfaces range from buff to gray color and are all rough. The cores of some are gray. At least two vessels are represented, both apparently built by the coil technique.

Bone Artifact

A single bone artifact fragment (Fig. 12, d) was recovered from 41 TG 40. It is a greatly modified long bone fragment, flattened and highly polished. Overall form could not be determined.

Lithic Manufacturing Debris

The categories used in this analysis are essentially those of Shafer (1969: 3-5). Within the following seven categories are materials representing the waste debris from lithic reduction as well as natural, unmodified flint.

Cores (175 specimens). These are nodules or cobbles of ledge flint from which flakes have been removed, presumably with the intent of using these flakes as

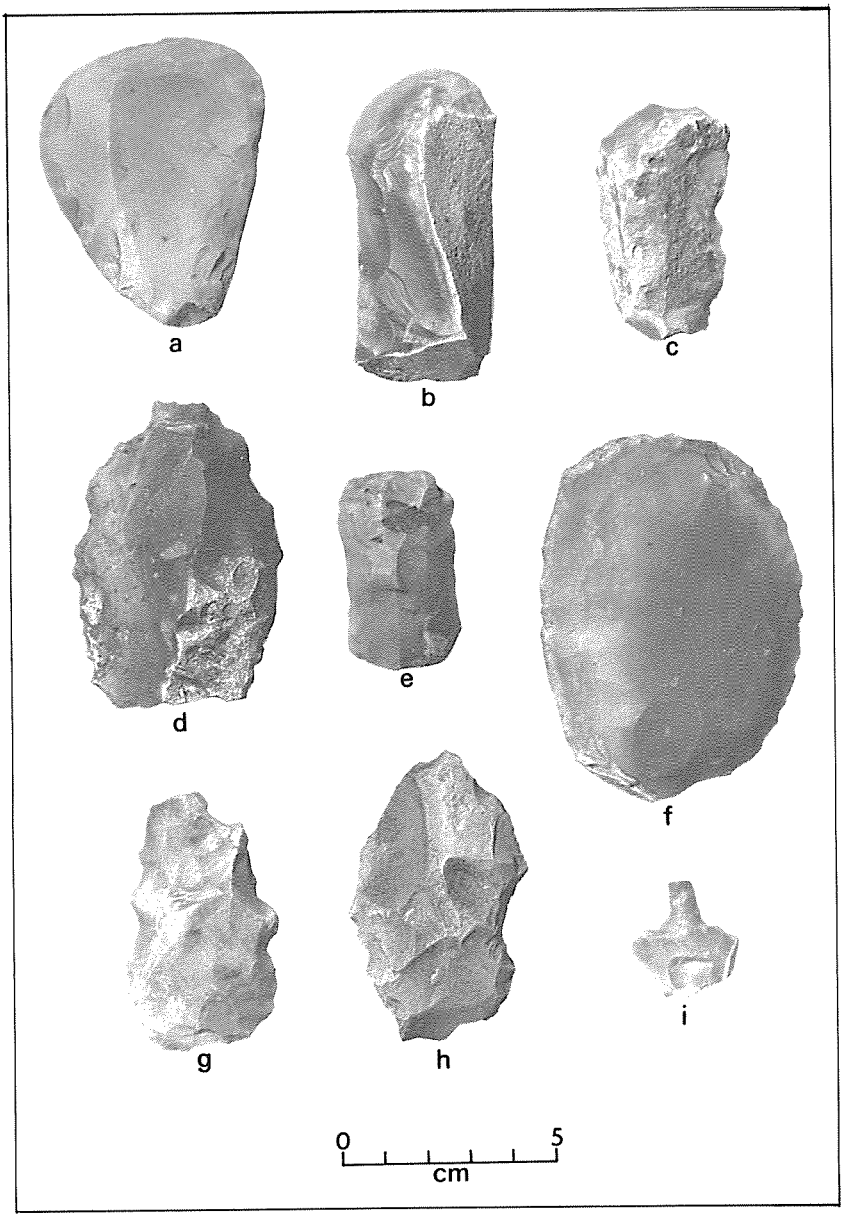

FIGURE 10. *Lithics*. a-c, end scrapers; d-f, side scrapers; g,h, Group III bifaces; I, drill.

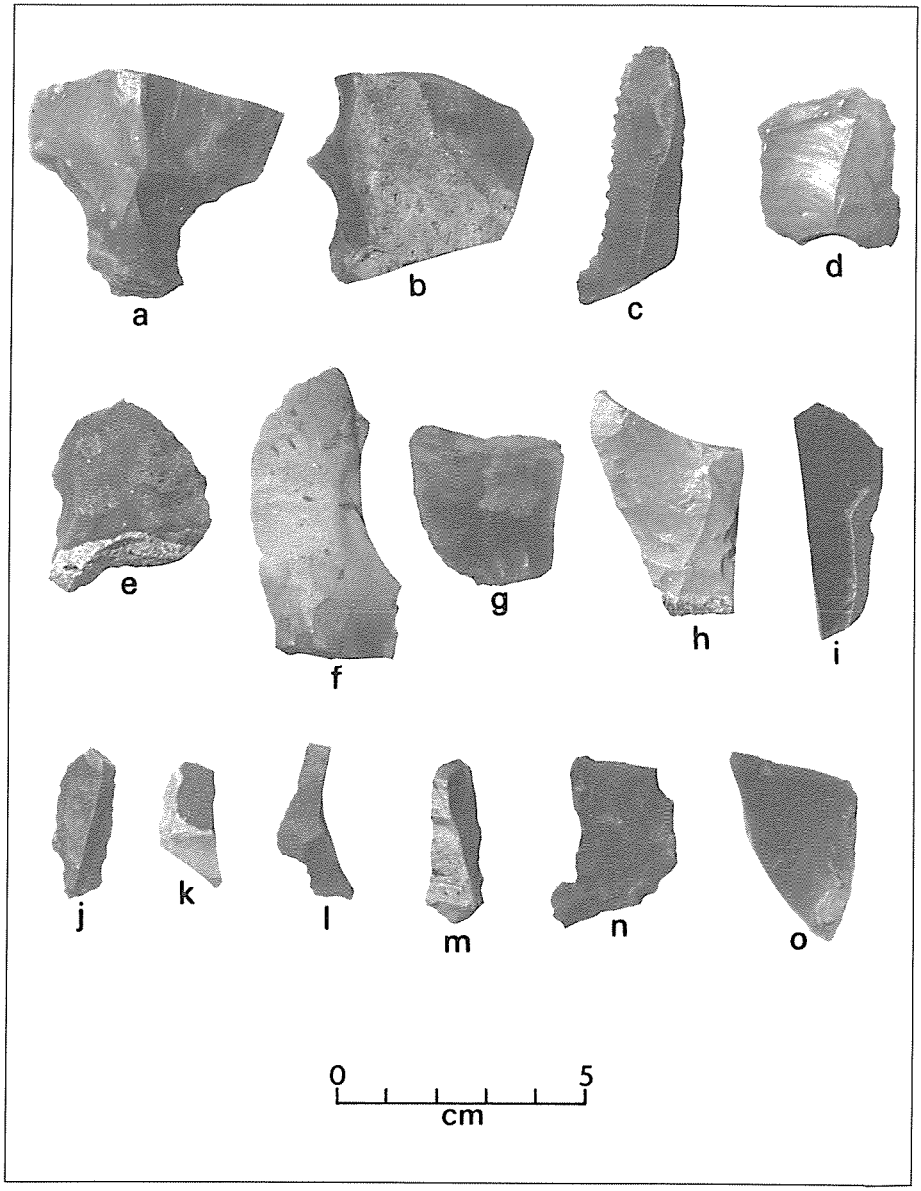

FIGURE 11. *Lithics*. a,b, concave edge unifaces; c, misc. uniface; d,e, utilized flakes I; f,g, utilized flakes II; h,i, burin spalls II; j,k, burin spalls I; l,m, burin spalls III; n-o, burin-faceted bifaces.

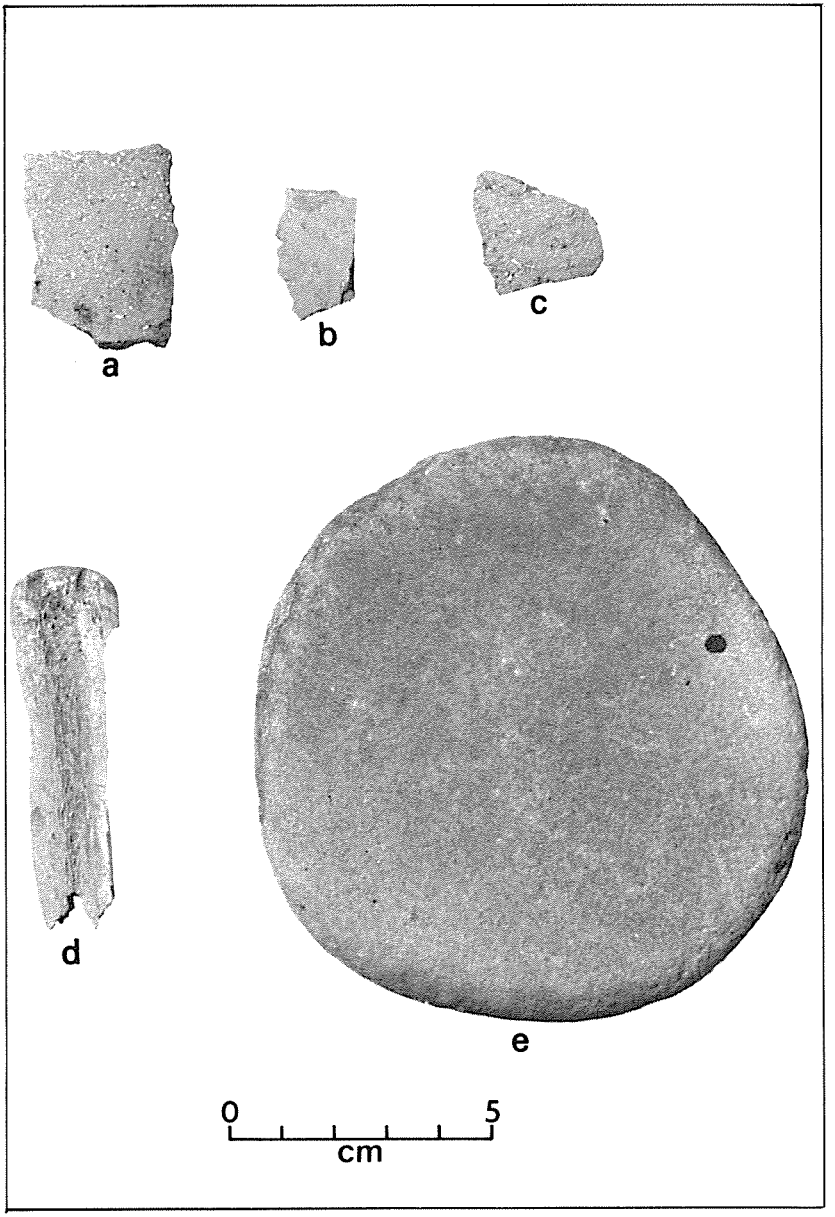

FIGURE 12. *Other Artifacts*. a-c, potsherds; d, bone artifact; e, mano.

tools, either unmodified or modified. No effort has been made to separate further the cores into subgroups.

Hard Hammer Flakes. These flakes typically possess a rather prominent bulb of percussion and are relatively thick, particularly at the bulbar end. The striking platform usually is large and flat, and may or may not be faceted. Three subgroups are recognized:

1. (57 specimens). Initial cortex flakes are those whose dorsal surface is covered by cortex.
2. (365 specimens). Secondary cortex flakes are those with some cortex on the dorsal surface.
3. (538 specimens). Interior flakes are those with no cortex on the dorsal surface, though they as well as initial secondary cortex flakes may have cortex on the striking platforms. All ledge flint hard hammer flakes are in this group.

Soft Hammer Flakes (441 specimens). In this category are those flakes usually possessing a diffuse bulb of percussion and a lip on the ventral surface at a right angle to the axis of flake removal. Striking platforms are usually faceted and are bifacially prepared, though in some cases, the platform appears almost nonexistent. Generally, these flakes are thin and may be arched.

Miscellaneous Flakes (239 specimens). These could not confidently be categorized as either hard hammer or soft hammer flakes.

Chips (2655 specimens). These are fragments possessing neither a striking platform nor a bulb of percussion.

Naturally Fractured Specimens (850 specimens). These specimens show no evidence of having been produced by human flaking activity, presumably having been created by natural processes such as frost action. At some sites, this group constitutes the greatest amount of observed and collected material.

Faunal Remains

Table III presents the taxa and minimum number of individuals of each for the faunal remains from 41 TG 40. All are well preserved as a result of having been in the dry cave deposits.

CONTROLLED COLLECTIONS

To elucidate suspected and/or observed qualitative and quantitative differences between assemblages from kinds of sites perceived to be "different," controlled surface collections were made at five selected loctions at three sites: 41 TG 38, 41 TG 46, and 41 TG 86. These collections were made only when additional personnel and equipment were available, and as a result, they vary considerably in extent of coverage. Unfortunately, these limited collections have not sampled all of the combinations of

site types and microenvironments; in fact, only three are represented. Ideally, at least one each of the possible combinations should have been sampled.

41 TG 46

Site 41 TG 46 was the first site where controlled surface collections were made. Two separate areas within the upland site, designated A and B, were selected for the collections. Area A includes a small burned rock midden and adjacent area, for a total of 700 square meters; recovery was from 28 contiguous 5 by 5 meter squares. Area B consists of 16 contiguous 5 by 5 meter squares (400 square meters) adjacent to but not including a small burned rock accumulation. Together, these collections represent approximately 0.7% of the estimated 15 hectare site area. In both these areas, ground vegetation was quite sparse and thus, visibility

TABLE III
FAUNAL REMAINS FROM 41 TG 40

Taxa	Common Name	Minimum Number of Individuals
Silvilgus sp.	Cottontail	4
Lepus californicus	Jackrabbit	3
Taxidea taxus	Badger	1
Ondatra zibethica	Muskrat	1
Didelphis marsupialis	Opossum	1
Procyon lotor	Raccoon	1
Mephitis mephitis	Striped skunk	1
Felis concolor	Mountain Lion	1
Odoicoileus virginianus	Whitetail Deer	1
Neotoma sp.	Packrat	2
Cynomys sp.	Prairie Dog	5
Sigmodon sp.	Cotton Rat	2
Geomys sp.	Gopher	1
Thomomys sp.	Gopher	1
Canis sp.	Coyote or Domestic Dog	2
	Goat or Sheep	1
	Bison or Cow	1
Trionyx sp.	Softshell Turtle	1
	Unidentified Turtle	1
	Unidentified Fish	—
	Unidentified Bird	2
Amblema plicata perplicata	Mussel	1
Lampsilis tampicoensis berlandieri	Mussel	1

was not impaired. For these and the other three subsequent collections, an effort was made to pick up even the smallest objects, many of which are less than 1 centimeter in maximum dimensions.

41 TG 86

Like 41 TG 46, site 41 TG 86 is an upland site located in an area of natural flint sources. Here, too, separate, but in this case rather small controlled collections were made at two locations in an effort to recover a useful sample of both modified and unmodified lithic material. Both collections concentrated on the outcropping of flint in places where plant cover was minimal, and thus, these restrictions in addition to those of time and personnel resulted in the small area coverage. Unlike the procedure at 41 TG 46, collection at 41 TG 86 was made in 1 by 1 meter grid squares because it was felt that use of 5 by 5 meter squares might impair the possibility of detecting horizontal clusters of cultural materials. The first collection was the smaller of the two, comprising 7 square meters, the second, 16 square meters. Although these represent considerably less than a 1% sample, it is felt that they **generally** reflect the nature of the site's remains.

41 TG 38

The collection at 41 TG 38, a riparian zone site, also was small, totaling 52 contiguous 1 by 1 meter squares which encompassed part of a burned rock accumulation and adjacent area. With the total site area conservatively estimated at 3 hectares, this collection constitutes less than a 1% sample.

Table VI presents the occurrence and density, expressed as number per square meter, of material from the 5 controlled collections, as well as occurrence only for the uncontrolled collections from 41 TG 40 and 41 TG 41. In terms of presence/absence and density of the artifact categories previously described, several differences among the sites are noted. Initially, both collections from 41 TG 86 stand out in their general lack of artifacts, though Area A did contain a few unifacially modified tools. However, as can be seen in Table IV, thick bifaces are present in other areas of the site. Significant also are the relatively high numbers and/or densities of cores, hard hammer flakes, and unmodified flint, in contrast to the complete absence of soft hammer flakes (see Table VI).

TABLE IV
PRESENCE/ABSENCE OF OBSERVED OR COLLECTED ARTIFACTS

	Site	Dart Points	Arrow Points	Thin Bifaces	Thin Beveled Bifaces	Thick Bifaces	End Scrapers	Side Scraper or Other Uniface	Utilized Flakes	Mano/Metate	Mortar Holes	Pottery	Drill	Hammerstone	Cores	Debitage
	38	x	x	x		x	x	x	x	x	x	x	x		x	x
	41	x		x			x	x	x	x					x	x
	43														x	x
	45			x	x		x	x							x	x
	48	x		x			x	x							x	x
Burned Rock	49						x	x							x	x
Accumulation	50							x								x
and/or	51															x
Midden	52								x						x	x
	65							x								x
	68	x		x		x	x	x	x	x					x	x
	78						x								x	x
	82															x
	83	x						x		x					x	x
	95	x		x		x	x	x	x						x	x
	39	x	x	x	x	x	x	x	x		x				x	x
	60			x				x							x	x
	61			x				x							x	x
Lithic	64			x			x	x							x	x
Scatter	70			x				x							x	x
with	73			x				x							x	x
Burned	74			x				x							x	x
Rock	75							x								x
	77							x								x
	80			x				x	x						x	x
	88					x									x	x
	44					x	x	x								x
	67						x								x	x
Lithic	69	x						x							x	x
Scatter	72							x							x	x
	76						x	x							x	x
	89														x	x
	93			x		x									x	x
	53															x
	62	x		x		x		x							x	x
	66			x				x							x	x
	71			x				x							x	x
Lithic	79			x												x

Procurement Site	81						x			x								x	x
	84																	x	x
	85						x			x								x	x
	86						x	x		x							x	x	x
	90						x			x								x	x
	92						x											x	x
	94						x											x	x
Lithic Procurement — Burned Rock Accumulation and/or Midden	46	x		x	x	x	x	x	x		x							x	x
	87			x		x	x	x										x	x
Rockshelter	40	x	x	x		x	x	x	x									x	x
	63			x															x

Strictly in terms of presence/absence of artifact categories and features, the other four sites generally appear quite similar, but when frequencies are compared, differences are readily apparent. These differences, though, may be more a function of sampling biases than of real variation. For example, in Table VI, the densities for collections 41 TG 38, 41 TG 46A, and 41 TG 46B indicate that most categories of cultural debris were relatively more common in 41 TG 38. If, however, sample sizes are made more nearly equal by determining densities for various sets of 2 continguous 5 by 5 meter squares in both Areas of 41 TG 46, then these differences disappear or, in some cases, are amplified. Even when comparisons were made between sets of squares which included or were near the burned rock midden in Area A and the accumulation in Area B, differences between these collections and that from 41 TG 38 were not consistently demonstrable. Thus, for these total samples, density, when expressed as the number per square meter, is not necessarily a reliable measure of differences between sites. It appears then, that, given the data base, the most valid way to compare the archeological remains from various sites is presence/absence.

Because of the lack of chronological indicators from 81% (39) of the sites and the fact that all but one of the collections are surface samples, the possibility of temporal differences overall cannot be considered with any degree of confidence.

TABLE V
PROJECTILE POINT PROVENIENCE

	38 cc	38 rc	39 rc	40 rc	41 rc	46A cc	46B cc	46 rc	48 rc	68 rc	69 rc	83 rc	Isolated Find	Total
Arrow Points														
Washita		1												1
Perdiz	1		1	1										3
Unclassified I				1										1
Unclassified II		1												1
Arrow point fragments		1		1										2
Dart Points														
Angostura			1											1
Bulverde I		1	6				1							8
Bulverde II		1	2			2	2	1	1					9
Castroville		2	5											7
Conejo			4											4
Ensor		1			2									3
Fairland		1										1		2
Frio		2	12				1							15
Martindale		1	1											2
Montell		1	1			1					1			4
Nolan	1		1						1	1				4
Pedernales			3											3
Plainview													1	1
Val Verde			1		1									2
Williams											1			1
Misc. A			1											1
Misc. B		1	2											3
Misc. C	1		2											3
Misc. D			2											2
Misc. E			2											2
Misc. F			2											2
Misc. G		1												1
Misc. H			1											1
Misc. I			1											1
Misc. J			1											1
Misc. K			1											1
Fragments		1	37			7	8	1	1					55
TOTAL	3	16	90	3	3	10	12	2	3	1	2	1	1	147

cc — controlled collection
rc — random collection

DESCRIPTIVE SITE TYPES

From the data summarized in Tables II, IV-VI, six descriptive site types have been recognized: burned rock accumulation and/or midden, lithic scatter with burned, rock, lithic scatter, lithic resource site, lithic resource site with burned rock accumulation and/or midden, and rockshelter. These are discussed below.

Burned Rock Accumulation and/or Midden (15 sites). These sites are distinguished primarily by one or more sizeable accumulations of burned limestone rock with surrounding cultural debris. Because conditions of site assessment often limited the determination of morphological type, all of the middens and other accumulations are here grouped together. Characteristically, but not always, assemblages are quite diverse and include, in the better known cases, projectile points, projectile point bases, thin bifaces (Group I), end scrapers, a variety of other unifacial artifacts, grinding implements or features, burin spalls (including uniface retouch flakes), cores, soft hammer flakes, hard hammer flakes, and chips. Mussel shell was observed in low frequency at nearly every one of these sites, bone at far fewer.

Lithic Scatter with Burned Rock (11 sites). These sites generally are poorly known, with no systematically recovered artifacts from any. For all but one site, data are restricted to observation, the exception being 41 TG 39 where collections made years before the survey emphasized projectile points and bifaces. As implied in the name, these sites all contained small amounts of burned limestone, either in recognizable hearths or merely scattered about. Though the most consistently observed artifacts were thin bifaces (Group I), side scrapers, cores and chipping debris, these and other cultural materials were generally observed in the field to be considerably less frequent at these sites than at Burned Rock Accumulation and/or Midden sites. Perhaps as a result of having been more extensively investigated, site 41 TG 39 stands out in containing a rather diverse assemblage, quite similar to those of Burned Rock Accumulation and/or Midden sites. Also somewhat aberrant is site 41 TG 88, which has the circular feature of unburned limestone boulders and in which no unifacial artifacts were noted.

Lithic Scatter (7 sites). Like Lithic Scatters with Burned Rock, these sites are incompletely known, none having been systematically sampled. They are distinguished from the other site types by having: (1) no recognizable burned rock; (2) no natural sources of flint; (3) infrequently occurring material; and (4) little diversity in assemblages. While chipping debris was observed at all Lithic Scatters, unifacial artifacts of one kind or another were noted at five, bifaces at two. More specifically, these sites, unlike Lithic Scatters with Burned Rock, generally were not observed to contain thin bifaces (Group I).

Lithic Procurement Site (12 sites). Based on data from both observation and controlled collections, these sites are characterized by the presence of naturally occurring flint and relatively large numbers of cores and hard hammer flakes. Primary chipping debris was noted at every site, thick bifaces (Groups II and III) and unifaces at most. In contrast, there was an *observed* complete absence of soft hammer flakes and scarcity of thin bifaces (Group I). Overall, the most commonly occurring artifacts show little diversity and typically seem related to procurement

of lithic raw material and to primary reduction to thick bifaces and perhaps occasionally to various types of unifaces and thin bifaces.

Lithic Procurement — Burned Rock Accumulation and/or Midden (2 sites). Although these sites have the same basic characteristics as Lithic Procurement sites, they contain much more diverse assemblages as well as burned rock accumulations and middens. As previously described, large controlled collections were made at 41 TG 46, and include projectile points, Group I, II, and III bifaces, all types of unifaces, utilized flakes, and all types of chipping debris. Mortar holes and mussel shells were also present.

Rockshelter (2 sites). Both of these sites are small; the larger, 41 TG 40, having an area of approximately 20 square meters. 41 TG 63 is apparently undisturbed and thus essentially unknown. The assemblage recovered by excavation at 41 TG 40 is quite diverse and includes projectile points, Group I, II, and III bifaces, all types of unifaces, utilized flakes, chipping debris, a bone artifact, and faunal remains. Acorns, pecans, and prickly pear fruits also occurred in the dry deposits associated with the cultural material.

INTERPRETATIONS

One of the basic assumptions on which this study is based is that hunter-gatherer populations articulate with their environment through patterned relationships and that these relationships can be studied and analyzed. More particularly, since similar subsistence activities can be expected in like environmental situations, one may predict a correlation between the patterned distribution of specific resources and the patterned distribution of specific archeological remains. It appears reasonable, therefore, to infer that important clues to site function may be found in the environmental context in which a specific site occurs. If proximity to economic resources is a primary goal operating in settlement placement, then investigation of resource potential should provide evidence complementing that from within a site. From these two sets of data, it should be possible to determine what attracted people to a particular place and possibly even during which season(s) of the year. The archeological remains should reveal which activities, in terms of resource procurement, processing, and consumption, took place in or near the site, and perhaps how extensive these activities were.

From the research reported here, there is a body of data on the distribution of archeological remains and a body of data on the distribution of certain naturally occurring resources which must be analyzed for patterned correlations. From the data presented in Fig. 4, Table VIII was drawn up to present the

TABLE VI
DENSITY OF ARTIFACTS FROM CONTROLLED COLLECTIONS

	41 TG 38		41 TG 46A		41 TG 46B		41 TG 86A		41 TG 86B		41 TG 40		41 TG 41		Total
	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	
Dart Points	2	.04	6	.01	11	.03	—		—		1		3		23
Arrow Points	1	.02	—		—		—		—		3		—		4
Pottery	7	.13	—		—		—		—		—		—		7
Bifaces Ia	2	.04	—		—		—		—		7		1		10
Bifaces Ib	—		—		—		—		—		—		—		—
Bifaces Ia I fragments	—		—		—		—		—		1		—		1
II	4	.08	11	.02	4	.01	—		—		—		2		21
III	—		2	*	—		—		—		—		—		2
II-III fragments	1	.02	11	.02	13	.03	—		—		1		—		26
End scraper	1	.02	66	.09	45	.11	—		—		2		—		114
Side Scraper	3	.06	7	.01	4	.01	1	.14	—		4		2		21
Concave edge	4	.08	30	.04	15	.04	1	.14	—		12		4		66
	1		15		21		1		—		—		1		39

	41 TG 38		41 TG 46A		41 TG 46B		41 TG 86A		41 TG 86B		41 TG 40		41 TG 41		Total
	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	#	#/m²	
uniface		.02		.02		.05		.14							
Misc. unifaces I	2	.04	—		—		—		—		2		—		4
Misc. unifaces II	—		13	.02	18	.075	—		—		2		—		33
Utilized flakes — chipped	1	.02	21	.03	9	.02	2	.28	—		—		2		35
Utilized flakes — use wear	3	.06	15	.02	3	.01	—		—		11		1		33
Uniface fragments	1	.02	2	*	—		—		—		2		1		6
Mano	—		—		—		—		—		—		1		1
Burin faceted biface	—		2	*	—		—		—		—		1		3
Burin spall I bifacial	—		3	*	—		—		—		—		—		3
Burin spall II unifacial	1	.02	1	*	—		—		—		—		1		3
Burin spall III other	2	.01	15	.02	6	.015	—		—		1		1		25
Cores	16	.31	65	.07	57	.14	16	2.28	12	.67	4		5		175
Soft hammer flakes	69	1.33	266	.38	62	.15	—		—		22		22		441
Hard hammer flake I	3	.06	12	.02	16	.04	10	1.43	9	.50	2		5		57
Hard hammer flake II	21	.60	153	.22	122	.31	37	5.3	12	.67	7		3		365
Hard hammer flake III	25	.48	250	.36	213	.53	11	1.57	12	.67	13		14		538

Misc flake	36	.69	140	.20	56	.14	—		—		3	4	239
Chips	25	4.14	1325	1.90	712	1.78	181	25.8	158	8.8	42	22	2655
Unmod.	—		92	.13	74	.19	121	17.3	563	21.2	—	—	850
Hammerstone	—		—		—		—		1	.06	—	—	1
													5802

distribution of each of the six descriptive site types in each of the three microenvironments and in contact areas between (1) the Riparian and (2) the Flatland and Upland microenvironments; these particular contact areas are considered because they contain 31% of the research area sites.

TABLE VII
SITE DISTRIBUTION

Site Types	Microenvironmental Location					Total
	I	I-II	I-III	II	III	
Burned Rock Accumulation and/or Midden	15					15
Lithic Scatter with Burned Rock	5	2	1	1	2	11
Lithic Scatter	1	1	1	3	1	7
Lithic Procurement Site		2	4		6	12
Lithic Procurement — Burned Rock Accumulation and/or Midden			2			2
Rockshelter			2			2
TOTALS	21	5	10	4	9	49

It is important to note again that temporal control is, for all practical purposes, non-existent, and that as a result, the following analysis does not consider possible long-term change in resource use patterns.

Site Types

Looking first at the Burned Rock Accumulation and/or Midden sites, we see that they occur exclusively in the Riparian microenvironment. Lithic Scatters with Burned Rock mostly occur within the Riparian or in zones transitional between it and the other two microenvironments (73% or 8 of 11), though they also occur in the

Flatlands (9% or 1 of 11) and the Uplands (18% or 2 of 11). Similarly, Lithic Scatters are found in all three of the microenvironments, not showing a restricted patterned distribution. The distribution of Lithic Procurement sites, on the other hand, corresponds not to microenvironments, but to the occurrence of the raw material sources; most are, however, in the Uplands along the extensive flint outcrops. In two instances where these sources are extensive and are in upland areas immediately adjacent to the Riparian zone, combination Lithic Procurement — Burned Rock Accumulation and/or Midden sites occur. Finally, the two Rockshelters are located in the limestone bluffs of the Riparian-Upland transition.

On closer examination of the data, it is apparent that the distribution of burned rock accumulations and middens covaries with the Riparian microenvironment or immediately adjacent areas. More specifically, however, these features are at the present time **always** in close association with stands of oak and/or pecan trees, and also with water sources of presently varying permanence. Although definitive paleoenvironmental data are lacking, the reconstructions mentioned earlier suggest that this relationship is more than a recent fortuitous development. As has been proposed by Weir (1976: 125), I submit that these burned rock features are associated with the exploitation of mast crops, and that this association is supported by the data from this study.

According to Jochim (1976), proximity of economic resources is a primary goal in hunter-gatherer settlement placement, settlements usually being located nearer the denser and less mobile of these resources. This results from the desire to attain a secure level of food and manufacturing needs by means of energy expenditure within a predefined range. The acorn and pecan resources certainly are among the densest and least mobile of those observed in the research area, and it is with them that the burned rock accumulations and middens are inferred to be associated. Furthermore, procurement and processing of these particular resources would require relatively little effort if the activities required were carried out near the sources. Thus, I argue that these features are connected with the exploitation of acorns and/or pecans, probably with processing.

Energy expenditure in this exploitation could be minimized by living near the resources, but this is probable only if other

needed or desired resources, wherever located, are also exploitable by means of a predefined amount of effort. Water and fuel, as well as a variety of other food and nonfood resources, are available in the Riparian or in neighboring microenvironments. Therefore, if acorns and/or pecans were primary resources, groups exploiting them could remain in the area of their occurrence for periods corresponding to natural availability and storability (as determined by size of surplus, if any). One could expect, then, that a buildup of archeological remains would result from extensive occupation of a particular locus and, moreover, that this assemblage of remains is likely to be a diverse one reflecting a variety of activities.

If for some reason occupation was of a more temporary nature, material might be expected to be less frequent and perhaps somewhat less diverse. Thus, the Lithic Scatters with Burned Rock in or near the Riparian microenvironment possibly reflect less intensive exploitation of these acorn and/or pecan resources or perhaps others of differing availability.

Regarding the Lithic Procurement Sites, these occur only where the raw material is available, with most of these sites conforming to outcrop areas in the Uplands. As implied in the name, the primary activitiy presumably was procurement of flint raw material and preliminary reduction to desired forms. At some of these sites the presence of unifaces and thin bifaces may indicate tool finishing, though debitage presumed to reflect finishing (small hard hammer flakes and soft hammer flakes) was not recovered or observed. In short, then, these are activity-specific sites with no evidence of anything other than brief, intermittent visits.

At the present time, I see no pattern in the locations of Lithic Scatters; but since these are some of the least known sites, it may well be that they have not been appropriately grouped. In any event, the range of archeological remains at these sites suggests that only a relatively few, presently undetermined, activities took place.

Study Area

According to Fitzhugh (1972: 138):

> Cultural adaptations are generally greared to exploit the microenvironment including its varied resources, rather than individual

> resource areas since in the microenvironment there are several resources available.

With this concept as a basis, I offer the following interpretations of the archeological data from the research area, presented in terms of procurement, processing, and consumption of resources.

The most extensive occupation of the research area as determinable from the archeological data is suggested to have coincided with the seasonal (fall) availability of the acorn and pecan crops, while other occupation, if any, was limited by the comparative lack of abundant, easily procurable subsistence resources.

As revealed in Table I, various economically important resources are differentially available in the three microenvironments. Assuming that these resources are unequally valued and that priority is normally given to resources required to sustain life (water and food), we recall that the more secure a resource in terms of its density and mobility, the greater is its attraction for settlement. In general, then, the Riparian microenvironment is the only one where such a resource situation occurs; and thus, I suggest that at least during the fall, hunter-gatherer groups occupied this zone primarily to procure, process, and consume the acorn and pecan crops. I also propose that the duration of this occupation could have been extended for two, three, or perhaps several months since these foods can be stored for long periods of time. Extensive processing of these and probably other foods likely resulted in the formation of burned rock middens and accumulations.

While gathering of acorns and pecans is presumed to have been a major food procurement activity in Zone I, the presence of mussel shell at most sites containing burned rock features, and the presence of bone and projectile points in the better known sites reveals that hunting and gathering of animal foods also contributed to the diet. The presence of bison bone at 41 TG 41 and the array of faunal remains from 41 TG 40 clearly indicate that hunters based in the Riparian microenvironment exploited animals populations within this zone and outside of it.

The large proportion of soft hammer flakes suggests that the tools used in processing plant and animal foods as well as other resources were generally manufactured at occupation sites in or

near the Riparian microenvironment from material obtained at various Lithic Procurement sites. Short procurement trips probably were made from these occupation sites.

As noted above, I propose that *occupation* was in general restricted to the Riparian microenvironment where the most important and secure food sources, as well as water, fuel, and protection from the elements were all available. In terms of resource use, activities in Zone I included processing and consumption of plant and animal foods that were procured in all three microenvironments, and manufacture of needed or desired lithic and non-lithic implements. Evidence for this variety of activities. can be found in the specific types of remains and their overall diversity.

The nature of the available resources and the relative scarcity of archeological remains in the Flatlands microenvironment (4 of 49 sites) suggest that activity here was generally restricted to procurement primarily of animal resources and secondarily of flint and perhaps plant resources. This is confirmed somewhat by the presence of Flatland faunal remains, particularly the priarie dog, in presumed Riparian occupation sites.

Resource exploitation in the Uplands is most evident in the procurement and preliminary processing of flint raw material. Significant, though, are the localized present associations of extensive stands of oaks and burned rock middens and accumulations adjacent to the Riparian microenvironment. In these areas, the archeological remains imply the occurrence of the same array of exploitation activities that took place in similar Riparian occupation sites.

The number and distribution of occupation sites in or adjacent to the Riparian microenvironment suggest that the exploitation model proposed by Prewitt (1976: 73-74) for the central San Gabriel River valley applies quite well to the South Concho research area in Tom Green County. Specifically, Prewitt predicts (1) that temporary depletion of resources at one site to a point where further energy expenditure would exceed predefined limits prompted movement to another site, and (2) that this has over long periods of time resulted in numerous sites reflecting repeated use. This, I suggest, is one explanation for the pattern observable in the study area.

Thus, we have occupation sites, where processing and

consumption of food and non-food resources took place, present in or very near the zone (the Riparian microenvironment) where the most important of these resources naturally occur in great abundance. Exploitation of those not so important resources which occur outside this area would have required brief procurement trips from the occupation sites.

CONCLUSIONS

Two general conclusions are derived from this study. First, I believe that in spite of the data limitations, this study has demonstrated the interpretive potential of correlating types of archeological remains with the distribution of certain economically important resources. Thus, this procedure brings to bear another line of evidence in hunter-gatherer subsistence-settlement studies. Depending on the quantity and quality of the data, however, its results probably will vary from convincing explanation of patterns to mere speculation.

This variable relationship between the primary data and interpretations brings me to the second general conclusion. I believe that the data reported here simply are not sufficient for convincingly demonstrating the proposed patterns of resource use. Moreover, the temporal data probably present in the research area have not been adquately sampled, nor for that matter have subsistence remains. Nonetheless, this study has provided a very useful base for subsequent work both in the research area and in other regions, and has done so in such a way that the bulk of the primary data retains its context for future analysis.

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NOTES

Use of Phosphate Analysis for Determining Land Use Patterns*

DONALD R. LEWIS

ABSTRACT

Recent research by R. C. Eidt has indicated that both spot tests and fractionation analysis for phosphate can be useful in identifying areas of land use by man and the probable nature of the land use. Phosphorus in the soil is primarily orthophosphate whether it results from animal or vegetable tissue or bone, teeth, animal waste or mineral sources. The relative ease of extractibility of phosphate can be used to determine the probable types of sources and thus provide information on land use. Additional research in this field can be expected to enhance the value of this information for the archaeologist and to more clearly define the limits of applicability.

INTRODUCTION

Recently R. C. Eidt (1977) has published results of phosphate analyses which show consistent patterns in the kinds and amounts of phosphates in the soil corresponding to past or recent uses made of the soil by man. This paper discusses the basis for these results and the factors which may influence the validity of the interpretations.

Soil chemists and geochemists have known for many years that phosphorus in the most common form as phosphate does not leach out or move about in the soil (Arrhenius 1931; Smith, Posner and Quirk 1977). They also learned that there was no simple relation between the total amount of phosphorus in the soil as determined by chemical analysis and the ability of particular plants to obtain the phosphorus needed for growth from that

*Based on a lecture presented at the October 15, 1977 meeting of the Southern Texas Archaeological Association in San Antonio.

soil (Sauchelli 1965). The approach which was taken was to determine the amounts of phosphate which could be extracted from the soil using a series of conditions ranging from the mildest in which the soil is leached with water at a controlled pH, through the most severe in which the soil minerals are destroyed by acid (Eidt 1977; Khin and Leeper 1960). These various classes of soil extracts, when analyzed for phosphates, give a much more useful index of the phosphorus available for plant growth — although the problem is not yet completely solved because of the enormous variations in the abilities of different plant species to extract phosphorus from the soil.

From an examination of the factors which affect the amounts of phosphate in the various classes of availability it became evident that the use which man had made of the soil was an important factor. Mans' activities may increase the phosphate content of the soil in areas where his occupation caused the accumulation of organic wastes as in a midden. Cultivation of plants may produce a strong reduction in the phosphate concentration in comparison with the uncultivated areas. Man may increase the phosphate content by deliberate fertilizing of the soil for planting. He may decrease it by mechanically removing the surface layer for construction materials. Combinations of these processes and similar activities of man generate phosphate extractability distributions which are characteristic of the land use.

The bones, tissues, and wastes from undomesticated animals will also contribute to the phosphate distribution in the soil. However, the concentrations, patterns and the magnitude of the effects usually will make it possible to recognize the influence of man.

BASIC PHOSPHATE CHEMISTRY

The element phosphorus never occurs free in nature. Most of the phosphorus in the crust of the earth occurs as a member of the apatite mineral group (McKelvey 1973). Apatite is calcium phosphate, but commonly includes fluoride, chloride, or hydroxide as in the very abundant mineral fluorapatite. In sediments the combination mineral carbonate-fluorapatite, known as francolite, is common. The two chemical factors which make phosphate determination useful to archaeology are its universality in living matter and its usually rapid conversion to an immobilized form when it reaches the soil. The mineral content of bones and teeth and other hard tissues of warm blooded animals is primarily fluorapatite or hydroxyapatite. In all of these minerals phosphorus occurs chemically in the orthophosphate radical. Organic phosphates from soft tissue of animals or plants usually are converted to orthophosphates in the soil very rapidly (Emsley and Hall 1976; Pierrou 1976).

In alkaline or calcareous soils (high pH) clacium phosphates are rapidly formed when phosphates are added from any source. These compounds are very insoluble and prevent the phosphate from migrating. In acid soils (low pH) the phosphates are captured by ferric iron or by aluminum to form very insoluble compounds which again tie down the phosphate and prevent it from migrating.

In swamps and areas subjected to prolonged flooding the chemical environment is reducing, the ferric iron is changed to ferrous iron and the phosphate moves from the solid soil material into the water and can be transported from its original location (Patrick and Khalid 1974).

TESTS FOR PHOSPHATE

The Spot Test

By far the most convenient test for phosphate is a simple spot test (Eidt 1973; Woods 1975). This test is ordinarily carried out by placing a small sample (approximately 50 milligrams) of soil on a piece of filter paper (phosphate-free). The phosphate is extracted from the soil by using hydrochloric acid and the reaction with ammonium molybdate in the extracting solution forms phosphomolybdic acid. This compound is then reduced by using ascorbic acid and forms "heteropoly blue", a deep blue color whose presence probably indicates the presence of phosphate, and whose intensity depends on the amount of phosphate present (Boltz and Mellon 1947). The details of a typical procedure (Eidt 1973; Woods 1975) are shown in Table 1.

The spot test for phosphate has strong recommendations based on its simplicity and the fact that it can be done in the field. This convenience is offset by a number of serious limitations. These factors are summarized in Table 2. Despite these limitations the spot test is a very convenient and useful method for surveying an area for horizontal and vertical patterns in phosphate. These surveys can provide the basis for selecting samples for a more quantitative examination.

The Fractionation Procedure

The most successful procedure for extracting the soil phosphate into fractions which can reflect land use of anthrosols has been published by Eidt (1977). The basic sequence of this procedure is outlined in Table 3. In essence the process consists of starting with an accurately known amount of soil which is subjected to a sequence of extractions ranging from a gentle wash to a hot strong acid treatment which will liberate any phosphate in the soil sample. These extracts are classified in three categories depending on the ease of extracting the

Table 1
SPOT TEST FOR SOIL PHOSPHATE*

1. Place approximately 50 mg. of soil on filter paper.
2. Add two drops of extractant to soil.
   (HCL and ammonium molybdate solution)
3. After 30 seconds add 2 drops of reducing agent.
4. After exactly 2 minutes rate phosphate value from
   1 (none) to 5 (strong) blue.
   (May quench reaction with sodium citrate solution.)

**See Eidt (1977); Woods (1975).*

Table 2
SPOT TEST FOR SOIL PHOSPHATE

Advantages:

Simple
Can be performed in field
Rapid

Limitations:

Qualitative
Temperature sensitive, 5° - 27° C
Variable sample size
Depends on color perception
Unequal extraction among samples
Cannot distinguish native phosphate from anthrosols.

phosphate from the soil. The most easily removed is **labile** phosphate, the intermediate is called **bound** phosphate, and the strong acid extract is classified as **mineral** phosphate.

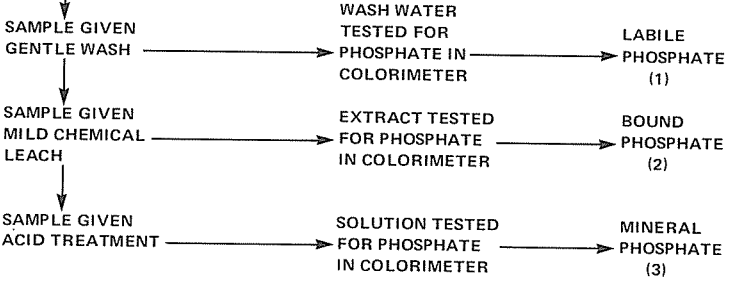
Both the total amount of phosphate and the distribution among these three groups are diagnostic of man's use of the soil. A summary of this type of information as reported by Eidt (1977) is given in Table 4. This information potentially provides a powerful tool for archaeologists. Among the areas of direct applicability are the following:

1. Determination of the nature of land use.
2. Estimation of population density.
3. Determination of changes of land use with time.
4. Determination of occupational chronology.

There is, of course, a price to be paid for the rich increase in the detailed information content of the data. That price is the increased complexity and demands of the procedures for obtaining the data. The general characteristics of the phosphate fractionation analysis are summarized in Table 5. Many of the characteristics of this analysis are

Table 3
FRACTIONATION METHOD
FOR SOIL PHOSPHATE ANALYSIS*

Basic Procedure



*From Eidt (1977).

Table 4
PHOSPHATE FRACTION PATTERNS
FOR DIFFERING LAND USES*

LAND USE	FRACT. 1	FRACT. 2	FRACT. 3	TOTAL PO_4^{-3}	SPOT
RESIDENTIAL	37%	30%	33%	836 ppm	4
	38	28	34	2324	5
	34	34	32	3237	5
PLANTING RIDGE	78	10	12	186	4
	75	7	18	665	4
	71	6	24	1084	4
SETTLEMENT	48	27	25	322	4
	3	2	95	355	4
MOD. VEG. FARM	47	28	25	702	4

*Data from Eidt (1977).

the opposite of those of the simple spot test. Fractionation analysis is slow, tedious and demands considerable operator skill and training to yield consistent, reliable results. Moreover, special equipment is required to prepare the soil, separate the fractions and make quantitative determination of the phosphate content of each fraction. A tabulation of commercial equipment which would be reasonably adequate to perform these determinations is given in Table 6. The prices shown are taken from the 1977 edition of the Fisher Scientific Company general laboratory catalog.

DISCUSSION AND CONCLUSIONS

Recognition of the factors which lead to immobilizing phosphates in the soil has provided an incisive tool for studying the temporal and spacial impact of man on his environment, and some additional details of the nature of his utilization of his resources. Implicit in these data are both climatological and cultural information. Moreover, it is important to recognize that the power of this approach is just beginning to be realized. Improvements in fractionation procedures and analytical techniques can also be expected to broaden the usefulness of the method.

Phosphate tests of anthrosols can provide information about man's occupation and usage of the soil. Although highly qualitative and subjective, the spot tests for phosphate in the field provide a useful,

Table 5
PHOSPHATE FRACTIONATION ANALYSIS

Advantages:

- Quantitative
- Provides characterization which can be interpreted in terms of land use
- Small sample size

Disadvantages:

- Tedious procedure
- Cannot be conveniently performed in field
- Requires complex equipment
- Slow
- Requires special operator skills

Table 6
EQUIPMENT REQUIRED FOR PHOSPHATE FRACTIONATION ANALYSIS

		ESTIMATED PRICE
BALANCE:	Typical Model Torbal DLM-2	$ 300
CENTRIFUGE:	Dynac II	1500
SHAKER:	Wrist-Action	400
COLORIMETER:	Spectronic 20	900
CONSTANT TEMP. BATH:	Freas 260	550
		$3650

ACCESSORIES:

Sieves, Glassware, Chemicals, Timer, Electric Heaters

rapid and convenient means for identifying areas which may indicate man's influence on the environment. More detailed and quantitative studies which require careful separation of phosphates into operational fractions **labile**, **bound**, or **mineral** provide unique information on whether or not the phosphate distribution is the result of man's activities. Moreover, the nature of man's activities throughout the time and area associated with the soil phosphate patterns can be generally identified. Additional work to extend the technique offers the potential of providing much detailed information about the environment in which man lived and the manner in which he influenced his surroundings.

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A Lithic Tool Cache in the Texas Panhandle

LEONARD M. SLESICK

ABSTRACT

This paper reports the finding of an undisturbed cache of lithic tools and flakes at a site on Pedrosa Creek in Potter County, Texas. The cache contained a total of 51 chipped stone items representing a variety of tools made of several different kinds of lithic material. The cache may date to the time of the Antelope Creek Focus, and gives significant information as to the implements and materials in the possession of one individual.

INTRODUCTION

The cache was found at a site recorded as A-1107 in the files of the Panhandle Plains Historical Museum and West Texas State University at Canyon, Texas. The site is on the Frying Pan Ranch of the Bush Estate in Western Potter County. It is situated on Pedrosa Creek, which runs northward into Tecovas Creek, which in turn runs northeastward into the Canadian River.

Site A-1107 lies at the base of a sharp east-west escarpment of the Ogallala formation which forms the northern edge of the Llano Estacado and the southern edge of the Canadian River breaks. Springs in the general area form near the base of the escarpment. The top of the caprock is approximately 1,160 meters AMSL with the springs forming about 1,100 to 1,130 meters AMSL. Signs of occupation are found on both sides of Pedrosa Creek near a spring which is active today. These indications extend 1,000 meters downstream (north) and 500 meters east to west from the spring. Although very little of the site is found upstream (south) from the spring, the cache was located upstream.

DESCRIPTION OF THE SITE

The site contains numerous darkened midden areas with burnt rock and broken burned rocks. Flint, other lithic debris, and bone are widespread in washes. One potsherd of *Borger Cordmarked* (Suhm and

Jelks 1962) was found in a midden, indicating connections with the Antelope Creek Focus. Obsidian flakes have been found on the site; the nearest probable sources of this material are to the west in New Mexico. Three mortar holes are located on the highest knoll forming the west bank of Pedrosa Creek, and two others are found east of the creek about 30 meters from the present channel. Small corner-notched, side-notched, and triangular arrow points have been found on the site, with the greatest concentration near the mortar holes to the west. A fall with a large pool forms on the creek near this spot. Archaic dart points have been reported from this site, and a Paleo-Indian (*Agate Basin*) point has been found in the creekbed not far away.

INVESTIGATION OF THE CACHE

Large flint flakes and some bone fragments were found on the surface 10-15 meters south of the cache. The lithic cache was discovered when a portion of a large thick biface (Artifact #1) was exposed by erosion. After the biface was uncovered with a trowel, and two additional pieces were removed, it was surmised that the find was a cache. The remaining pieces were removed in layers. The first two layers were neatly arranged, but the third was more random with overlapping (Fig. 1), the fourth layer may have been more than a single tier, with considerable overlapping of the pieces. Layers 5 and 6 were mainly utilized flakes, with the position of pieces very random and the order of removal uncertain. The pieces were laid horizontally throughout, with the well worked tools near the top. The area of the cache was approximately the size of the biface and the depth was about 10 cm (Fig. 2). Two small bone fragments were in the cache but were so badly deteriorated that they could not be identified. No points were found in the cache. After all the pieces were removed, the soil was screened for approximately one meter around the cache area, and Artifact #14 was found in the loose soil taken from the cache. The soil in the cache was indistinguishable from the surrounding sterile soil. Darkened soil about 30 cm to the north of the cache was also screened but was sterile.

DESCRIPTION OF THE ARTIFACTS

The 51 lithic artifacts found in the cache are described individually in Table 1 and pictured in Figs. 3-6. Table 1 indicates the type, size, and material of each specimen and includes remarks on some of the items. When noted, right and left edges are as seen when looking at the flake with the proximal end at the bottom.

Of the 51 pieces in the cache, 21 are classifiable as well-worked tools, 5 as retouched flakes, 22 as utilized flakes, and 3 as unmodified flakes. The 21 specimens regarded as well worked tools include 1 large thick biface (#1), 1 beveled knife (#5), 1 drill (#6), 2 scrapers (#2 and 7),

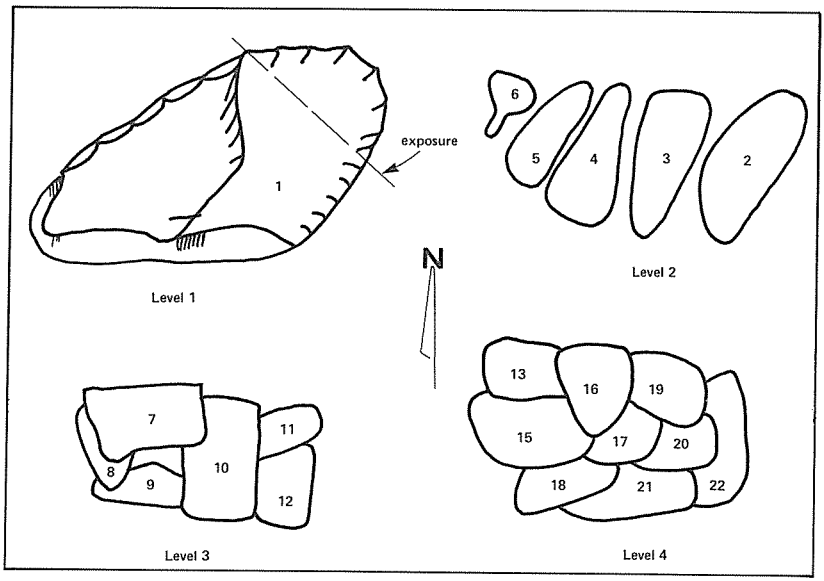

FIGURE 1. *Lithic Tool Cache.* Approximate position of pieces in the cache. The remainder of the specimens were scattered, possibly forming two additional levels. Artifact 14 was found in loose soil when screened.

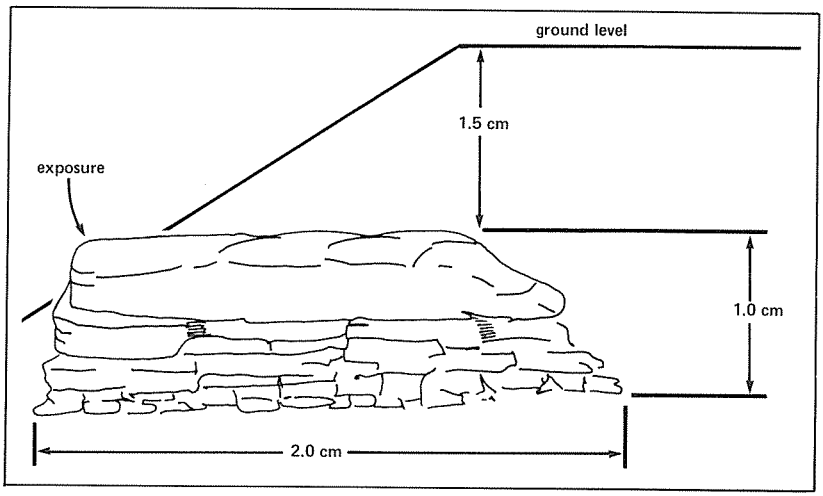

FIGURE 2. *Lithic Tool Cache.* Approximate position and profile view of the cache.

2 side scrapers (#8 and 9), 6 end scrapers (#3,4,11,14,16, and 17), and 8 knives (#10,12,13,15,18-20, and 43). Artifact numbers correlate with specimens as illustrated in Figs. 3-6. The knives are unusual being extremely straight along one edge with little or no work on remaining edges. These are made on very thin flakes. The five pieces listed as retouched flakes (#22,24,26,32, and 36) show some minor flaking. The 22 items shown as utilized flakes (#21,27,31,33,35,37-42, and 44-51) show some signs of wear damage from use, but no work beyond striking from the core. Many of these still retain the striking platform. The remaining 3 pieces (#23,25, and 34) show no sign of either work or use.

Certain of the pieces are remarkably similar. These include 2 scrapers (#2 and 7), which are large, thin triangle unifaces; the 2 side scrapers (#8 and 9), which are small flakes with one well-worked edge; 2 of the end scrapers (#3 and 4) which are large unifaces; 2 of the end scrapers (#11 and 14) which are small square unifaces; 2 of the end scrapers (#16 and 17) which are small rectangular unifaces; 3 of the knives (#10,12, and 13) which are thin flakes with one edge well-worked in a very straight line, and with squared corners; 2 of the knives (#15 and 19) which are thin flakes with one well-worked edge and a rounded corner; and 2 of the knives (#20 and 43) which are small square unifaces with fine work on one edge.

With regard to material, the vast majority (43) of the pieces are Alibates agate, 3 are Tecovas jasper (#4,5, and 25), 2 are Edwards flint (#9 and 14), 1 is Potter chert (#8), 1 is Dakota quartzite (#20), and 1 is Tecovas quartzite (#3). Fourteen pieces of the Alibates agate are very distinctive (#10,19,21,22,26,27,29,30,36,38,41,46,48, and 50) and more than likely came from the same core. Pieces 21 and 50 can be fitted together as struck from this core. The 3 pieces of Tecovas jasper are similar enough to be from a single core. It is also noteworthy that the specimens of material other than Alibates agate are all classifiable as well-worked tools, except for the one piece of Tecovas jasper (#25). Also, on the five retouched flakes, all work is on the right edge of the inner face, or the left edge of the outer face.

The Alibates agate which makes up the bulk of the material in the cache is a local material quarried approximately 65 kilometers to the northeast on the Canadian River near Fritch, Texas (Southwest Regional Office, National Park Service 1975). The nearest known source of the Tecovas materials is an outcrop on Sierrita de la Cruz Creek a few miles to the north, but the material also occurs in the Canadian River breaks north of Amarillo, and along the eastern caprock escarpment from the Palo Duro Canyon southward. Edwards flint occurs along the southern part of the escarpment and southward into the Edwards Plateau. Potter chert comes from Pliocene and Pleistocene gravel deposits at many places in the Texas Panhandle. Dakota quartzite

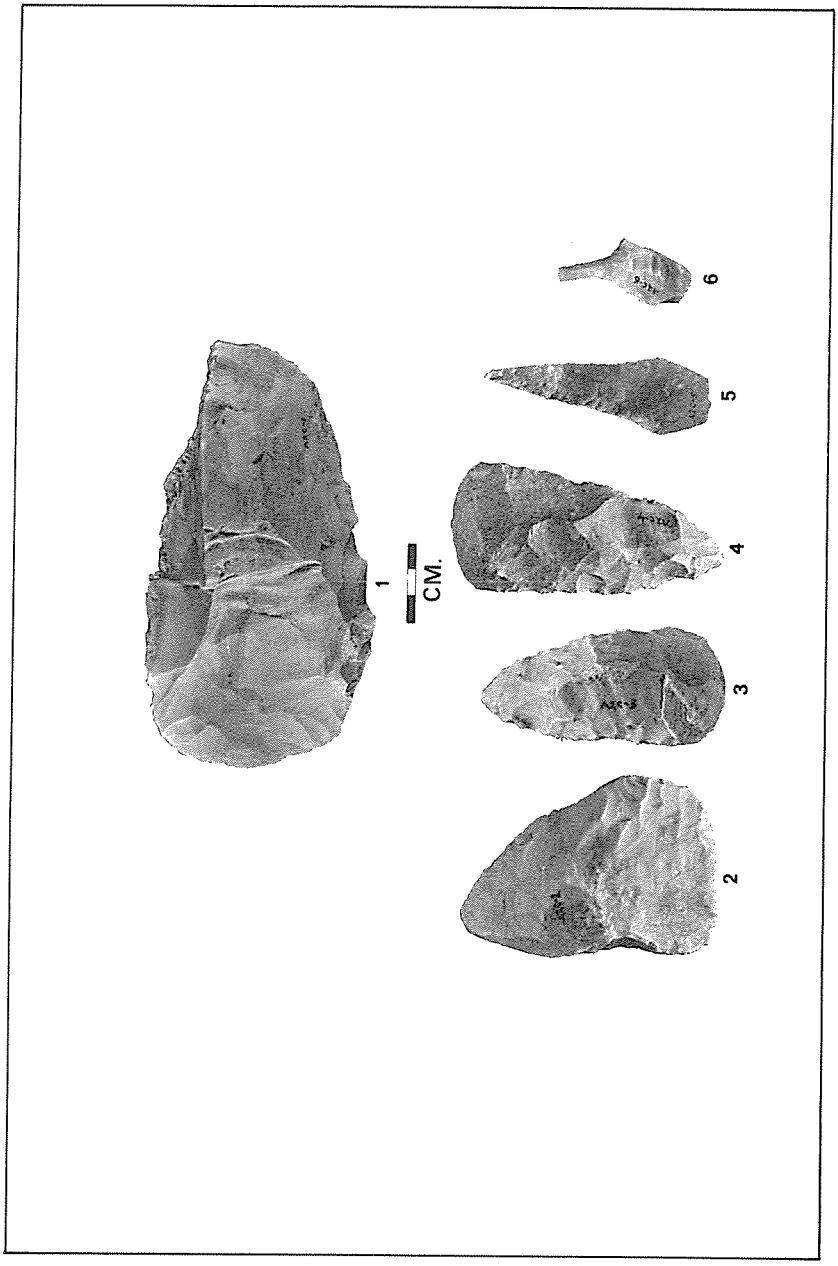

FIGURE 3. *Artifacts from the Cache. Specimens 1-6.*

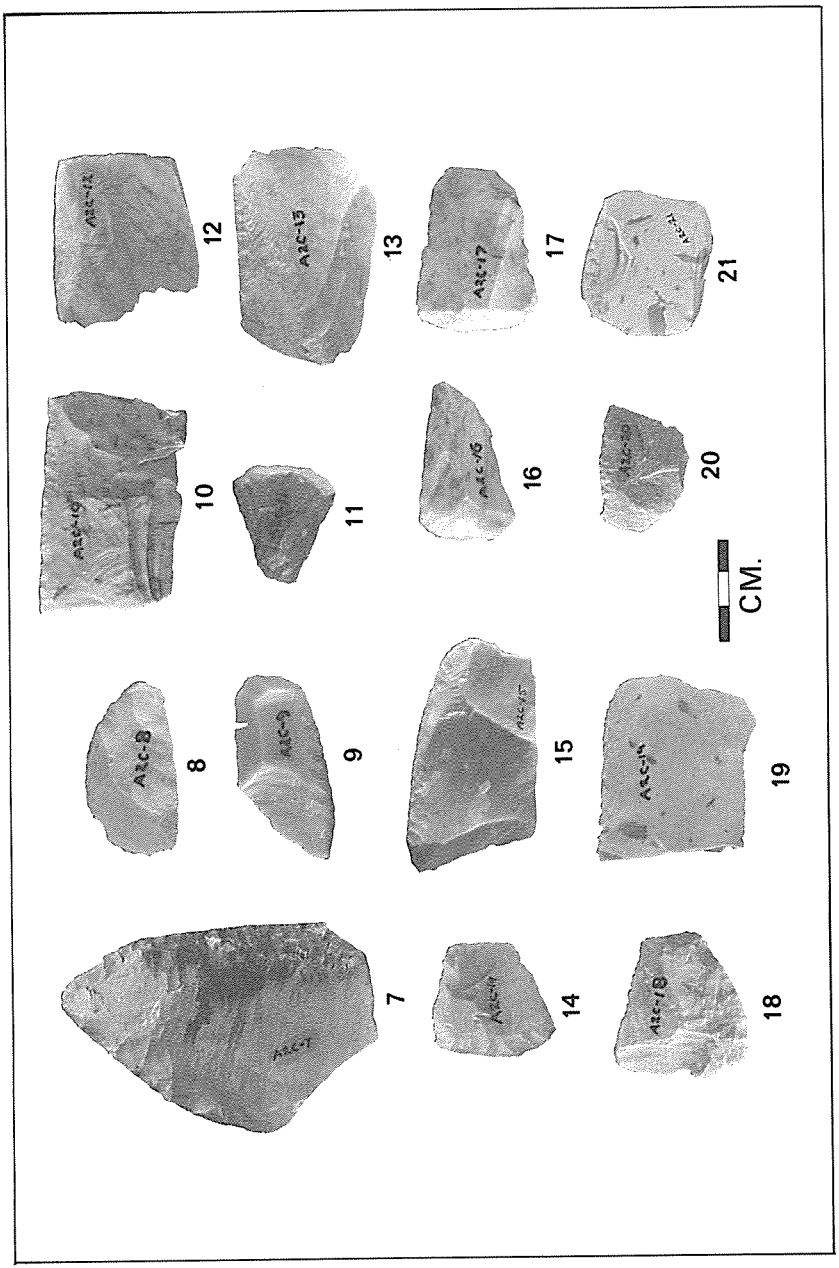

FIGURE 4. *Artifacts from the Cache.* Specimens 7-21.

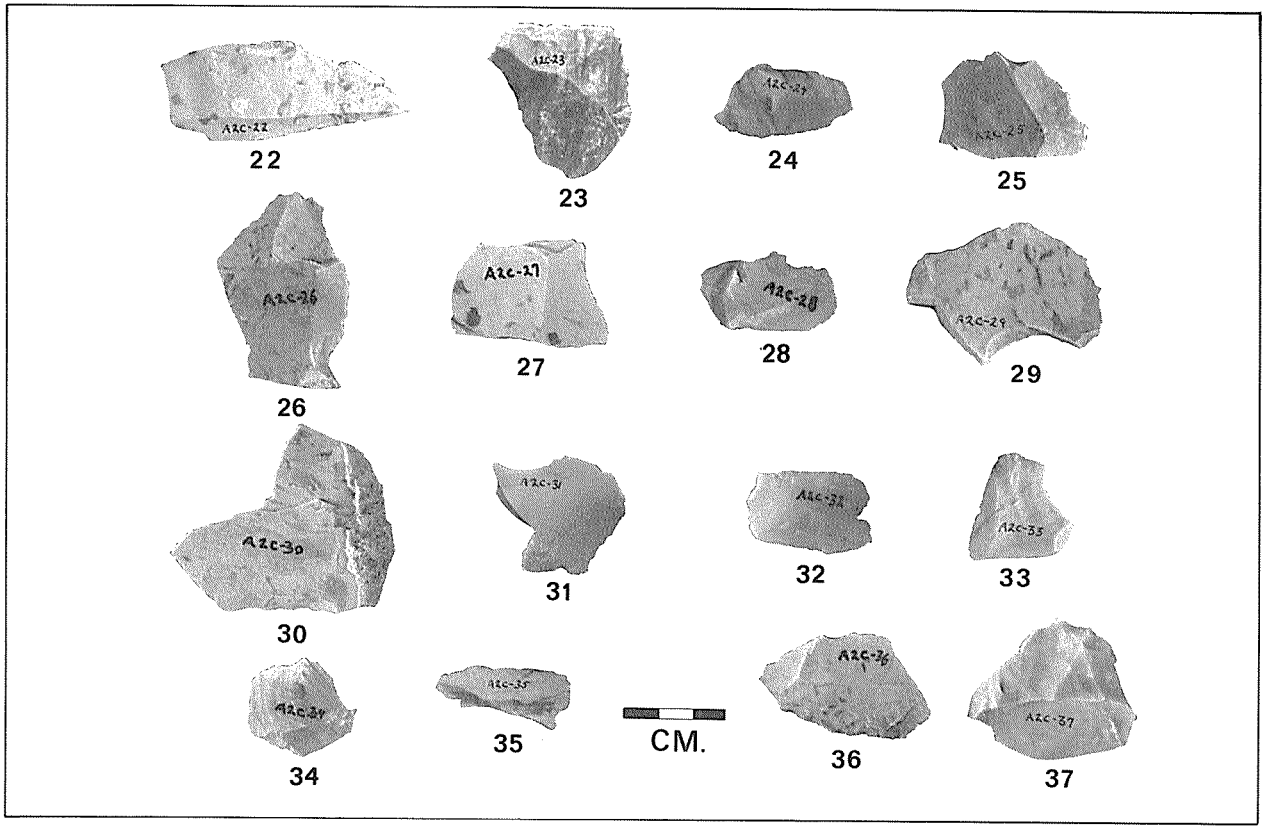

FIGURE 5. *Artifacts from the Cache.* Specimens 22-37.

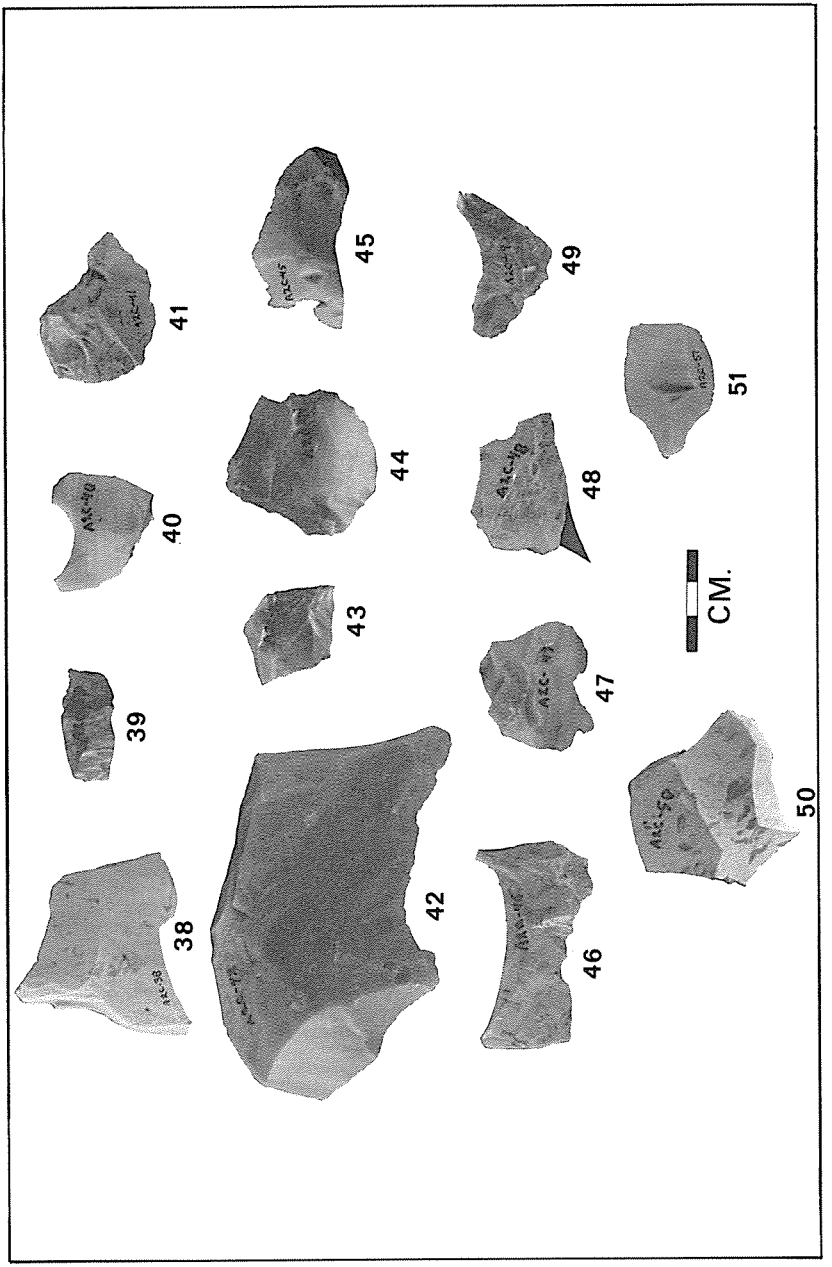

FIGURE 6. *Artifacts from the Cache.* Specimens 38-51.

outcrops along the southern rim of the Canadian River breaks to the west in New Mexico.

CONCLUSIONS

The lithic cache was found in a buried, neatly stacked, undisturbed condition. The cache should therefore show the variety of materials and the range of tools in the possession of a single person at a particular time. Although consisting largely of flakes with only slight modification by or for the use in cutting or scraping processes, the cache also includes an interesting variety of more extensively shaped unifaces and bifaces for chopping, cutting, scraping, and perforating. And despite the owner's obvious preference for Alibates agate, an interesting range of other materials, both local and remote, is present. Work on the finished tools in general is excellent quality; most of the remainder of the flakes show some signs of use or minor trimming for sharpening an edge.

Dating of the cache is difficult without point types as reference. The wide variety of points found on the site (from Paleo-Indian through Archaic to Neo-American) is of no assistance. However, the beveled knife (Artifact #5) is characteristic of artifacts found in assemblages attributable to the Antelope Creek Focus (Hughes 1962) along the Canadian River in this part of the Texas Panhandle. Approximate dating of this cultural unit is 1200-1450 A.D. If the beveled knife can be used as an indicator, the cache would be about 500 to 700 years old.

ACKNOWLEDGMENT

I am grateful to Dr. Jack T. Hughes for his time and guidance in the preparation of this paper.

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TABLE 1. DESCRIPTION OF ARTIFACTS

Artifact Type	Size in Centimeters			Material	Remarks
	Length	Width	Thickness		
1. Thick biface	17.0	9.2	5.1	Alibates agate	Weighs 740 grams
2. Scraper	10.4	7.5	1.2	Alibates agate	Upper right corner of inner face rounded bifacially
3. End scraper	9.6	4.5	2.8	Tecovas quartzite	
4. End scraper	10.6	5.0	1.9	Tecovas jasper	
5. Beveled knife	8.7	3.0	0.8	Tecovas jasper	Broken on short end
6. Drill	5.0	2.0	1.1	Alibates agate	Broken tip
7. Scraper	9.6	6.6	1.6	Alibates agate	
8. Side scraper	5.1	2.8	0.7	Potter chert	
9. Side scraper	5.8	2.8	0.9	Edwards flint	Fine work on right edge of inner face
10. Knife	6.6	4.2	0.3	Alibates agate	Left edge of the inner face has very fine work forming a straight line
11. End scraper	3.5	3.0	0.8	Alibates agate	
12. Knife	5.0	4.4	0.5	Alibates agate	Fine work forming a straight edge with crude work on the adjacent edge
13. Knife	6.4	4.1	0.6	Alibates agate	Fine work forming a straight line on the left edge of the outer face
14. End scraper	3.4	3.6	0.9	Edwards flint	
15. Knife	7.0	3.9	1.0	Alibates agate	Fine work on the distal end of the outer face with the right corner rounded
16. End scraper	4.7	2.9	1.3	Alibates agate	
17. End scraper	4.9	3.6	1.2	Alibates agate	

18. Knife	4.3	4.0	0.5	Alibates agate	Outer face worked on all edges except the proximal end
19. Knife	5.4	4.5	0.7	Alibates agate	Left edge on the outer face worked straight with the distal end corner rounded
20. Knife	3.7	2.6	0.3	Dakota quartzite	Fine work in a straight line on the left edge of the outer face
21. Utilized flake	4.0	3.6	0.6	Alibates agate	
22. Retouched flake	7.2	2.8	0.5	Alibates agate	Retouched on the inner face along a convex curve of the right edge halfway up from the proximal end
23. Flake	4.9	3.4	0.6	Alibates agate	
24. Retouched flake	4.0	2.0	0.7	Alibates agate	Crude retouch on the left edge of the outer face
25. Flake	4.4	3.1	0.9	Tecovas jasper	
26. Retouched flake	5.8	3.9	0.4	Alibates agate	Crude chipping on the right side of the inner face near the distal end
27. Utilized flake	4.7	3.1	0.4	Alibates agate	
28. Utilized flake	4.1	2.0	0.8	Alibates agate	
29. Utilized flake	5.7	4.4	0.4	Alibates agate	
30. Utilized flake	6.5	5.8	0.9	Alibates agate	
31. Utilized flake	4.0	3.5	0.2	Alibates agate	
32. Retouched flake	3.7	2.4	0.2	Alibates agate	Crude chipping on the left edge of the outer face
33. Utilized flake	3.4	3.3	0.2	Alibates agate	
34. Flake	3.1	2.8	0.2	Alibates agate	
35. Utilized flake	4.0	1.5	0.4	Alibates agate	
36. Retouched flake	5.1	3.0	0.3	Alibates agate	Crude chipping on the left edge of the outer face
37. Utilized flake	5.0	4.0	0.6	Alibates agate	

Artifact Type	Size in Centimeters			Material	Remarks
	Length	Width	Thickness		
38. Utilized flake	5.1	5.1	0.6	Alibates agate	
39. Utilized flake	3.5	1.6	0.3	Alibates agate	
40. Utilized flake	3.8	2.9	1.2	Alibates agate	
41. Utilized flake	4.4	3.5	0.6	Alibates agate	
42. Utilized flake	11.4	6.6	1.7	Alibates agate	
43. Knife	2.7	2.7	0.3	Alibates agate	Fine chipping on the right edge of the outer face
44. Utilized flake	4.8	4.5	1.5	Alibates agate	
45. Utilized flake	5.5	2.9	0.4	Alibates agate	
46. Utilized flake	6.0	2.5	0.3	Alibates agate	
47. Utilized flake	3.8	3.6	0.8	Alibates agate	
48. Utilized flake	4.1	3.1	0.5	Alibates agate	
49. Utilized flake	3.6	3.5	0.5	Alibates agate	
50. Utilized flake	5.2	5.0	0.5	Alibates agate	
51. Utilized flake	4.0	2.6	0.6	Alibates agate	

The Re-examination of Pedro De Castaneda's Bone Bed by Geological Investigations

EDWIN L. KISER

ABSTRACT

This paper describes the bone bed mentioned by Pedro de Castaneda in 1541 and compares it to the Silver Lake Bison Site in Hockley County, Texas.

The Silver Lake site is described in some detail. Concluding the paper is a brief examination of different historians' proposed routes which Coronado's army traveled on their return from Quivira.

The journey of the Coronado expedition across the American Southwest has always been an intriguing study for the student of American history or anthropology. Scholars have toiled many years trying to define precise routes which the Conquistadors traveled to and from Quivira. Regardless of historians' quibbling, Coronado and his army were the first to record descriptions of the Llano Estacado, or Staked Plains.

Among their descriptions was the first palaeontological site report, and perhaps also first anthropological site report recorded in the American Southwest. This description was given by Pedro de Castaneda in 1541 after the Army had split from Coronado on their return trip from Quivira. Castaneda's description follows:

> Another thing was a heap of cowbones, a crossbow shot long, or a very little less, almost twice a man's height in places, and some 18 feet or more wide, which was found on the edge of a salt lake in the southern part, and this in a region where there are no people who could have made it. The only explanation of this which could be suggested was that the waves which the north winds must make in the lake had piled up the bones of the cattle which had died in the lake, when the old and weak ones, who went into the water were unable to get out. The noticeable

> thing is the number of cattle that would be necessary to make such a pile of bones (Winship 1896: 140).

Castaneda definitely described the southern plains area in this exerpt, and specifically mentioned an area in which salt lakes are present. Castaneda also mentioned in his narrative that they traveled by way of both salt and fresh water lakes. This area visited by Castaneda appears to fit the description of lakes within the Portales valley drainage system (Holden 1944: 14).

The Portales valley drainage system extends from near Portales, New Mexico, to west of Lubbock, Texas. Drainage is from the northwest dipping towards the southeast. Salt lakes are found extending from northern Bailey and Lamb Counties to the southern edge of the Llano Estacado.

Castaneda's bone bed should be within the northern area of the salt lakes as stated. Thorough geological investigations by Evans and Meade (1945) indicated vertebrate palaeontological localities within this northern salt lake area; however, only one was described as a bison bone bed situated along the southern edge of a salt lake.

This particular vertebrate palaeontological locality described by Evans and Meade is Locality Number 10. It is a bison bone bed 55 yards southeast of Silver Lake. Silver Lake is in the extreme northwestern corner of Hockley County, Texas and extends into adjacent Cochran County (Fig. 1).

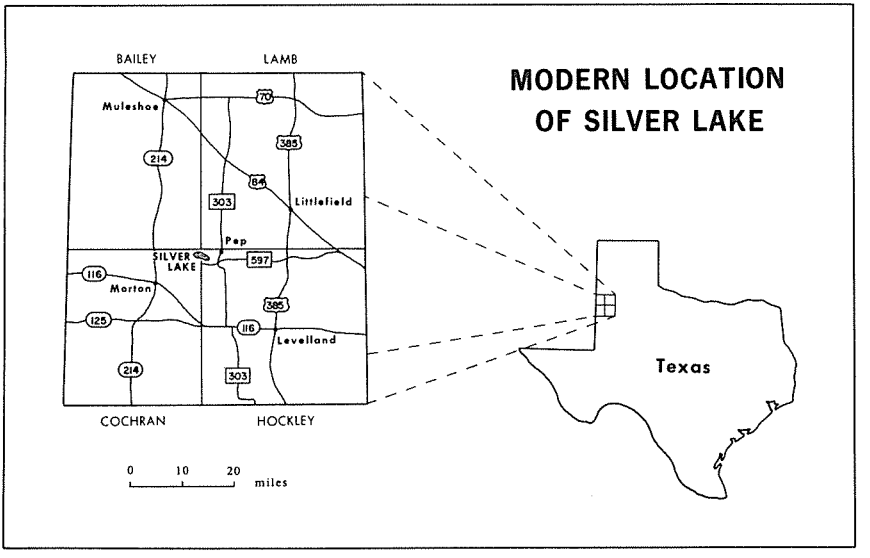

FIGURE 1. *Modern Location of Silver Lake.*

Locality Number 10 has been assigned the name the "Silver Lake Bison Site." Several anthropological sites are located nearby and a Spanish sword with inscriptions dating 1724 has been found east of the lake (Demel 1976). Silver Lake was also used as a natural landmark by Mexican guides for the U. S. military during the 1874-1875 Red River War. As indicated, the lake area has an intriguing, complex story of historical significance.

The Silver Lakes Bison Site was originally recorded on November 8, 1954, by Jack T. Hughes of West Texas State University. Hughes and Glen Evans examined several fossil sites in the area. The November field notes were used as a guide for a February 22, 1976, re-examination of the site.

Arrangements were made prior to the February field trip for permission to investigate the site located on the McCutchin Ranch. The February observations indicated Silver Lake was .7 mile in length by ¼ to ⅓ mile in width, or north-south direction. Diameter of the lake had previously been reported as .7 mile (Reeves 1966: 282). The lake's measurements have varied which is to be expected of playa lakes.

Silver Lake is fed by underground springs from both the east and west side (Hogue 1976). A high content of salt in the lake deprives the lakeshore of much vegetation; however, a few cacti and yucca are present in the sandy soil surrounding the lake.

Silver Lake (Fig. 2) was formed out of a series of lakes which were filled during the Late Wisconsin glaciation. Presently minor land modifications are taking place in the form of wind action that results in the formation of sand dunes.

Soil deposits are of two distinguishable types: the Tahoka Clay, and recent dune sand. The Tahoka Clay is bluish gray in color and is the oldest deposit definitely recognized in Silver Lake (Frye and Leonard 1957: 8). Extinct vertebrate animal faunas are associated within some of the Tahoka Clay deposits. These fossils are representatives of the Late Pleistocene. Unconformably overlying the Tahoka Clay is the recent sand material. Prevailing southwest and winter north winds present a major erosional problem at the site. The result is a mixture of the bluish-gray clay with reddish brown sand.

The Silver Lake Bison Site (Fig. 3) is situated in the Tahoka Clay at a depth of 6 to 8 inches (Bass and Kiser 1976: 5). Bison bone also rests on top of the Tahoka Clay intermixed with caliche, and recent dune soil.

The bison site underlies 6 to 8 feet of overburden and covers an area of 35 yards east-west by 32 yards north-south. The bison bone is piled, giving the appearance and mixture of a bone bed. The number of individual bison present is estimated at two dozen. The bone is in good shape and is mineralized. A few samples of the bone were taken to Killgore Research Center in Canyon, Texas, for comparative studies. The Silver Lake Bison Bone samples proved to be much larger in

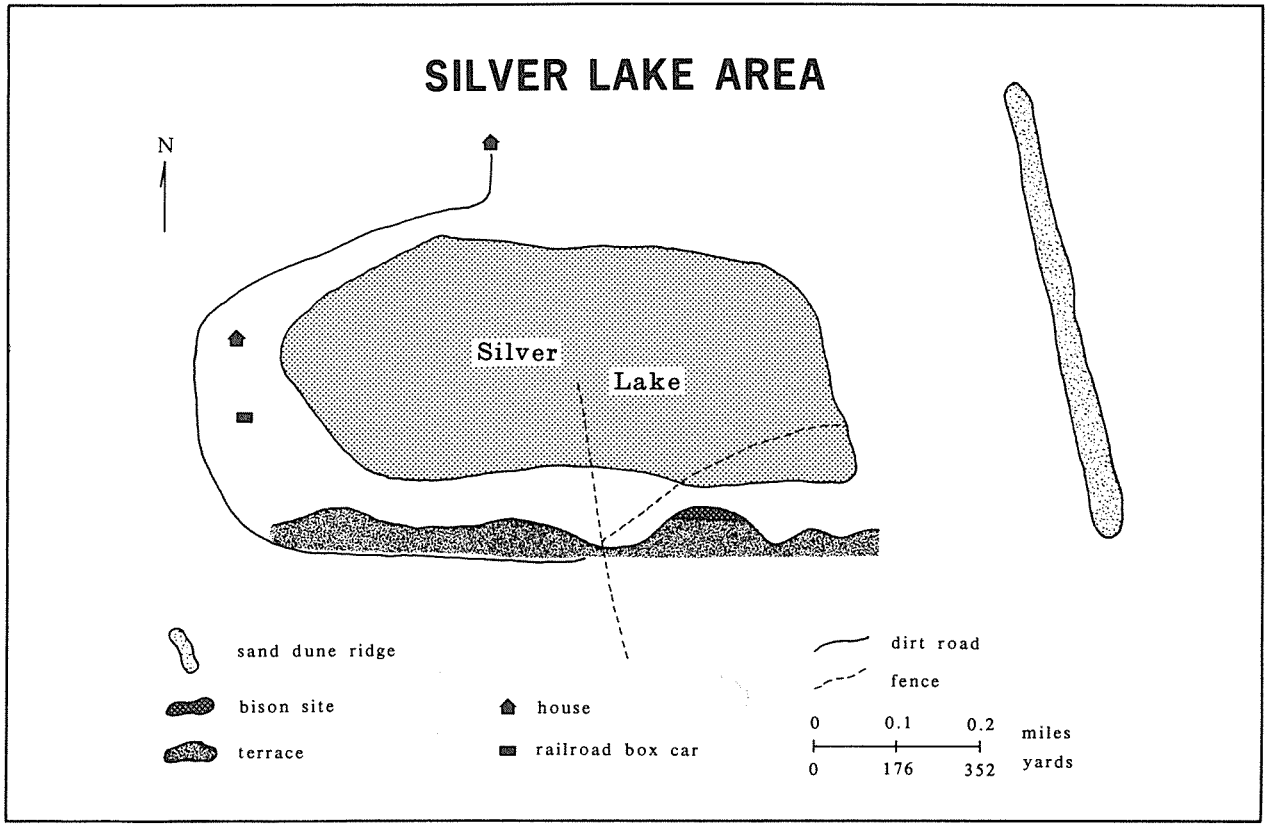

FIGURE 2. *The Silver Lake Area.*

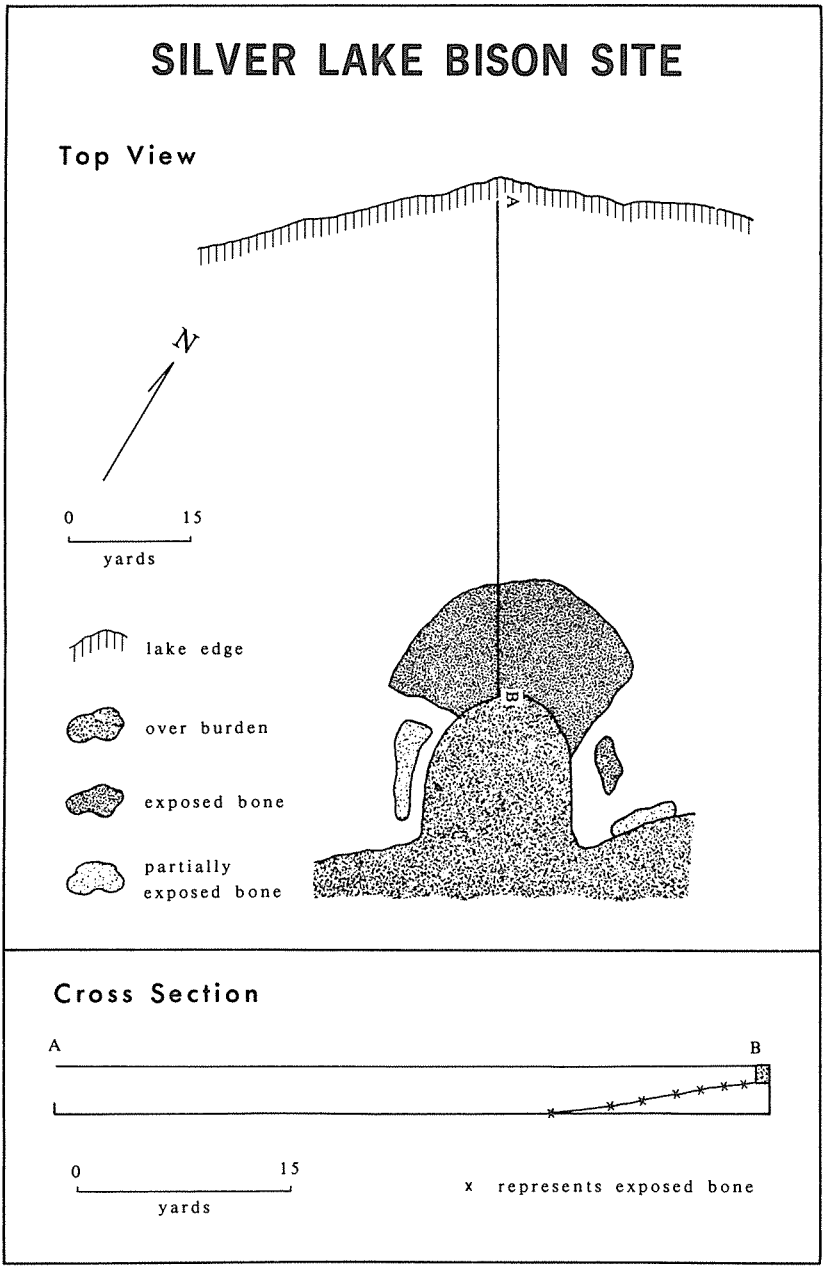

FIGURE 3. *Plan and Cross Section Views of the Silver Lake Bison Site.*

comparison to bison from known Archaic bison sites of the Texas Panhandle. After comparative studies and identification were made the Silver Lake samples were placed in the Panhandle-Plains Historical Museum and assigned the site number of P-61.

Some of the bison gives the appearance of being broken prior to deposition (Wendorf and Hester 1975: 32). Located near the bison bone is evidence of burned caliche, previously reported by Wendorf and Hester (1975). Artifacts had previously been found by Adolph A. Witte near the bison site and *Folsom* points have been found along the lake's eastern dune ridge (Demel 1976). These findings enhance the probability of an Early Man site at Silver Lake.

The Silver Lake Bison Site, previously discussed, and Castaneda's bone bed in all reality may be the same site. The Silver Lake Bison Site was the only bone bed described by Evans and Meade located on the south side of a salt lake. The assumption of the Silver Lake Bison Site being Castaneda's cannot be made on these comparisons alone. Other comparisons can be made as follows: Castaneda described his bone bed as being a crossbow shot long, or a very little less (Winship 1896: 140). James Hansen, former Director of the Panhandle-Plains Historical Museum, described the length of a crossbow shot as being about 200 yards (Hansen 1976). Bison bones were found on the February field trip eroding out of the terrace edge 180 yards west of the main bison bone concentration. These samples were also mineralized and of the same comparable size as those at the main site concentration. Palaeontological testing indicated that the majority of the bones had already eroded (Wendorf and Hester 1975: 32); Castaneda described his bone bed as being almost twice a man's height in places and some 18 feet or more wide (Winship 1896: 140). Height of the Silver Lake Bison Site was recorded as being over 8 feet, and the site extends north of the terrace edge 15 yards; Castaneda remarked on the number of cattle that would be necessary to make such a pile of bones (Winship 1896: 140).

These comparisons are all intriguing, but the most interesting still remains that Evans and Meade only found one bone bed on the south side of a salt lake. Several historians have considered the Silver Lake as one of the possibilities as being within the return route of Coronado's army (Fig. 4). Four historians have properly placed their routes within the salt lake area; however, Holden and Donoghue's routes are along the extreme northern area of the salt lakes in northern Bailey and Lamb Counties. Winship and Wedel placed their proposed routes further south, nearer Silver Lake, and away from the very marginal salt, fresh water area.

Definite proof of the Silver Lake Bison Site being Castaneda's bone bed does not exist, nor will it ever be definitely proven. But as indicated in this paper, the Silver Lake Bison Site is the most likely candidate for

being the first palaeontological and archaeological site to be recorded in the American Southwest.

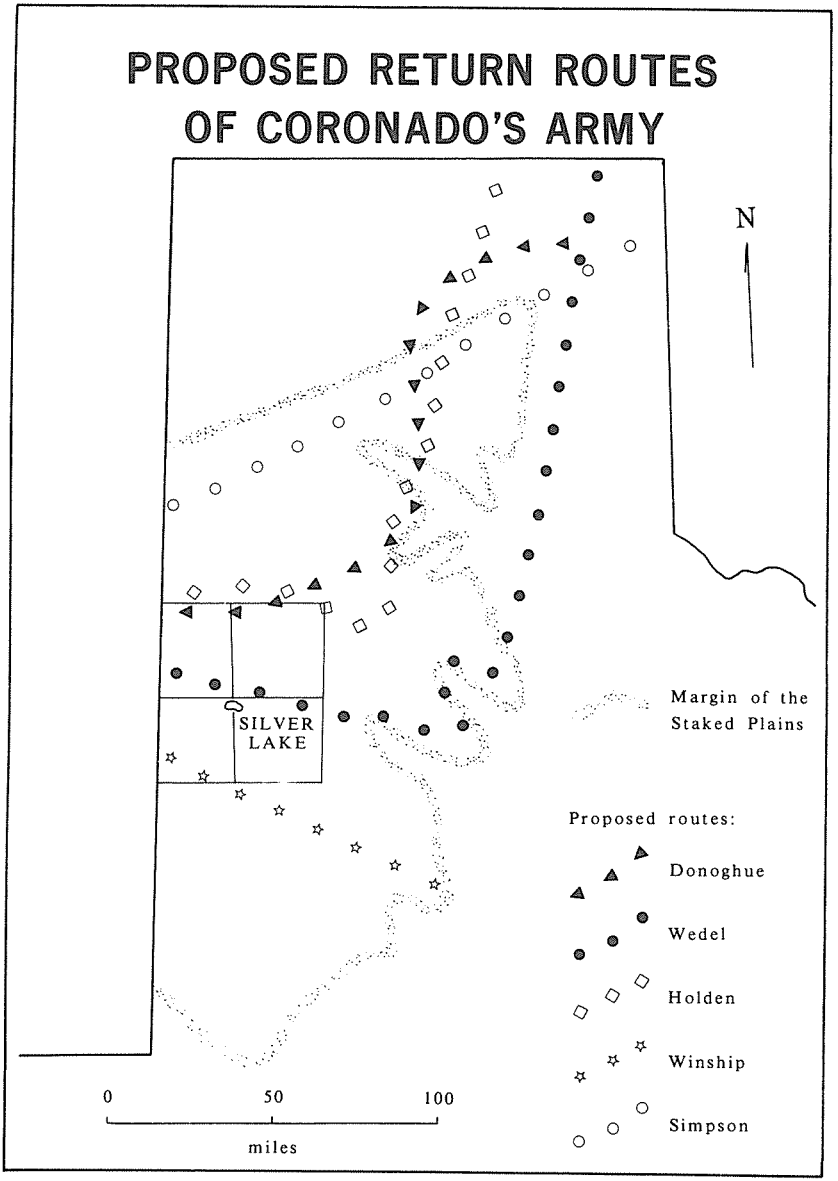

FIGURE 4. *Proposed Routes of Coronado's Army Return from Quivira in Relation to Silver Lake.*

ACKNOWLEDGMENTS

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Two Clay Figurines from the Central Coastal Region of Texas

CHARLES K. CHANDLER

ABSTRACT

Descriptive data are provided for two clay figurines from the central coastal area of Texas. One specimen appears to be linked to the Late Prehistoric Rockport Complex, while the cultural attribution of the other is uncertain.

Two fired clay figurines from the central coastal area of Texas are described. One is from San Patricio County and one is from Live Oak County (see Fig. 1).

The first of these two figurines was discovered in 1969 by the late D. R. Espy on the surface of an open campsite along Chiltipin Creek, San Patricio County, Texas. The site, 41 SP 77, is one of several sites recorded along Chiltipin Creek by the author and D. R. Espy. All of these sites are located immediately adjacent to the existing stream channel and most are subject to occasional flooding. Site 41 SP 77 was discovered and recorded after severe flooding removed approximately 10 inches of topsoil. The clay figurine was found a few weeks later after subsequent flooding.

Most of the sites along Chiltipin Creek had large amounts of lithic debitage and artifacts, but pottery was comparatively scarce. Materials recovered from 41 SP 77 include *Perdiz* and *Scallorn* arrow points, corner-notched expanding stem dart points, side-notched rectangular stem dart points that most closely resemble the *Darl* type, triangular stemless forms of both straight base and rounded base types, several forms of bifaces, four different styles of drills (bi-pointed, large rounded base, reworked *Plainview* dart point, and alternately beveled point on a flake), cores, metate fragments, flake blades, flake scrapers, hammerstones, and 25 small potsherds. Of the 25 sherds, nine are about the same color as the

figurine with similar amounts of sand in the paste; but, these nine sherds have bone temper. The remaining sherds have a fine sandy appearance with occasional bone temper. One is asphalt-coated on the interior and two are partially asphalt-coated on the exterior. Surface and core colors range from light gray through dark brown to black. The reddish to buff sherds and the figurine have coarser sand grains than the gray to black sherds. This difference in grain size is visible only under magnification.

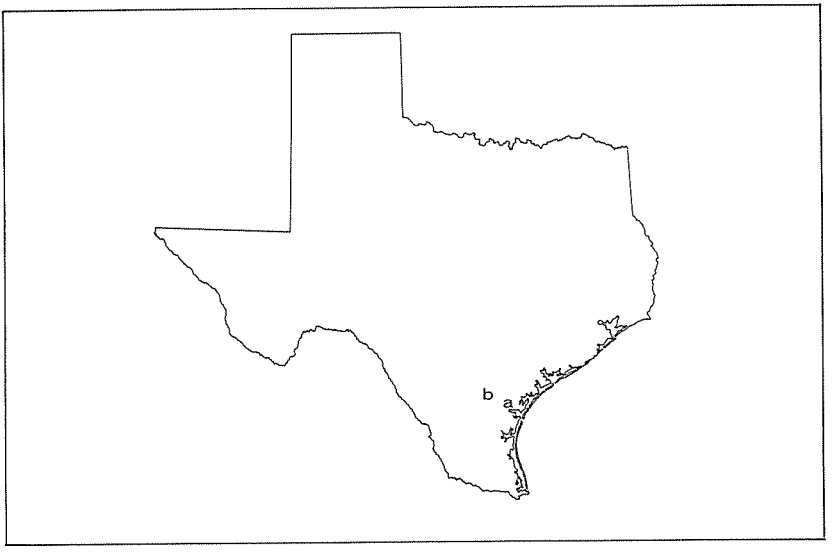

FIGURE 1. *Map Showing Locations of San Patricio and Live Oak Counties, Texas.* a, San Patricio County; b, Live Oak County.

The figurine is illustrated by both line drawings and photographs in Figs. 2 and 3. It is hand-shaped into a small, anthropomorphic figure with the following characteristics:

Height: 53 mm. (estimated maximum height 56 mm.)
Width: 21 mm. near top (shoulders)
Thick: 18 mm. near bottom (hips)
Color: exterior hue 10 YR (all color determinations are based on comparisons with the Munsell color charts). Mostly resembles "grayish orange" (10 YR 7/4) with some areas tending to "dark yellowish orange" (10 YR 6/6).
Color: interior paste is generally gray but ranges from "pale yellowish brown" (10 YR 6/2) to "light olive gray" (5 Y 6/1).
Paste texture: very fine, compact, homogeneous, sandy.

Finish:	Smoothed but not polished, decorated with fine incised, zigzag, vertical lines.
Temper:	None.
Weight:	16.91 grams.

The figurine does not appear to have had a head but does have abbreviated legs, one of which is partially missing and also has horizontally cut indentations across the torso near the upper portions of the legs. These appear intended to delineate the limit of the legs. There is also a cut surface from these indentations downward to the lower limits of the legs. These cuts were made by a sharp tool (possibly a flint flake) prior to firing. A navel is formed on the frontal surface of the figurine. There is a slight indentation at the top that tends to define the shoulders. There has been some surface erosion of the figurine, but there are eight closely spaced, vertical zigzag lines on the back and seven on the front. Five of these on the front are on the right side. Some of these lines are barely visible and can best be determined with magnification.

This figurine appears to be locally made. The paste is almost identical to *Rockport* pottery and surface color is like much of the reported *Rockport* wares (Suhm and Jelks 1962). The zigzag incised lines are very similar to the squiggly asphalt lines found on *Rockport Black on Gray* wares. It is well-fired.

The specimen is unlike the figurines reported from the lower Pecos area to the west. Those are unfired, and do not have appendages (legs); see Shafer (1975 a,b) and Shafer and Speck (1974).

My original intent was to document only the San Patricio County figurine found by Espy, but in my search for comparative information I discovered that Jim Warren had found a clay figurine in Live Oak County that had not been documented. This fired clay artifact (see Figs. 4-6) was found (on the surface and without other directly associated artifacts) in the general area of site 41 LK 67 overlooking the Frio River near Three Rivers. It appears to be anthropomorphic, but only the torso survives. It shows evidence of having had a head, arms and legs but these appendages are missing. It is shaped by hand. Following are data obtained by visual and microscopic examination:

Length:	98 mm.
Maximum width:	52 mm. at the upper (arm pit) area
Minimum width:	34 mm. at the lower (hip) area
Thickness:	31 mm. at the upper (shoulder) area
Thickness:	34.5 mm. at the lower (hip) area
Color:	exterior, pale reddish brown (5 YR 5/3) to grayish red (5 YR 5/2); interior paste, dark gray (5 YR 4/1)
Paste texture:	very coarse and not well compacted
Finish:	smooth but not polished. Some areas appear to have been

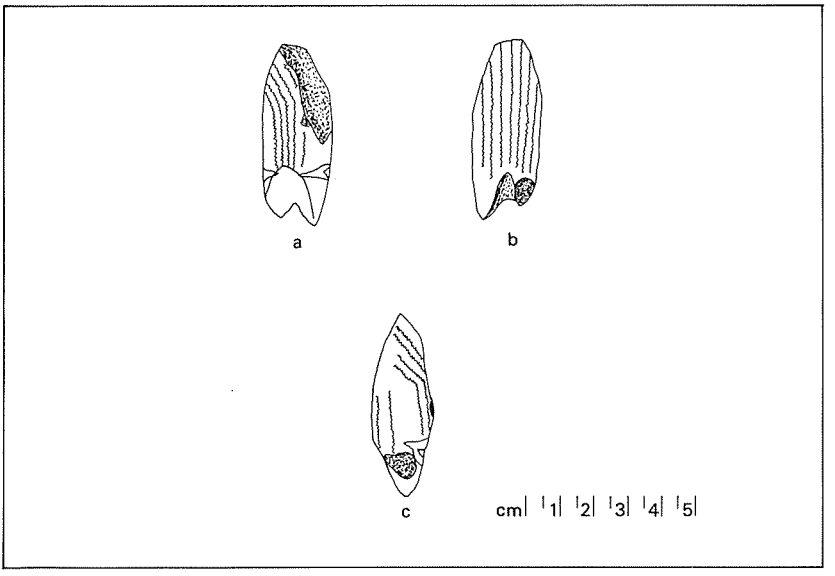

FIGURE 2. *Figurine from San Patricio County, Texas.* Artist's version; front, back and side views are shown.

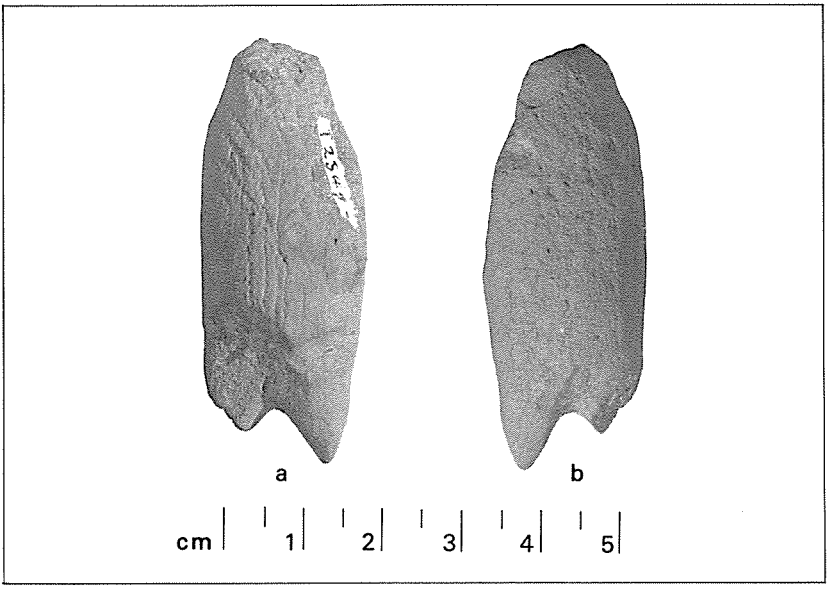

FIGURE 3. *Figurine from San Patricio County, Texas.* Photographs of front and back of the specimen are shown (see Fig. 2,a,b).

rubbed to produce a slightly faceted surface. These areas are visible in Fig. 4.

Weight: 161.3 grams

Both the surface and the interior paste have numerous small pitted areas. There are numerous dark brown to black inclusions that appear to be hematite and some gold angular grains that look like iron pyrite. An occasional fragment of mica is also included. Small inclusions of an ashy looking substance that appears to be volcanic ash (tuff) occur through the paste. These do not react to hydrochloric acid.

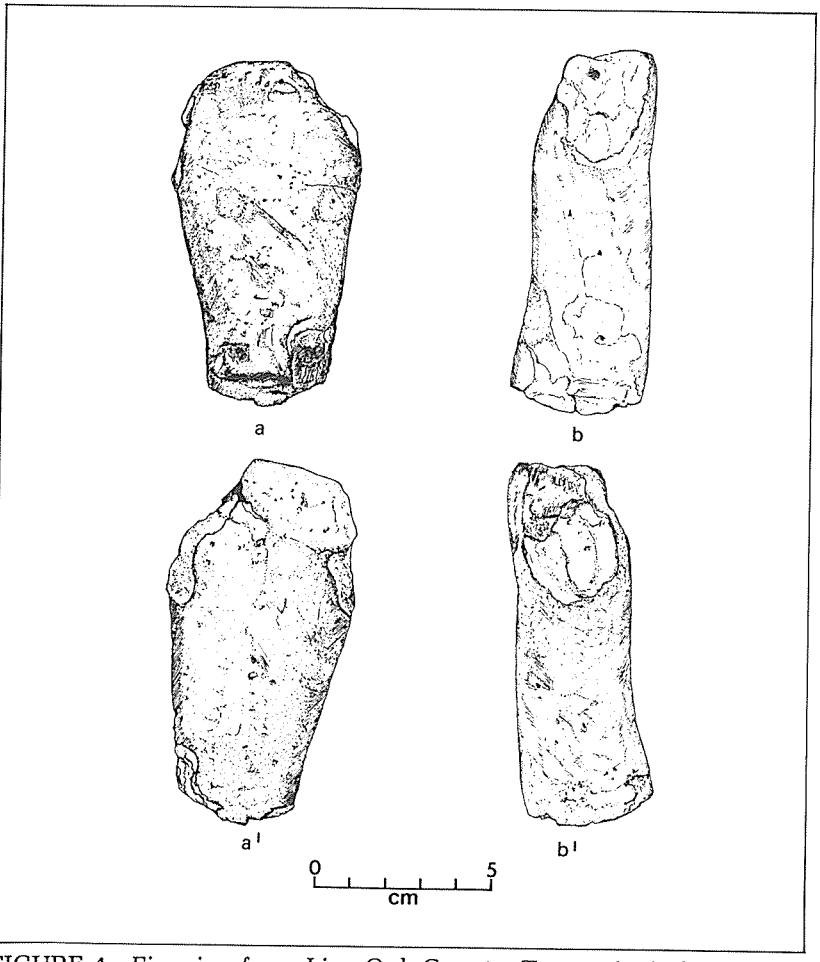

FIGURE 4. *Figurine from Live Oak County, Texas.* Artist's version; front, back, and two side views are shown.

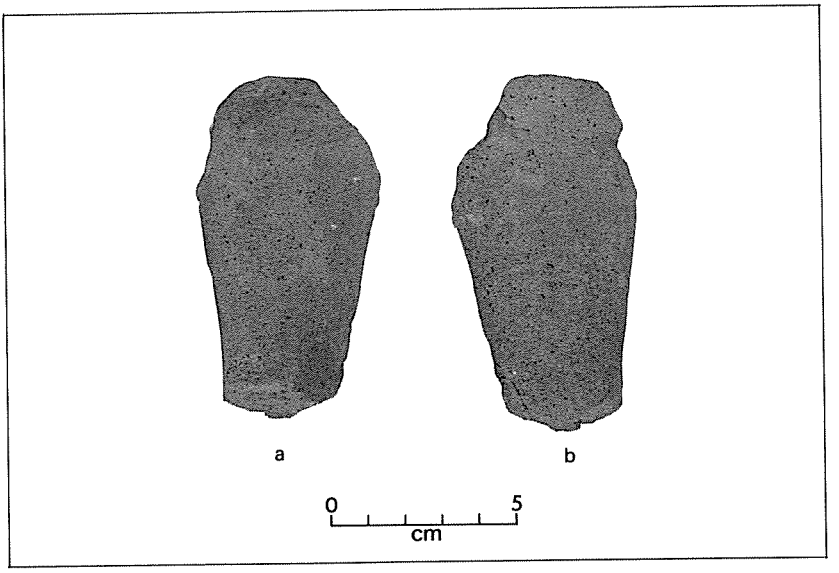

FIGURE 5. *Figurine from Live Oak County, Texas.* Photographs of front and back of the specimen are shown (see Fig. 4,a,a′).

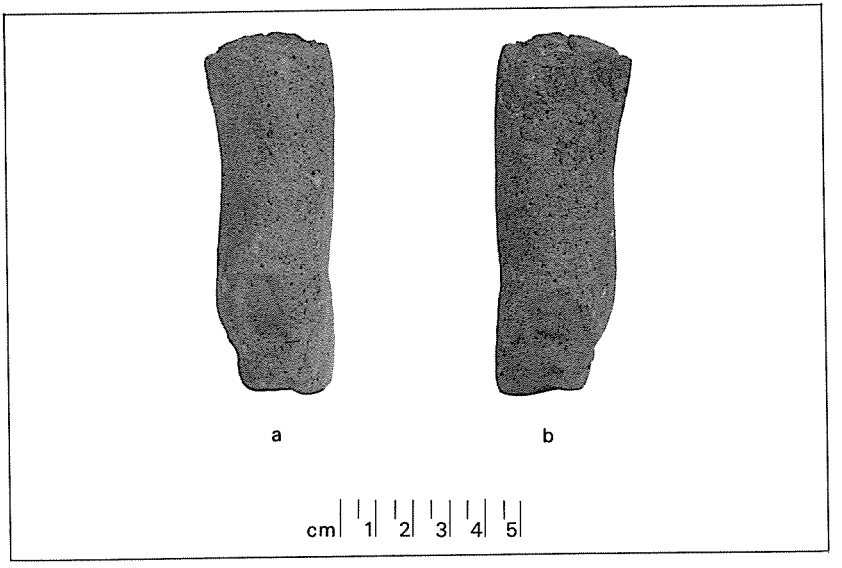

FIGURE 6. *Figurine from Live Oak County, Texas.* Photographs of sides are shown (see Fig. 4,b,b′).

Clay figurines are almost unknown in southern Texas. The only previous report reflecting their occurrence was by George C. Martin (1929) who reported specimens from a site on Copano Bay:

> "Two small curious objects of reddish baked clay. These could have been of no particular use and were probably fetishes or ceremonial. The clay composing these were baked to unusual hardness. The objects themselves were of irregular shape, and about two-thirds of the surface of each was coated over with a thick layer of asphalt. A third specimen of exactly similar materials found on the banks of Inferno Creek, Baffin Bay, Kleberg County. The three specimens appear to have been made at one time, all by one person. The clay of all three baked to a peculiar shade never found in pot sherds along the coast."

These three objects were reportedly donated to the Witte Museum (San Antonio) but could not be located for comparative studies.

Fired clay figurines do occur elsewhere in Texas (e.g., Skinner 1978) but are very scarce. Newell and Krieger (1949) report one torso fragment from the George C. Davis site. This object is described in detail by Fritz (1975). From this description it appears to be similar in size and surface color to the Live Oak County figurine.

Hollow and solid body figurines of Mesoamerican origin have been noted in central and south Texas. I have looked at illustrations of these (cf. Krieger 1953) and none of them resemble the two artifacts described here.

The two figurines documented in this note are an insufficient sample for any far reaching conclusions regarding their cultural implications. However, they do add to our growing knowledge of the cultural inventories of the prehistoric people of this area of Texas.

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Additional Notes on the Fishing Technology of the Yucatan Peninsula, Mexico

DAVID A. PHILLIPS, JR.

ABSTRACT

Notched net-sinkers, described by Eaton (1976) for the Gulf Coast of Yucatan, are also found on that peninsula's eastern coast. Preliminary results of an analysis of net-sinkers from the island of Cozumel, Mexico, are discussed.

INTRODUCTION

In the 1976 *Bulletin*, a paper by Jack D. Eaton reported on a survey of the north coast of Yucatan, Mexico. Eaton found over 200 notched sherds and stones at eight coastal sites, and he concluded that they were net- and line-sinkers used in fishing.

Such net-sinkers are common in Mesoamerica. Eaton (1976: 234-236) notes a number of locations, including the Yucatecan east coast, where they have been found. However, one place not mentioned by him has yielded what is probably the largest single collection of notched sherds and stones from the Maya area. This is the island of Cozumel (Fig. 1), where excavations in 1972 and 1973 turned up over 1000 such items. There, they were tentatively termed *mariposas* — Spanish for "butterflies" — in order to avoid the automatic functional implications of a term like "net-sinker." They have been described only briefly so far (Connor 1975: 131-133) but are now being analyzed as part of the Cozumel Project's artifact collections. It is already possible to add some comments to Eaton's report, based on findings from the 1973 season.

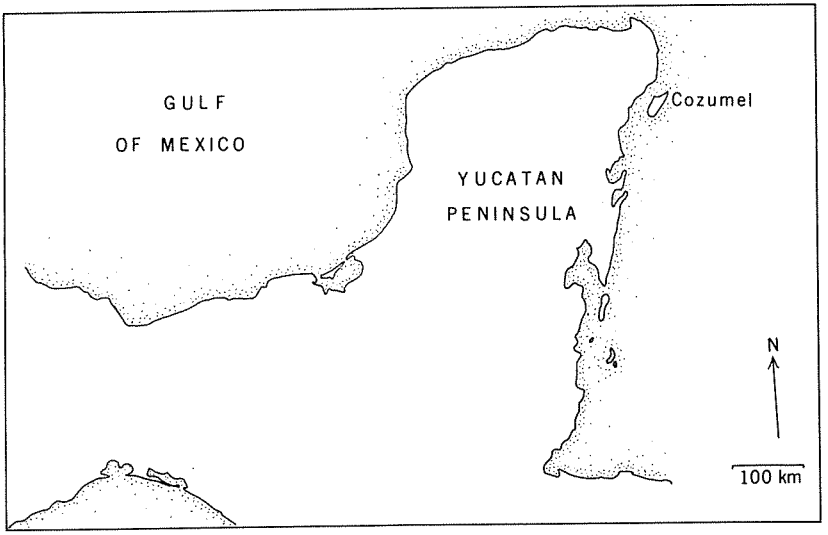

FIGURE 1. *Map of the Yucatan Peninsula, Showing the Location of Cozumel.*

DESCRIPTION OF THE SPECIMENS

1. **Materials and manufacture.** Eaton found more notched stones (168) than notched sherds (58) on his survey of the north coast. The stone and sherd sinkers also came from separate sites. On Cozumel, however, the situation is different: of 1068 notched items from the 1973 field season, 1027 were of pottery, 23 of coral, 16 of limestone, and two of shell. The various materials are found mixed at any given site.

Analysis suggests that manufacture of notched artifacts on Cozumel is the same as that described for the northern coast. Sherds, in particular, were worked into shape by breaking and grinding the edges, and then the notches were cut into the ends with a sharp blade (Eaton 1976: 234). With softer varieties of pottery, however, cutting the sherd to shape was also done. Four notched artifacts made of *Fine Orange Ware* from Cozumel still show clear cut-marks along their edges.

Notched clay pellets (Fig. 2,h), not found by Eaton, occur rarely (7 times) in the Cozumel collections. The notch was incised into the pellet before firing, while the clay was still wet. Such specimens are smaller and lighter than those of pottery, coral, stone, or shell.

Sizes and weights reported by Eaton for the north coast (1976: 234) conform to those for Cozumel. Eaton's notched sherds ranged in weight from 5 to 51 grams; those from the island range from 1 to 36 grams with a mean of 6.6 grams.

2. **Wear patterns.** On some slipped-ware notched sherds, the slip has worn off the convex surface of the sherd except in the zone between the

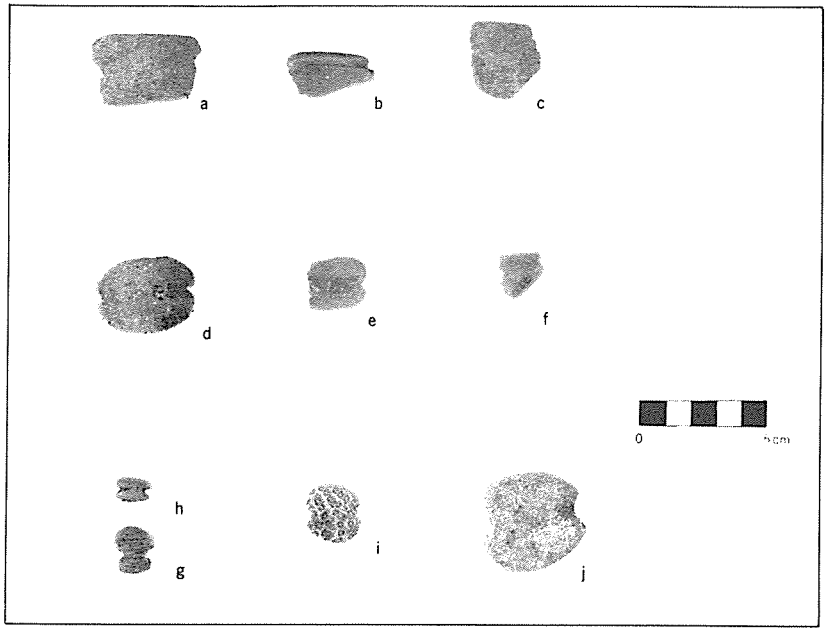

FIGURE 2. *Selected Notched Artifacts from Cozumel.* a-g, worked sherds; h, clay pellet notched before firing; i, coral; j, limestone. Examples d-f show "striping"; e, fragmentary.

two notches, creating a "stripe" (Fig. 2,d, e, f). This seems to be the result of gradual abrasion, not deliberate removal of slip. Only a small proportion of the notched sherds (33 out of 1027) show this trait, but many of the others were unslipped to begin with or were very weathered when found. The "striping" trait is found on *Tuluum Red Ware* (20 out of 295), *Mayapan Red Ware* (9 out of 123), and *Puuc Slate Ware* (3 out of 28). "Striping" on these notched sherds is also known from the site of Tuluum (Alfredo Barrera, personal communication).

The obvious interpretation of such "stripes" is that at some time there was a cord tied around the artifact, through the notches; this cord protected the slip beneath it as the rest of the surface of the object gradually was being abraded. These notched artifacts have been interpreted as weft-weights for weaving (Kent and Nelson 1976), or as door-hangings (Brunelle 1974; see Clavigero in Pollock and others 1962: 184). But neither of these functions would expose the artifacts to the kind of regular, gradual wear suggested by "striping." Use as weights in nets or on lines, however, would produce just this kind of wear pattern.

3. **Temporal and spatial distribution.** Dating of excavation units on Cozumel awaits completion of pottery analysis, but the wares on which mariposas were made give an indication of their time range. Of the 272 mariposas on diagnostic sherds, 4 are from the Formative or Early Periods, 38 are from the Florescent, and 230 from the Decadent or Contact Periods (3 are on European wares). The increase through time probably reflects population trends rather than more intensive use in later periods, although other interpretations are possible.

It might be expected that these notched artifacts, as net-sinkers, would be concentrated on the coast of Cozumel (the island is 14 km, or 8.5 mi. wide). Actually, they are just as common at interior sites. This suggests that fishing was a general activity practiced by a wide segment of the population. Of course, there could have been specialists located on the coast, and who fished, for example, out at sea. But they probably did so in addition to farmers from interior sites, who spent an occasional day wading in the shallows with a casting net made at home.

CONCLUDING REMARKS

Analysis of notched artifacts from Cozumel supports Eaton's interpretation of notched potsherds and similar items as fishing weights. Notching on such sherds is invariably functional for suspension; and a heretofore undescribed phenomenon labelled "striping," apparently a use-wear pattern, suggests the kind of rough-and-tumble treatment that fishing weights would undergo. The weight range of Cozumel mariposas is concordant with the range of lead weights used by modern-day Yucatecan coastal fishermen (Eaton 1976: 239).

The Cozumel fishing weights, incidentally, show an amazing variability in terms of size, shape, and finish. This variability is difficult to explain and appears not to correlate with temporal shifts. Perhaps the ancient Cozumeleans did not really care what the artifacts looked like, so long as they performed their assigned function.

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Book Reviews

Texana: Excavations at a Nineteenth Century Inland Coastal Town, Jackson County, Texas. Marsha F. Jackson, with contributions by J. Barto Arnold, III, Georgeanna H. Greer, Kerry A. Grombacher, Catherine H. Yates. *Research Report No.* 56, *Palmetto Bend Reservoir Series* Vol. 1. Texas Archeological Survey, The University of Texas at Austin, August, 1977. x + 166 pp., 29 illus., 5 tables. No price given.

Architecture of Texana, 1831-1883, Jackson County, Texas. H. Anthony Crosby. *Research Report No.* 57, *Palmetto Bend Reservoir Series* Vol. 2. Texas Archeological Survey, The University of Texas at Austin, July, 1977. iv + 254 pp., 25 illus. No price given.

These two publications, part of a series of three reports dealing with test excavations at Palmetto Bend Reservoir, cover historic site work and architectural documentation in 1974 within the reservoir area. The work was done primarily at and in relation to the old townsite of Texana, although several other historic sites are dealt with briefly. Principal Investigator for the project was David Dibble and series editor was Suzanne Carter.

"Texana: Excavations at a Nineteenth Century Inland Coastal Town" is a report of archeological testing done at the townsite in June, 1974, by members of the Texas Archeological Survey staff. The report is divided into a number of sections.

The first section, appropriately entitled "The Nineteenth Century Coastal Scene," consists of a brief survey of the history of the area from the time of LaSalle through Reconstruction. Hampered at first by some needlessly erudite language and the evident omission of one line of type which obscures the meaning at one point, the statement recovers admirably by the second page and the remainder of the section is thoroughly and adequately done. I would argue with the consistent misspelling of Felix Huston's name, but this is undoubtedly an editorial oversight rather

than the author's error. The inclusion of an eyewitness account of Civil War times in Texana enlivens and enhances the historical account.

The next section, "Texana: Establishment to Abandonment," tells the history of the town from several points of view which complement each other and present a comprehensive picture of the settlement. First, establishment and layout of the town is described and discussed by Jackson. I do not share her conclusion that the town plan "reflects its Mexican dependence" (p. 5). The evidence that it was first conceived in 1834, that Spanish measurements were used and that it was laid out in an orderly manner is not sufficient in itself to prove any particular relationship to the Laws of the Indies. Most town plans of this period in Texas could be said to share these same specifications. Actually the plan more closely resembles those of early towns in Virginia (Reps 1971: 120, 128), probably reflecting the Anglo-American background of its founders.

The legal background, by Kerry Grombacher, consists of a well-written account of the acquisition of the land and the growth and final collapse of the town as seen through the county records. Notes are handled with a table of numbered deed references, an idea which we all might profitably borrow in this sort of report. A short collection of contemporary accounts rounds out this section. Surely more passing travellers must have described a town in existence for over 50 years.

The following section concerns the excavations. A number of factors have combined to make archeological investigation of the townsite difficult and comparatively unproductive. Apparently many of the structures in the town were removed to other locations when the site was abandoned (p. 19). Later much of the area was extensively bulldozed in a brush-removal operation, a large gully made inroads into the site, and then much of the area was root plowed and cultivated. In addition, a quantity of top soil had been moved, creating a dam for a rice farming experiment. The only features visible at the present time are a number of cisterns which show up as depressions.

Because of these problems, extensive use was made of a backhoe and a road maintainer in trenching and blading selected areas which were determined to be those where concentration of population probably occurred. In one of these areas a brick chimney footing and foundations were located and controlled excavations revealed the outlines of two structures. These were subsequently identified as a dwelling and detached kitchen built in the mid-19th century. A magnetometer survey of part of the site located no other subsurface structures. The fact that the building for which the foundations were located is one which was still on the site in the early 20th century (p. 45) undoubtedly accounts for its partial preservation.

It is unfortunate that there was not more careful coordination between the site map and the excavation drawings. As it is, one must

study the descriptions and photographs and locate the excavation units on the site map by deduction and intuition. It is also hard to understand why the superposition of the townsite map over the site map has been done in such a way as to put half of the cisterns in the streets. Possibly this discrepancy is due to the use of 2.78 feet to equal one vara. According to Taylor (1955: 71-72) the equivalent agreed upon in 1837 between the Mexican government and holders of Mexican bonds was 833 mm or 2.75 feet. In the width of a 60-foot street, this would mean a difference of two feet.

The section describing material culture is adequate and the illsutrations are excellent. I have a few arguments with terms used to describe the ceramics, such as the use of the term "Gaudy Dutch" for hand painted pearlwares (p. 50) and "Stamped" for sponged or spattered pearlwares (p. 51). However, the descriptions and illustrations are sufficiently clear to indicate the author's intent. While the descriptions of glass tableware and miscellaneous glass are quite clear, one might wish that these had been illustrated for purposes of comparison with those from other sites.

The last section of the main body of the report, entitled "Epilog," might be more accurately called "Summary and Conclusions." Unfortunately there appears here, as in so many of our reports, the wistful prsumption that should additional structural remains be revealed in the course of reservoir construction, "the proper agencies would be contacted so that features can be examined and recorded." (p. 101). I suppose we should never give up hope that this will be done.

Of the four appendices to this report, two are deserving of special attention for the important information they contain. Catherine Yates in Appendix I does an interesting job of recording and discussing three cemeteries near Texana. The background information on burial practices is useful and her sketches are more detailed and readable than photographs would have been.

In Appendix IV Georganna Greer has done her usual thorough job of research and careful description of the Abraham Babcock Pottery Manufactory. Of particular interest is the news that lead glazed pottery was being made in this area of south Texas around 1860. Sherds of the Babcock lead glazed wares are sufficiently like those from wares imported from Mexico during the previous century to cause confusion for us all. The possibility that some of the 19th century wares which we have previously attributed to Mexico might have originated in Texas bears further investigation. We hope that Dr. Greer will continue to search out and report these elusive south Texas potters. Unfortunately, there is some confusion in this section due to misnumbering of illustrations. However, with a little perseverance the reader can straighten them out. The photographs are sharp with good detail. It

would have been helpful to include the Babcock site on the map in Figure 1.

J. Barto Arnold reports in Appendix III that a magnetometer survey shows that two anomalies recorded at the Babcock site could be the location of the kiln. Certainly more work should be done to determine if there is anything remaining at this site.

Appendix II is a brief report on work done at three other historic sites in the reservoir. In each case it was decided that natural or human interference had caused sufficient destruction to make further investigation pointless.

This report is attractive in appearance, with good maps and illustrations. The authors have made the best of unfortunate site conditions. I wonder if more time spent in detailed site reconstruction before going into the field and testing closer to the edge of the old river channel might have found some of the wharf area. However, it seems likely that very little remains.

Given the stated intent of the project (p. *ix*) "to amplify the total framework within which investigations at historic sites in the reservoir would be evaluated" (whatever that means), I hope the minimal amount of structural information recovered at these sites will not discourage further historic site work in the reservoir.

In the preface to "Architecture of Texana", Crosby explains that the initial intent of the study was to identify and document the six buildings known to have been moved from Texana seven miles north to Edna in the 1880's, when the town was abandoned. When it was discovered that none of these buildings was constructed before 1875, the scope of the project was expanded to include other structures in the surrounding area, in other parts of East Texas and along the coast in order to more accurately describe all types of buildings which would have existed at Texana during its 52-year history.

The methodology of the study included measuring and photographing of the structures and structural details, archival research and personal interviews in order to record as much as possible about the history of each building. Extensive use was made of early accounts, diaries and newspaper advertisements in compiling information on building materials available at various time periods.

Part I, entitled "Architecture of the First Twenty Nine Years (1831-1859)," consists of a compilation of information on frontier architecture, with emphasis on east Texas and the Austin colony. Also included are several eyewitness descriptions of early buildings in and around Texana. Sections on available materials, building design and building practices are full of information which will be of particular interest to the archaeologist working with structures of this period. The section on commercial buildings is regrettably brief. Unfortunately little attention has been paid to this type of construction by authors of books about

early Texas architecture. A study on these buildings similar to Alexander's (1966) work on early Texas homes would be a useful contribution to the literature.

Part II, entitled "Architecture of the Last Twenty Three Years (1860-1883)" entails primarily a detailed description of the history and construction of twelve buildings located in the vicinity of Texana. Ten houses, including the six moved from Texana to Edna, a church and a store comprise the group. Each building is well recorded in photographs and sketches, and both historical and structural documentation are impressively thorough. While the first impulse is to read one or two and skip the rest as redundant, one soon discovers that each structure is unique and that bits and pieces of valuable building information and hints on dating old structures are included in each descriptive section.

The concluding chapter entitled "Trends," consists of 27 pages of information vital to the historical archaeololgist. Included are details on everything from reasons for choice of building locations and orientations, to the choice of paint colors. Crosby discusses in some detail the evolution of floor plans and building profiles. Useful sections are included on materials, structural systems and architectural details.

The first appendix is a portion of the daybook of John A. Brackenridge of Texana, kept between 1854 and 1856. Included are plans for a number of houses, along with detailed lists of building materials required for their construction. Three other appendices contain tabulated comparisons of windows, paint colors and types of milled lumber used in the houses described in Part II.

The format of the publication is well-organized, with few typographical errors. The illustrations are sharp and readable and the sketches of framing details should be most helpful for those of us not familiar with architectural terms.

This impressive piece of work should be required reading for anyone doing historic site archaeology in Texas. Not only is the detailed structural information valuable, but instruction is gained in how to fully document a historic structure and which details are important to record for future reference.

Anne A. Fox
The University of Texas at San Antonio

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Hop Hill: Culture and Climatic Change in Central Texas. *Center for Archaeological Research, The University of Texas at San Antonio, Special Report,* No. 5. x + 295 pp., 99 illus. Out of print.

Hop Hill is a prehistoric site located in Lyndon B. Johnson State Historic Park near Stonewall, Texas. Fieldwork which lead to this monograph was conducted in the summer, 1976 as a field course in archeology at The University of Texas at San Antonio (UTSA) and was compiled with the assistance of a laboratory analysis class at UTSA. The study was directed by Joel Gunn and is an example of the interest and energy which can be fostered in an enthusiastic and aware environment. The monograph presents the results of a wide range of multidisciplinary research activities which were focused upon Hop Hill.

As an integrative mechanism Gunn conceives of the research as a sphere intersected by a plane. The plane is the ground surface which is enveloped by the ecosphere in its atmospheric and geospheric aspects. Hop Hill is situated in the center of the plane and the sphere and is conceived as the location where a body of data has been preserved (encoded) and which can be extracted using a specific suite of excavation techniques (decoder). After acknowledging belief in the value of attempting to solve explicit problems, the report shifts to describing the various aspects of the ecosphere rather than thoroughly developing specific site problems.

A great deal of descriptive information is presented about various aspects of the natural environment. In fact this reviewer conceives of these sections as an almanac or encyclopedia of basic data and almost a manual which could be used to show beginning researchers many of factors they should be aware of when beginning archeological and ethnographic studies. Researchers in the Texas "hill country" should avail themselves of this monograph for the basic information it contains.

After a cursory description of four physiographic zones across which the site is spread and the five stratigraphic strata at the site, the writers describe the excavation phases: "Roadbed", "Midden" and "Village". The only real description of the "village" is that it was 1 x 1 m unit that coincided with an area of possible Paleo-Indian occupation. No explanation is offered as to the presence of a "village". Later on these terms are dropped and intrasite patterning is discussed without explaining the transition from one set of terms to another. Possibly these were field designations which were not caught in editing.

A very stimulating section by David Brown and Clint Davis discusses the role of erosion in site exposure and in evaluating the impact of erosion upon archeological sites. This chapter presents a methodology which is useful at Hop Hill but could be used by other researchers who recognize the importance of quantifying erosional processes. One interesting comment of this and a later artifact collection chapter is the recognition that a methodology should serve the archeologist and not vice-versa. In this case the authors recognize that transit readings on the tops of all nails used in the experiment would have made it more precise but was not justifiable in terms of its value to the experiment. A similar justification is made with regard time and effort expenditure for individual artifact plotting. Consequently the "surface surveyor" method devised by Phil Bandy of Texas Tech University is recommended because it was shown that this technique was more effective than a transit.

Lithic technology is a basic concern of the study. Models of core flaking and face flaking (bifacial and unifacial) are presented and considerable effort is spent presenting lithic terminology. Many of these facts have become common in Texas archeology but with the aid of J. B. Sollberger a new concept is presented and developed. Sollberger made a biface and broke its manufacture down into critical technological steps. The debris from this process was quantified by step and is used as a standard against which debris from various parts of the site was compared. Using this "Sollberger distribution" it was possible to show that there are spatially and functionally separable activity areas within the site.

In a short four-page chapter W. Max Witkind describes a carefully conducted experiment in stone boiling, a form of aboriginal cooking technology. The experiment demonstrated that reheated boiling stones have less ability to retain heat than unfired pieces. It is suggested that this may explain the large number of stones in burned rock middens but that further experimentation will be necessary to show the differences between heated stones which were used for boiling and those heated and used for other activities. This working experiment could be conducted by researchers in the Texas hill country and would not require a university facility to carry out.

The monograph is so extensive that much more could be written about it. It is an ambitious study which shows the value of multidisciplinary research but suffers somewhat from overenthusiasm. Nevertheless it contains a wealth of information and should stimulate future research in Central Texas. Texas Parks and Wildlife should be thanked for having the study done and UTSA thanked for developing an innovative archeological program.

S. Alan Skinner
Southern Methodist University

A Predictive Assessment of Cultural Resources in Hidalgo and Willacy Counties, Texas. by Robert J. Mallouf, Barbara J. Baskin, and Kay L. Killen. *Texas Historical Commission, Office of the State Archeologist, Archeological Survey Report*, No. 23, Austin, 1977. xv + 308 pp., 73 illus., 11 tables. $8.00.

This volume is the ultimate in a tradition of archeological survey investigations by the State Archeologist's Office funded by various government agencies complying with antiquities legislation. It was prepared in response to a request by the Corps of Engineers for a predictive assessment of archeological and historical resources in an area of 3,900 square kilometers in Willacy and Hidalgo counties. To this end, Mallouf and his associates developed their own research strategy, its primary purpose being to make a "statistically valid sample field reconnaissance in the proximity of the proposed single-purpose floodwater channels . . . of the magnitude required to provide a predictive model for the numbers, types, and significance of archeological and historical resources (Corps of Engineers, quoted in Mallouf, *et al.*: 89) . . ." Also in answer to government specifications, the authors compiled information from "available publications and any unpublished materials related to past work in the project area which, when combined in summary with survey data, shall provide the basis for the report (Corps of Engineers, quoted in Mallouf, *et al.*: 89)."

A wealth of data concerning geology, climate, flora, fauna, and land-modification of the study area are presented by Mallouf and Baskin in the first of three extensive background sections of the report. The second of these, Killen's "Ethnohistory", synthesizes the history of 16th-20th century population of the project area and explains the significance of salt in historic trade. Baskin's "Archeological Background" offers a well researched critical review of archeological work in "far southern Texas".

Next is Mallouf's explanation of the "Strategy of Investigation". Patterned after a methodology proposed for the California desert (Weide 1973), project objectives were designed to satisfy government needs, rather than to further basic archeological research. Determining the sampling strategy, Mallouf argues against the use of probability sampling, and chooses his own "judgement sampling which employs certain attributes of probability methodology (p. 93)." He proceeds to explain why the sampling strategy was executed using large quadrats, as opposed to narrow transects, and that these quadrats were placed "on the basis of judicious, non-statistical selection" (p. 96). Among other factors, incessant rainfall and reluctance of some landowners to permit property access influenced the placement of 12 quadrat sample areas.

A section entitled "Sampling Divisions" presents a detailed description of seven environmental zones, followed by environmental descriptions, presurvey predictions, and survey results for each of the

twelve quadrats used to sample six of the seven environmental zones.

Next comes a "Prehistoric Overview" with a lengthy description of 2,368 specimens of prehistoric cultural material, followed by a detailed interpretation of this material, and culminating in a number of hypotheses concerning aboriginal lifeways. Much less verbiage is found in the description and discussion of historic material culture and a listing of significant historic markers, National Register sites, and cemetery sites in the project area.

In the next section, Mallouf and Baskin make their "Site Projections for the Project and Sample Universes." For prehistoric sites, field data and statistical data, calculations of site densities, projections of site conditions, and projections of site and zone significance are organized by environmental zone. A much less rigorous approach to historic site projections is given.

Finally, recommendations for further pre-construction and construction investigations are made for each environmental zone. A detailed description and discussion of a large private collection of material culture forms an appendix. A short glossary of selected technical jargon and an extensive bibliography conclude the report.

In the style of previous publications by the Office of the State Archeologist, the graphics in this volume are excellent. Indeed, without them the organization of the text might be more difficult to follow. Had the verbal elaboration of data presentation been condensed into tables, charts, and appendices, the continuity of the contents would have been more apparent.

The report offers at least five contributions to the archeology of "far southern Texas": (1) a thorough and delightful critical review of previous research which reflects the increasingly competitive nature of contract archeology; (2) a good ethnohistory; (3) a rigorous argument for "judgement sampling" as opposed to probability sampling"; (4) basic archeological reconnaissance data for 49 prehistoric and historic sites; and (5) some intuition about prehistoric subsistence-settlement pattern.

All in all, the contents of the report accomplish its primary purpose — to deal mainly with the practical application of contract archeology by delineating areas with a high probability of "reduced archeological sensitivity" where construction would result in minimal costs for mitigation (p. 89). Although the statistical validity of the sampling done has yet to be determined, the large quantity of background data presented and the manipulation of field data are complicated enough to intimidate the critical reveiwer, suggesting that the investigators' projections are accurate enough for prehistoric sites. In this way, Mallouf, Baskin, and Killen have succeeded in making a predictive assessment of the cultural resources of Hidalgo and Willacy counties, Texas.

However, the authors base their prehistoric site projections upon the idea that various environmental variables are reliable predictors for prehistoric site locations. Even though they concede that historic European and American subsistence-settlement patterns may not be predicted as reliably with strictly environmental variables (p. 241), they sampled historic cultural resources by quadrats selected using environmental predictors.

The reviewer is more concerned about the effects of the practical (as opposed to academic) nature of the research design upon the meaning of "archeological significance". For example, it is suggested in the archeological background section that interpretation based on surface evidence is much less credible than that based upon controlled excavation (pp. 64, 81, 86-87). Yet, projections and interpretations made in this report are based upon a very limited sample of surface evidence. Perhaps such concepts as "archeological significance" and "archeological reality (p. 87)" should be afforded more introspective consideration by archeologists competing for projects with predetermined research designs.

Daniel E. Fox
Austin, Texas

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The Poverty Point Culture. Clarence H. Webb. *Geoscience and Man*, Vol. XVII, School of Geoscience, Louisiana State University. 1977. 73 pp., 23 illus. $6.00.

Poverty Point is one of the more perplexing archeological sites in prehistoric North America. The site is located along Bayou Maçon in West Carroll Parish, northeastern Louisiana and consists of an enigmatic structure of six concentric ridges arranged in a series and forming a giant partial octagon opening to the east. Immediately west of

the center series of ridges is Mound A, a massive structure measuring seven meters high and approximately 73 by 91 meters at the base. The smaller, conical Mound B lies north of Mound A. The nearby and apparently associated Motley Mound is 2.3 km north of the village center while the Lower Jackson Group is almost equadistant south of the center.

The Poverty Point culture, the nucleus of which is clearly the Poverty Point site, was born out of a Southeastern U.S. Archaic complex and was followed by a succession of ceramic assemblages such as Tchefuncte, Marksville, Troyville, Coles Creek and Plaquemine. Components of Poverty Point are found mostly on natural levees and terraces bordering major rivers that drain the lower Mississippi River alluvial valley and central Gulf Coast. The area of the Poverty Point culture incorporates the oak and hickory-dominated uplands with the river valley ecological habitats, marshes, brackish water lakes and saltwater resource zones.

The temporal span of Poverty Point culture is from about 1200 to 200 B.C. based on radiocarbon, thermoluminescence and the cross-dating of artifact styles. The general lack of preservation of organic materials, however, leave little tangible evidence for assessing the subsistence mode of the Poverty Point adaptation. There is general speculation that the economic pattern lacked agriculture although this interpretation is based largely on negative data. The settlements range markedly in size and Webb feels that these can be ranked into regional centers such as Jaketown; each regional center in turn is thought to have had a network of supporting satellite settlements and the Terral Lewis Site is considered an example of such a village.

The diagnostic elements of the Poverty Point sites lie not in their distribution or settlement location, use of mounds or site layout, but rather in a diagnostic set of artifacts which convincingly demonstrates the participation in an interaction network. The artifacts most diagnostic of Poverty Point culture include the Poverty Point baked clay objects which are hand molded into a variety of shapes; six shapes are especially diagnostic. The function served by these objects is interpreted by Webb to be in the realm of food processing. A small amount of pottery occurs at some Poverty Point sites including a fiber-tempered ware along with sherds either tempered with clay-grit or exhibiting no visible tempering agent. Solid clay figurines are occasionally found and Webb suggests their presence implies some contact with Mesoamerica. Steatite and sandstone vessels occur at the better-investigated Poverty Point sites but these never appear to be common at any one site. Other items in the stone technology include the interesting core-blade microflint industry, hematite and magnetite plummets and an impressive lapidary craft that yielded cylindrical and zoomorphic-shaped stone beads.

Webb presents an excellent synthesis of what is known of the settlement patterns and distribution system of the Poverty Point culture. He provides descriptions of representative sites and of the diagnostic artifact assemblage. The 23 illustrations of sites and artifacts are highly informative and serve as an impressive indicator of the socio-political complexity of the Poverty Point cultural system and influence.

Webb's discussion on the societal implications of the intrasite artifact patterning at the Poverty Point site and on the intersite distribution of certain artifact sets is perhaps the weakest part of the overall contribution. These interpretations would be regarded as highly subjective at best. Largly influenced by his colleague Jon Gibson, Webb believes that the answer to the enigma of Poverty Point's position in a seemingly Archaic milieu lies in the evidence of a widespread population and in a social organization structured in a series of centers consisting of regional chiefdoms. Assuming that social organization can be delineated by the distribution of "artifact fossils" Webb interpreted the distributional patterns of certain artifact classes as indicating hierarchical ranking and matrilocal residence at the Poverty Point Site.

The intrasite patterning of the artifact classes indicates some intrasite variability at the Poverty Point site. The interpretation that these are indicative of matrilocal residence and male or female activity areas is, however, suspect to this reviewer. The site may have been utilized for 1000 years and it would be very difficult to explain a constant pattern of usage for all parts of the site over 50 or more generations. In other words, one would expect differential use of portions of the site through time. Over 18,000 artifacts were sorted "in an attempt to show differences by presumed gender or social class usage in various parts of the site" (p. 54). These groups include objects thought to indicate women's everyday activities, a lamellar microflint cores, blades and blade tools presumed to have a special function and masculine hunting and fowling objects, among others. These groups are meaningless since the function of any of the artifacts in the groups is not satisfactorily demonstrated, and the cultural information to ascertain the gender of the task in the Poverty Point culture is simply not available. It is a general rule in tracing the evolution of human society from egalitarian hunting and gathering cultures through the continuum of agricultural technololgy that divisions of labor become progressively more complex and variable as a higher level of social integration is reached. The level of social integration implied by the size and structure of the Poverty Point site would not indicate a simplified egalitarian division of labor. To assume that only women cooked or used "culinary objects" is without foundation and that a rare steatite vessel would constitute a "culinary object" is equally doubtful. Furthermore, the function of the artifacts in the entire class of "masculine hunting and fowling objects" (plummets and stemmed bifaces) is only presumed

and far from demonstrated; in a zone of poor stone resources, one cannot assume that all stemmed bifaces were indicative of hunting.

There is no doubt that Poverty Point site served as the hub of a far-reaching and complex interaction network. However, to assume that each site was contemporaneous with all others and fits into a static model of a settlement network is extending the data beyond reasonable limits. A workable settlement model must incorporate a dimension allowing for change in the system. Based on the data Webb provides, this reviewer's interpretation is that the Poverty Point culture represents an example of an interregional interaction network. The location of the components suggest to me that the contemporaneous sites were probably linked by a network of riverine routes which provided the means for transporting bulk resources for exchange. The system could have operated effectively with symbiotic relationship between dialectic tribes occupying contiguous resource areas. Such an interaction sphere would easily explain the hint of a regional uniqueness yet allow for interregional exchange and artifact similarity. Until the Poverty Point components are better dated and the functional range of the diagnostic artifacts (and indeed all artifact classes) are determined, statements on societal organization of political and kinship nature best be placed under the heading of presumption or speculation. To this reviewer, Poverty Point has not been satisfactorily explained. Its eventual explanation will undoubtedly serve as a significant key to understanding the cultural processes which gave rise to the Adena-Hopewell and Mississippian cultural developments and in gauging the kinds and nature of the influences in the Southeastern U.S. that eminated from the Mesoamerican Formative and Classic cultural systems.

Aside from these interpretive disagreements, Webb has brought together in this monograph many years of research and thought involving the Poverty Point site. He has made an excellent contribution to the prehistory of the Eastern United States. This monograph will stand as an invaluable reference for the Poverty Point culture. It is highly recommended for any researcher who is interested in the Formative development in the Eastern United States and in a most intriguing adaptation to the lower Mississippi Valley.

Harry J. Shafer
Texas A & M University

A Guide to Basic Archaeological Field Procedures. By K. R. Fladmark. Department of Archaeology, Simon Fraser University, Publication No. 4. 1978. 189 pp. + 102 illus. $8.00.

This spiral-bound volume is, I think, a very useful technical manual. It was specifically designed for use by Canadian archeologists, and so there are certain parts (e.g., discussion of Canadian site designation systems) that are not applicable in the United States. However, it presents a host of basic step-by-step, "how-to-do-things" procedures for a variety of field tasks, including site survey, mapping, field photography, and excavation. Some readers will find the chapters on equipment handling and field living quite interesting. Knowing how to operate (and repair) water pumps, power winches, and the like are often essential in field work, as are the considerations that go into the selection of a field camp, setting up a field kitchen, navigating in the wilderness, and fending off the bears and wood ticks. To demonstrate the emphasis on practicality found in this manual, there is even a section on the protocol to be used in dealing with visitors who show up unannounced at your site. Illustrations are numerous and generally illuminating, although sometimes crudely drawn. There is a 16-page glossary that will be of most use to beginning students or persons new to avocational archeology. Appendices contain site survey form data relevant to Canadian archeololgy, but there is also a table of random numbers and a table of natural sines and cosines.

In general, this is primarily a guide to the practical aspects of field work, or as the author states: ". . . a simple reference hand-book, intended to be of particular use for relatively low-budget projects in isolated or wilderness areas." I think it goes quite a bit beyond the "simple reference hand-book" level, and that it contains much of value for both professional and avocational archeologists. Fladmark notes that ". . . specialized facets of archaeological inquiry . . . are covered more fully in other sources such as Hester, Heizer and Graham 1975." As co-author of this latter volume, I would rather immodestly suggest that **both** books could be usefully employed as basic references in field research.

Thomas R. Hester
The University of Texas at San Antonio

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Hester, Thomas R., Robert F. Heizer and John A. Graham
1975 *Field Methods in Archaeology*. 6th edition. Mayfield Publishing Company, Palo Alto, CA.

The Authors

Charles K. Chandler has long been active in the Texas Archeological Society (including service on the Board of Directors), the Houston Archeological Society, and the Southern Texas Archaeological Association. He is a co-author of "Excavations at the Harris County Boys' School Cemetery", *Special Publication*, No. 3 of the Texas Archeological Society. Chandler's research interests have included fieldwork and site documentation along the upper and central Texas coast. Address: 13719 Brook Hollow, San Antonio, Texas 78232.

Darrell G. Creel received his B.A. and M.A. degrees from The University of Texas at Austin and is presently on the staff of the Department of Sociology and Anthropology at Texas A&M University. He has worked in many parts of Texas and in Louisiana with principal interests in west Texas and the Caddoan area. Address: Department of Sociology and Anthropology, Texas A&M University, College Station, Texas 77843.

Anne A. Fox is a Research Associate at the Center for Archaeological Research, The University of Texas at San Antonio. She has also served as a Research Associate at Witte Museum in San Antonio. She has been an active member of the Texas Archeological Society and is currently a regional vice-president. Her publications include "The Archaeology and History of Alamo Plaza" (*Archaeological Survey Report*, No. 9, Center for Archaeological Research, 1975) and "Historical, Architectural and Archaeological Investigations at the Steiner-Schob Complex, Victoria County, Texas" (*Archaeological Survey Report*, No. 52, Center for Archaeological Research, 1978). Address: 106 Fawn Drive, San Antonio, Texas 78231.

Daniel E. Fox received his B.A. degree from The University of Texas at Austin and his M.A. degree from Texas Tech University. He has been a member of the Texas Archeological Society for over 13

years and has been employed in applied archeology by six institutions. Research interests include anthropology, archeological method and theory, field methods in prehistoric and historic archeology, and humanistic archeology. Address: 1202 Hollow Creek, Apt. 203, Austin, Texas 78704.

Carol Graves is a Research Associate with the Center for Archaeological Research, The University of Texas at San Antonio, currently employed as editor for the Nueces River Project. She received her B.A. degree in anthropology from UTSA, where she served as Anthropology Club president. Research interests include settlement patterns and cultural change in central and south Texas. Address: Rt. 2, Box 140A, Pipe Creek, Texas 78063.

Thomas R. Hester is Professor of Anthropology, and Director, Center for Archaeological Research, The University of Texas at San Antonio. He received the Ph.D. degree from the University of California, Berkeley, in 1972. His publications include *Field Methods in Archaeology* (with R. F. Heizer and J. A. Graham, 1975), and numerous papers and monographs on research in Texas, the Great Basin, California, Mexico, Egypt, and Belize. Hester is a Fellow of the Texas Archeological Society. Address: Center for Archaeological Research, The University of Texas at San Antonio, San Antonio, Texas 78285.

Lynn Highley is a Technical Staff Assistant at the Center for Archaeological Research, The University of Texas at San Antonio. She has co-authored several Center publications and has had papers published in *La Tierra*. She received a B.S. degree from Texas A&I University and is currently working toward a Masters degree. She is an active member of the Southern Texas Archaeological Society, having served as Treasurer. Address: 4810 Rockford, San Antonio, Texas, 78249.

George Judson received his B.S. degree from The University of Texas at Austin in mechanical engineering. He is a member of the Texas Archeological Society and Southern Texas Archaeological Association, with interests in south-central and west Texas. Address: 5405 Prue Road, San Antonio, Texas 78240.

Edwin L. Kiser is presently completing a B.G.S. Degree in Anthropology at West Texas State University. He has been active in New Mexico and Texas archeology for seven years. Kiser's interests include historical research, and American Indian history. He co-authored "Anglo-American Archaeology Of The Seven Rivers Area", (with Mark Henderson) in An Archaeological Inventory of

Brantley Reservoir, New Mexico (*Southern Methodist University, Contributions In Anthropology*, No. 18, 1976). Address: 907 6th. Avenue, Canyon, Texas 79015.

Carol Benson Land received her B.S. in education and music from Southwest Texas State Collge in 1975. She attended the Turtle Creek field school in 1975 and has participated in several excavations. Address: 1516 Jefferson, Kerrville, Texas 78028.

Donald R. Lewis is a charter member and past Chairman of the Houston Archeological Society. He received a Ph.D. in Chemistry from the University of Wisconsin, and has been engaged in research directed toward improved dating methods for time ranges of both geological and archaeological interest. He has contributed to the development of thermoluminescence dating of ceramics and carbonate rocks and is active in several areas of archaeometry. He is a Research Associate, Center for Archaeological Research, The University of Texas at San Antonio. Address: 3642 Broadmead Drive, Houston, Texas 77025.

David A. Phillips, Jr. received his B.A. from Prescott College in 1973, and his M.A. from the University of Arizona in 1976. He has done fieldwork in Arizona and on the island of Cozumel, Mexico, and is analyzing artifacts from Cozumel as part of his dissertation research. At the moment, Phillips is finishing a nine-month job as an archeologist for the National Park Service. Address: 2908 East Edison Street, Tucson, Arizona 85716.

Harry J. Shafer is Associate Professor of Anthropology and Coordinator of the Archeological Research Laboratory at Texas A&M University. He received his Ph.D. degree from The University of Texas at Austin and has conducted archeological field work in many areas of Texas, and in Israel and Belize. His publications include a number of monographs in the Texas Archeological Salvage Project series, and he is also the author of "Clay Figurines from the Lower Pecos Region, Texas" (*American Antiquity* 1975) and *Archeological and Botanical Studies at Hinds Cave, Val Verde County, Texas* (Texas A&M 1977). Address: Department of Sociology and Anthropology, Texas A&M University, College Station, Texas 77843.

S. Alan Skinner is Director of the Archaeology Research Program and Assistant Professor of Anthropology at Southern Methodist University. He has directed and written about fieldwork in Texas and the Southwest with particular emphasis upon settlement patterns. He is a past president of the Dallas and Texas Archeological Societies and is involved with integrating the general public into

archaeological studies. Address: Archaeology Research Program, Southern Methodist University, Dallas, Texas 75275

Leonard M. Slesick is a meteorologist with KVII Television in Amarillo. He is an active amateur archeologist presently serving as president of the Panhandle Archeological society and is a member of the Texas Archeological Society. Address: 2212 South Hughes Street, Amarillo, Texas 79109.

George B. Thomas received his B.A. and M.A. degrees from the University of Arizona, and has done archeological work in Arizona, Idaho, New Jersey, South Carolina, Georgia, and Oaxaca, Mexico, as well as in central and west Texas. His interests lie in data synthesis from a wide range of cultural context, association, and preservation situations. He is currently involved with the first stages of the Fort Hood Archeological, Historical, and Paleontological Project, for which probabilistic survey sampling strategies will be used, considering a variety of physiographic, biotic, and other stratification zones. Address: P.O. Box 341, Georgetown, Texas 78626.

Robert L. Turner, Jr. is an engineering specialist with the General Dynamics Corporation in Fort Worth. He received B.S. degrees in both mechanical and aeronautical engineering as well as an M.S. in aeronautical engineering from The University of Texas at Austin. He has been a member of the Texas Archeological Society, and has served as a regional vice president for both East and North Texas. Turner is past president of the Tarrant County Archeological Society. His archeological research has been focused in north and central East Texas, with emphasis on the Caddo time period. Address: 5913 Sycamore Creek Road, Fort Worth, Texas 76134.

Frank H. Watt is a widely known avocational archeologist, a Fellow of the Texas Archeological Society, and a member of the Society for more than 40 years. He holds a number of academic degrees and honorary awards. He is a graduate of the School of Lithography, Winona Technical Institute (1910), the Indianapolis Conservatory of Music (1913) and the Wichita College of Music (1916). Among his many honors have been Master Archeologist (Guild of American Prehistorians); George McJunken Award (1963); and Honorary Member, Mark Twain International Society.

Mr. Watt was co-organizer of the Central Texas Archeological Society, and served as vice-president, secretary-treasurer, president (1952-1958, 1966), and president emeritus (1967) of that organization. He has also worked for years in the Texas Archeo-

logical Society, both as a regional vice-president (1940-1948) and as a member of the board of directors (1956-1959). He helped to organize the Council of Texas Archeologists in 1939. Although much of his life has been devoted to his work as a publisher, he has also worked as a farmer, tree surgeon, aviation mechanic, professional singer, and lithographer.

He has made many outstanding contributions to Texas archeology, including over 100 papers and monographs and the compiling of hundreds of site records. He has also published in areas outside of archeology. Address: P.O. Box 1176, Waco, Texas 76703.

Information for 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 will also be considered. Articles concerning archeological technique, method, or theory are encouraged.

Manuscripts must be typed, double-spaced, on 8½ x 11 white paper. Footnotes should be avoided or kept to a minimum. References 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 at the end. See this issue of the *Bulletin* for examples. Authors should also consult "Information for Authors", in *Texas Archeology*, Vol. 18, No. 1 (January, 1974) or write to the Editor for a copy.

The proportions of full-page illustrations (picture or drawing plus captions) should be suitable for reduction to the effective page size of the *Bulletin* of 4¼ x 7 inches. Plates may be printed either horizontally or vertically, but allowance for the caption to be printed the same direction must be made. Captions for illustrations should be listed in numerical order and placed behind the list of references cited.

A complete manuscript is one with: a title page, an abstract, main body, references cited, appendices (if necessary), figure captions, and completed photographic and drafted plates.

Papers published in the *Bulletin* are abstracted and indexed in *Abstracts in Anthropology*.

Manuscripts should be addressed to: Dr. Eileen Johnson, The Museum, Texas Tech University, Lubbock, TX 79409.

Texas Archeological Society